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## SYM1

### ANHEDONIA IN NICOTINE DEPENDENCE: INTEGRATING PRE-CLINICAL, HUMAN LABORATORY, NATURALISTIC, AND CLINICAL RESEARCH PERSPECTIVES

Chair: Adam M. Leventhal, Ph.D.<sup>1</sup>

Presenters: Adam M. Leventhal, Ph.D.\*<sup>1</sup>, Manoranjan S. D'Souza, M.D., Ph.D.<sup>2</sup>, Janet Audrain-McGovern, Ph.D.<sup>3</sup>, and Jessica Cook, Ph.D.<sup>4</sup>

Discussant: John R. Hughes, M.D.\*<sup>5</sup>

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Affective models of nicotine dependence often highlight negative emotions as a primary determinant of tobacco use. However, it is often overlooked that anhedonia—diminished capacity to experience pleasure—is a unique aspect of affective experience that putatively motivates tobacco use. Clarifying the role of anhedonia in nicotine dependence is important for advancing models of addiction, elucidating nicotine neuropsychopharmacology, and developing novel tobacco use interventions. One barrier to advancing this research area, however, is that a variety of perspectives have been employed to study anhedonia in nicotine dependence but there have been few attempts to integrate across perspectives. The focus of this symposium is to integrate and discuss new research on anhedonia in nicotine dependence from several scientific perspectives: (a) pre-clinical animal models; (b) human laboratory; (c) naturalistic research; and (d) clinical settings. Collectively, this symposium will address the role of anhedonia in various stages of the nicotine dependence process (onset, maintenance, cessation/relapse). The session will begin with the chair briefly reviewing the anhedonia concept, methods to studying anhedonia, and anhedonia's relevance for nicotine and tobacco research. Then, Dr. D'Souza will present data from a preclinical study examining the role of glutamatergic neurotransmission in the nucleus accumbens as a mechanism of withdrawal-induced anhedonia and nicotine-seeking behavior in rats. Dr. Leventhal will present data from a human laboratory study examining trait anhedonia as a predictor of diminished sociocognitive reward processing in acutely abstinent cigarette smokers. Dr. Audrain-McGovern will present data from a naturalistic longitudinal study of trait anhedonia as a risk factor for smoking progression in adolescence. Dr. Cook will present data from a large smoking cessation trial that examines changes in anhedonia before and after quitting smoking and the clinical relevance of such changes. Finally, Dr. Hughes will briefly summarize and integrate the four presentations and lead a discussion with a view toward clinical translation.

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## SYM1A

### ANHEDONIA PREDICTS ALTERED SOCIOCOGNITIVE REWARD PROCESSING IN ABSTINENT CIGARETTE SMOKERS

Adam M. Leventhal, Ph.D.\*<sup>1</sup>, Marcus Munafo, Ph.D.<sup>2</sup>, Jennifer Tidey, Ph.D.<sup>3</sup>, Steve Sussman, Ph.D.<sup>1</sup>, John Monterosso, Ph.D.<sup>1</sup>, Ping Sun, Ph.D.<sup>1</sup>, and Christopher W. Kahler, Ph.D.<sup>3</sup>, <sup>1</sup>University of Southern California; <sup>2</sup>University of Bristol; <sup>3</sup>Brown University

Anhedonia—diminished capacity to experience pleasure—is associated with tobacco dependence and smoking cessation failure. However, the mechanisms linking anhedonia and smoking are unclear. This human biobehavioral lab study examined whether trait anhedonia predicted sociocognitive reward processing during experimentally-manipulated acute nicotine deprivation in smokers. Because nicotine may offset reward processing deficits in anhedonia and these deficits may become unmasked during abstinence, we hypothesized that anhedonia would predict diminished cognitive processing of stimuli that signal social reward (i.e., happy faces) in nicotine deprived but not nondeprived states. Smokers not attempting to quit ( $n=75$ ; 10+cig/day) completed anhedonia questionnaires in a baseline session. Participants then attended two counterbalanced experimental sessions: one following 18-hours of tobacco abstinence and one after unrestricted smoking. At both sessions, they completed a computer-based measure of implicit sociocognitive processing that assesses attentional interference induced by emotional facial expressions. Results showed a significant anhedonia x deprivation interaction in predicting processing of happy faces before and after adjustment for depression ( $ps < .04$ , Partial Eta squared  $> .06$ ). Anhedonia predicted diminished processing of happy faces in the deprived condition ( $r = -.28$ ,  $p = .02$ ) but not in the nondeprived condition ( $r = .08$ ,  $p = .51$ ). Analyses of a secondary measure of anhedonia found marginally-significant effects in the same direction. These findings indicate that diminished processing of reward-related social cues occurs upon abstinence in high-anhedonia individuals. It is possible that this deficit may motivate reinstatement of smoking in order to remediate these deficits and may explain anhedonia's relation to relapse risk during cessation. More broadly, these results suggest

that the neuropharmacological pathways affected by nicotine may underlie diminished reward processing in anhedonia—a prominent feature in several psychiatric disorders.

*This research was supported by National Institute on Drug Abuse Grants R01-DA026831 and K08-DA025041.*

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## SYM1B

### BLOCKADE OF N-METHYL-D-ASPARTATE RECEPTORS IN THE NUCLEUS ACCUMBENS INCREASES NICOTINE SEEKING: DOES THE DEVELOPMENT OF AN ANHEDONIA-LIKE STATE PLAY A ROLE?

Manoranjan S. D'Souza, M.D., Ph.D.\*<sup>1</sup>, and Athina Markou, Ph.D., University of California San Diego

Anhedonia (i.e., inability to experience pleasure) resulting from smoking cessation plays an important role in relapse to tobacco smoking in humans. Thus, identifying neural substrates that mediate smoking cessation induced-anhedonia will greatly help in developing medications that prevent relapse to tobacco smoking. Previous work in our laboratory has shown that withdrawal from nicotine, a major component of tobacco smoke, induces an anhedonia-like state in rats that is hypothesized to be mediated by decreased glutamatergic neurotransmission in the mesocorticolimbic system. In the present study, the effects of microinjections of a N-methyl-D-aspartate (NMDA) receptor antagonist LY235959 (0, 0.1, 1 & 10 ng/0.5  $\mu$ l/side) in the nucleus accumbens (NAcc) shell or core on nicotine-seeking behavior (nicotine self-administration and cue-induced reinstatement of nicotine-seeking) was assessed during both early (24 h) and late (10 days) withdrawal from nicotine in rats. LY235959 (10 ng/0.5  $\mu$ l/side) microinjections into the NAcc shell, but not the core, significantly increased nicotine self-administration. Furthermore, LY235959 microinjections (10 ng/0.5  $\mu$ l/side) into either the NAcc core or shell significantly increased reinstatement of cue-induced nicotine seeking compared to reinstatement after vehicle administration, with the effects being more pronounced in the core. Taken together, these data suggest that blockade of NMDA receptors in either the shell or core increases nicotine seeking during both early and late nicotine withdrawal. The increased nicotine seeking observed in the current study could be due to the development of an anhedonia-like state exacerbated by injection of the NMDA receptor antagonist in the NAcc in rats with chronic nicotine exposure that can be considered to be nicotine-dependent. In conclusion, glutamatergic neurotransmission via the NMDA receptors in the NAcc shell and core plays a critical role in nicotine seeking in rats, and actions at these or other glutamate receptors could possibly alleviate the anhedonia-like state in humans after smoking cessation.

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## SYM1C

### WHERE'S THE PLEASURE IN THAT? LOW HEDONIC CAPACITY PREDICTS SMOKING ONSET AND ESCALATION

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Hedonic capacity is a dispositional ability to experience pleasure in response to stimuli that are typically rewarding. It is thought that diminished responsiveness to typically rewarding stimuli reflects a disruption of neural pathways implicated in reward and motivation. Individuals with lower hedonic capacity may come to rely on unnatural or pharmacological rewards for pleasure, such as smoking, to stimulate an under-responsive reward system. The ability to derive pleasure from natural reinforcers has been relatively overlooked as a risk factor for adolescent smoking. The present study sought to provide initial evidence for a relationship between hedonic capacity and adolescent smoking onset and escalation. The sample was composed of 1,106 adolescent participating in a longitudinal survey study of adolescent health behaviors. In this prospective cohort study, variables were measured via self-report every six months for four waves of data spanning 18 months. We anticipated that adolescents with lower hedonic capacity may be less responsive to natural reinforcers and therefore be prone to take up and rely on

smoking as a reinforcer. A two-part latent growth curve model indicated that adolescents low in hedonic capacity were over two and a half times more likely to have smoked a cigarette in the past month at age 15.5 years old (OR=2.64; 95% CI=1.08, 6.45) and to show a 90% increase (beta=.9, z=2.28, p=.02) in the rate of smoking escalation every six months across the following 18 months compared to adolescents with high hedonic capacity. This study provides the first evidence implicating hedonic capacity as a risk factor for adolescent smoking initiation and progression. Adolescents low in hedonic capacity may be an important population to target for smoking prevention and smoking cessation efforts possibly through behavioral skills to enhance pleasure derived through natural reinforcers.

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## SYM1D

### ANHEDONIA IN SMOKERS SEEKING TREATMENT FOR TOBACCO DEPENDENCE: RELATIONS WITH TOBACCO DEPENDENCE AND CESSATION

Jessica Cook, Ph.D.\*, Megan Piper, Ph.D., Su-Young Kim Ph.D., Tanya Schlam, Ph.D., and Tim Baker Ph.D., University of Wisconsin School of Medicine and Public Health, Center for Tobacco Research and Intervention

Anhedonia (loss in pleasure) may be a component of nicotine withdrawal and a predictor of smoking relapse, but important questions about its clinical relevance remain. We used longitudinal intensive data from a large clinical trial to: 1) characterize anhedonia trajectories before and after quitting smoking and its association with different withdrawal components (craving, negative affect), 2) identify baseline characteristics related to the variability of anhedonia, and 3) examine the relations of different anhedonia trajectories with quitting smoking. Adult smokers (N=1,504) in a double-blind randomized placebo-controlled smoking cessation trial provided real-time withdrawal symptom data four times per day for 10 days pre-quit and 10 days post-quit via palmtop computers. Point prevalence abstinence was biochemically confirmed at 8-weeks post-quit. Hierarchical linear modeling showed that anhedonia increased prior to quitting ( $p < .01$ ), further increased from pre-to post-quit ( $p < .05$ ), and then gradually decreased, returning to pre-quit levels 10 days following quitting ( $p < .05$ ). Anhedonia trajectories were minimally related to post-quit negative affect and craving ( $r = .05-.07$ ,  $p < .05$ ) but were related to the following second order variables ( $p < .05$ ): history of mood disorder, gender, nicotine dependence, and treatment (placebo vs mono vs combo therapy). Logistic regression analysis showed that average pre- and post-quit anhedonia each predicted 8-week outcomes in covariate-adjusted univariate models ( $p < .05$ ; with treatment, craving, negative affect, and nicotine dependence covariates). Importantly, the pre- to post-quit increase in anhedonia was not associated with 8-week outcomes. Thus, while quitting smoking prompts losses in pleasure, pre-quit anhedonia has a stronger effect on 8-week post-quit abstinence. This research suggests that higher pre-quit anhedonia may be a barrier to quitting, one which could be identified and treated prior to quitting smoking.

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## SYM2

### NICOTINE EXPOSURE, METABOLISM, AND GENETICS AMONG ALASKA NATIVE PEOPLE

Chairs: Dorothy K Hatsukami<sup>1</sup> and Mark Parascandola<sup>2</sup>

Presenters: Caroline C. Renner<sup>3</sup>, Neal L. Benowitz<sup>4,5</sup>, Rachel F. Tyndale<sup>6</sup>, and Andy Z.X. Zhu<sup>5</sup>

Discussant: Scott J. Leischow<sup>7</sup>

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The prevalence of tobacco use in Alaska Native (AN) people is among the highest of any group in the United States. Furthermore, AN people have elevated risks for cancer and other tobacco-related diseases. Few studies have examined factors that might contribute to the high prevalence and pattern of tobacco use among this population. This presentation describes a community based participatory research project that was initiated by regional Alaska Native leadership and multidisciplinary and multi-institutional scientists to better understand factors that may be associated with these high rates of smoking and cancer. Caroline Renner will describe the characteristics, attitudes and beliefs of tobacco use in AN people. Neal Benowitz will be discussing levels of nicotine and carcinogens in various smoked and smokeless tobacco products, including the indigenous product iqmik, and biomarkers of exposure associated with use of these products. Rachel Tyndale will describe genetic profiles associated with nicotine and carcinogen metabolism among the AN population which may make this population at greater risk for addiction and cancer. Andrew Zhu will be presenting the extent to which the CYP2A6 genotype and phenotype, the nicotine metabolite ratio, predict tobacco consumption and NNK exposure in smokers and smokeless tobacco users. The team will leave some time to discuss the implications of these results for addressing health disparities among AN people and other at-risk populations.

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## SYM2A

### TOBACCO USE AMONG SOUTH WESTERN ALASKA NATIVE PEOPLE: PRODUCTS, PATTERNS OF USE AND DEPENDENCE

Caroline C. Renner<sup>1</sup>, Neal L. Benowitz<sup>2</sup>, Rachel F. Tyndale<sup>3</sup>, Andy Z.X. Zhu<sup>3</sup>, Mark Parascandola<sup>4</sup>, and Dorothy K. Hatsukami<sup>5</sup>, <sup>1</sup>Clinical Research Services, Alaska Native Tribal Health Consortium, Anchorage, AK; <sup>2</sup>Division of Clinical Pharmacology, Departments of Medicine and Bioengineering & Therapeutic Sciences, and the Helen Diller Comprehensive Cancer Center, University of California, San Francisco; <sup>3</sup>Departments of Psychiatry, Pharmacology and Toxicology and Centre for Addiction and Mental Health, University of Toronto, Toronto, Canada; <sup>4</sup>National Cancer Institute, Tobacco Control Research Branch; <sup>5</sup>Masonic Cancer Center, University of Minnesota, Minneapolis, MN

We examined the characteristics, attitudes, and beliefs and exposure to tobacco products in a cohort of 400 rural dwelling Alaska Native (AN) people. We conducted a cross-sectional cohort study of AN adult tobacco users and nonusers living in western Alaska. Questionnaires covered variables such as tobacco use history, current tobacco use and dependence scales, general health status, demographics, attitudes and beliefs about tobacco, and quitting history. Extensive collaborative efforts were undertaken with tribal leadership and a regional community advisory board to ensure that study aims were in line with the Alaska Native health concerns and goals. The study population uses 7.8 cigarettes per day compared with 16.8 for the U.S. population; a significant proportion of the population engaged in dual use of products. Over one third began regular use at age 11 or younger (40.9%). The mean measures of tobacco addiction (e.g., Fagerstrom Test for Nicotine Dependence, Severson Scale of Smokeless Tobacco Dependence) scores were lower compared to other populations. Very high tobacco use prevalence, dual product use and early tobacco use incidence were observed. Unexpectedly these did not appear to be correlated with heavier individual tobacco use or higher levels of addiction in this population. The high cost of tobacco products and observance of indoor tobacco use bans in rural Alaska may be a factor in the lower levels of tobacco products consumed per day. However there may also be genetic or other medical conditions in this population that impact levels of tobacco use such as how tobacco users metabolize nicotine.

*This study was supported NIDA/NCI NARCH III (Indian Health Service Grant) U26IHS30001/01 and National Institute on Drug Abuse grant DA012353.*

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## SYM2B

### EXPOSURE TO NICOTINE AND CARCINOGENS AMONG ALASKA NATIVE CIGARETTE SMOKERS AND SMOKELESS TOBACCO USERS

Caroline C. Renner<sup>1</sup>, Neal L. Benowitz<sup>2\*</sup>, Rachel F. Tyndale<sup>3</sup>, Andy Z.X. Zhu<sup>3</sup>, Mark Parascandola<sup>4</sup>, and Dorothy K. Hatsukami<sup>5</sup>, <sup>1</sup>Clinical Research Services, Alaska Native Tribal Health Consortium, Anchorage, AK; <sup>2</sup>Division of Clinical Pharmacology, Departments of Medicine and Bioengineering & Therapeutic Sciences, and the Helen Diller Comprehensive Cancer Center, University of California, San Francisco; <sup>3</sup>Departments of Psychiatry, Pharmacology and Toxicology and Centre for Addiction and Mental Health, University of Toronto, Toronto, Canada; <sup>4</sup>National Cancer Institute, Tobacco Control Research Branch; <sup>5</sup>Masonic Cancer Center, University of Minnesota, Minneapolis, MN

The prevalence of tobacco use, both cigarette smoking and smokeless, including iqmik (homemade smokeless tobacco prepared with dried tobacco leaves or twist tobacco mixed with alkaline ash), and of tobacco-related cancer is high in Alaska Native people (AN). To investigate possible mechanisms of increased cancer risk we studied levels of nicotine and tobacco-specific nitrosamines (TSNA) in tobacco products used and biomarkers of tobacco toxicant exposure in AN people. Participants included 163 cigarette smokers (CS), 76 commercial smokeless tobacco (ST), 20 iqmik, 31 dual CS and ST (DT) and 107 non-tobacco (NT) users. Tobacco use history, samples of tobacco products used and blood and urine samples were collected. Nicotine concentrations were highest in cigarette tobacco and similar in ST and iqmik. TSNA concentrations were highest in commercial ST products. AN participants smoked on average 7.8 cigarettes per day (CPD), lower than the national average. Nicotine exposure assessed by several biomarker measures was highest in iqmik users, while exposure in ST and CS were similar. TSNA exposure was highest in ST users, intermediate in CS and lowest in iqmik users. Polycyclic aromatic hydrocarbon (PAH) exposure was highest in CS and similar among other groups. Despite smoking fewer CPD, AN CS had similar daily intake of nicotine compared to the general US population, indicating intensive smoking of each cigarette. Nicotine exposure was much from iqmik compared to ST, despite similar nicotine content in the product, most likely related to its high pH due to preparation with ash; this suggests a high addiction potential. TSNA exposure was much higher with ST compared to other product use, consistent with a cancer risk. Our data contribute to an understanding of the high addiction risk of iqmik use and of the cancer-causing potential of various forms of tobacco use among AN.

*This study was supported NIDA/NCI NARCH III (Indian Health Service Grant) U26IHS30001/01 and National Institute on Drug Abuse grant DA012353.*

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## SYM2C

### CYP2A6 AND CYP2B6 GENETIC VARIATION AND NICOTINE METABOLISM IN YUPIK ALASKA NATIVE PEOPLE

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Variation in the CYP2A6 and CYP2B6 genes, encoding enzymes responsible for nicotine metabolic inactivation and procarcinogen activation, has not been characterized in Alaskan Native people (AN) and may contribute to an increased risk for tobacco addiction and consumption and to the high levels of tobacco-mediated cancers among AN. Participants were genotyped for CYP2A6\*1X2A, \*1X2B, \*1B, \*2, \*4, \*7, \*8, \*9, \*10, \*12, \*17, \*35 and CYP2B6\*4, \*6, \*9 and provided plasma and urine samples for measurement of concentrations of nicotine and metabolites. CYP2A6 and CYP2B6 variant frequencies among the AN Yupik subgroup (n = 361) were significantly different from other world populations. The rate of nicotine metabolism (as measured by the plasma and urinary ratio of metabolites trans-3'-hydroxycotinine to cotinine) was significantly associated with variation in CYP2A6 (P < 0.001) but not CYP2B6 genotype (P = 0.95) even when controlling for known covariates. Of note, plasma 3HC/COT ratios were high in the entire Yupik group, and among the Yupik CYP2A6 genetic wild-type subgroup they were substantially higher than previously characterized racial/ethnic groups (P < 0.001 vs. Caucasians and African Americans). Alaskan Native Yupik people have a unique CYP2A6 genetic profile which associated strongly with in vivo nicotine metabolism. More rapid CYP2A6-mediated

nicotine and nitrosamine metabolism in the Yupik people may modulate tobacco-related disease risk.

*This study was supported NIDA/NCI NARCH III (Indian Health Service Grant) U26IHS30001/01 and National Institute on Drug Abuse grant DA012353.*

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## SYM2D

### REDUCED CYP2A6 ACTIVITY INCREASES TOBACCO CONSUMPTION AND NNAL LEVELS: A STUDY IN ALASKA NATIVE SMOKERS AND SMOKELESS TOBACCO USERS

Caroline C. Renner<sup>1</sup>, Neal L. Benowitz<sup>2</sup>, Rachel F. Tyndale<sup>3</sup>, Andy Z.X. Zhu<sup>3\*</sup>, Mark Parascandola<sup>4</sup>, and Dorothy K. Hatsukami<sup>5</sup>, <sup>1</sup>Clinical Research Services, Alaska Native Tribal Health Consortium, Anchorage, AK; <sup>2</sup>Division of Clinical Pharmacology, Departments of Medicine and Bioengineering & Therapeutic Sciences, and the Helen Diller Comprehensive Cancer Center, University of California, San Francisco; <sup>3</sup>Departments of Psychiatry, Pharmacology and Toxicology and Centre for Addiction and Mental Health, University of Toronto, Toronto, Canada; <sup>4</sup>National Cancer Institute, Tobacco Control Research Branch; <sup>5</sup>Masonic Cancer Center, University of Minnesota, Minneapolis, MN

Nicotine is the primary psychoactive ingredient in tobacco; it is metabolically inactivated by the liver enzyme CYP2A6 to cotinine. Genetic variation in CYP2A6 is known to alter cigarettes smoked per day in Caucasian heavy smokers (>10 cigarettes/day, cpd), which has not been clearly demonstrated in light smokers as the sensitivity of tobacco consumption markers, such as cpd, is limited in these light smokers. The impact of CYP2A6 on levels of consumption in smokeless tobacco users has not been studied previously. Therefore we investigated the influence of CYP2A6 genotype and the 3'-hydroxycotinine/cotinine ratio (a biomarker of CYP2A6 activity and the rate of nicotine metabolism), on tobacco consumption behaviors among Alaska Native peoples who smoked cigarettes, used smokeless tobacco or iqmik. AN light smokers with reduced CYP2A6 genotype/activity had lower cigarette consumption, measured using total urine nicotine equivalents. We report for the first time that people with reduced CYP2A6 activity also had lower consumption of smokeless tobacco and iqmik use. No effect on self-reported cpd/chews per day was detectable suggesting that the CYP2A6 reduced metabolizers had lower nicotine intake using methods which were insensitive to self-report indicators (e.g. decreased depth of inhalation, decreased chewing time). In addition, we show that reduced CYP2A6 activity is related to lower levels of urinary NNAL, a tobacco-specific nitrosamine and a biomarker of carcinogen exposure in smokeless tobacco users. Together our results show, for the first time, that among light cigarettes smokers, smokeless tobacco users and iqmik users that genetically reduced CYP2A6-mediated nicotine metabolism lowers tobacco consumption and carcinogen exposure.

*This study was supported NIDA/NCI NARCH III (Indian Health Service Grant) U26IHS30001/01 and National Institute on Drug Abuse grant DA012353.*

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## SYM3

### SMOKING CESSATION: INTERPLAY OF GENES AND TREATMENTS

Chair: Timothy B. Baker<sup>\*1</sup>

Presenters: Andrew W. Bergen<sup>2</sup>, Li-Shiun Chen<sup>3</sup>, Caryn Lerman<sup>4</sup>, and Marcus R. Munafò<sup>5</sup>  
 Discussant: Laura J. Bierut<sup>3</sup>

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Understanding the genetic influences on smoking cessation facilitates treatment development. Dr. Munafò will present two cessation trials (Patch II and Patch in Practice), and a prospective study of pregnant women (Avon Longitudinal Study of Parents and Children), which support an association between 15q25 variants and smoking cessation. The 15q25 variants show considerably stronger association with biochemical measures of smoking heaviness than with self-report measures. Discussion will focus on design and assessment implications, including the imprecision of self-report measures. Dr. Bergen will present the largest meta-analysis to date examining nAChR SNPs and abstinence at End-Of-Treatment (EOT) and at 6 Months (6MO) in 2,725 treatment-seeking smokers from eight cessation trials. Rs16969968 was significantly associated with EOT abstinence [Pooled Effect Size=0.883 (95% C.I. 0.783-0.996) P=0.043] adjusted for demographics, dependence and therapy. No other nAChR SNP at EOT or at 6MO had a significant pooled effect size estimate. While statistically significant, the increase in the ability to predict

abstinence by rs16969968 is of small magnitude. Dr. Chen will present results from a community study showing that variants in CHRNA5-A3-B4 predicted a later age of smoking cessation. In a cessation trial the same variants predicted point prevalence abstinence in individuals receiving placebo, but not in individuals receiving active medication. The high-risk variants increase the risk of cessation failure, but this increased risk can be ameliorated by cessation pharmacotherapy. Dr. Lerman will present the neurochemical basis of the mu opioid receptor (OPRM1) Asp40 allele and PET imaging data showing that smokers with the OPRM1 Asp40 allele exhibit reduced mu opioid receptor binding availability in vivo after smoking, and binding availability is correlated with nicotine reward. In addition, another line of research uses chromatin immunoprecipitation (ChIP) and whole genome sequencing to identify novel targets for potential pharmacologic treatment. The symposium informs the audience how genetics help target high risk smokers and deliver most efficacious treatments.

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## SYM3A

### CHROMOSOME 15 GENETIC VARIANTS, SMOKING CESSATION, AND OBJECTIVE ASSESSMENT OF TOBACCO EXPOSURE

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Chromosome 15 variants within the CHRNA5-A3-B4 gene cluster are unequivocally associated with heaviness of smoking. However, their role in smoking cessation remains unclear, with genome-wide association studies of smoking cessation (which typically use retrospective self-report measures to compare current and former smokers) failing to show a clear signal. Here we argue that this may be in part due to phenotype heterogeneity, and that the prospective assessment of smoking status in those motivated to quit, ideally with biochemical verification, may offer greater statistical power to identify genetic influences. In studies of this kind, there is growing evidence for a weak association between 15q25 variants and smoking cessation. We present data from two prospective clinical trials of smoking cessation (Patch II and Patch in Practice), and one prospective cohort study of pregnant women (Avon Longitudinal Study of Parents and Children), which support this. It remains unclear, however, whether these genotypes also modify treatment response, and whether this association is mediated fully or in part by heaviness of smoking or tobacco dependence. We therefore also present data showing that 15q25 variants show considerably stronger association with biochemical measures of heaviness of smoking than self-report measures. Genome-wide association studies using similar phenotypes may therefore reveal novel loci undetectable using conventional measures of smoking behavior. Moreover, imprecision in the quantification of heaviness of smoking by self-report may explain the failure of these measures to account for the observed relationship between 15q25 variants and smoking cessation. Implications for the design of future studies will be discussed.

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## SYM3B

### CHRNA5, AND CHRNA3 SNPS AND ABSTINENCE IN TREATMENT-SEEKING SMOKERS

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The goal of the Pharmacogenetics of Nicotine Addiction Treatment (PNAT) research program is to generate the evidence base to optimize treatment decisions for individuals

who want to quit smoking. We performed random effects meta-analyses of 26 therapy arms from eight randomized clinical trials of different smoking cessation therapies to evaluate the association of five nAChR single nucleotide polymorphisms (SNPs) previously associated with smoking cessation or heaviness in 2,725 self-identified white participants with seven day point prevalence abstinence (abstinence) at End-Of-Treatment (EOT) and at 6 Months (6MO). We performed adjustment for therapy randomization, demographic (age, sex, education, marital status) variables, dependence (cigarettes per day and Fagerström Test for Nicotine Dependence) variables, and principal component of population genetic variation. We also evaluated nAChR SNP models adjusted for correlated SNPs where appropriate. Finally, we performed analyses to assess the ability of significantly associated nAChR SNPs to predict abstinence. In the largest meta-analysis to date examining nAChR SNPs in association with abstinence in treatment-seeking smokers, we observed statistically significant association of rs16969968 with EOT abstinence adjusted for therapy randomization, demographic and dependence variables, and population genetic variation [rs16969968EOT Pooled Effect Size=0.883 (95% C.I. 0.783-0.996) P=0.043]. No other nAChR SNP meta-analysis model at EOT and no nAChR SNP models at 6MO resulted in a statistically significant pooled effect size estimate. Demographic variables, dependence variables and individual CHRNA5 or CHRNA3 SNPs predicted abstinence with 71% likelihood. The incremental increase in the ability to predict abstinence from inclusion of genotypes from a nAChR SNP significantly associated with abstinence was <1%. While the increase in the ability to predict abstinence provided by rs16969968 was statistically significant, it does not appear, at present, to be clinically significant. Additional studies will be needed to identify biomarkers for the development of personalized therapy for smoking cessation.

*Baker P50 CA84724, K05 CA139871 and P50 DA19706; Hall DA16752, DA18691, DA15732 and DA9253; Lerman P50 CA143187 and CA63562; Lerman/Tyndale U01 DA020830; Swan CA071358.*

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## SYM3C

### INTERPLAY OF GENETIC RISK FACTORS (CHRNA5-CHRNA3-CHRNA4) AND CESSATION TREATMENTS IN SMOKING CESSATION SUCCESS

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Smoking is highly intractable and the genetic influences on cessation are unclear. Identifying the genetic factors affecting smoking cessation could elucidate the nature of tobacco dependence, enhance risk assessment, and support treatment algorithm development. Several genes were identified as associated with heavy smoking including the nicotinic receptor CHRNA5-CHRNA3-CHRNA4 gene cluster. The specific genetic risks involved in smoking cessation are less clear. Our goal is to test whether variants in the (CHRNA5-CHRNA3-CHRNA4) gene cluster predict age of smoking cessation and relapse to smoking after a quit attempt, and whether genetic risks modify the treatment responses. We examined smoking cessation success in two samples: smokers (N=5,216) from the Atherosclerosis Risk in Communities (ARIC) community-based study and nicotine dependent smokers in a cessation trial (N=1,073). Smoking cessation outcomes included self-reported quit age in the community study and point prevalence abstinence at end of cessation treatment in a clinical trial. Three common haplotypes in the CHRNA5-CHRNA3-CHRNA4 region were defined by rs16969968 and rs680244. The genetic variants in the CHRNA5-CHRNA3-CHRNA4 region that predicted nicotine dependence also predicted a later age of smoking cessation in a community-based sample (X<sup>2</sup>=8.46, df=2, p=0.015). In the smoking cessation trial, the same variants predicted point prevalence abstinence in individuals receiving placebo medication, but not amongst individuals receiving active medication. Genetic variants interacted with treatment in affecting cessation success (X<sup>2</sup>=8.97, df=2, p=0.011). Therefore, the identified haplotypes predicted cessation, and this effect could be modulated by treatment. In summary, genetic variants in the CHRNA5-CHRNA3-CHRNA4 region not only confer risk for heavy smoking, but also predict a decreased ability to quit smoking.

The high-risk variants increase the risk of cessation failure, but this increased risk can be ameliorated by cessation pharmacotherapy. This work identifies a high-risk genetic group that is at heightened need for smoking cessation pharmacotherapy.

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## SYM3D

### TRANSLATIONAL RESEARCH IN PHARMACOGENETICS AND SMOKING CESSATION

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An improved understanding of genetic influences on smoking cessation and the underlying neurobiological mechanisms could facilitate the identification of novel molecular targets for treatment development. Toward this end, we have characterized the aspects of the neurochemical basis of the mu opioid receptor (OPRM1) Asp40 allele that has been associated with smoking cessation and with reduced nicotine reward. The Blendy lab created a knock-in mouse with the equivalent of the human allele (Asp38 in mouse), and demonstrated reduced mRNA and protein in homozygous carriers of the minor allele. Translating this to humans, new PET imaging data show that smokers who carry the OPRM1 Asp40 allele exhibit reduced mu opioid receptor binding availability *in vivo* after smoking, and that, in smokers homozygous for the wildtype (putative risk) allele, binding availability is correlated with nicotine reward. To identify novel molecular targets, the second line of research used chromatin immunoprecipitation (ChIP) and whole genome sequencing to identify CREB binding proteins. Chronic nicotine and withdrawal differentially modulated CREB binding to the gene for Neuregulin 3 (NRG3). Quantitative PCR and Western blot analysis of saline, nicotine, and nicotine withdrawal groups in two biological replicates corroborate this finding. Single nucleotide polymorphisms (SNPs) across NRG3 were examined for association with prospective smoking cessation among 595 smokers of European ancestry treated with transdermal nicotine in two independent cohorts. Individual SNP and haplotype analysis support association of NRG3 SNPs and smoking cessation success; however, the function of these specific SNP markers in NRG3 is unknown. Future studies in genetically modified mice for the NRG3 gene and its cognate receptor, ERBB4, will investigate behavioral and molecular changes associated with nicotine treatment and withdrawal.

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## SYM4

### MINDFULNESS AND SMOKING CESSATION

Chair: David W. Wetter, Ph.D.<sup>1</sup>

Presenters: Aimee C. Ruscio<sup>2</sup>, Whitney L. Heppner, Ph.D.<sup>1</sup>, Jennifer Irvin Vidrine, Ph.D.<sup>1</sup>, and James Davis, M.D.<sup>3</sup>

Discussant: Jennifer McClure, Ph.D.<sup>4\*</sup>

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Mindfulness has been defined as “paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally.” Mindfulness reflects an intentional awareness of internal and external stimuli occurring in the present moment, and can be considered to be a cognitive set in which cognitions and emotions are experienced as mental events in a broader context of awareness. A key characteristic of mindfulness is that by simply noticing emotions, cognitions, perceptions, and sensations in a nonjudgmental manner, individuals learn over time that these phenomena are transient and that they are not compelled to impulsively react. Thus, flexible, adaptive responding is fostered when awareness is brought to the present moment. As such, mindfulness may both facilitate quitting smoking, and fostering greater mindfulness among smokers could serve as an innovative intervention approach. In fact, mindfulness is prominently featured in “third wave” psychotherapeutic approaches. The rationale for applying a mindfulness-based approach to the treatment of tobacco dependence is grounded in:

1) compelling evidence for the efficacy of mindfulness-based treatments across a wide range of conditions, disorders, and populations, and 2) the relevance of mindfulness-based treatments to the affective and cognitive mechanisms underlying smoking cessation and relapse. This symposium presents the results of two studies examining the effects of dispositional mindfulness on outcomes including tobacco dependence, smoking cessation, and recovery from a lapse. These studies also investigate the potential mechanisms linking mindfulness to these outcomes. A second pair of studies examine mindfulness-based treatments for tobacco dependence in two randomized clinical trials.

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## SYM4A

### MINDFULNESS AND TOBACCO DEPENDENCE: A MULTIPLE MEDIATOR MODEL

Aimee C. Ruscio<sup>1\*</sup>, Andrew J. Waters, Ph.D.<sup>1</sup>, Lorraine R. Reitzel, Ph.D.<sup>2</sup>, Paul Cinciripini, Ph.D.<sup>2</sup>, Yisheng Li, Ph.D.<sup>2</sup>, Marianne Marcus, Ed.D., R.N.<sup>3</sup>, Jennifer I. Vidrine, Ph.D.<sup>2</sup>, and David W. Wetter, Ph.D.<sup>1</sup>, <sup>1</sup>Uniformed Services University; <sup>2</sup>University of Texas MD Anderson Cancer Center; <sup>3</sup>University of Texas Health Science Center

More mindful smokers are less dependent on tobacco, but the psychological mechanisms linking mindfulness and dependence are unknown. Using a multiple mediator model, we examined negative affect, positive affect, perceived stress, and a decentered perspective as mediators of the association between mindfulness and dependence. A decentered perspective refers to the use of an observer mode of consciousness that separates the self observing from the contents of consciousness (e.g., thoughts, emotions, or sensory input). We used data from a mindfulness-based smoking cessation trial (N=363). The Smoking Implicit Association Test (S-IAT), Anxiety Implicit Association Test (A-IAT), and the Depression Implicit Association Test (D-IAT) were used to measure a decentered perspective to stimuli previously associated with smoking relapse. All measures (Mindful Attention Awareness Scale (MAAS), Positive and Negative Affect Schedule (PANAS-PA, PANAS-NA), Perceived Stress Scale (PSS), S-IAT, A-IAT, D-IAT, and Wisconsin Inventory of Smoking Dependence Motives (WISDM) were administered at baseline. The S-IAT and A-IAT were excluded from the model due to a non-significant correlation with the MAAS. We used Bias-Corrected Bootstrapping with 5000 bootstraps to estimate 95% confidence intervals around each specific indirect effect. PANAS-PA (95% CI = -1.62, -0.23) and D-IAT (95% CI = -0.83, -.08) were significant partial mediators of the association between MAAS and WISDM scores. PANAS-NA (95% CI = -1.61, 0.28) and PSS (95% CI = -0.42, 1.03) were not significant mediators. Thus, greater mindfulness may reduce dependence via at least two mechanisms: by increasing positive affect and by fostering a detached perspective to emotional stimuli. Mindfulness-based treatments may target processes

not specifically addressed by conventional cessation treatments, which primarily target negative affect and craving, and may be useful as a standalone or adjunctive therapy for smoking cessation. Further research is warranted on the measurement and the role of the decentered perspective construct in smoking cessation.

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## SYM4B DISPOSITIONAL MINDFULNESS, SMOKING ABSTINENCE, AND RECOVERY FROM A SMOKING LAPSE

Whitney L. Heppner, Ph.D.\*, Virmarie Correa-Fernandez, Ph.D., Yessenia Castro, Ph.D., Yisheng Li, Ph.D., Lorraine R. Reitzel, Ph.D., Jennifer Irvin Vidrine, Ph.D., Carlos A. Mazas, Ph.D., Ludmila Cofta-Woerpel, Ph.D., Paul M. Cinciripini, Ph.D., and David W. Wetter, Ph.D., University of Texas MD Anderson Cancer Center

Mindfulness reflects enhanced awareness of and attention to one's thoughts, emotions, and environment. A mindful disposition consistently predicts positive health outcomes for individuals. However, no research has examined how a mindful disposition influences the process of smoking cessation. The current study investigated the association between dispositional mindfulness and smoking abstinence, including its impact on early and late stages of a quit attempt. Participants were 399 African Americans (51% female) seeking treatment for smoking cessation. Mean age of participants was 42.4 years, 21.3% lived with a spouse or significant other, and 51.6% had less than or equal to a high school education. Results revealed that individuals high in mindfulness were more likely to quit when examining abstinence across all the follow-up time points. Moreover, among those individuals who lapsed in the early stages of a quit attempt (74% lapsed by 3 days post-quit), individuals high in mindfulness were more likely to recover abstinence by the later follow-up time points (31 days and 26 weeks post-quit). Among early lapsers, rates of recovering abstinence by week 26 were over two-fold higher for individuals who were high in mindfulness compared to individuals who were low in mindfulness (using a median split). Furthermore, increased social support and self-efficacy, and decreased depression, sadness, and anger mediated the relation between mindfulness and early smoking abstinence. These results suggest that mindfulness helps regulate smoking behavior by operating on mechanisms posited by prominent models of addiction. These results also converge with other preliminary studies suggesting that mindfulness exercises and training to increase dispositional mindfulness could provide an innovative avenue for smoking cessation treatment.

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## SYM4C RANDOMIZED CLINICAL TRIAL OF MINDFULNESS-BASED ADDICTION TREATMENT

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This randomized clinical trial evaluated a Mindfulness-Based Addiction Treatment (MBAT) for tobacco dependence. The core aims of MBAT are derived from Mindfulness-Based Cognitive Therapy (MBCT) and include helping individuals to: 1) become more aware of thoughts, feelings, and sensations from moment to moment, 2) develop a different way of relating to thoughts, feelings, and sensations, and 3) obtain the ability to disengage attention and choose skillful responses to any thoughts, feelings, or situations that arise. Participants recruited from the greater Houston area (N=411) were randomized to: Usual Care (UC; n=103), Standard Treatment (ST; n=154), or MBAT (n=154). ST and MBAT received eight two-hour group counseling sessions. UC received four brief individual counseling sessions. All patients received self-help materials and nicotine replacement therapy. Participants were racially/ethnically diverse (59% minority) and 57.6% reported a total annual household income of less than \$30,000. The

majority of participants were female (55.0%) and 35% had less than or equal to a high school education. The average smoking rate was 19.9 (SD= 10.1) cigarettes per day and 39.2% of participants reported smoking their first cigarette within 5 minutes of waking. All analyses controlled for age, gender, race/ethnicity, education, partner status, cigarettes per day and time to first cigarette after waking Biochemically verified, intent-to-treat, 7-day point prevalence abstinence at 1 week post-treatment was 27.5% in UC, 36.8% in ST, and 38.3% in MBAT. Abstinence at 23 weeks post-treatment was 13.6% UC, 14.8% in ST, and 11.7% in MBAT. These effects were nonsignificant. However, among participants smoking at the end of treatment, those in MBAT were more likely to recover abstinence at 1 week post-treatment (18.4% in UC, 10.4% in ST, 30.9% in MBAT; MBAT vs. ST: OR=5.01, 95% CI: 1.52 to 16.49; p=.027; MBAT vs. UC: OR= 1.94, 95% CI: 0.66 to 5.73, p=.027). MBAT was equivalent to established treatments, and appears promising with respect to facilitating recovery from a lapse.

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## SYM4D RANDOMIZED TRIAL COMPARING MINDFULNESS TRAINING FOR SMOKERS TO STANDARD OF CARE SMOKING CESSATION THERAPY

James Davis, M.D.\*, Simon Goldberg, Maggie Anderson, and Timothy Baker, Ph.D., University of Wisconsin School of Medicine and Public Health

Overview: This randomized controlled trial tested the efficacy of a novel smoking cessation intervention, Mindfulness Training for Smokers (MTS), in comparison to a standard-of-care smoking cessation therapy. Mindfulness is a cognitive skill taught to improve moment-to-moment awareness, acceptance and non-reactivity to thoughts, sensations and emotions. The MTS intervention consists of 8 weekly classes, and includes the use of medications, an MTS website, and a 2-hour MTS video. MTS combines mindfulness training with skills training and group support. MTS provides instruction on how to use mindfulness skills to manage relapse challenges such as smoking triggers, strong emotions, addictive thoughts, urges, and withdrawal symptoms. Methods: All study participants were provided with 4 weeks of nicotine patches and access to a phone-based quit line. The MTS group was also provided with the MTS intervention. Primary outcome measures included biochemically confirmed smoking abstinence at 4 and 24 weeks post-quit. Data from 28-day time-line follow-back was used to determine point prevalence and continuous abstinence at 4 weeks post-quit. Results: The sample (N=196) included 50% men, 50% women, mean age = 41.6, mean years smoked = 22.3, mean cigarettes per day = 16.8. Intent-to-treat analysis show 4-week post-quit continuous abstinence rates for MTS = 21.9% and controls = 11% (p = .042). The 24-week point prevalence abstinence rates for MTS = 23.8 % and controls = 15.4% (p = .137). Intervention starters (those who attended class 1) (n=60) show mean class attendance = 65.8% and mean quit day attendance = 71.7%. Data from MTS intervention starters show 4-week post-quit 7-day point prevalence abstinence = 45.0% and 24-week post-quit point prevalence abstinence = 40.0%. In the MTS group, but not in controls, statistically significant changes were found in baseline to post-quit self-report measures on mindfulness, emotion regulation, attentional control, perception of urge and motivation to quit. Conclusions: Results suggest that the MTS intervention holds promise for enhancing smoking cessation, but more research is needed.

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## SYM5

### UNDERSTANDING THE ROLE OF METABOLISM IN TOBACCO DEPENDENCE AND CESSATION TREATMENT: FROM ANIMAL, DEVELOPMENTAL AND SPECIAL POPULATION MODELS

Chair: Rachel Tyndale, Ph.D.<sup>1</sup>

Presenters: Sharon Miksys, Ph.D.<sup>1</sup>, Charmaine S. Ferguson<sup>1</sup>, Mark Rubinstein, M.D.<sup>2</sup>, Jill M. Williams, M.D.<sup>3,4</sup>, and Andy Z.X. Zhu<sup>1</sup>

Discussant: Neal Benowitz, M.D.<sup>2</sup>

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Understanding how the liver metabolizes nicotine represents one key area of research for better understanding the process of nicotine dependence. Further, understanding how treatments for nicotine dependence, including nicotine replacement and bupropion, are metabolized can inform the understanding of treatment mechanisms and inform the development of new tobacco dependence treatments. In this symposium, Dr. Miksys will first talk about the development of the zebra finch as a model for studying nicotine-induced behaviours. Next, Ms. Ferguson will talk about how monkey models can provide important information on how nicotine and bupropion metabolism are influenced by nicotine and self-administration of alcohol. Third, Dr. Rubinstein will talk about how nicotine metabolic rates influence the development of tobacco dependence among adolescents. Dr. Williams will talk about issues of nicotine metabolism among smokers with mental illness. Finally, Dr. Zhu will discuss how the metabolism of bupropion can influence treatment success. Dr. Benowitz will serve as a discussant to synthesize these findings and offer his thoughts about nicotine and bupropion metabolism

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## SYM5A

### ZEBRA FINCH METABOLIZE NICOTINE WITH A CYP2B-LIKE ENZYME

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The zebra finch (*Taeniopygia guttata*) is an important model to study the neural and social bases of vocal learning. Like humans, finches learn their vocalizations during critical developmental stages and learning is dependent on social interactions and auditory experiences. Nicotine affects the song pattern in adult male zebra finches and to better understand this, we are investigating the pharmacology of nicotine metabolism in these birds. Previously we showed that cotinine is formed from nicotine both in vivo and in vitro by finch liver. Here we investigate which hepatic enzyme(s) are involved in the main metabolic inactivation pathway of nicotine. In humans, monkeys and mice this is mediated by CYP2A enzymes while rats use a CYP2B enzyme to form cotinine. We found that zebra finch liver microsomes (ZFLM) did not metabolize coumarin, a specific CYP2A substrate in human, monkey and rodent, nor did the CYP2A-specific inhibitor pilocarpine or substrate coumarin inhibit cotinine formation. ZFLM were able to metabolize bupropion, a specific CYP2B substrate in human, monkey and rodent and the levels of activity correlated with both cotinine formation ( $r=0.76$ ,  $P=0.0003$ ) and immunoreactive CYP2B ( $r=0.72$ ,  $p=0.001$ ). Consistent with this, cotinine formation also correlated with levels of immunoreactive CYP2B protein in ZFLM ( $r=0.51$ ,  $p=0.04$ ) while it did not correlate with CYP2A protein ( $r=0.11$ ,  $p=0.69$ ). Cotinine formation was substantially inhibited by the CYP2B-specific C-8-xanthate and CYP2B- and CYP2A-specific 8-methoxypsoralen and by ketoconazole, an inhibitor of CYPs including CYP3A. It was not inhibited by either quinidine or quinine, specific for human and rodent CYP2D respectively. These data suggest that zebra finch metabolize nicotine to cotinine with a hepatic CYP2B-like enzyme, much like the rat does, and are also able to metabolize the smoking cessation drug bupropion. Having a better understanding of nicotine pharmacokinetics in zebra finch will aid in the design and interpretation of nicotine pharmacological studies when studying vocal learning and the underlying cognitive processes of learning, memory and vocalizations.

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## SYM5B

### EFFECT OF ETHANOL SELF-ADMINISTRATION AND NICOTINE TREATMENT ON THE NICOTINE- AND BUPROPION-METABOLIZING ENZYMES, CYP2A6 AND CYP2B6, IN AFRICAN GREEN MONKEYS

Charmaine S. Ferguson\*, Joel Keshwah, Bin Zhao, Sharon Miksys, Roberta Palmour, and Rachel. F. Tyndale

In humans and non-human primates nicotine is metabolized in the liver by CYP2A6 and to a lesser extent by CYP2B6. Smoking behaviours can be affected by variability in the rate of nicotine metabolism (i.e. cigarette consumption, risk for becoming dependent and the ability to quit). This study investigated the effect of ethanol-self-administration and nicotine treatment, alone and in combination, on hepatic CYP2A6 and CYP2B6 protein levels and nicotine metabolism in monkeys. African Green Monkeys (i.e., Vervet) were randomized into four groups: an ethanol group, a nicotine group, an ethanol + nicotine group and a control (vehicle only) group (n=10/group). Ethanol was self-administered (access to 10% ethanol in sucrose solution for 4 hrs/day) and nicotine was administered as subcutaneous injections (0.5 mg/kg bid). CYP2A6 and CYP2B6 protein levels and in vitro nicotine metabolism were assessed in liver tissue. Hepatic CYP2A6 protein levels were significantly reduced by nicotine treatment but unaffected by ethanol consumption. Conversely, hepatic CYP2B6 protein levels were significantly increased by ethanol consumption but unaffected by nicotine treatment. Combined ethanol consumption and nicotine treatment resulted in a significant reduction in hepatic CYP2A6 and an increase in CYP2B6 protein levels. There was a positive correlation between CYP2A6 protein levels and the velocity of nicotine metabolism, with nicotine-treated animals having the lowest velocities. There was no significant correlation between CYP2B6 protein levels and the velocity of nicotine metabolism. In summary, nicotine and ethanol can alter the levels of hepatic CYP2A6 and CYP2B6 respectively. These results suggest that exposure to nicotine may impact the clearance of drugs metabolized by CYP2A6, including nicotine. The induction of hepatic CYP2B6 by ethanol had little effect on nicotine metabolism but may increase the metabolism of other CYP2B6 substrates such as bupropion, efavirenz and cyclophosphamide altering their impact on smoking cessation, antiretroviral therapy for HIV and chemotherapy, respectively.

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## SYM5C

### NICOTINE METABOLISM AND ADDICTION AMONG ADOLESCENT SMOKERS

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OBJECTIVES: The rate of nicotine metabolism affects smoking behaviors and nicotine dependence in adult smokers, among whom rapid metabolizers smoke more cigarettes per day and have a more difficult time quitting. The impact of the rate of nicotine metabolism during adolescence has not been determined. The purpose of this study was to determine the association between the nicotine metabolic rate and smoking behavior, including addiction, in early-stage adolescent smokers. METHODS: 164 adolescent (age 13-17) early stage smokers (<5 cigarettes per day but at least one per month) from the San Francisco Bay area participated. They completed self-report measures of smoking behavior and nicotine dependence (modified Fagerstrom Tolerance Questionnaire; mFTQ), and were given 2 mg of deuterium-labeled cotinine (cotinine-d4) solution orally. Eight hours after cotinine administration, a saliva sample was collected and assayed for cotinine-d4 and deuterium-labeled 3'-hydroxycotinine (3HC-d4). The nicotine metabolite ratio (NMR), a phenotypic marker of the rate of nicotine metabolism, was calculated using the ratio of concentrations of 3HC-d4 to cotinine-d4. RESULTS: After controlling for duration of smoking, NMR was negatively associated with the mFTQ (the faster the rate of metabolism, the lower the score on the mFTQ;  $\beta=-3.49$ ,  $p=.01$ ), and also inversely related to CPD (faster metabolizers smoked fewer CPD than faster metabolizers;  $\beta=-1.84$ ,  $p=.02$ ). CONCLUSIONS: Our findings that slower nicotine metabolism is associated with an increased risk for addiction and higher CPD in early stage adolescent smokers is in contrast to the results observed in adults. Among adult smokers, faster metabolism correlates with higher CPD and more difficulty quitting. Our results suggest that at an early stage of smoking, slower clearance of nicotine may promote the development of addiction, perhaps mediated by higher levels of nicotine

exposure per cigarette. This pattern may reverse subsequently, as smoking progresses. The current findings highlight the importance of studying adolescents at various stages of smoking progression.

*No Funding.*

## SYM5D

### INCREASED NICOTINE METABOLISM AND SHORTER INTERPUFF INTERVAL IN SMOKERS WITH BIPOLAR DISORDER

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**Introduction:** Cigarette smoking is common in bipolar disorder with prevalence rates of about 60% in various studies. Because of clinical, epidemiologic and genetic similarities between bipolar disorder and schizophrenia there is potential for similarities in smoking patterns between these groups that warrant further study. **Methods:** This study objective was to measure serum nicotine, nicotine metabolite levels and smoking behavior in 75 smokers with bipolar disorder (BPD) as compared to 86 control smokers (CON). This study was part of a larger study that also included 75 smokers with schizophrenia (SS). **Results:** BPD were not different in baseline smoking characteristics (i.e. cigarettes per day, exhaled CO, Fagerstrom summary score, years of smoking) as compared to CON. There were no differences in nicotine or cotinine levels in BPD vs. CON smokers. The 3-hydroxycotinine to cotinine ratio, a marker of CYP2A6 metabolic activity, was significantly higher in BPD vs. CON (0.68 vs. 0.49;  $p=0.002$ ). This remained significant when we removed those smokers taking carbamazepine-like drugs ( $n=10$ ) that are known hepatic inducers. In regression analyses, having a diagnosis of bipolar disorder, race/ethnicity and number of cigarettes smoked per day significantly predicted 3HC levels and the 3HC/cotinine ratio (all  $p<0.05$ ). The time between puffs, or interpuff interval (IPI) was shorter in BPD by an average of 3.0 sec ( $p<0.05$ ). For all subjects (BPD and CON), a decrease in IPI by one second was associated with a significant increase in the 3HC/Cotinine ratio of 0.0086 ng/mL. A history of psychosis or taking antipsychotic medication was not a predictor of any outcome including nicotine metabolite levels or smoking topography. **Conclusions:** Increased metabolism of nicotine in BPD may be due to psychotropic medications that we did not account for, racial differences in the sample, or some other aspect of the illness such as genetics differences. Smokers with rapid nicotine metabolism would be expected to smoke more intensely to compensate for the more rapid disappearance of nicotine from the blood and brain and may have more difficulty in quitting smoking.

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## SYM5E

### HYDROXYBUPROPION CONCENTRATION, MEDIATED BY CYP2B6 ACTIVITY, IS A MAJOR DETERMINANT OF BUPROPION'S EFFICACY FOR SMOKING CESSATION

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Bupropion (BUP) is indicated to promote smoking cessation. Animal studies suggest that BUP's major metabolite hydroxybupropion (OH-BUP) mediates some aspects of BUP's pharmacology activity; it also has a longer half-life than BUP which may enhance its contribution to the BUP effect. We measured plasma BUP and metabolite levels (Week 3 at  $\approx$ steady state) in a double-blind, placebo controlled, randomized smoking cessation trial in African American light smokers ( $\leq 10$  cigarettes per day,  $n=540$ ). Our pharmacokinetic results revealed the following key observations. (1) Many subjects were classified "non-adherent" as they either did not have detectable BUP in their plasma ( $n=60$ ), did not provide blood ( $n=5$ ) or were lost to follow-up at Week 3 ( $n=51$ ). Those subjects ( $n=116$ ) had quit rates comparable to placebo ( $n=270$ ) treatment (Week 26: 8% in the non-adherent group vs. 10.0% in the placebo group, OR=0.76, 95%CI:0.35-1.63,

$P=0.49$ ). (2) In those with detectable levels of BUP ( $n=156$ ), BUP significantly improved quit rates compared to placebo (Week 26: 17.5% in the BUP adherent group vs. 10.0% in the placebo group, OR=1.91, 95%CI:1.08-3.38,  $P=0.025$ ). (3) There was a positive relationship between OH-BUP concentrations and smoking abstinence in the BUP adherent individuals (Week 3: OR=2.82, 95%CI: 1.34-5.95,  $P=0.007$ ; Week 7, end of treatment: OR=2.96, 95%CI:1.38-6.34,  $P=0.005$ ; Week 26: OR=2.37, 95%CI:1.04-5.41,  $P=0.04$ ); which was not observed for BUP drug levels (Week 3: OR=1.00,  $P=0.90$ ; Week 7, end of treatment: OR=1.01,  $P=0.78$ ; Week 26: OR=1.03,  $P=0.59$ ). (4) Genetic variation in CYP2B6, the enzyme that metabolizes BUP to OH-BUP, was identified as the major source of variability in OH-BUP formation ( $\beta=0.24$ ,  $P=0.003$ ). Our data indicate that OH-BUP mediates the pharmacologic effects of BUP that promote smoking cessation, and that variability in response to BUP treatment is related, at least in part, to variability in CYP2B6-mediated OH-BUP formation. Our findings suggest that adjusting plasma steady state OH-BUP levels to a minimum therapeutic concentration of 700 ng/ml and/or increasing BUP dose for CYP2B6 slow metabolizers, should improve cessation outcomes of BUP treatment.

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## SYM6

### SHIFTING THE TOBACCO PARADIGM: CAN THE FDA TOBACCO CONTROL ACT LEAD TO THE END OF COMMERCIAL CIGARETTE SALES IN THE US?

Chair: Scott J. Leischow<sup>\*1</sup>

Panelists: Scott J. Leischow<sup>\*1</sup>, Mitch Zeller<sup>2</sup>, Sue Curry<sup>3</sup>, and Tom Glynn<sup>4</sup>, <sup>1</sup>The University of Arizona; <sup>2</sup>Pinney and Associates; <sup>3</sup>The University of Iowa; <sup>4</sup>American Cancer Society

The Family Smoking Prevention and Tobacco Control Act (FSPTCA) became US law in 2009, and provisions of the Act gives the FDA wide-ranging authority to regulate tobacco products. While the implementation of the law is in its very earliest stages, it is clear that there are great potential for the implementation of this new law to dramatically change the nature of tobacco products, how they are marketed, and how they are purchased. For example, the law prevents the FDA from eliminating nicotine - the main addicting ingredient - but does not prevent the FDA from reducing nicotine to levels that are functionally non-addicting. Moreover, the law gives the FDA authority to restrict the design and color of packaging, increases the visibility of tobacco use warnings and allows for tobacco treatment assistance on the package, and gives states the right to impose even more stringent requirements than the FDA itself. Given the many provisions in the law, particularly the potential to virtually end the addiction potential of cigarettes, it is possible that the Act could lead to the end of cigarettes as we have known them. However, the tobacco industry has already begun to fight back. In order to explore the potential of the Act to eliminate the most dangerous legal product in the US - the cigarette - we are proposing to convene a panel of research and policy experts to explore whether the Act could cause the elimination of the cigarette as we have known it. The panel will also explore potential ways that the tobacco industry might undermine such an effort. The chair of the panel will use an 'interview-style' approach to fostering panelist comment and discussion that will address the interplay of science and policy on the potential to eliminate the cigarette as a product in the US. Audience participation will assure a discussion that could lead to new research directions and have policy implications.

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## SYM7

### INCREASING OUR UNDERSTANDING OF NONDAILY SMOKING: INDIVIDUAL PATTERNS, SMOKING TRAJECTORIES, AND CULTURAL INFLUENCES

Chairs: Jasjit S. Ahluwalia, M.D., M.P.H., M.S.<sup>1</sup>, and Saul Shiffman, Ph.D.<sup>\*2</sup>

Presenters: Carla J. Berg, Ph.D.<sup>3</sup>, Taneisha S. Buchanan, Ph.D.<sup>4</sup>, Saul Shiffman, Ph.D.<sup>2</sup>, and Hilary A. Tindle, M.D., M.P.H.<sup>5</sup>

Discussant: Neal Benowitz, M.D.<sup>6</sup>

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of Medicine and Center for Health Equity; <sup>5</sup>Department of Medicine, University of Pittsburgh; Division of Clinical Pharmacology, Department of Medicine, University of California San Francisco

Nondaily (ND) smoking, or intermittent tobacco smoking (ITS) (smoking less than 30 days per month), is a growing trend among current smokers in the U.S. population. While ND smoking may be a transitional smoking pattern for some smokers who accelerate to daily smoking or progress to quitting, previous research has suggested that a segment of ND smokers sustains this pattern for prolonged periods of time. Even ND smoking contributes to premature cardiovascular and cancer morbidity and mortality relative to nonsmokers. At present, nicotine dependence in ND smokers is not clearly understood and factors that sustain this smoking pattern have not been identified. Dr. Carla Berg will present findings of a study comparing students from five college smoking trajectories (nonsmokers, quitters, native ND smokers, converted ND smokers, and daily smokers [DS]) on demographic, psychosocial, tobacco and substance use variables, and examine readiness to quit among current smokers. Dr. Taneisha Buchanan will present the results of a mixed-methods study with African American, Latino, and non-Hispanic White nondaily smokers. This study examined smoking behavior, psychosocial, and cultural factors among ND smokers who were 25 years and older and smoked ND for at least six months. Dr. Saul Shiffman will address the extent to which intermittent smokers are social smokers. He will present results from an ecological momentary assessment (EMA) study on the circumstances of smoking among 218 ITS and 198 DS. Dr. Hilary Tindle will present an analysis of quit attempts, use of cessation aids, and quit success in ND and DS from the Tobacco Use Supplement of the Current Population Survey. Her presentation will provide comparisons among converted ND smokers (i.e., former DS), native DS (never daily smokers), and DS. Dr. Neal Benowitz will discuss the findings of the four presentations in the context of the existing literature, and potential future directions of research.

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## SYM7A SMOKING CESSATION BEHAVIOR AMONG INTERMITTENT AND DAILY SMOKERS

Hilary A. Tindle, M.D., M.P.H.\*<sup>1</sup>, and Saul Shiffman, Ph.D.<sup>2</sup>, <sup>1</sup>Department of Medicine, University of Pittsburgh; <sup>2</sup>Department of Psychology, University of Pittsburgh

Non-daily (Intermittent smokers, ITS) are increasingly common, but their cessation behavior remains elusive. Based on current models of nicotine dependence, one would expect ITS to find it easy to quit smoking. We analyzed data from 29,192 respondents to the Tobacco Use Supplement to the Current Population Survey, a large household tobacco survey weighted to reflect the US civilian non-institutionalized population. We assessed quit attempts, use of cessation aids, and quit success in ITS and DS. Given the heterogeneity of ITS we include both native-ITS, who had never smoked daily (NITS, n=2,040), and converted-ITS, who had smoked daily in the past (CITS, n=1,808), and compared them to daily smokers (DS, n=25,344). Not surprisingly, the three groups differed on a number of demographic and smoking dimensions, for which we adjusted in statistical comparisons. Most ITS made a quit attempt in the preceding year, with more attempts among CITS (69%) than NITS (53%). We speculate that CITS may have converted to non-daily smoking as part of a trajectory towards quitting. Both ITS groups were more likely than DS (39%) to try quitting (adjusted odds ratio (AOR): NITS 1.60, 95% CI [1.42-1.80]; CITS 3.33 [2.93-3.78]). Surprisingly, although ITS were more likely to succeed at quitting than DS (13% success rate), most ITS who attempted quitting failed: the success rate was 18% for NITS and 27% for CITS (AOR for NITS vs. DS 1.34 [1.07-1.67]; CITS vs. DS 2.36 [2.01-2.78]). Moreover, some ITS reported making use of behavioral and pharmacologic aids (NITS: 6% and 11%; CITS: 11% and 21%). While these rates were lower than those seen in DS (12% and 33%), the use of aids even by a fraction of ITS further suggested that ITS had difficulty quitting. ITS' difficulty quitting and low success rates challenge the notion that they are non-addicted.

*NIDA (RO1 DA020742, Dr. Shiffman) and the National Center for Research Resources (NCRR), a component of NIH, and NIH Roadmap for Medical Research (KL2 RR024154, Dr. Tindle.) Dr. Shiffman consults exclusively for GlaxoSmithKline on matters relating to smoking cessation.*

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## SYM7B A MIXED METHODS INVESTIGATION OF NONDAILY SMOKING AMONG AFRICAN AMERICANS, LATINOS, AND NON-LATINO WHITES

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Among current smokers, 23.8% of African Americans, 35.7% of Latinos, and 16.6% of Non-Latino Whites are nondaily (ND) smokers (smoke less than 30 days per month). Much of the research on ND smoking was derived from large data sets that do not allow a more in-depth exploration. We present data from a mixed-methods approach on ND smoking that examined psychosocial, sociocultural, and smoking-related characteristics among African American, Latino, and non-Latino White ND smokers. At the completion of this study, we will have conducted nine ethnically homogenous focus groups (FGs; three FGs per racial/ethnic group) and we will present the complete data. To date, we have conducted 5 FGs with 28 African American and 16 White participants. Each FG participant also completed a brief survey assessing smoking and quitting behaviors, other tobacco and alcohol use, nicotine dependence, risk perceptions, and interest in treatment. To date, our sample was 48% female, with a mean age of 44 (SD = 10), smoked an average of 13 days in the past month, and averaged 4 cigarettes per day (cpd) on days smoked. The sample was comprised of 34% converted ND smokers (former daily smokers), with the remaining 66% being native ND smokers (never a daily smoker); 18% of all participants reported smoking within 30 minutes of waking. Focus group discussions assessed: smoking occasions, social influences on smoking, reasons for smoking nondaily, risk perceptions, and quitting experiences and beliefs. Our preliminary qualitative findings indicate that ND smokers tended to smoke when stressed, bored, in social situations, and when drinking. Many described smoking as a pleasurable experience, while some reported that smoking was aversive and therefore limited their cigarette intake. Although several participants, particularly converted ND smokers, reported a desire to quit, many participants did not feel that their smoking was a serious risk to their health and felt no desire to quit. Qualitative and quantitative results will be presented across groups and intergroup differences will be discussed. We will also report findings from a larger online survey of 750 ND smokers stratified by ethnicity.

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## SYM7C NON-DAILY SMOKERS = SOCIAL SMOKERS?

Saul Shiffman, Ph.D.\*<sup>1</sup>, Xiaoxue Li, B.S.<sup>2</sup>, Michael Dunbar, M.S.<sup>1</sup>, Sarah Scholl, M.P.H.<sup>1</sup>, and Hilary Tindle, M.D., M.P.H.<sup>3</sup>, <sup>1</sup>University of Pittsburgh, Department of Psychology; <sup>2</sup>University of Pittsburgh, Graduate School of Public Health, Department of Biostatistics; <sup>3</sup>University of Pittsburgh, School of Medicine

Non-daily smokers (or, intermittent smokers, ITS) have become increasingly common, accounting for up to a third of US adult smokers. Authors have typically assumed that ITS are 'social smokers' who smoke primarily or even exclusively in social settings and for social motives (rather than pharmacological ones). We assessed social smoking using EMA data on the circumstances of smoking. A sample of 218 ITS and 198 daily smokers (DS) used palmtop computers for 3 weeks to record the context of each cigarette: whether others were present, whether others were smoking, whether they had been drinking, etc. (n=27,456 assessments). For comparison, subjects were also 'beeped' at random to gather such data when they were not smoking (n=22,025 assessments). Compared to DS, ITS smoking was more strongly associated with evenings (Odds Ratio=1.22, 1.06-1.40) and weekends (Odds Ratio=1.16, 1.04-1.30), the presence of others (Odds Ratio=1.33, 1.04-1.69), smoking by others nearby (Odds Ratio =2.50, 1.87-3.35), and alcohol consumption (Odds Ratio=1.97, 1.36-2.85), consistent with the image of social smoking. Based on concepts in the literature, we defined social smokers conservatively as those who smoked most of their cigarettes in the presence of others, and whose probability of smoking was increased at least 50% by the presence of others. By this definition, only 16% of ITS were social smokers (versus 1% of DS). Moreover, 43% of ITS' cigarettes were smoked when alone (versus 54% for DS), 34% were smoked before 1:00 PM (DS=38%), and many were not associated with eating or drinking (72%, DS=84%). We conclude that only a minority of ITS are social

smokers, and that ITS are characterized by heterogeneous patterns of smoking, which cannot be explained primarily by social motives. We discuss the theoretical and clinical implications of these conclusions.

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## **SYM7D**

### **INTENTIONS TO QUIT SMOKING AMONG DAILY SMOKERS AND NATIVE AND CONVERTED NONDAILY SMOKERS IN THE COLLEGE STUDENT POPULATION**

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We aimed to 1) examine differences in sociodemographic, other substance use, psychosocial, and smoking-related characteristics among subgroups of college students representing five trajectories of smoking (nonsmokers, quitters, native nondaily smokers [ND], converted ND smokers, daily smokers [DS]); and 2) examine readiness to quit among current smokers. In 2010, students at 6 colleges in the Southeast were recruited to complete an online survey. Of students invited to participate, 20.1% (N=4,849/24,055) returned a completed survey. We created 5 subgroups: 1) nonsmokers (n=3,094); 2) quitters (former daily smokers; n=293); 3) native ND smokers (never been daily smokers; n=317); 4) converted ND smokers (previously DS; n=283); and 5) daily smokers (n=451). Bivariate analyses indicated differences in other substance abuse (alcohol, binge drinking, marijuana, other tobacco products), attitudes toward smoking, perceived harm, depressive symptoms, and parental and friend smoking among the 5 subgroups (p<.001). Among current smokers, we found differences in cigarette consumption, smoking within 30 minutes of waking, recent quit attempts, readiness to quit in the next month, social smoking, considering oneself a smoker, cessation self-efficacy, and motivation to quit (p<.001). Multivariate analyses identifying correlates of readiness to quit among current smokers indicated that converted ND smokers were more likely to be ready to quit in the next month versus native ND smokers (OR=2.15, 95% CI 1.32, 3.49). Participants with greater readiness to quit had more negative attitudes toward smoking (OR=1.03, CI 1.02, 1.04), greater quitting self-efficacy (OR=1.02, CI 1.00, 1.05), and greater autonomous motivation (OR=1.04, CI 1.01, 1.06). Participants less ready to quit smoked less frequently (OR=0.94, CI 0.92, 0.97) and did not consider themselves to be smokers (OR=0.55, CI 0.32, 0.95); however, they were also more likely to smoke within 30 minutes of waking (OR=2.11, CI 1.23, 3.62). These findings highlight differences among smokers in terms of their readiness to quit, such that converted ND smokers were most frequently ready to quit smoking in the next month.

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## **SYM8**

### **SMOKING CESSATION AND PSYCHIATRIC COMORBIDITY: A BIDIRECTIONAL RELATIONSHIP?**

Chair: Paul M. Cinciripini, Ph.D.\*<sup>1</sup>

Presenters: Vance Rabius, Ph.D.<sup>1</sup>, Virmarie Correa-Fernández, Ph.D.<sup>1</sup>, and Jessica Cook, Ph.D.<sup>2</sup>

Discussant: Thomas H. Brandon, Ph.D.\*<sup>3</sup>

<sup>1</sup>The University of Texas MD Anderson Cancer Center; <sup>2</sup>University of Wisconsin School of Medicine and Public Health; <sup>3</sup>Moffitt Cancer Center, University of South Florida

Smoking is the most preventable risk factor for cancer and other chronic conditions, and its prevalence and public health burden is not distributed equally across all segments of society. People with psychiatric disorders consume twice as many cigarettes as those without disorders, may be less successful in quitting, and may relapse early. There is a need to understand how psychiatric comorbidities impact smoking cessation and relapse, whether smokers with psychiatric comorbidities can benefit from treatments

designed to address their symptoms, and how mental health is affected by quitting compared to continuing to smoke. This symposium will highlight research in these areas of need. The first presentation will describe a tobacco treatment program that has provided smoking cessation services to cancer patients and general smokers with and without psychiatric comorbidity, and will report treatment outcomes overall and as a function of cancer diagnosis and psychiatric disorder. Abstinence rates were similar regardless of the presence or history of cancer; however, people without a psychiatric disorder were more likely to be abstinent at follow-up. The second presentation will focus on the effect of anxiety and depressive disorders on smoking relapse among postpartum women who quit smoking during pregnancy, and examined the mechanisms linking these disorders to relapse. Both anxiety and depression significantly predicted relapse. After adjusting for depression, anxiety continued to predict relapse, but not vice versa. Cognitive aspects of negative and positive reinforcement were mediators of the relationship between these disorders and relapse. The third presentation will report on the impact of smoking status on psychiatric diagnoses 1 and 3 years following smoking cessation treatment. Among participants with no disorder in the year prior to the baseline assessment, those who were smoking at year 3 were more likely than those who quit smoking to have developed and maintained a disorder in the 3 years following the quit attempt. Finally, the integration of these findings will be discussed emphasizing the implications for both research and clinical practice.

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## **SYM8A**

### **MEDIATORS OF THE ASSOCIATION OF ANXIETY AND DEPRESSION WITH POSTPARTUM SMOKING RELAPSE**

Virmarie Correa-Fernández, Ph.D.\*<sup>1</sup>, Lingyun Ji, M.S.<sup>1</sup>, Yessenia Castro, Ph.D.<sup>1</sup>, Whitney L. Heppner, Ph.D.<sup>1</sup>, Jennifer Irvin Vidrine, Ph.D.<sup>1</sup>, Ludmila Cofta-Woerpel, Ph.D.<sup>1</sup>, Patricia Dolan Mullen, Dr.P.H.<sup>2</sup>, Mary M. Velasquez, Ph.D.<sup>3</sup>, Paul M. Cinciripini, Ph.D.<sup>1</sup>, and David W. Wetter, Ph.D.<sup>1</sup>, <sup>1</sup>University of Texas MD Anderson Cancer Center; <sup>2</sup>The University of Texas Health Science Center at Houston; <sup>3</sup>The University of Texas at Austin

Based on conceptual models of addiction and affect regulation, this study examined the mechanisms linking anxiety and depressive disorders to postpartum smoking relapse. Data were collected in a randomized clinical trial from 251 women who quit smoking during pregnancy. Simple and multiple mediation models of the relations of anxiety and depression with postpartum relapse were examined using linear regression, continuation ratio logit models, and a Bootstrapping procedure to test the indirect effects. Both anxiety and depression significantly predicted postpartum smoking relapse. After adjusting for depression, anxiety still significantly predicted relapse, but not vice versa. Self-efficacy, expectancies of controlling negative affect by means other than smoking, and various dimensions of tobacco dependence individually mediated the effect of both anxiety and depression on relapse. In multiple mediation models, only self-efficacy in negative/affective situations significantly mediated the effect of anxiety and depression on relapse. The findings underscore the negative impact of anxiety and depressive disorders on postpartum smoking relapse, and suggest that the effects of depression on postpartum relapse may be largely explained by comorbid anxiety. The current investigation provided mixed support for affect regulation models of addiction. Cognitive aspects of negative and positive reinforcement significantly mediated the relationship of depression and anxiety with relapse, while affect and stress did not. Findings emphasize the unique role of automaticity of smoking, exposure to social and environmental cues and low self-efficacy in abstaining from smoking in negative affective situations as important determinants of postpartum smoking relapse.

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## SYM8B

### THE RELATION BETWEEN PSYCHIATRIC DISORDERS AND TOBACCO QUITTING BEHAVIOR

Jessica Cook, Ph.D.\*, Megan E. Piper, Ph.D., Matt Rodock, and Timothy B. Baker, Ph.D., University of Wisconsin School of Medicine and Public Health

People with psychiatric disorders smoke at over twice the rate of those in the general population and may have a harder time quitting smoking. Less is known about how mental health is affected by quitting vs. continuing to smoke. The purpose of this study was to use data from a large prospective clinical trial to examine the impact of smoking status on psychiatric diagnoses 1 year and 3 years following smoking cessation treatment. This study enrolled 1504 smokers (83.9% white; 58.2% female) who were highly motivated to quit smoking into a randomized placebo-controlled comparative efficacy cessation trial with long-term follow-up. At baseline, Year 1, and Year 3, participants completed the Composite International Diagnostic Interview to assess psychiatric disorders, and were assessed for biochemically confirmed point-prevalence abstinence. After controlling for the effects of baseline AODA (alcohol and other drug abuse), logistic regression analysis showed that participants who reported smoking at Years 1 and 3 were more likely to have an AODA disorder at these same time points, relative to participants who were smoke-free ( $p < .05$ ). Nominal regression analyses showed that, of participants with no disorder in the 12 months prior to the baseline assessment, those who were smoking at Year 3 were more likely than those who quit smoking to have developed and maintained an AODA or major depressive disorder in the 3 years following the quit attempt ( $p < .05$ ). Smoking status did not significantly predict transitions in anxiety diagnoses. These results suggest that quitting smoking is not associated with deterioration in mental health. Moreover, continued smoking may increase risk of developing some mental health disorders.

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## SYM8C

### SMOKING CESSATION AS A FUNCTION OF PHYSICAL AND PSYCHIATRIC COMORBIDITIES

Vance Rabius, Ph.D.\*, Cho Lam, Ph.D., Kelly Merriman, Ph.D., Janice A. Blalock, Ph.D., Maher Karam-Hage, M.D., and Paul M. Cinciripini, Ph.D., University of Texas MD Anderson Cancer Center

Tobacco plays a causal role in at least 15 types of cancer, accounts for almost one-third of all cancers, and has deleterious consequences on cancer treatment outcomes. Since 2006 the Tobacco Treatment Program (TTP) has provided smoking cessation assistance to patients and employees at MD Anderson Cancer Center (MDACC). TTP provides a 3-month program of behavioral counseling and pharmacotherapy (NRT, Bupropion, Varenicline, Nortriptyline, or Clonidine), for smoking cessation in combination with psychological counseling and/or psychiatric treatment for conditions directly affecting a cessation attempt. Counseling sessions are provided both in-person and by telephone. This study summarizes treatment outcomes overall and as a function of cancer diagnosis and psychiatric disorder at multiple follow-up intervals. From 2006-2010 the TTP provided assistance to 1792 MDACC patients and employees for whom psychiatric disorder data are available. Psychiatric disorders were assessed using the Patient Health Questionnaire which was administered at the initial TTP consult. Cancer diagnosis and survivorship were determined from the tumor registry and patient records. Smoking status was assessed by self-report at 3 (end of treatment), 6, and 9 months following the initial TTP consult. 7-day point-prevalence abstinence rates with non-respondents assumed to be smoking (intent-to-treat) are reported. Of the 1792 TTP patients, 41% (741) had one or more psychiatric disorders and 86% (1549) either had a cancer diagnosis or were cancer survivors. Overall abstinence rates ranged from 36% to 34% to 30% at 3, 6, and 9 months respectively. Using Generalized Linear Mixed Modeling of abstinence rates as a function of psychiatric disorder and cancer diagnosis at multiple follow-up intervals, we found that abstinence rates decreased significantly over time at follow-up intervals ( $p < 0.0001$ ). Patients without a psychiatric disorder were more likely to be abstinent ( $p < .02$ , OR = 1.31, 95% CI = 1.05-1.63). Cancer diagnosis

was not significantly related to abstinence. The TTP provides comprehensive cessation assistance that is comparably effective regardless of the presence or history of cancer.

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## SYM9

### GENOME-WIDE ASSOCIATION STUDIES ON SMOKING BEHAVIOR AND NICOTINE DEPENDENCE

Chair: Jaakko Kaprio\*<sup>1,2</sup>

Presenters: Sarah Medland<sup>3</sup>, Pamela Madden<sup>4</sup>, Jaakko Kaprio\*<sup>1,2</sup>, Marcus Munafò<sup>5</sup>, and Andrew Bergen\*<sup>6</sup>

Discussant: Andrew Bergen\*<sup>6</sup>

<sup>1</sup>University of Helsinki, Hjelt Institute and Institute for Molecular Medicine Finland FIMM;

<sup>2</sup>National Institute for Health and Welfare, Finland; <sup>3</sup>Queensland Institute of Medical Research, Australia; <sup>4</sup>Washington University School of Medicine, USA; <sup>5</sup>University of Bristol, School of Experimental Psychology, UK; <sup>6</sup>SRI International, Molecular Genetics Program, Center for Health Sciences, USA

Over the past two years, large scale whole genome-wide association studies (GWAS) have identified novel genes in many complex diseases. For smoking behavior and nicotine dependence, studies published in 2007 and 2008 have consistently implicated the nicotinic receptor gene complex on chromosome 15, with the alpha 5 gene being the most likely the important one in explaining inter-individual differences in risk of nicotine dependence. In 2010, three large GWAS meta-analyses on >100,000 Caucasian subjects identified only a handful of loci associated with the crude phenotypes of smoking initiation, quantity and persistence. In this symposium we will present results from recent GWAS on cigarette smoking behaviour and nicotine dependence. Sarah Medland will start with a methodological introduction into the most recent developments in imputation and analysis, such as the 1,000 Genome Project, novel statistical approaches and contribution of sequencing data. Next, we will focus on evidence provided by the GWAS conducted in Australia and Finland in samples with sophisticated phenotyping and ascertainment for heavy smokers. Pam Madden and Jaakko Kaprio will present Australian and Finnish data. Further, Marcus Munafò will continue with a GWAS on cotinine levels, the metabolite of nicotine, conducted in the UK. Finally, Andrew Bergen will present novel approaches to identify genes involved in nicotine metabolism and debate alternative solutions, interpretations, or points of view on a body of knowledge.

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## SYM9A

### GENOME-WIDE ASSOCIATION METHODOLOGY: RECENT DEVELOPMENTS IN IMPUTATION AND ASSOCIATION

Sarah E. Medland, Ph.D.\*, Queensland Institute of Medical Research, Australia

Genome-wide association analysis proved to be one of the most successful methods employed to date to identify risk variants and regions of interest. The past five years have yielded extraordinary advances in the understanding of complex trait genetics and a number of these results are in the process of being translated to clinical treatments. As the focus shifts from common to rare variation it is important to consider the lessons learnt from common-variant GWAS and the way in which these can inform rare-variant studies. Current methodological challenges in imputation and analysis of both common and rare variant GWAS will be presented. The implications of these challenges for data imputed using the 1,000 Genome Project reference sets will also be examined. Of particular importance are the challenges that rare-variant analyses present when working collaboratively at the consortium or meta-analysis level. Strategies to overcome these problems will be discussed.

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## SYM9B

### HOW GENETIC FINDINGS FROM GENOME-WIDE ASSOCIATION ANALYSIS CAN LEAD TO REFINEMENT OF SMOKING BEHAVIOR PHENOTYPES

Pamela A.F. Madden<sup>\*1</sup>, Michele L. Pergadia<sup>1</sup>, Grant W. Montgomery<sup>2</sup>, Nicholas G. Martin<sup>2</sup>, and Andrew C. Heath<sup>1</sup>, <sup>1</sup>Washington University School of Medicine, St. Louis, MO, USA; <sup>2</sup>Queensland Institute of Medical Research, Brisbane, Queensland, Australia

Among psychiatric phenotypes, tobacco dependence has been one of the most successful for insights from GWAS findings. Genetic findings from GWAS, such as the robust evidence for smoking outcomes associations with Chromosome 15 CHRNA5 SNP rs16969968 (and its proxy: CHRNA3 SNP rs1051730), may be used to examine assumptions about phenotype definitions for Nicotine Dependence. Here we used GWAS (Illumina platform) and survey interview data obtained from about 9,000 Australian individuals (more than 4,500 regular smokers) recruited for family-based gene-discovery projects focused on alcohol and tobacco phenotypes. Using either MERLIN FastAssoc (quantitative phenotypes), or MQLS (binary phenotypes) for the analysis of these data, genome-wide significant results were observed, including an association between the Fagerstrom-based Heavy Smoking Index Score (HSI) and two SNPs on Chromosome 15 (rs1051730 and rs4887053), which appear to flag separate genetic signals ( $r^2=0.045$ ). Much weaker associations were observed between these SNPs and a measure of DSM-IV Nicotine Dependence and Nicotine Withdrawal. Taking advantage of the robust evidence for smoking outcome associations with Chr 15 CHRNA3 SNP rs1051730, we examined assumptions about phenotype definitions for Nicotine Dependence. Comparing items used to measure DSM-IV and Fagerström-based criterion, strongest associations were observed between rs1051730 and the 3 Fagerstrom-related morning smoking items (hate to give up first cigarette of day; smoke more after first hours after waking; and time to first cigarette). A factor score created using these 3 items was found to have a stronger association with rs1051730 ( $p=9.7E-9$ ) than cigarette smoked per day (CPD); although, no novel GWAS findings were identified. No progress has yet been made in GWAS data on a number of important components of tobacco dependence; e.g., tobacco withdrawal, which is a major predictor of smoking cessation failure.

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## SYM9C

### GENOME-WIDE ASSOCIATION ANALYSIS IN FINNISH TWINS REVEALS NOVEL SUSCEPTIBILITY GENES FOR SMOKING RELATED TRAITS

Jaakko Kaprio, M.D., Ph.D.\*, Department of Public Health, Hjelt Institute, University of Helsinki; Institute for Molecular Medicine Finland FIMM, University of Helsinki and National Institute for Health and Welfare

Regular tobacco smoking represents one of the most preventable causes of morbidity and mortality. Increasingly often smoking is associated with substance abuse and psychiatric disorder co-morbidity. In recent years, the nicotinic acetylcholine receptor gene cluster (CHRNA5-CHRNA3-CHRNA4) on chromosome 15q24-25 has been established in nicotine dependence (ND) and other smoking-related traits, while the evidence for other loci from GWA studies is clearly weaker. Here, we utilized a study sample of twin pairs concordant for ever smoking. This series with extensive phenotypic profiles was ascertained from the Finnish Twin Cohort, involving adult twins born between 1938 and 1957, with baseline in 1975 at age 18 and over. As part of the Nicotine Addiction Genetics (NAG) study, participants were interviewed using the diagnostic SSAGA protocol including a section on smoking behaviour and ND during 2001-2005. Within the current study, we utilized multiple traits measuring smoking behaviour and ND. We performed genome-wide association analysis in 1125 twins with 3,858,597 markers from Illumina 670k chip and HapMap2-based imputation data. Genome-wide significant signals were detected for DSM-IV ND symptoms on 2q33 (best  $p=0.0000008$ ; near CD28), overlapping our previous linkage locus for regular smoking at D2S325 (max two-point LOD 2.56, Loukola et al., 2008) and 8q21 (best  $p=0.000001$ ; near STMN2, coding for a neuronal growth-associated protein), for cigarettes per day (CPD) on 16p12 (best  $p=0.00000007$ ; near SYT17), and sensation felt after smoking the first cigarette on 8p21 (best  $p=0.0000004$ ; near GFRA2, coding for a neurotrophic factor receptor). In the analysis of age at quitting smoking, the most prominent association was detected with rs11717064 on 3q24 ( $p=0.00000009$ ) and two other suggestive SNP associations were detected (rs7739467 on 6p12, and rs11639172 on 15q25, 9Mb apart from CHRNA5). Among subjects ascertained for smoking, detailed phenotyping yields

genome-wide significant signals even with relatively modest sample size. Replication and functional follow-up are still needed.

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## SYM9D

### MEASUREMENT PRECISION AND GENETIC EFFECT SIZE: IMPLICATIONS FOR FUTURE GENOME-WIDE ASSOCIATION STUDIES

Marcus R. Munafò, Ph.D.\*, University of Bristol

Smoking behaviour is known to be highly plastic, so that varying the nicotine content of cigarettes, for example, results in compensatory smoking in order to extract a consistent amount of nicotine. This can be done by inhaling more or less deeply, varying the extent to which filter holes on the cigarette are closed, and so on. One consequence of this is that self-reported cigarette consumption correlates only relatively weakly with the amount of nicotine extracted per cigarette. This means that any genetic signal for heaviness of smoking may be diluted if self-reported cigarette consumption is used as the phenotype. We report data which indicates that the established association between chromosome 15 variants (rs1051730 / rs16969968) and heaviness of smoking is considerably stronger when cotinine levels are used as the phenotype instead of self-reported cigarette consumption, with the proportion of phenotypic variance explained increasing from ~1% to ~5%. The implication is that existing genomewide association studies which have used relatively imprecise phenotypes may have failed to identify loci contributing a meaningful proportion of phenotypic variance. We also report preliminary analyses of genomewide association studies (Illumina Human550 quad array) of cotinine levels in  $n \sim 8,600$  unrelated adolescents and  $n \sim 9,000$  female adults, capturing smoking initiation, heaviness of use in the early stages of tobacco use, and heaviness of use in established smokers.

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## SYM9E

### NOVEL APPROACHES TO IDENTIFY GENES INVOLVED IN NICOTINE METABOLISM

Andrew W. Bergen\*, Aaron Wacholder, Martha Michel, Denise Nishita, Ruth Krasnow, Harold Javitz, and Gary E. Swan, SRI International, Menlo Park, CA

Tobacco smoking is the largest modifiable adverse health behavior and novel treatments are needed to help individuals who wish to quit smoking to do so. The nicotine metabolism literature is primarily focused on a single gene/protein, i.e., CYP2A6, responsible for the largest single pathway of nicotine metabolism, from nicotine to cotinine to 3'-hydroxycotinine. Variance in this pathway remains after accounting for CYP2A6 allelic variation. We applied gene association analyses and genome-wide gene expression analyses to identify novel genes associated with the Nicotine Metabolic Ratio (NMR), the ratio of 3'-hydroxycotinine to cotinine. We used two datasets with pharmacokinetic phenotypes from the administration of labeled nicotine and cotinine, biospecimen sampling, estimation of levels of nicotine, cotinine and metabolites via liquid chromatography-mass spectrometry, and calculation of phenotypes. In the first approach, individuals were genotyped for single nucleotide polymorphisms at >200 pharmacokinetic candidate genes. Linear regression, followed by adjustment for correlated tests within genes identified CYP2A6 and two genes not previously associated with the NMR using the criterion of significant ( $P<0.05$ ) association adjusted for correlated tests in both datasets. In the latter approach, we conducted genome-wide gene expression analysis in total RNA from lymphoblastoid cell lines (LCL) from four monozygotic twin pairs discordant for pharmacokinetic phenotypes. Genome-wide expression analyses were performed on LCL total RNA from each twin pair with over

750,000 probes. Robust Multiarray Averaging and the ComBat algorithm were used to normalize arrays and adjust for batch effects and the Significance Analysis of Microarrays method was used to identify differentially expressed genes. Three and seven genes were positively and negatively associated with the NMR at a FDR of 35% and 20%, respectively. Further analyses of genotype data, confirmation of gene expression differences and gene expression regulation analyses, and analyses of biochemical function can be used to confirm which novel candidate genes are functionally involved with nicotine metabolism.

We thank Jay Tischfield and the Rutgers University Cell and DNA Repository for providing RNA from PKTWIN lymphoblastoid cell lines. We acknowledge funding from DA11170 (GES), from a Collaboration Agreement between Affymetrix, Medco Health Solutions and SRI International, the loan of an Affymetrix Gene Atlas instrument and the provision of Gene ST 1.1 strips and reagents through a Instrument Loan Agreement between Affymetrix and SRI International, and SRI International Internal Research & Development funding.

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## SYM10

### RELATIONSHIP BETWEEN TOBACCO AND OTHER SUBSTANCE USE AMONG YOUNG ADULTS, BY RACE ETHNICITY, EDUCATION, AND INCOME

Chair: Donna M. Vallone, Ph.D., M.P.H.

Presenters: Kymberle L. Sterling, Dr.P.H., Jessica M. Rath, Ph.D., M.P.H., and Andrea C. Villanti, Ph.D., M.P.H.

Discussant: Pebbles Fagan, Ph.D., M.P.H.\*

NHIS 2010 data indicate that, over the past five years, the decline in smoking among young adults has slowed, and disparities in smoking by race/ethnicity, education and income persist. Monitoring the Future data show that young adult use of marijuana and alcohol, including instances of being drunk, remain unchanged over this period. This symposium presents three new studies which explore the relationship between tobacco and other substance use among young adults, with a focus on patterns of use by race/ethnicity, education and financial situation. The first study uses longitudinal data to assess correlations between tobacco, alcohol and marijuana use among young adults with a mean age of 20 at the last data collection. They find that use of the three substances was strongly correlated for blacks and less correlated for whites; among Hispanics, alcohol and marijuana use were correlated, but were not associated with use of tobacco. The second study uses cross-sectional data from the Legacy Young Adult Cohort Study, with over 4000 respondents ages 18-34, to explore tobacco use initiation and use of tobacco products other than cigarettes, by race/ethnicity. The study shows that Blacks and Hispanics are significantly more likely than whites to initiate regular tobacco use after age 18, and that tobacco products other than cigarettes account for about 20% of initiation among Blacks and Hispanics. The third study, also based on the Legacy Young Adult Cohort Study, examines patterns of tobacco and other substance use by education and financial situation. It shows that individuals with greater education and a better financial situation were more likely to have tried their first tobacco product after age 18, and more likely to have used novel products such as the hookah, a pipe or snus. The findings from these studies represent a substantive contribution to the literature on young adult patterns of tobacco and other substance use by race/ethnicity, education and income, and will enhance the effectiveness of prevention and cessation interventions for this audience.

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## SYM10A

### PATTERNS OF COMORBID SUBSTANCE USE AMONG YOUNG ADULTS AT HIGH RISK FOR SMOKING ESCALATION: DIFFERENCES BY RACE AND ETHNICITY

Kymberle L. Sterling, Dr.P.H.<sup>1</sup>, and Robin Mermelstein, Ph.D.<sup>2</sup>, <sup>1</sup>Institute of Public Health, Georgia State University, Atlanta, GA; <sup>2</sup>Institute for Health Research and Policy and Psychology Department, University of Illinois at Chicago, Chicago, IL

Young adulthood is a time of substantial increases in cigarette smoking along with other substances, and the use of multiple substances may increase nicotine dependence as well as difficulties in cessation. This study examined ethnic differences in patterns of cigarette, marijuana and alcohol use among a cohort of young adults at high risk for smoking escalation. The sample was recruited during adolescence (mean

age 15), with an oversampling of youth who had ever smoked (at baseline, 80% had ever smoked). We report data from a 4-year follow-up of these participants (mean age = 19.8 years, SD=0.78; 56.6% female), focusing on White (N = 629); Black (N=181); and Hispanic (N =183) participants. Educational status differed significantly, with 31% of the Black, 41% of the Hispanic, and 19% of the Whites having no more than a high school education. Participants had smoking-intensive social environments; 45.6% lived with a smoker. There were significant differences among the groups in smoking, alcohol, and marijuana use patterns. Whites smoked cigarettes on significantly more days in the past 30 (10.5) than did either Blacks (6.2) or Hispanics (7.9),  $F=10.35$ ,  $P<.0001$ ; and smoked more per day (3.1 vs. 1.0 and 1.5,  $F = 19.61$ ;  $p<.0001$ ). Whites also had significantly higher rates of alcohol problems than either Hispanics or Blacks, including significantly greater quantities when drinking ( $p<.0001$ ) and more drunk episodes ( $p<.0001$ ). Whites were significantly more likely to have ever tried marijuana (76%) than Blacks (67%) or Hispanics (68%), but recent frequency of marijuana use did not vary by group, with 25% smoking marijuana at least once/week. Patterns of association among the 3 substances differed by ethnicity. For Blacks, use of all 3 substances was highly correlated (all  $r's > .5$ ,  $p<.0001$ ). For whites, use of all 3 substances was also significantly comorbid but less so ( $r's .2-.3$ ). Among Hispanics, however, alcohol and marijuana use were significantly correlated, but each was much less related to cigarette smoking. These differing patterns of comorbid substance use have important implications for developing cessation interventions for this age group.

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## SYM10B

### TOBACCO AND OTHER DRUG USE IN A NATIONALLY REPRESENTATIVE SAMPLE OF YOUNG ADULTS: DIFFERENCES BY RACE/ETHNICITY

Jessica M. Rath, Ph.D., M.P.H.\*<sup>1</sup>, Andrea C. Villanti, Ph.D., M.P.H.<sup>2,3</sup>, Donna M. Vallone, Ph.D., M.P.H.<sup>1</sup>, <sup>1</sup>Department of Research and Evaluation, Legacy; <sup>2</sup>The Schroeder Institute for Tobacco Research and Policy Studies, Legacy; <sup>3</sup>Department of Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health

This study examines differential patterns in emerging tobacco product and other substance use by race/ethnicity in the 2011 baseline assessment of the Legacy Young Adult Cohort Study (n = 4,201, ages 18-34). Poisson regression, accounting for sampling weights, was conducted to identify prevalence ratios (PR) for past 30-day use (tobacco and other products), and other drug use. The sample consisted of Whites (53%), Hispanics (28%), Blacks (14%) and respondents who reported being another race (5%). Tobacco products other than cigarettes accounted for about 20% of initiation among Blacks and Hispanics. Blacks were more likely to report little cigars (21% vs. 4%) and Hispanics were more likely to report regular cigars as their first tobacco product ever used (19% vs. 9%) relative to Whites. Blacks were more likely than Whites to report past 30-day use of little cigars (PR=2.95,  $p<.001$ ); they were significantly less likely to report past-30 day use of dip/snuff tobacco (PR=0.11,  $p=0.029$ ). Hispanics were more likely than Whites to report past 30-day use of regular cigars (PR=1.63,  $p=0.004$ ) and hookah (PR=1.72,  $p=0.044$ ). Of the Black respondents who initiated tobacco use with little cigars, 15% report current use of cigarettes only, 16% report dual use (cigarettes and other tobacco products) and 11% report use of other tobacco products only. Among Hispanic respondents who initiated with cigars, 15% report cigarette use only, 11% report dual use, and 5% report use of other tobacco products only. Blacks and Hispanics were significantly more likely than Whites to initiate regular tobacco use after age 18 ( $p<.001$ ). Among respondents who reported using tobacco at least once in their life, Blacks and Hispanics were less likely than Whites to report alcohol use, and blacks were more likely to report marijuana use (PR=1.64,  $p<.001$ ). Results from this study suggest that patterns and products associated with tobacco use initiation differ markedly by race/ethnicity, and use of tobacco products other than cigarettes precipitates the use of cigarettes or dual use. These findings are critical to the development of effective prevention and cessation campaigns.

No funding.

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## SYM10C

### EDUCATION AND FINANCIAL SITUATION: PREDICTORS OF TOBACCO AND OTHER DRUG USE IN A NATIONALLY REPRESENTATIVE SAMPLE OF YOUNG ADULTS

Andrea C. Villanti, Ph.D., M.P.H.<sup>1,2</sup>, Jessica M. Rath, Ph.D., M.P.H.<sup>3</sup>, and Donna M. Vallone, Ph.D., M.P.H.<sup>3</sup>, <sup>1</sup>The Schroeder Institute for Tobacco Research and Policy Studies, Legacy; <sup>2</sup>Department of Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health; <sup>3</sup>Department of Research and Evaluation, Legacy

This study examines differential patterns in emerging tobacco product and other substance use by education and self-described financial situation in the 2011 baseline assessment of the Legacy Young Adult Cohort Study (n = 4,201, ages 18-34). Data were weighted to be nationally representative. Multivariate Poisson regression, accounting for sampling weights, was conducted to identify prevalence ratios (PR) for past 30-day tobacco use and other drug use. Reference groups used were "completion of high school" (education) and able to "meet needs with a little left based on current income" (financial situation). Education and financial situation were positively associated (p<0.001); 37% of those with a college or graduate degree reported living comfortably on their current income compared to 12% of those with less than a high school education. Respondents reporting at least "some college" or "living comfortably on their current income" were more likely to have tried their first tobacco product after age 18. Respondents with at least some college were twice as likely to report having used hookah as their first tobacco product. Those with at least a Bachelor's degree reported greater use of cigars in the past 30 days as compared with those with less education (PR=1.66, p=0.022), controlling for financial situation. Individuals who reported "living comfortably" were significantly more likely than those who were not to have used a pipe (PR=4.51, p=0.001), dip/snuff (PR=2.13, p=0.022) or snus (PR=3.22, p=0.005) in the past 30 days, controlling for education. Alcohol use was greater among those with at least some college education, and lower among those who "did not meet" or "just met" basic expenses. Marijuana use was positively associated with education but negatively associated with a better financial situation. These findings highlight the co-occurrence of tobacco and other drug use among young adults of lower socioeconomic status. The findings indicate that college is an environment for initiation of tobacco use, and available income is a predictor of emerging tobacco product use in young adults.

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## SYM11

### ALCOHOL USE, CRAVING, AND CESSATION OUTCOMES

Chair: David Wetter, Ph.D.<sup>1</sup>

Presenters: Michael Businelle, Ph.D.<sup>2</sup>, Cho Lam, Ph.D.<sup>1</sup>, Jessica Cook, Ph.D.<sup>3</sup>, and James Davis, M.D.<sup>3</sup>

Discussant: David Drobes, Ph.D.<sup>4</sup>

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Tobacco use and alcohol use are clustered behaviors: Smokers are more likely than nonsmokers to drink alcohol, drinkers are more likely than nondrinkers to smoke, there are strong associations between tobacco dependence and alcohol use disorders, alcohol and tobacco are often used together, and laboratory studies suggest that use of one of these drugs may prime the use of the other. Although researchers often refer to the effects of alcohol on tobacco use, it is also plausible that tobacco use impacts subsequent alcohol use. Thus, the patterning of alcohol and tobacco related phenomena (e.g., craving) in real-world settings warrants additional investigation, as does the impact of alcohol use on important clinical outcomes such as cessation and lapse. Using ecological momentary assessment, the first two studies examine the association between alcohol use and craving, as well as potential mechanisms accounting for this relationship. The results indicate a likely reciprocal relationship, highlighting: 1) greater severity of craving early in the day, an increase in craving across the day, and greater volatility of craving on drinking days vs. nondrinking days, and on drinking days, greater volatility of craving after drinking commences; and, 2) that the association between alcohol use and craving may be mediated by positive smoking outcome expectancies. The second two studies examine the impact of alcohol use on smoking cessation, lapse, and relapse. Interestingly, the relationship between alcohol use and outcomes was not necessarily linear, with both non/infrequent drinkers and binge drinkers showing less favorable cessation outcomes than moderate drinkers, as well as different patterns across measures of primary and secondary dependence motives. On a positive note, an innovative intervention designed to treat both alcohol and tobacco use among young

adult smokers yielded promising findings with respect to both increasing cessation and reducing postcessation drinking. Together, these four studies illustrate the complex relations amongst alcohol use, tobacco dependence, craving, and cessation outcomes.

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## SYM11A

### MOMENTARY URGES TO SMOKE AND ALCOHOL CONSUMPTION DURING A SMOKING CESSATION ATTEMPT

Michael S. Businelle, Ph.D.\*<sup>1</sup>, Cho Y. Lam, Ph.D.<sup>2</sup>, Darla E. Kendzor, Ph.D.<sup>1</sup>, Ludmila Cofta-Woerpel, Ph.D.<sup>2</sup>, Jennifer B. McClure, Ph.D.<sup>3</sup>, and David W. Wetter, Ph.D.<sup>4</sup>, <sup>1</sup>University of Texas School of Public Health; <sup>2</sup>Department of Behavioral Science; <sup>3</sup>University of Texas MD Anderson Cancer Center; <sup>4</sup>Group Health Research Institute; <sup>5</sup>Department of Health Disparities Research, University of Texas MD Anderson Cancer Center

Many laboratory and ad libitum smoking studies have indicated that alcohol consumption increases the frequency and intensity of smoking urges. However, little research has examined the relation between smoking urges and alcohol use in natural settings during a specific quit attempt. The purpose of this study was to examine the momentary relation between smoking urge and alcohol use in a sample of women who reported drinking on at least one occasion during the first seven days of a smoking quit attempt (N = 134). Participants were asked to use a handheld device to complete random and participant initiated assessments that recorded smoking urges and recent alcohol use. On average, participants smoked 21 cigarettes per day prior to their quit date, 81% were Caucasian, 38% were married or living with a significant other, and 88% had completed at least "some college." Multilevel analyses were conducted to examine the relation between smoking urge parameters (i.e., intercept, slope, and volatility of smoking urge) and alcohol use. Results indicated that smoking urges were higher during assessments where alcohol had recently been consumed compared to assessments where no alcohol had been consumed. Interestingly, the first urge rating of the day was higher, urge ratings increased at a greater rate as the day progressed, and urges were more volatile on days where alcohol would eventually be consumed as compared to days where no alcohol was consumed. A closer examination of urge parameters on drinking days, controlling for time of alcohol consumption, indicated that urge volatility following alcohol consumption was significantly higher than volatility prior to drinking. However, smoking urge trajectory was not significantly different before and after drinking occurred. The findings suggest that there may be reciprocal relations between urge and alcohol use (e.g., higher initial urges, increasing urges over time, and more volatile urges may contribute to alcohol use; and, alcohol use may increase the volatility of urges). The findings shed light on the relation between alcohol use and smoking urge and may have implications for future smoking cessation interventions.

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## SYM11B

### POSITIVE SMOKING OUTCOME EXPECTANCIES MEDIATE THE RELATIONSHIP BETWEEN ALCOHOL CONSUMPTION AND URGE TO SMOKE: A MOMENTARY ANALYSIS

Cho Y. Lam, Ph.D.\*<sup>1</sup>, Michael S. Businelle, Ph.D.<sup>2</sup>, Ludmila Cofta-Woerpel, Ph.D.<sup>1</sup>, Jennifer B. McClure, Ph.D.<sup>3</sup>, Paul M. Cinciripini, Ph.D.<sup>1</sup>, and David W. Wetter, Ph.D.<sup>4</sup>, <sup>1</sup>Department of Behavioral Science, University of Texas MD Anderson Cancer Center; <sup>2</sup>University of Texas School of Public Health; <sup>3</sup>Group Health Research Institute; <sup>4</sup>Department of Health Disparities Research, University of Texas MD Anderson Cancer Center

Previous laboratory studies have found that alcohol consumption increases urge to smoke and positive smoking outcome expectancies. There is also evidence that smoking outcome expectancies mediate the relations between smoking and correlates of smoking (e.g., negative affect, cigarette taste). However, the question remains whether positive smoking outcome expectancies mediate the relation between alcohol consumption and smoking urge. This study used ecological momentary assessment (EMA) to examine



the association among alcohol consumption, positive smoking outcome expectancies, and smoking urge. Female smokers who were trying to quit (N = 134, mean age = 41.03, mean FTND score = 5.01) used a handheld computer to record their alcohol consumption, positive smoking outcome expectancies, and smoking urge during their first post-cessation week. Participants completed both computer-initiated random and self-initiated (e.g., when tempted to smoke) assessments Using multilevel mediational modeling, the paper found: 1) significant effect of alcohol consumption measured at time j on smoking urge measured at time j + 1, t = 2.24, p = .03; 2) significant effect of alcohol consumption measured at time j on positive smoking outcome expectancies measured at time j, t = 7.26, p < .01; 3) significant effect of positive smoking outcome expectancies at time j on smoking urge measured at time j + 1, t = 11.45, p < .01; and, 4) after adding positive smoking outcome expectancies in the model, a nonsignificant effect of alcohol consumption on smoking urge. Furthermore, the results showed that 58% of the total effect between alcohol consumption and smoking urge could be explained by the mediation effect of positive smoking outcome expectancies. The results suggest that during first 7 days after quitting smoking, female smokers, regardless of their smoking status, report significantly higher smoking urges after they ingest alcohol compared to when they had not recently consumed alcohol. The results further suggest that a significant proportion of the effect of alcohol on urge could be explained by a mediational path through positive smoking outcome expectancies.

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## **SYM11C** **ALCOHOL CONSUMPTION AND SMOKING CESSATION MILESTONES**

Jessica Cook, Ph.D.\*, Megan Piper, Ph.D., Tanya Schlam, Ph.D., and Tim Baker, Ph.D., University of Wisconsin School of Medicine and Public Health, Center for Tobacco Research and Intervention

Both longitudinal community research and clinical research have demonstrated an association between alcohol consumption and smoking cessation failure. However, little is known about the relations between alcohol consumption and smoking cessation milestones (i.e. initial abstinence, lapse and relapse latencies). This study used data from a large prospective clinical trial to: 1) examine the relations between alcohol consumption categories (non/infrequent drinker, moderate drinker, binge drinker) and smoking cessation milestones; and, 2) examine the relations between alcohol consumption categories and smoker characteristics. This study enrolled 1504 smokers who were motivated to quit smoking into a randomized placebo-controlled smoking cessation trial. Alcohol consumption category was identified using the Composite International Diagnostic Interview (CIDI). After controlling for the effects of treatment, race, gender, and cigarettes smoked daily, Cox regression survival analysis showed that alcohol consumption category significantly predicted achievement of initial abstinence and latency to lapse. Relative to moderate drinkers, both non/infrequent drinkers and binge drinkers were less likely to achieve initial abstinence (p<.05), and binge drinkers were more likely to lapse earlier (p<.01). When drinking categories were compared on dependence indices, results showed that relative to moderate drinkers, non/infrequent drinkers were higher in several WISDM (Wisconsin Inventory of Smoking Dependence Motives) Primary Dependence Motives (tolerance, control, and automaticity; p<.05) and binge drinkers were higher in several Secondary Dependence Motives (cues, sensory, and social goads; p<.05). Moreover, compared with moderate drinkers, binge drinkers reported significantly more smokers, and non/infrequent drinkers reported fewer smokers, in their social networks (p<.05). Overall, results suggest that cessation difficulties in binge drinkers could be particularly related to environmental/social influences, whereas non/infrequent drinkers' difficulties may be more influenced by core features of physical dependence.

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## **SYM11D** **PILOT STUDY COMPARING MINDFULNESS FOR TREATMENT OF TOBACCO AND ALCOHOL TO A MATCHED EDUCATION-BASED SMOKING CESSATION INTERVENTION**

James Davis, M.D.\*, David Mills, Alison Manly, Kristin Stankevitz, and Timothy Baker, Ph.D., University of Wisconsin School of Medicine and Public Health, Center for Tobacco Research and Intervention

Overview: We report results of a pilot, randomized clinical trial designed to provide efficacy data on a novel smoking cessation intervention, Mindfulness for Tobacco and Alcohol (MTA), in young smokers with ongoing alcohol abuse. Mindfulness is a cognitive skill taught to improve moment-to-moment awareness, acceptance, and non-reactivity to thoughts, sensations and emotions. MTA consists of 8 weekly classes that provide instruction on how to apply mindfulness skills to manage smoking triggers, strong emotions, addictive thoughts and withdrawal symptoms. Methods: The study compared MTA to a time/intensity matched education-based control group. Recruitment was conducted at a local university and technical college. Participants were asked to permanently quit smoking and temporarily quit drinking on the quit day, and were provided with no smoking cessation medications. Primary outcome measures included biochemically confirmed smoking abstinence and alcohol use at 2, 8 and 24 weeks post-quit with a 14-day time-line follow-back. Results: The sample (N = 65) was 69.2% male with mean age = 24.6 years and mean drinks per week = 11.1. Intent-to-treat analysis showed 2-week point prevalent abstinence rates for treatment group = 16.67% and for controls = 3.45% (p=.071). Number of drinks per week in the first 2 weeks post-quit predicted smoking relapse at 2 weeks post-quit (abstinent = 6.6/week) (relapse = 14.1/week) (p = .049). Also, the mean time to first drink (4.70 days) was correlated with the mean time to first cigarette after quitting (5.05 days) (r = .513). From baseline to two weeks post quit, controls increased their alcohol consumption by 4.14 drinks per week, whereas the treatment group decreased their drinks per week by 2.25 per week (p = .14). Conclusions: The effect sizes suggest that the MTA intervention produced some benefit in this population with regard to smoking and drinking outcomes, but a larger trial would be required to draw more substantive conclusions.

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## **SYM12** **TRANSLATING EVIDENCE OF EFFECTIVENESS OF BEHAVIOR CHANGE INTERVENTIONS FOR SMOKING CESSATION INTO A NATIONAL PROGRAM**

Chair: Susan Michie, Ph.D.<sup>1</sup>

Presenters: Robert West<sup>2</sup>, Andy McEwen<sup>2</sup>, Fabiana Lorencatto<sup>1</sup>, and Leonie Brose<sup>2</sup>

Discussant: Suzanne Colby, Ph.D.<sup>3</sup>

<sup>1</sup>NHS Centre for Smoking Cessation and Training, UK and Centre for Outcome Research and Effectiveness, University College London, UK; <sup>2</sup>NHS Centre for Smoking Cessation and Training, UK and Health Behaviour Research Centre, University College London, UK; <sup>3</sup>Center for Alcohol & Addiction Studies, Brown University, Providence, RI, USA

Aims This symposium presents findings from the English National Health Service (NHS) Centre for Smoking Cessation and Training (NCSCT) whose role is to determine 'best practice' in smoking cessation support and translate this into assessment and training of stop-smoking practitioners at a national level. Rationale Behavioral support for smoking cessation, shown in RCTs to increase the chances of stopping by 50-100%, is one of the most cost-effective life-preserving interventions available. England was the first country to introduce a national smoking cessation service; however, success rates and practices vary across the network. The NCSCT was funded by the Department of Health to help bring the performance of all services up to the standard of the best. This involves undertaking research to establish what behavior change techniques (BCTs) are used and which are most effective and to design, implement and evaluate training and assessments for practitioners to ensure that they can deliver these BCTs effectively. Summary This symposium describes the research underpinning the work of the NCSCT as an example of how a scientific approach to understanding behavior change can be applied at a national level to improve public health. Four inter-linked studies will be presented. West will report the wide variation in practice and success rates in Stop-Smoking Services in England; McEwen will describe behavioral support for smoking cessation in terms of evidence-based behavior change techniques and their reported frequency of use; Lorencatto will present the findings of audio-recorded behavioral support sessions and the frequency of techniques used in practice; and

Brose will describe a training program for stop-smoking practitioners and its impact on their knowledge and confidence in their competence to deliver effective interventions.

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## SYM12A

### VARIATION IN SUCCESS RATES IN THE ENGLISH STOP-SMOKING SERVICES: NEED FOR AN EVIDENCE-BASED APPROACH

Robert West<sup>\*1</sup>, Leonie Brose<sup>1</sup>, and Matthew West<sup>2</sup>, <sup>1</sup>NHS Centre for Smoking Cessation and Training, UK and Health Behaviour Research Centre, University College London, UK; <sup>2</sup>British Websites Ltd.

**Objectives:** To examine how far variation between success rates across Stop-Smoking Services (SSSs) and Stop-Smoking Practitioners (SSPs) in England can be explained by smoker characteristics and broad differences in service provision. **Methods:** CO-verified 4-week quit rates across SSSs were compared across 24 SSSs (126,000 clients) for whom individual data were available on key smoker characteristics, type of medication used, setting and use of group versus individual support. **Results:** There was wide variation across SSSs and SSPs in success rates, even after adjusting for key smoker characteristics. Type of medication used, setting and group versus individual support explained a significant proportion of this variance but a large amount remained unexplained. **Discussion:** It seems likely that variation in practice between SSSs and SSPs contributes to substantial variation in outcome in the English SSSs. It is important to assess what underlies this variation to enable more smokers to receive optimal support.

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## SYM12B

### STOP SMOKING PRACTITIONERS' SELF-REPORTED USE OF EVIDENCE-BASED BEHAVIOR CHANGE TECHNIQUES (BCTS)

Andy McEwen<sup>\*1</sup>, Fabiana Lorencatto<sup>2</sup>, Susan Michie<sup>2</sup>, and Robert West<sup>1</sup>, <sup>1</sup>NHS Centre for Smoking Cessation and Training, UK and Health Behaviour Research Centre, University College London, UK; <sup>2</sup>NHS Centre for Smoking Cessation and Training, UK and Centre for Outcome Research and Effectiveness, University College London, UK

We set out to examine self-reported use of sixteen behavior change techniques (BCTs) with demonstrated effectiveness amongst National Health Service (NHS) stop smoking practitioners in England. An online survey was made available via a hyperlink sent out in an electronic flier to all 152 NHS stop smoking service managers in England, with a request that they forward it on to their stop smoking practitioners. Four hundred and eighty four stop smoking practitioners completed the survey and estimated their use of each BCT 'always' over the last three months on a five-point scale (1='never'; 5='always'). Practitioners reported very high use of most BCTs (range 47-95%). All but one was reported being used by over 50% of practitioners and 10 of the 16 were used by over three-quarters of respondents. Giving information and advising on medication use were the two BCTs reportedly used by most practitioners (95% and 93% respectively) and providing information about options for additional support was reported by the fewest (47%). This is the first study to investigate the delivery of individual elements of behavioral support to smokers, and the first to assess use of evidence-based BCTs. The variability between the effectiveness of individual practitioners is not reflected in their reported use of BCTs in this survey; suggesting that they may be an overestimate. We also only measured self-reported use of the BCTs and not how effectively they were delivered. An important next step therefore is to investigate concordance between self-reported use of BCTs and observed practice. The less frequently used BCTs and those delivered less well should be targeted in training programs.

*This study was funded by the Department of Health (DOH T336/BSS/M award number 49945).*

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## SYM12C

### IDENTIFYING EVIDENCE-BASED BEHAVIOR CHANGE TECHNIQUES (BCTS) FOR SMOKING CESSATION BEHAVIORAL SUPPORT DELIVERED IN PRACTICE

Fabiana Lorencatto<sup>\*1</sup>, Robert West<sup>2</sup>, Natalie Seymour<sup>3</sup>, and Susan Michie<sup>1</sup>, <sup>1</sup>NHS Centre for Smoking Cessation and Training, UK and Centre for Outcome Research and Effectiveness, University College London, UK; <sup>2</sup>NHS Centre for Smoking Cessation and Training, UK and Health Behaviour Research Centre, University College London, UK; <sup>3</sup>NHS Centre for Smoking Cessation and Training, University College London, UK

Behavioral support interventions effectively help smokers to quit. Due to the complexity of these interventions, it is often unclear which component BCTs comprise behavioral support. There is also limited knowledge of the extent to which BCTs established as evidence-based are being applied in actual practice. A coding-based method for specifying the components of behavioral support interventions described in published trial reports and service treatment manuals has recently been established. Whether this method may be applied to reliably specify the content of behavioral support in actual practice remains to be ascertained. Our objectives were to examine to what extent: i) Component BCTs delivered in practice by the NHS Stop Smoking Services (SSSs) can be reliably identified using an established taxonomy of 40 smoking cessation BCTs ii) Sixteen BCTs with demonstrated intervention effectiveness feature in practice. Fourteen behavioral support sessions delivered by NHS SSSs were audio-recorded. Session transcripts were coded into component BCTs following a content analysis approach using the taxonomy as a coding framework. The frequency of BCTs included in sessions was recorded, focusing on the frequency of use of the sixteen evidence-based BCTs. Inter-rater coding agreement was assessed. Average inter-rater agreement was high (96.8%). Thirty-seven BCTs (92.5%) featured at least once across sessions. Sessions contained an average of 22 BCTs per session (SD 1.7, range: 12-31). Of the evidence-based BCTs, some occurred infrequently: 'facilitate use of social support (2/14 sessions), 'advise on changing routine,' 'provide rewards,' 'provide information on withdrawal symptoms' and 'advise on conserving mental resources' (4/14). This is the first ever demonstration that BCTs in behavioral support for smoking cessation can be reliably identified and categorized in practice; preliminary findings suggest many evidence-based BCTs are infrequently delivered in practice. A discrepancy between previously established self-reported and presently identified actual use of evidence-based BCTs appears to exist. The next step is to establish the generalizability of this.

*This study was part of the work of the NHS Centre for Smoking Cessation and Training that is funded by the Department of Health (DOH T336/BSS/M award number 49945).*

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## SYM12D

### EVALUATION OF THE TRAINING PROVIDED BY THE NHS CENTRE FOR SMOKING CESSATION AND TRAINING (NCSCT)

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To date no training programmes for Stop Smoking Practitioners have been subject to formal evaluation. Objectives were (i) To describe an innovative training program for stop smoking practitioners and (ii) To evaluate its impact on practitioners' knowledge and confidence in their competence to deliver effective interventions. Training consists of two stages: knowledge is taught online (ncsct.co.uk), skills are trained in face-to-face group courses. Knowledge was assessed using 778 practitioners' responses to multiple choice questions (validated using free text responses) before and after use of the online training. Interactions of the change in knowledge with professional experience and previous training were analysed; the association of the change in knowledge with time spent on training was examined. Skills were assessed using practitioners' ratings of confidence in 16 competences completed before, immediately after (both n: 164-165) and three months after (n: 118-119) skills training; satisfaction with aspects of the training courses was rated (n: 335-386). Practitioners' knowledge improved significantly (p<0.001); scores showed predicted associations with free text responses. Knowledge scores improved irrespective of practitioners' previous training and experience and differences between practitioners were significantly reduced after training. Time spent using the online training predicted improvement. Practitioners' confidence in all competences improved during skills training (all p<0.001); improvement was maintained at follow-up. Aspects of the training received 87% to 99% positive satisfaction ratings.

In conclusion, the training improved practitioners' knowledge, benefiting practitioners with any level of previous knowledge and it improved practitioners' confidence in their competence. Associations with actual competence and smoking cessation rates are being investigated.

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**PAPER SESSION 1: VARENICLINE: LEARNING  
 MORE ABOUT WHAT WORKS**

**PA1-1**

**EXTINCTION OF SMOKING DURING RESPONSE TO VARENICLINE: IS ONE WEEK LONG ENOUGH?**

Rebecca L. Ashare, Ph.D.\*, Rachel L. Dumont, B.A., Kathy Z. Tang, M.S., A. Clementina Mesaros, Ph.D., Ian A. Blair, Ph.D., Frank Leone, M.D., and Andrew A. Strasser, Ph.D., University of Pennsylvania

Varenicline is an effective smoking cessation treatment. Recent work suggests it reduces smoking behavior prior to quitting. We examined the effect of extended pre-cessation treatment with varenicline on smoking behavior among 17 (3 female) non-treatment seeking adult smokers (mean age = 43 years; mean CPD = 20; mean FTND = 5.1). Using a within-subjects, double-blind, placebo-controlled crossover design, participants received standard dosing of varenicline for 21 days, followed by a 14-day washout period and 21 days of placebo; order counterbalanced. CPD, topography, craving (QSU), and side effects (e.g., nausea) were assessed on days 1, 4, 7, 10, 14, 18, and 21. Biomarkers (e.g., urinary nicotine) were collected on days 1, 7, and 21. Repeated measures ANCOVAs, controlling for age, FTND, and drug order were used for all outcomes. For CPD, the drug x time interaction was significant,  $F(1,13)=17.4$ ,  $p=.001$ . Post-hoc comparisons indicated that in the varenicline phase, CPD did not change between days 1 and 7,  $ps>.17$ , but there was a 23% decrease between days 10 and 21,  $p<.02$ . CPD did not change in the placebo phase,  $F<1$ . Urges to smoke for pleasure (QSU factor 1) decreased in the varenicline phase,  $F(1,13)=6.0$ ,  $p=.03$ . QSU scores did not decrease between Days 1 and 10, but did beginning at Day 14,  $F(1,13)=11.8$ ,  $p<.01$ . As hypothesized, there were no changes in urges to smoke for withdrawal relief (QSU factor 2). Consistent with CPD, urinary nicotine decreased from day 1 to 21 in the varenicline phase,  $F(1,13)=6.1$ ,  $p=.03$ , but not the placebo phase,  $F<1$ . There were no significant changes in breath carbon monoxide, or topography,  $ps>.22$ . Nausea tended to be higher during varenicline compared to placebo,  $p=.06$  and peaked at day 7. Even though the current smokers were not treatment-seekers, treatment with varenicline resulted in significant reductions in smoking behavior. Results have important treatment implications. Namely, the fact that changes in CPD and craving did not occur until days 10 and 14, respectively, suggests that some smokers may benefit from a longer pre-cessation duration of treatment in order to extinguish a complex behavior such as cigarette smoking.

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**PA1-2**

**A DOUBLE-BLIND, PLACEBO-CONTROLLED STUDY EVALUATING THE SAFETY AND EFFICACY OF VARENICLINE FOR SMOKING CESSATION IN SCHIZOPHRENIA AND SCHIZOAFFECTIVE DISORDER**

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Objective: Patients with schizophrenia have high rates of cigarette smoking (58–88%) compared with the general population (approx 20%), and have more difficulty with quit attempts. Given the high rates of tobacco-related morbidity and mortality in smokers with schizophrenia, safe and effective treatments are needed. We evaluated the safety and efficacy of the alpha4beta2 nicotinic partial agonist, varenicline for smoking cessation in patients with schizophrenia and schizoaffective disorder. Methods: In this randomized, double-blind, placebo-controlled, multicenter trial, subjects were clinically-stable outpatients, aged 18–75 years with confirmed schizophrenia or schizoaffective disorder who smoked  $\geq 15$  cigarettes/day and were motivated to quit. Subjects were randomized in a 2:1 ratio to receive either varenicline 1mg BID or placebo for 12 weeks, with 12 weeks post-treatment follow-up. Results: In total, 127 participants received study medication (varenicline n=84; placebo n=43). Study retention rates were comparable between groups (varenicline: 73%; placebo: 86%). At the 12-week end of treatment assessment, the 7-day point prevalence of abstinence (PPA) was 19.0% (16/84) in the

varenicline group compared with 4.7% (2/43) (4.7%) for placebo (OR: 4.74 [95% CI: 1.03, 21.78],  $p=0.046$ ). At Week 24, the 7-day PPA was 11.9% (10/84) versus 2.3% (1/43) of subjects in the varenicline and placebo groups, respectively (OR: 6.18 [95% CI: 0.75, 50.71],  $p=0.09$ ). Total rates of adverse events (AEs) were similar in both groups, with the most frequent AEs in the varenicline group being nausea (23.8% vs placebo 14.0%), headache (10.7% vs placebo 18.6%), and vomiting (10.7% vs placebo 9.3%). There was no significant change in positive and negative symptoms of schizophrenia, or in mood and anxiety ratings. Conclusions: Varenicline was well-tolerated with no evidence of exacerbation of psychotic or affective symptoms and was associated with significantly higher smoking cessation rates at the end of treatment. Our findings suggest the safety and efficacy of varenicline when used for smoking cessation in patients with schizophrenia and schizoaffective disorder.

This study was funded by Pfizer Inc (www.clinicaltrials.gov identifier: NCT00644969).

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**PA1-3**

**THE EFFECTS OF EXTENDED PRE-QUIT VARENICLINE TREATMENT ON SMOKING BEHAVIOR AND SHORT-TERM ABSTINENCE: A RANDOMIZED CLINICAL TRIAL**

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CONTEXT: Preclinical research and learning theory suggest that a longer duration of varenicline treatment prior to the target quit date (TQD) can help smokers reduce their cigarette consumption during the pre-quit phase leading to better abstinence outcomes. OBJECTIVES: To determine whether extended pre-cessation varenicline treatment resulted in a greater reduction in smoking (cigarettes per day [CPD] and expired-air CO) prior to the TQD and improved bio-verified continuous abstinence during weeks 8-11 post-TQD (final four weeks of treatment). METHODS: A double-blind two-group randomized clinical trial was conducted. Of the 66 treatment-seeking adult male and female smokers from the community who volunteered, 60 were randomized and included in an intent-to treat analysis. Participants were randomized to an extended run-in group (4 weeks of pre-TQD varenicline) or to a standard run-in group (3 weeks of placebo, followed by the typical 1 week of pre-TQD varenicline); both groups received 11 weeks of post-TQD varenicline and brief counseling support. RESULTS: The Extended Run-In group demonstrated a significantly greater reduction in cigarettes per day during the pre-quit period compared to the Standard Run-In group (CPD, 42% vs. 24%),  $p<0.01$ . The reduction in the Extended Run-In group was more pronounced among women than men (57% vs. 26%,  $p=0.001$ ). CO exhibited a similar pattern, with a marked reduction among women in the Extended Run-In group. Continuous abstinence during the final four weeks of treatment (Weeks 8-11 post-TQD) was enhanced among women receiving extended pre-quit varenicline (67%) compared to a standard run-in (35%;  $p=.05$ ), but not among men (both groups were ~40%). CONCLUSIONS: These data generally support the hypothesis that increasing the duration of pre-quit varenicline therapy reduce smoking during the pre-quit period and may enhance cessation outcomes above the already notable abstinence rates obtained using standard varenicline dosing. These effects may be greater among women. Stronger conclusions await confirmatory evidence from a larger clinical trial.

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**PA1-4**

**REAL WORLD EFFECTIVENESS OF VARENICLINE AND NICOTINE REPLACEMENT THERAPY: FINDINGS FROM AN OUTPATIENT SMOKING CESSATION CLINIC**

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Nicotine replacement therapy (NRT) has been used for many years in the treatment of tobacco dependence. Varenicline use has been increasingly popular over the last few years but evidence of its real world effectiveness is limited. The purpose of this study was to compare the effectiveness of nicotine replacement therapy and varenicline

for smoking cessation among patients who received individualized treatment from a multidisciplinary outpatient smoking cessation clinic within a mental health facility. To achieve this, a retrospective chart review was conducted in 200 smokers matched by age and sex who were treated with either varenicline (N=100) or NRT (N=100). In addition to treatment outcomes, patient and treatment characteristics were compared between groups. Patients in both groups attended an average of 4 to 5 treatment visits to the clinic. Self-reported history of mental illness was high in the overall sample (69.5%); a history of depression was the most prevalent mental illness in both the NRT (56.3%) and varenicline (46.0%) groups. Anxiety (49.5% vs. 27.0%,  $p < .001$ ) and schizophrenia spectrum disorders (12.0% vs. 2.0%,  $p = .01$ ) were more prevalent in the NRT group. The end of treatment quit rates were significantly higher among the varenicline group (32.0%) compared to NRT group (18.0%),  $p = .02$ . After controlling for history of psychiatric illness, baseline FTND scores, and total number of treatment visits, medication type remained a significant predictor of end-of treatment quit rates with varenicline two times more effective than NRT (OR=2.2; 95% CI=1.1-4.6). Nausea was the only adverse effect for which there was a significant difference, being higher in the varenicline group (14.0%) versus the NRT group (3.0%). There were no serious adverse events, including psychiatric events. In conclusion, these findings suggest that varenicline treatment is safe and effective even in patients with a history of mental illness and is associated with higher quit rates than nicotine replacement therapy in these patients.

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**PAPER SESSION 2: ADOLESCENT SMOKING:  
 BELIEFS AND BUILDING ON TECHNOLOGY**

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**PA2-1**

**FEELINGS OF SUBJECTIVE INVULNERABILITY AND PERCEPTIONS OF TOBACCO-RELATED BENEFITS INFLUENCE ADOLESCENT SMOKING BEHAVIOR**

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Epidemiological data show that approximately 80% of all smokers start smoking before 18 years of age. Identifying which factors influence adolescents' decisions to start smoking is necessary to improve interventions aimed at reducing tobacco use. Models of health behavior postulate and research confirms that lower perceptions of tobacco-related risks and higher perceptions of benefits predict an increased likelihood to initiate smoking. Little is known about what factors drive these perceptions. Theories of adolescent development posit that adolescents engage in risk behavior because they feel invulnerable to physical and psychological harm. These general feelings of invulnerability may drive adolescents' perceptions of the risks and benefits of smoking, and thus be targets for intervention. There are no studies to date that have examined this possibility. Using longitudinal data, the current study was designed to determine (1) the direction of influence between invulnerability and smoking, (2) whether danger (physical) and psychological invulnerability differentially influence adolescent smoking, and (3) whether smoking-related perceptions mediate the relationship between invulnerability and smoking. Participants were 228 adolescents (57% female; mean age = 14 yrs) recruited from 9th grade classrooms in a CA high school. Participants completed questionnaires during class every 6 months through the end of 10th grade. Data analyses included linear and logistic regression analysis, and multiple mediation analysis. Results showed that only danger invulnerability was related to smoking behavior, and that this relationship was bidirectional. Perceived benefits of smoking, but not perceptions of risk, mediated the relationship between danger invulnerability and smoking behavior ( $ab = .03$ , 95% CI [.004, .078]). Results indicate that adolescents who feel invulnerable to physical danger may be more likely to smoke because they perceive more benefits associated with smoking, suggesting that tobacco prevention efforts, which focus almost exclusively on increasing perceptions of tobacco-related harm, should also focus on decreasing perceptions of tobacco-related benefits.

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**PA2-2**

**LONG-TERM OUTCOMES AND CHALLENGES OF A WEB-BASED CESSATION PROGRAM FOR YOUNG SMOKELESS TOBACCO USERS**

Herb Severson\*, Brian Danacher, Judy Andrews, and Milagra Tyler, Oregon Research Institute

The MyLastDip project is a NCI-funded randomized controlled trial that compared two Web-based interventions targeted to smokeless tobacco (ST) users ages 14 -25. The two conditions were: (a) a highly interactive targeted and tailored website that provided cessation materials, advice and support to teen ST users (Enhanced Condition), and (b) a more static information website that presented more static (non-tailored) cessation content (Basic Condition). Assessments occurred at baseline and at both 3 and 6 months following enrollment. We use a CONSORT diagram to describe participant flow in the program for 1718 study participants. We also describe our national recruitment process and compare the efficacy of various methods for recruitment. We present participant baseline characteristics and outcome results in terms of ST abstinence and all-tobacco abstinence at the 3- and 6-month assessments. Complete case analysis showed self-reported abstinence rate at 3 months of 43.4% and 38.8% for Enhanced and Basic conditions, respectively. Abstinence rates at 6 months were 46% and 43%. Intent-to-treat imputation results will also be reported. While the Enhanced program appears significantly more effective at 3 months this difference dissipated at the 6 month follow-up. Absolute levels of abstinence was encouraging and consistent with prior research. Results will be related to measures of user engagement with the program. Strengths and limitations of the study will be noted and implications of these results for enhancing the design of Web-based tobacco cessation interventions generally will be highlighted.

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**PA2-3**

**RELATIONSHIP BETWEEN MOMENTARY AFFECT STATES AND SELF-EFFICACY IN ADOLESCENT SMOKERS**

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Dynamic changes in self-efficacy (SE), or confidence in one's ability to abstain from smoking, predict the occurrence of lapses and relapse among adolescent smokers. It is essential to identify factors that predict dynamic changes in SE, in order to improve treatments for this population. Previous research suggests that momentary increases in negative affect are associated with decreases in SE. However, the specific nature of these affective states is unknown. In this study, we examined the relationship between momentary changes in individual affect states and SE. The study included 208 daily smokers between the ages of 14-18 (mean=16.6) years old, who were interested in quitting smoking. Participants completed assessments of affect states and SE 5-10 times per day just before smoking and at random, non-smoking times for 3 weeks (1 prior to and 2 after quitting). Ten affect items were administered in each assessment that addressed 4 combinations of affect valence and arousal (pleasant/unpleasant by high/low activation). SE was measured with a single item. Generalized estimating equations were used to assess the relationship between affect states and momentary SE in the pre- and post-quit intervals. Following the quit attempt, SE was negatively associated with unpleasant/activated states (e.g., fidgety, irritable; linear coefficients =  $-.01$ -.05,  $p < .05$ ) and positively associated with pleasant/deactivated states (relaxed, calm; linear coefficients =  $.02$ -.04,  $p < .01$ ). SE was generally unrelated to pleasant/activated (cheerful, excited) and unpleasant/deactivated (sad, bored) states. Surprisingly, SE was robustly associated with all affect states during the pre-quit period. SE is not static following an attempt to quit smoking among adolescents; it covaries with affect states. In particular, unpleasant/activated and pleasant/deactivated states were associated with SE. As these affect states are mirror images of one another, these relationships may reflect a common underlying biological or psychological mechanism. These findings may help improve treatments for adolescents by specifying individual affect states that may lead to relapse.

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## PA2-4

### MENTHOL USE IN YOUNG ADULTS: IMPLICATIONS FOR INITIATION AND CESSATION

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National studies report high prevalence of menthol cigarette use among youth and young adult smokers. However, few of these studies have addressed whether current menthol users initiated smoking with a menthol brand or describe how young adult smokers would respond to a possible menthol ban. The current study uses baseline data from the Legacy Young Adult Cohort study to examine menthol use among young adult (ages 18-34) smokers. Data were weighted to provide nationally-representative estimates. Prevalence ratios were estimated using Poisson regression to identify associations between menthol use and demographic characteristics. In this sample of 706 smokers, 47% (95% CI: 43-51%) reported current use of a menthol brand cigarette. Menthol users were significantly more likely to be young (aged 18-24), female, Black, Hispanic, or other race, and of lower education. Among all smokers, 40% (95% CI: 36-45%) reported smoking menthol cigarettes at smoking initiation. When menthol smokers were asked what they would do if menthol cigarettes were no longer sold, 41% reported that they would switch to a non-menthol cigarette, 13% would switch to some other tobacco product and 37% would quit smoking and not use any other tobacco product. Other responses (8%) included switching to mint flavored e-cigarettes, buying menthol cigarettes from another country and adding menthol flavoring to cigarettes/tobacco. This study demonstrates persistent disparities in menthol use in a nationally representative sample of young smokers. It supports previous studies showing a relationship between menthol use and smoking initiation as well as the possibility that if menthol cigarettes were not available, young adults who would have initiated with menthol cigarettes may delay initiation or may not ever start smoking. This study also complements recent research indicating the possibility that a menthol ban may facilitate smoking cessation in young smokers.

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### PAPER SESSION 3: DOPAMINE: EVERYONE'S FAVORITE MONOAMINE

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## PA3-1

### B2 NACHRS ON DA AND GABA VTA NEURONS RESPECTIVELY SIGNAL THE AVERSIVE AND REWARDING MOTIVATIONAL EFFECTS OF ACUTE NICOTINE

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The ventral tegmental area (VTA) of the mesolimbic dopamine system, containing both dopamine (DA) and gamma-aminobutyric acid (GABA) neurons, has been implicated in the processing of nicotine's acute motivational effects. Our previous work showed that nicotine injected directly in to the VTA in previously drug-naïve animals produces a DA-mediated aversive response as well as a GABA-mediated rewarding motivational response. The  $\beta 2$  subunit of the nicotinic acetylcholine receptor (nAChR) is necessary and sufficient for nicotine motivation, and can be found of both DA and GABA neurons in the VTA. We hypothesized that  $\beta 2$  nAChRs on VTA DA neurons mediate acute nicotine aversions while  $\beta 2$  nAChRs on VTA GABA neurons mediate acute nicotine reward. We selectively re-expressed the  $\beta 2$  nAChR subunit on GABA or DA neurons in the VTA of  $\beta 2$  knockout (KO) mice and subjected these mice and their controls to place conditioning after injection of a low (0.35 mg/kg) or high (1.75 mg/kg) dose of acute nicotine. Our results show that WT mice will exhibit a rewarding motivational response to the low dose and an aversive motivational response to the high dose of acute nicotine, while global  $\beta 2$  KO mice will not show a preference or aversion to either dose of acute nicotine. Selective re-expression of the  $\beta 2$  nAChR on VTA DA neurons rescued the aversive but not the rewarding motivational response to acute nicotine, while re-expression of the  $\beta 2$  nAChR on VTA GABA neurons restored the rewarding but not the aversive motivational response. These results doubly dissociate the role of DA and GABA VTA neurons in the motivational response to acute nicotine.

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## PA3-2

### CLASSIFICATION OF VTA NEURONS IN FREELY MOVING RATS

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Nicotine is the main addictive component found in tobacco. Nicotine modulates midbrain dopamine (DA) neurons of the ventral tegmental area (VTA) and substantia nigra compacta (SNc) that participate in subconscious decision making and goal-directed behavior. Alterations in DA transmission contribute to disorders such as drug addiction, schizophrenia, and Parkinson's disease. To study dopamine's role in these disorders, it is necessary to accurately identify the DA phenotype. The VTA and SNc consist of at least 4 different cell types, including neurons that release DA, GABA, glutamate, and others that co-release both DA and glutamate. For electrophysiological studies, immunohistochemical identification of the recorded neuron in combination with electrophysiological and pharmacological markers remains the most reliable standard for neuron identification. Electrophysiological techniques such as antidromic activation and juxtacellular labeling have proven valuable in the anesthetized preparation, but are not practical in a freely behaving animal. Due to these technical limitations, studies of midbrain DA neurons in the awake animal have relied primarily on indirect electrophysiological (e.g., action potential width, basal firing rate, and burst activity) and pharmacological (e.g., DA D2 receptor pharmacology) methods for the identification of the DA phenotype. In this study, we hypothesized that neurons of the same class should consistently group together when viewed in a multidimensional space. Using *in vivo* tetrode recording methods, this study performed a multidimensional clustering analysis on a range of common VTA neuronal parameters, including spontaneous action potential properties and D2 pharmacological responses, to codify putative neuronal types. While each parameter alone is not sufficient, together they reliably separated at least two distinct neuronal populations that have characteristics attributed previously to VTA DA and GABA neurons.

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## PA3-3

### DECREASE IN ALPHA6BETA2\* NACHR SIGNALING IN NONHUMAN PRIMATE NUCLEUS ACCUMBENS WITH LONG-TERM NICOTINE

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Nicotine is the main component responsible for the addictive nature of tobacco smoking, the second leading cause of death worldwide. Although many smoking cessation therapies are available, long-term success rates are only ~5%. Thus, identification of the molecular and cellular changes with nicotine exposure is critical as this may lead to the development of more successful treatment options. Recent work suggests that alpha6beta2\* nAChRs dominate in the control of nAChR-mediated DA release in the nucleus accumbens. However, the effects of long-term nicotine exposure on alpha6beta2\* nAChR-mediated dopaminergic function are only beginning to be understood. Our previous voltammetry studies show that chronic nicotine treatment (months) completely abolished alpha6beta2\* nAChR-mediated dopamine release in accumbal slices from nicotine-treated monkeys, as assessed using nAChR blockers. The present studies were done to investigate the mechanisms underlying this depression of alpha6beta2\* nAChR-mediated release. Monkeys were given vehicle or nicotine in the drinking water for 2-3 months. We then performed voltammetry experiments to test whether direct application of the agonist nicotine could modulate DA release in slices from both treatment groups. Acute exposure of the slice to nicotine decreased single-pulse stimulated dopamine release in vehicle-treated monkeys and also in nicotine-treated animals, although to a much lesser extent. This observation suggests that alpha6beta2\* nAChRs are partially functional after nicotine treatment. Next, synaptosomal [3H]-dopamine release assays were done to determine the effect of nicotine treatment on the dopamine release process. Alpha6beta2\* nAChR-mediated [3H]-dopamine release was similar in vehicle and nicotine-treated monkeys at concentrations ranging from 0.1 to 100  $\mu$ M nicotine. This finding indicates that long-term nicotine administration does not directly modify alpha6beta2\* nAChR-mediated dopamine release. Instead chronic

nicotine exposure may induce its depressant effect via changes in signaling mechanisms linked to alpha6beta2\* nAChR-mediated dopaminergic function.

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## PA3-4

### PROTEIN KINASE C EPSILON MODULATES NICOTINE CONSUMPTION AND DOPAMINE REWARD SIGNALS IN THE NUCLEUS ACCUMBENS

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Nicotine and alcohol addiction are very widespread and often occur together. Although nicotine and alcohol addiction share common genetic factors, the molecular mechanisms underlying their co-morbidity are unknown. Currently, there are no single drugs approved for the simultaneous treatment of both conditions. Our studies suggest that protein kinase C epsilon (PKCe) is a common mechanism mediating co-morbid nicotine and alcohol addiction. We have previously shown that mice lacking PKCe (Prkce<sup>-/-</sup> mice) show decreased ethanol self-administration and reward, and increased aversion to ethanol. In this study, we found that Prkce<sup>-/-</sup> mice (n=23) consume less nicotine in a 4-week two-bottle choice test [Fgenotype (1,135)=17.39, P=0.0001; Fweek (3,135)=6.13, P=0.006; Fgenotype x week (3,135)=3.37, P=0.02] compared with wild type mice (n=24). Prkce<sup>-/-</sup> mice also show decreased nicotine reward in a conditioned place preference test [Fgenotype (1,112)=1.47, P=0.228; Fdose (3,112)=2.36, P<0.076; Fgenotype x dose (3,112)=3.04, P=0.032]. These behaviors are associated with a 26-28% reduction in alpha6 (P=0.03) and beta3 (P=0.01) mRNA in the striatum and a 22% decrease in both (P=0.04) transcripts in the ventral midbrain, with no differences in alpha4 or beta2 mRNA. The alpha6-containing nicotinic receptors (nAChR) located on dopaminergic terminals in the nucleus accumbens modulate dopamine release - inhibition of these receptors increase the contrast in dopamine levels released during low and high frequency dopamine neuron firing. We tested if the reduction in alpha6 and beta3 nAChR subunit mRNA resulted in reduced nAChR function in Prkce<sup>-/-</sup> mice. Using fast scan cyclic voltammetry, we found reduced alpha6-containing nAChR modulation of dopamine release in the nucleus accumbens [Fgenotype (1,42)=4.14, P=0.05; Ftreatment (2,42)=96.66, P<0.0001; Fgenotype x treatment (2,42)=9.97, P=0.0003] from Prkce<sup>-/-</sup> brain slices, indicating a reduction in alpha6-containing nAChR function. Our results indicate that PKC $\epsilon$  regulates reward signaling through  $\alpha$ 6-containing nAChR and suggest that PKC $\epsilon$  could be a target for the treatment of co-morbid nicotine and alcohol addiction.

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## PAPER SESSION 4: BIOLOGICAL INDICES OF SMOKE EXPOSURE

## PA4-1

### AN EXPERIMENTAL EVALUATION OF TOBACCO SMOKE POLLUTION CONCENTRATIONS IN A SIMULATED DOORWAY ENVIRONMENT UNDER CONTROLLED WIND CONDITIONS

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**BACKGROUND:** There is no known risk-free level of exposure to tobacco smoke pollution (TSP). In Canada, outdoor smoking restrictions are present in environments like doorways; however, these restrictions are not ubiquitous, nor consistent. For example, some policies do not permit smoking within 3metres of a doorway, while others do not permit smoking within 30metres. **AIM:** The present study sought to understand how TSP impacts air quality at different distances from a burning cigarette, and how concentrations may vary under different wind conditions. **METHODS:** Experiments were conducted in the University of Waterloo Fire Research Facility, in July 2011. This facility has a wind generation system that can create a highly controlled crossflow (wind

speed & direction). Two cigarettes were pumped manually to mimic smoking using the Health Canada testing protocol (55mL puffs drawn over 2 seconds every 30 seconds). Concentrations of particulate matter (PM<sub>2.5</sub>), an establish proxy measure for TSP, were measured before and during cigarette smoking at set distances upwind (3m and 1m) and downwind(1m, 3m, 6m, 9m, and 12m) from the cigarettes. Wind speed and direction were set to mimic a range of realistic outdoor conditions including no-controlled-wind, wind at 1.5m/second, and wind at 2.5m/second. **RESULTS:** During the study, background concentrations of PM<sub>2.5</sub> were approximately 6 micrometres/m<sup>3</sup>. When cigarettes were pumped during the no-controlled-wind condition, PM<sub>2.5</sub> concentrations were elevated at all air quality monitoring locations – geometric mean concentrations ranged from 11micrometres/m<sup>3</sup> (12m downwind) to 102 micrometres/m<sup>3</sup> (1m downwind). During the wind conditions, PM<sub>2.5</sub> concentrations upwind were the same as background readings, but concentrations of PM<sub>2.5</sub> downwind were elevated at each monitor. Ranges of concentrations during the 1.5m/second wind scenario ranged from 24 micrometres/m<sup>3</sup> (3m downwind) to 14 micrometres/m<sup>3</sup> (12m downwind). **CONCLUSION:** The results of this study demonstrate that TSP does not vanish in outdoor environments or disappear when it is windy, but can impact air quality as far as 12m away from a cigarette.

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## PA4-2

### PLASMA COTININE VALIDATED SECOND HAND SMOKE (SHS) EXPOSURE IN INFANTS AND CHILDREN ATTENDING URBAN PREVENTATIVE CARE CLINICS

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**OBJECTIVE** Cotinine has been used to study SHS exposure in population-based studies of children ( $\geq 3$  years). The goal of this study was to determine the prevalence of SHS exposure among infants and young children who received preventive care at an urban public hospital. **PATIENTS AND METHODS** Between 11/3/09 and 3/31/10, routine laboratory samples collected during preventive pediatric visits were retrieved from the SFGH Laboratory and plasma analyzed for cotinine. Electronic charts were reviewed for age, sex, and race/ethnicity. Paper charts were reviewed for history of SHS exposure. This was an un-consented study approved by the UCSF-IRB. **RESULTS** Among 540 subjects, 66% were under 3 years old. Thirteen percent of parents reported that their child was exposed to SHS, yet biochemical assays detected cotinine in 57% of samples (mean concentration, [95% CI]: 0.55 ng/ml, 0.44-0.66). There were no significant sex or age differences in prevalence of exposure or cotinine levels. African American children had much higher mean cotinine levels than Latino children (1.43 ng/ml, 95% CI 1.1-1.77 versus 0.25 ng/ml, 95% CI 0.18-0.32, P <0.0001). Among parents who denied exposure, 54% of their children had detectable cotinine. **CONCLUSIONS** In a city with a low smoking rate (12%) and public smoking bans, we documented 57% SHS exposure using a plasma biomarker, and 54% exposure among children whose parents denied exposure. Since SHS is associated with a significantly increased risk of respiratory diseases and parents underreport or are unaware of their child's exposure to SHS, the benefits of biochemical screening to reduce SHS exposure should be studied in pediatric primary care.

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## PA4-3

### COTININE HALF-LIFE IS SIMILAR IN YOUNG CHILDREN COMPARED TO ADULTS: IMPLICATIONS FOR INTERPRETATION OF SHS EXPOSURE IN CHILDREN

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**INTRODUCTION:** Some infants/children exposed to SHS have been found to have cotinine levels consistent with those of smokers. Also, long cotinine half lives have been reported in the young. We conducted a study to determine the pharmacokinetics of oral deuterium-labeled cotinine, Cot-d4, in children under 84 months old (m.o.). The



**PAPER SESSION 5: TOBACCO PACKS**

goal is to determine cotinine half-life (HL) in the young, without confounding by ongoing SHS exposure, which will aid in the interpretation of cotinine levels in pediatric studies. METHODS: 56 healthy children, between 2 and 84 m.o., who were exposed to SHS were enrolled. Each received 0.05 mg/kg Cot-d4 orally. Serial timed saliva and urine samples were collected for up to 10 days post dosing and analyzed for cotinine by LC-MS/MS. DNA was extracted from saliva. Cotinine HL was calculated from urine levels from days 1-10. The consented study was approved by UCSF-IRB. RESULTS: 49 subjects had adequate urine data to determine HL and of these: 53% were male, 59% were black, 25% were white, 16% were mixed ancestry, 33% were 2.5-19m.o., 37% were 19-48 m.o., 31% were >48 m.o., and 47% had the CYP2A6 \*1/\*1 genotype. The mean HL was 18.9 hrs (95%CI: 17.2-20.5), with a minimum, median and maximum of 8.1, 17.9, and 36.7 hrs respectively. There was no significant difference by age (correlation,  $r=0.17$ ). Results of regression analysis of age, sex, race/ethnicity and genotype as determinants of HL will be presented. DISCUSSION: These data indicate that young children have cotinine half lives similar to the adult average of 16 hours. Higher cotinine levels in children compared to adults with SHS exposure are likely due to greater intake of SHS, and not to slower cotinine metabolism.

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**PA4-4**

**DETERMINANTS OF URINE NNAL LEVELS AMONG NONDAILY AND DAILY SMOKERS AND USERS OF OTHER COMBUSTIBLE TOBACCO PRODUCTS**

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Little is known about biochemical identification of nondaily smokers or how different patterns of tobacco use impact carcinogen exposure. NNAL (4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol) is a metabolite of the tobacco-specific carcinogen NNK. NNAL has a long half-life in the body (10-18 days), making it a useful marker for long-term exposure to tobacco. We examined urine total NNAL levels among nondaily and daily smokers and users of other combustible tobacco products to determine the extent to which low levels of smoking are detectable and how different tobacco products impact NNAL. We obtained urine samples from 64 current cigarette smokers (37 nondaily; 27 daily). 18 participants also used other combustible tobacco products. 79.0% were aged 18-30 years, 40.3% were male, and 27.4% were black. Of 6 participants reporting 1 day of smoking in the past 30 days, 2 had undetectable levels of NNAL, whereas 4 participants had detectable levels. Among nondaily smokers, NNAL levels (normalized for urine creatinine) were associated with number of days of smoking in the past month ( $p=.05$ ), average cigarettes per day (cpd) on smoking days ( $p<.001$ ), and amount of each cigarette smoked ( $p=.04$ ). In multivariate analysis using backwards stepwise entry, cpd was associated with NNAL levels ( $p=.004$ ;  $R^2=.234$ ). Among daily smokers, NNAL levels were associated with age ( $p=.02$ ), cpd ( $p<.001$ ), smoking within 30 minutes of waking ( $p=.006$ ), and self-reported depth of inhalation ( $p=.006$ ). Multivariate analysis indicated that cpd ( $p=.01$ ), smoking within 30 minutes of waking ( $p=.02$ ), and depth of inhalation ( $p=.007$ ) were associated with NNAL levels ( $R^2=.656$ ). Among users of other combustible tobacco products, NNAL levels were associated with number of smoking days ( $p=.02$ ), cpd ( $p=.04$ ) and number of days of other tobacco use ( $p=.01$ ). Multivariate analysis indicated that number of days of other combustible tobacco product use were associated with NNAL levels ( $p=.001$ ;  $R^2=.328$ ). Urine NNAL may be used to identify current nondaily smokers, and different factors predict NNAL levels among nondaily and daily cigarette smokers and those using other combustible tobacco products.

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**PA5-1**

**GRAPHIC WARNING LABELS IN CIGARETTE ADVERTISEMENTS IMPROVE RECALL AND AFFECT VIEWING PATTERNS**

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The Family Smoking Prevention and Control Act gave the Food and Drug Administration (FDA) legal authority to mandate graphic warning labels on cigarette advertising and packaging. In June 2011, FDA identified 9 images and warnings to be embedded into cigarette advertising and packaging by September 2012; however, in August 2011 tobacco companies filed a lawsuit to prevent the adoption of these warning labels. The current study was designed to examine differences in recall and viewing patterns between text-only and graphic cigarette warning labels, and the association between viewing patterns and recall. Current daily smokers ( $n=200$ ) were randomized to view a cigarette advertisement with text-only or graphic warning labels while viewing patterns were measured and recall assessed after. Sessions occurred prior to the FDA release of graphic warning labels in the United States. The main outcome measures were correct recall, and eye tracking measures of dwell time, fixations, and time to first viewing for a priori areas of interest in the cigarette advertisements. There was a significant difference in percent correct recall of the warning label between text and graphic conditions, 50% versus 83% ( $\chi^2=23.74$ ,  $p=.0001$ ). Time to first view the graphic warning label text (OR=0.41; 95% CI, 0.22-0.76,  $p=.005$ ), dwell time duration of graphic image (OR=1.37; 95% CI, 1.00-1.86,  $p=.049$ ), and preferred cigarette brand (OR=0.18; 95% CI, 0.04-0.81,  $p=.03$ ) were significantly associated with correct recall, in a model that also included daily cigarette consumption (OR=1.11; 95% CI, 0.96-1.3,  $p=.17$ ). The more quickly attention was drawn to the warning label text, longer dwell time of the graphic image, and not being a Marlboro smoker (the cigarette brand in the advertisement), were associated with correct recall. Graphic warning labels significantly improve smokers' recall of warning and health risks, and do so by drawing and holding attention.

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**PA5-2**

**RACIAL DIFFERENCES IN CIGARETTE BRAND RECOGNITION AND IMPACT ON YOUTH SMOKING**

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African Americans are disproportionately exposed to cigarette advertisements, particularly for menthol brands. Tobacco industry documents outline strategic efforts to promote menthol cigarettes to African Americans at the point of sale, and studies have observed more outdoor and retail menthol advertisements in neighborhoods with more African-American residents. Little research has been conducted to examine the effect of this target marketing on adolescents' recognition of cigarette brand advertising and on smoking uptake. To our knowledge, this is the first study to examine racial differences in brand recognition and to assess the prospective relationship between brand recognition and smoking uptake. School-based surveys assessing tobacco use and environmental and social influences to smoke were administered to 6th through 9th graders (ages 11 to 15) in an urban and racially diverse California school district. The primary outcome for the cross-sectional analysis ( $n=2,589$ ) was brand recognition, measured by students' identification of masked tobacco advertisements. The primary outcome for the longitudinal analysis ( $n=1,179$ ) was progression from never to ever smoking within 12 months. At baseline, 52% of students recognized the Camel brand, 36% Marlboro and 32% Newport. However, African-American students were three times more likely than others to recognize Newport (OR=3.03, CI=2.45, 3.74,  $p<.0001$ ) and less likely than others to recognize Marlboro (OR=0.60, CI=0.48, 0.73,  $p<.0001$ ). At follow-up, 17% of never smokers reported trying smoking. In this racially diverse sample, brand recognition of Camel and Marlboro did not predict smoking initiation. For students

who recognized the Newport brand at baseline, the odds of initiation increased by 49% (OR=1.49, CI=1.04, 2.15, p<0.05) after adjusting for shopping frequency and other risk factors. The study findings illustrate the detrimental effect of target marketing for Newport on smoking uptake by African-American youth. This longitudinal study contributes to a growing evidence base that supports a ban on menthol-flavored cigarettes in the US.

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## **PA5-3**

### **EFFECT OF THE UNITED STATES FOOD AND DRUG ADMINISTRATION BAN OF "LIGHT" DESCRIPTORS ON CONSUMER RECOGNITION OF CIGARETTE BRANDS AS PREVIOUSLY LABELED**

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Effective June 22, 2010, the U.S. Food and Drug Administration (FDA) banned the use on cigarette packages of misleading terms such as "Lights" and "Mild", which the National Cancer Institute found to be interpreted by consumers as claims of a safer product. Experimental and population studies in the U.S., Canada, U.K. and Australia have found that consumers perceive color descriptors to mean less harmful as they do the "lights" descriptors they have replaced. To examine the effect of the law as implemented, a nationally representative survey was conducted one year after the descriptors ban. 1,021 of 2,913 respondents to a bilingual random-digit-dialing sample of landline telephone households and randomly generated cell phone numbers qualified to complete the interview, including 510 current smokers. In response to the question, "In the past six months, how easy has it been for you to identify your usual brand of cigarettes? Ninety-two percent of current and prior six months-smokers answered somewhat easy or very easy, with minimal difference in percentages among smokers of full flavor, light or medium or ultra-light cigarettes. Sixty-nine percent answered correctly when asked, "What is the main color on the cigarette package of [previously identified] brand that you smoked most often during the past 30 days?" The results suggest that the ban on light descriptors has had little or no effect on smokers' ability to recognize their brand as previously labeled. Substitution of colors for the verbal descriptors has occurred in other countries as well and appears to have played a role in brand recognition. The substitution of colors appears to be continuing to promote the deceptive practice of marketing certain cigarettes as safer and should be investigated by the U.S. judicial system, considering Judge Kessler's 2006 ruling regarding "lights", as well as by the FDA. The FTC also may consider available global governance tools to prevent this practice circumventing Framework Convention on Tobacco Control restrictions.

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## **PA5-4**

### **EFFECT OF CIGARETTE PACK DESCRIPTOR REMOVAL ON PERCEPTIONS OF RISK, STRENGTH AND SENSORY APPEAL**

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**BACKGROUND:** The FDA has prohibited tobacco product advertising or labeling using descriptors which wrongly imply lower risk, such as "light," "low," or "mild." However, this may not protect consumers from misleading non-text descriptors. Pack colors, brand imagery, and chemosensory descriptor terms such as "smooth" may also influence risk perceptions and appeal. This study assessed the effect of removing i) text descriptors and ii) all descriptors (including color) on perceptions of tar level, nicotine level, taste, and health risk among Marlboro Gold (previously Marlboro Lights) smokers, using an online survey. **METHODS:** 180 adult cigarette smokers (mean age = 43.3, 50% male) completed the web survey. Participants viewed frontal images of Marlboro Full Flavor (MFF), Marlboro Lights (ML; text descriptors), Marlboro Gold (MG; no text descriptors) and a plain pack (Plain). A fictitious brand, Dunfield, with similar color schemes and pack imagery, was used to validate responses to descriptors independent of brand identity. Marlboro or Dunfield packs were presented in a counterbalanced order. **RESULTS:** Most participants perceived MFF as higher tar (64.3%) and nicotine (57.5%), while rating ML as smoother (81.6%), and more pleasant taste (76.5%). Risk perception did not differ between MFF and ML. MG was perceived by 34.6% and 31.8% respectively as

higher tar and nicotine than ML, although no difference in risk perception was observed between MG and ML. ML was perceived as having smoother taste (48.6%) and a more pleasing taste (50.8%) than MG. MG was rated as equivalent to Plain on all measures of appeal, although a substantial minority of respondents selected MG smoother taste and more pleasant taste than Plain (27.4% & 31.8% respectively). Similar responses were observed for Dunfield packs. **DISCUSSION:** The majority of the sample did not differentiate between health risks of different cigarette pack designs. However, shifting from red to white and gold coloring, and from the presence to absence of textual descriptors, lessened sensory appeal. Removing all descriptors may optimize reduction of product sensory appeal, but may not further reduce risk perceptions.

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## **PA5-5**

### **IMPACT OF TOBACCO PACKAGING AND PRODUCT FEATURES ON CONSUMER PERCEPTIONS**

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**Background:** Novel packaging configurations and product shapes continue to be marketed by the tobacco industry with unknown effects on consumers, particularly youth. This study assessed the influence of packaging and tobacco product shape and size on consumer perceptions of product appeal and health risks. **Methods:** Data were collected via face-to-face interviews conducted in 2011 with 618 current and 602 noncurrent cigarette or smokeless tobacco users (ages 18-35) in Buffalo NY, Morgantown WV, and Columbia SC. Additionally, focus groups with high school students assessed how they perceive differences in tobacco packaging. In the field experiment, participants were presented with cigarette and smokeless tobacco packs and products varying in shape and size and asked to rate them on dimensions reflective of appeal and risk. To assess the impact of branding, half the participants were randomized to view fully "branded" packs while half viewed "plain" brown packs. **Results:** Regardless of tobacco use status, respondents tended to rate longer length cigarettes (120mm) as most dangerous and addictive. By contrast, superslim cigarettes were rated as least dangerous to health. Respondents overwhelmingly rated unfiltered cigarettes as more dangerous compared to filtered cigarettes. Filtered cigarettes with cork-colored tipping paper were rated as better tasting but higher risk compared to the same length cigarette with white tipping paper. Regarding smokeless tobacco, respondents rated dip as most dangerous and dissolvable products as least dangerous. Dissolvables were perceived as being most attractive to teenagers. This finding was confirmed in focus groups with teenagers who noted dissolvable products had the advantage of being less detectable if used in school. Removing brand elements influenced the main effect of pack shape and size. **Conclusions:** Overall, findings suggest that tobacco users and non-users rate products based in part on pack design and product configurations. The FDA should consider standardizing package and product shape, which could reduce consumer misperceptions arising from variations in product packaging and design configurations used for marketing purposes.

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## **PAPER SESSION 6: EXPLORING NICOTINE DEPENDENCE AT THE POPULATION LEVEL**

## **PA6-1**

### **DOES THE SMOKER KNOW BEST? PERCEIVED ADDICTION A PREDICTOR OF SMOKING CESSATION**

M. Chaiton<sup>1,2</sup>, J. Cohen<sup>1,4</sup>, S. Bondy<sup>1,2</sup>, P. Selby<sup>1,2</sup>, S. Brown<sup>1,3</sup>, R. Ferrence<sup>1,2</sup>, P. McDonald<sup>1,3</sup>, J. Garcia<sup>1,3</sup>, <sup>1</sup>Ontario Tobacco Research Unit; <sup>2</sup>University of Toronto; <sup>3</sup>University of Waterloo; <sup>4</sup>Johns Hopkins Bloomberg School of Public Health

**Objectives:** In this study, we investigate whether perceived addiction (PA) predicts quit attempts and successful cessation, over and above cigarette dependence. Secondly, we evaluate the change in perceived addiction after a relapse or failed quit

attempt. Methods: Data used for this analysis came from 4024 of current adult smokers (18+) with at least one follow up wave in the Ontario Tobacco Survey longitudinal cohort study. The OTS is a representative telephone survey of Ontario adults (18 years of age and over) in which smokers were followed up every six months for up to three years. Baseline data collection occurred from 2005-2008. All smokers were asked how addicted they perceived themselves to be (very vs. somewhat or not very addicted). Dependence was measured using the Heaviness of Smoking Index (HSI) a validated measure. Generalized Estimating Equation models were used to test the predictive ability of PA, controlling for HSI and demographic factors. Results: Fifty-eight percent of Ontario smokers reported being 'very addicted'. Perceived addiction was not associated with the likelihood of reporting a quit attempt (0.99; 95% CI: 0.83, 1.21 ; p=0.917) after controlling for demographics and HSI. However, given a quit attempt, low PA smokers were more likely to report being abstinent in the past 30 days at follow-up both before (1.50; 95% CI: 1.18, 1.90) and after controlling for HSI (1.37; 95% CI: 1.07, 1.75). After relapse following reporting 30 days abstinence, 21% (95% CI: 15, 28) reported a lower level of PA compared to 6% (95% CI: 3, 11) who reported increased PA. For a quit attempt that did not last 30 days, smokers were more likely to report higher PA (13%; 95% CI: 11, 15) than lower PA (7% ;95% CI: 5, 8). Conclusion: Asking smokers about perceived addiction is an effective way to measure likely success in quitting that may be easily implemented in clinical settings. A substantial quit attempt longer than 30 days, even if it ends in relapse, is associated with a decrease in perceived addiction.

*The Ontario Tobacco Survey is an initiative of the Ontario Tobacco Research Unit, which receives funding from the Ontario Ministry of Health Promotion and Sport.*

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## PA6-2

### TRAJECTORIES OF CRITERIA OF NICOTINE DEPENDENCE FROM ADOLESCENCE TO EARLY ADULTHOOD

Denise B. Kandel, Ph.D.<sup>\*1,2,3</sup>, Mei-Chen Hu, Ph.D.<sup>2</sup>, Pamela C. Griesler, Ph.D.<sup>1,3</sup>, Christine Schaffran, M.A.<sup>3</sup>, <sup>1</sup>Department of Psychiatry, Columbia University; <sup>2</sup>Mailman School of Public Health, Columbia University; <sup>3</sup>New York State Psychiatric Institute

OBJECTIVE: To identify patterns and correlates of developmental trajectories of DSM-IV nicotine dependence criteria from adolescence to early adulthood. METHODS: The analytical sample of lifetime cigarette smokers (N=877) is from a longitudinal cohort of adolescents drawn from a large city school system. Subjects were interviewed 5 times at 6-month intervals and once 4.5 years later. Symptoms of DSM-IV nicotine dependence and psychosocial factors were ascertained. Growth mixture models were estimated to identify trajectories of nicotine dependence criteria over ages 12 to 23. Symptoms were reported on average over an interval of seven years after smoking onset. RESULTS: A four-class solution fitted the data best: No DSM-IV dependence criteria (Class 1, 32.6%), Early onset full DSM-IV dependence/Chronic course (Class 2, 27.3%), Early onset of symptoms/Remission (Class 3, 14.3%), Late onset of symptoms (Class 4, 25.8%). There appeared to be two critical ages. Between ages 16 and 17, the Early onset/Chronic class stabilized at high levels of symptoms while the Early onset/Remit class started its symptomatic decline. At ages 19-20, there was a convergence in the prevalence of symptoms experienced at high levels by members of classes 2 and 4 and at low levels by classes 1 and 3. Pleasant initial sensitivity to tobacco, marijuana use, extensiveness of drinking, and neither employed nor in school were associated with a higher baseline level of nicotine dependence. Pleasant initial sensitivity and anxiety disorder were associated with all three symptomatic trajectories. Parental dependence was uniquely associated with the Early/Chronic class, while onset age of marijuana use and disruptive disorder characterized the two early onset classes, whether chronic course or remission. Females tended to be classified in Class 3. CONCLUSION: These data highlight the importance of developmental course in evaluating risk factors in the development of nicotine dependence and in implementing prevention and intervention programs. Trajectories of dependence criteria constitute an advantageous phenotype for research and intervention over static summaries of smoking behaviors.

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## PA6-3

### PRENATAL EXPOSURE TO TOBACCO AND FUTURE NICOTINE DEPENDENCE: A POPULATION-BASED COHORT STUDY

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Background: Maternal smoking during pregnancy may increase the risk of especially female nicotine dependence, but data is conflicting and confounding by other familial factors can not be ruled out. We aimed to clarify the relationship between prenatal tobacco exposure and adolescent tobacco uptake and dependence in boys and girls respectively, while taking confounding factors into close consideration. Methods: We conducted a prospective longitudinal study, comprising 3020 Swedish youths followed from 11 to 18 years of age. Exposure and outcome information was elicited via self-administered parental and repeated youth questionnaires. Hazard ratios, odds ratios, and corresponding 95% confidence intervals, were calculated as measures of associations. Results: Girls prenatally exposed to both maternal and paternal smoking had more than three-fold increased odds of having experienced at least four withdrawal symptoms in case of discontinued tobacco use before the age of 17 years (adjusted odds ratio 3.28 [95% CI: 1.66-6.94]). Exposed girls also had two-fold increased odds of experiencing craving for tobacco and to be heavy tobacco users (5 or more cigarettes or snus dips per day). Prenatal exposure did not predict nicotine dependence or tobacco consumption among boys. Associations between prenatal tobacco exposure and onset of regular tobacco use appeared to be explained by parents' social position and postnatal smoking behaviour. Conclusion: Prenatal exposure to tobacco is a risk factor for nicotine dependence among adolescent girls.

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## PA6-4

### THE STATE OF THE SCIENCE REGARDING MEASURES OF DEPENDENCE FOR NON-CIGARETTE TOBACCO USE: A SYSTEMATIC REVIEW OF THE LITERATURE

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Background: The way that nicotine dependence is conceptualized, measured and diagnosed has implications for global tobacco control. Dependence metrics have been validated, but there is no unifying definition across products. Without unifying concepts, fully realizing tobacco control goals is potentially impossible. We review how nicotine dependence has been operationalized to date, focusing on how dependence to non-cigarette tobacco products has or has not been discussed. Methods: Searches were conducted in PubMed, Scopus, PsycINFO, EMBASE, CINAHL, and Global Health databases using variant terms for types of tobacco (smokeless tobacco, shisha, hookah, bidi, paan, etc.), dependence (addiction, drug dependence, withdrawal syndrome, loss of autonomy, etc.), measures (criteria, diagnosis, checklist, questionnaire, etc.) and validity/reliability. Articles were selected for full review based on an explicit focus on nicotine dependence theories and/or metrics. Results: Searches yielded 2,529 unique articles. Two coders identified 569 articles for abstract review and a subset of 229 for full review. A thematic analysis highlights four emergent concepts: general nicotine dependence, dependence metrics, tobacco dependence in low income countries and dependence pertaining to non-cigarette tobacco. There is no single unifying conceptualization of nicotine dependence, though popular metrics and diagnostic criteria do exist. Social learning theory and DSM-related models drive most studies on dependence to tobacco products. Evidence to distinguish the manifestation of dependence in non-cigarette tobacco users from dependence in cigarette smokers has not been fully explored. Metrics have been created/modified for smokeless tobacco and hookah. Conclusions: To the extent that there are measures of tobacco dependence, these largely pertain to cigarettes rather than other forms of tobacco, and mainly utilize data from high income countries. The literature regarding non-cigarette tobacco dependence is growing, but there is a compelling need to establish unified and validated measures for these products. Such measures need to be applicable across national contexts.

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**PA6-5**

**CIGARETTES SMOKED PER DAY, TIME TO FIRST CIGARETTE, AND SEURM COTININE LEVELS BY CIGARETTE NICOTINE LEVEL**

Ralph S. Caraballo\*<sup>1</sup> and David B. Holiday<sup>2</sup>, <sup>1</sup>Office on Smoking and Health, CDC; <sup>2</sup>RTI International

It is believed that reductions in the addictiveness of tobacco products such as cigarettes to levels that are non-addicting will have an impact in tobacco-related morbidity and mortality. At the present time we do not know the nicotine threshold level essential for the onset of addiction. Because identifying this nicotine threshold will require different type of studies, including population-based studies, we analyzed data from the 2001-2008 National Health and Nutrition Examination Survey to determine if: 1) smokers of 0.0-0.4 mg nicotine in cigarettes (by the discarded FTC method), called here "Low, smoked more cigarettes per day (cpd) (a form of compensation) in the last 2 days than smokers who smoked cigarettes with 0.41-0.70 mg (called here "Medium" cigarettes) and smokers of >0.70 mg cigarettes (called here "High"), 2) if smokers of Low cigarettes were less likely to smoke their first cigarette within 5 minutes of waking up than smokers of Medium and High cigarettes, and 3) if smokers of Low cigarettes had lower serum cotinine levels than smokers of higher nicotine yield cigarettes. Data were analyzed only for non-Hispanic whites (n=1,623) because estimates were not precise for other racial groups. We found that 1) smokers of Low cigarettes smoked about the same number of cpd (17.0) than smokers of Medium (16.1) and High (17.1) cigarettes; 2) the numbers were too small to report if smokers of Low cigarettes were less likely to smoke their first cigarette within the first 5 minutes, however, non-precise data suggest no differences, and 3) there were no meaningful differences in serum cotinine levels (adjusted for nuisance factors) by nicotine (247.0; 95% CI's: 209.1-285.0, 213.1; 95% CI's: 197.1-229.0, and 234.6; 95% CI's: 225.6-243.7, respectively). Current cigarette brands do not seem to make a difference in non-Hispanic white smokers' cpd, nicotine addiction, and serum cotinine levels regardless of the old FTC-method nicotine yield, thus, the nicotine addiction threshold level seems to be lower than 0.2 mg of nicotine of current Low cigarettes.

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**PAPER SESSION 7: IMPROVING BEHAVIORAL CESSATION TREATMENT: USE OF TECHNOLOGY AND THEORY**

**PA7-1**

**FIRST RANDOMIZED TRIAL OF WEB-BASED ACCEPTANCE AND COMMITMENT THERAPY FOR SMOKING CESSATION: RESULTS ON THREE-MONTH CESSATION PROCESSES AND OUTCOMES IN COMPARISON WITH NCI'S SMOKEFREE.GOV**

Jonathan B. Bricker\* and Bryan A. Comstock, Fred Hutchinson Cancer Research Center and University of Washington

Objective: Web-based smoking cessation interventions have low quit rates that average 10%. To test the potential of a new intervention to boost cessation rates, we developed a smoking cessation website using an innovative approach called Acceptance and Commitment Therapy (ACT). ACT teaches individuals how to be open to their smoking cues (e.g., urges) while staying committed to not smoking. As the first test of web-based ACT, this study reports on the three-month cessation processes and outcomes from a pilot randomized trial. Design: Adult participants were recruited nationwide into the "webquit.org" double-blind randomized controlled pilot trial (N = 222) comparing web-based ACT with a national website utilizing current best practices (i.e., smokefree.gov). Consistent with published web-based cessation trials, participants at baseline were average age 45, 62% female, 44% married, 92% Caucasian, 79% nicotine dependent, and 81% smoked more than a half pack (11 or more) of cigarettes per day. Three months after randomization, participants self-reported the following: (1) ACT theory-based processes: acceptance of (a) physical, (b) emotional, and (c) cognitive cues to smoke; (2) number of quit attempts; (3) nicotine dependence; (4) 30-day point prevalence quit rate. Results: The two conditions were balanced at baseline on all characteristics (p value average: .522). At the three month follow-up, ACT participants reported higher levels of progress on cessation processes than control participants: (a) higher levels of acceptance of physical (p = .001), emotional (p = .022), and cognitive (p = .083) cues to smoke, (b) higher number of quit attempts (9.21 vs. 3.92; p = .101), and (c) significantly lower levels of nicotine dependence (18% vs. 44%; p = .036). The thirty-day point prevalence quit rate was 23% for ACT and 10% for smokefree.gov (p = .050). Conclusion: Promising initial evidence that web-based ACT for smoking cessation

yields (1) results consistent with its underlying theory, (2) positive cessation progress endpoints, and (3) over double the quit rates of smokefree.gov. Rigorous testing of web-based ACT in a large scale RCT is now needed.

*Fred Hutchinson Cancer Research Center.*

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**PA7-2**

**EFFECTS OF MOTIVATIONAL INTERVIEWING AND THE NICOTINE PATCH FOR SMOKING CESSATION AMONG HOMELESS SMOKERS**

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Smoking prevalence in homeless populations is strikingly high at 70% yet little is known about effective smoking cessation interventions for this population. We conducted the first NIH-funded clinical trial to target cigarette smoking among the homeless- Power To Quit, a randomized trial of motivational interviewing (MI) counseling in combination with the transdermal nicotine patch (NRT) for 430 homeless smokers. Eligible smokers were randomized to receive MI+NRT or Brief Advice+NRT. All participants received 21mg nicotine patch for 8 weeks. MI was provided at weeks 0, 1, 2, 4, 6, and 8 while Brief Advice was provided at week 0. Primary outcome was biochemically-verified 7-day abstinence at week 26. Participants were mostly male (74.7%), African American (56.3%), with mean age of 44.4 years, monthly income less than \$400 (63.5%), and had at least a high school education (76.7%). Most participants usually slept in emergency shelters (60.0%); 35.2% had been homeless for more than a year; and 14.7% had been homeless for more than 3 years. More than eighty percent of the sample screened positive for lifetime history of drug abuse or dependence. Participants smoked on average 19.3 cpd , were daily smokers (96.7%), and smoked within 30 minutes of awakening (87%). Participants rated importance of quitting as 9.1/10 (SD = 1.6) and confidence to quit as 7.3/10 (SD = 2.4) at baseline. Using intention-to-quit analysis, verified abstinence rates at week 8 (end of MI and NRT) were 9.3% for MI and 8.9% for brief advice (p=0.89). At week 26, verified abstinence rates were 9.3% for MI and 5.1% for brief advice (p=0.15). Those adherent to MI (attended at least 5 of 6 sessions) had higher abstinence rates than those not adherent at week 8 (10.9% vs. 3.0%; p=0.02) and at week 26 (8.5% vs. 4.0%; p=0.19). MI appears to be a feasible, acceptable, and promising intervention for helping homeless smokers quit, but further studies are needed to develop more powerful interventions for improving smoking cessation rates among homeless populations in order to reduce the burden of tobacco-related morbidity and mortality in this underserved group.

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**PA7-3**

**USING TELEPHONE-BASED AND INTERNET-BASED SMOKING TREATMENTS WITH LGBT SMOKERS: PRELIMINARY FINDINGS**

Gary Humfleet, Ph.D.\* and Sharon M. Hall, Ph.D., University of California, San Francisco

Cigarette smokers have changed over the years, and smoking is now concentrated in special populations. Smoking rates are significantly higher among lesbian, gay, bisexual, and transgender (LGBT) populations compared to the general population. The primary aim of this study was to compare the efficacy of two technology-based smoking cessation treatment interventions, alone and in combination, that were designed to address the unique needs of LGBT smokers. The study was a 2 X 2 factorial design. Factors were Internet-based treatment and proactive telephone counseling . All 356 participants were mailed a smoking cessation self-help manual. The four treatment groups were: a mail-based smoking treatment alone (MST); MST plus Internet-based smoking treatment; MST plus phone counseling intervention; and MST plus Internet-based intervention plus phone counseling group. Assessments were conducted at 3 and 6 months after treatment initiation. We have completed preliminary data analyses. Six-month abstinence rates were 15% for MST, 21% for MST + Internet-based smoking

treatment, 34% for MST + phone counseling intervention, and 29% for MST + Internet-based intervention + phone counseling group. Although we hypothesized that the MST + internet treatment + telephone counseling would have significantly higher quit rates than the 3 other treatments, the combined intervention was not significantly more efficacious than the telephone counseling or internet intervention alone. A main effect for the telephone counseling intervention was found with higher quit rates among those assigned to telephone counseling than those not receiving telephone counseling. Use of the behavioral interventions was low. The average number of website visits was 2.2 per participant. Of those assigned to the proactive telephone counseling, almost half (48%) declined participation or never responded to attempts to initiate counseling. These findings support the use of telephone counseling and Internet interventions with LGBT smokers. Given the large refusal rates for telephone counseling access to other modes of tobacco-related treatment may be important in treating this group of smokers.

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## **PA7-4**

### **TREATED AS INTENDED: A PRAGMATIC ANALYSIS OF THE SMOKERS' HEALTH PROJECT**

Geoffrey C. Williams, M.D., Ph.D.<sup>\*1</sup>, Holly McGregor Lavigne, Ph.D.<sup>1</sup>, Heather Patrick, Ph.D.<sup>2</sup>, Edward L. Deci Ph.D.<sup>1</sup>, and Richard M. Ryan, Ph.D.<sup>1</sup>, <sup>1</sup>University of Rochester; <sup>2</sup>National Cancer Institute, Division of Cancer Control and Population Sciences, Behavioral Research Program, Health Promotion Research Branch

**Background:** Funded as part of the Health Maintenance Consortium, the Smokers' Health Project was a pragmatic comparative effectiveness trial comparing three intensive theory-based interventions on long term tobacco abstinence. Respect for autonomy is a central construct of Self-Determination Theory (SDT), and is a fundamental principle of biomedical ethics. Efficacy for initial abstinence with a 6 month intervention was demonstrated in a previous study, and was suggestive of respect for autonomy being predictive of maintained tobacco abstinence. Herein, we present the Treated as Intended outcomes from the trial. **Methods:** This was a pragmatic comparative effectiveness trial of three intensive theory-based, tobacco-dependence interventions. Eligible participants are randomized to: (1) Community Care (CC- 6 contacts over a 6-month intervention previously validated); (2) Extended Need Support (8 contacts over 12 months); and (3) Harm Reduction (8 contacts over 12 months + option to start medications before quitting). The primary outcome was 12-month prolonged abstinence from tobacco, assessed one year following termination of treatment. Respect for patient autonomy was assessed in treatment and tested as a predictor of abstinence. **Results:** Twelve-month prolonged abstinence rates for the 40% of smokers who completed treatment as intended was significantly higher among those receiving the 12-month treatments (15.7% and 13.6%, for Extended Need Support and Harm Reduction, respectively) than those in Community Care (3.8%,  $p$  less than 0.05). Furthermore, respect for autonomy (Odds Ratio=2.48,  $p$  less than 0.01), and medication use (Odds Ratio = 1.01,  $p < 0.001$ ) were confirmed as predictors of twelve-month prolonged abstinence. Intention-to-treat outcomes from the Smokers' Health Project showed no difference between groups. **Conclusions:** Treated as intended analyses indicate that a twelve month intensive treatment that adds two additional visits in the second six month is more beneficial for long term abstinence from tobacco. In addition, respect for autonomy was shown to be an important predictor of maintained abstinence. Implications for policy will be discussed.

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## **PAPER SESSION 8: UNDERSTANDING THE PROCESS OF QUITTING**

### **PA8-1**

#### **FINE-GRAIN ANALYSIS OF THE NATURAL HISTORY OF QUIT ATTEMPTS**

John R. Hughes, M.D.\*, Laura J. Solomon, Ph.D., James Fingar, M.D., Shelly Naud, M.S., and John E. Helzer, M.D., University of Vermont

Many descriptions of changes in smoking assume a simple model of stopping, abstinence and (often) relapsing. In a prior study (NTR 11:1083), we found changing tobacco use was much more complex with users often transitioning among typical use, abstinence, lapse, relapse and reduction on multiple occasions even during a single month. The current study attempted to replicate those results and add new information on other topics. Forty smokers who planned to quit within the next 3 months called in nightly for 28 days to an Interactive Voice Response (IVR) system to report cigs/day, intentions to smoke or not for the next day, and the presence of cues to stop smoking (e.g., a new tobacco-related symptom or a request to stop smoking). We provided no treatment. A minority of participants used a medication (33%) or in person or phone counseling (10%) during the month. Half (48%) of smokers transitioned back and forth among smoking, abstinence and reduction states on > 3 occasions within the month; 37% of quit attempts were not planned; and 64% of quit attempts lasted less than a day. Reduction in cigs/day (by > 50%) was a more common outcome than abstinence (71 episodes vs 31 episodes). Most episodes of reduction (65%) were not associated with a quit attempt; however, 53% of quit attempts were preceded by > 1 day of reduction in cigs/day and 80% were followed by > 1 day of reduction. Smokers reported a cue to stop smoking on 41% of non-abstinent days; cost concerns and embarrassment were the most common cues (occurring on 14% and 11% of days). These results indicate quit attempts are often multiple, unplanned, short-lived, are preceded and post-ceeded by a reduction in cigs/day. Our results also suggest that reduction rather than abstinence is the most common outcome and that cues to stop smoking are fairly common. Our ongoing larger study is attempting to determine whether the type or number of cues or pre-quit reduction predicts making a quit attempt or success on a quit attempt.

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### **PA8-2**

#### **A SYSTEMATIC REVIEW OF THE RELATIONSHIPS BETWEEN CRAVING AND SMOKING CESSATION OUTCOME**

Jennifer M. Wray\* and Stephen T. Tiffany, University at Buffalo, the State University of New York

Craving is often portrayed as a defining feature of addiction, but the role of craving in the addictive process is controversial. Particularly contentious is the extent to which desire to use a drug predicts subsequent relapse. Clarifying this association has important implications for models of addiction and for determining the utility of craving as a treatment target or as a prognostic indicator of outcome. This review synthesizes findings from 50 smoking cessation studies published before December 2010. Eligible studies measured craving for cigarettes in treatment-seeking smokers and related this to subsequent smoking status. As craving assessed at any point over the course of a smoker's day (background craving) may be differentially related to relapse when compared with craving that arises in response to smoking related cues (cue-specific craving), the relationships of these two types of craving with outcome were examined separately. Further, analyses that related background craving to smoking status were divided into those that used craving data collected before or after the quit attempt, as well as those that used change in craving over time as a predictor. Results across studies revealed a total of 166 indices of association with 84 of these being significant. In general the findings indicated: 1) there were only a few cases of significant associations between craving collected as part of cue-reactivity studies and treatment outcomes; 2) post-quit craving was a stronger predictor of treatment outcome than pre-quit craving; and 3) several moderators likely influence the relationship between craving and cessation outcome. The overall results suggest that craving is not a necessary condition of relapse. In addition, inconsistent relationships between craving and treatment outcome call into question the value of craving as a target of treatment and underscore limitations in the

prognostic utility of craving. This review also identified several methodological issues important to the evaluation of the relationship between craving and treatment outcome, which will be discussed in the presentation.

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## PA8-3

### RACE AND SMOKING CESSATION: MEDIATING MECHANISMS

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Some evidence suggests that blacks experience greater difficulty quitting tobacco than whites, but the mechanisms underlying racial differences in smoking cessation have remained unclear. We evaluated the influence of a number of candidate variables that may mediate an association between race and short-term smoking cessation outcomes. Smokers (139 whites, 144 blacks) enrolled in a smoking cessation study were followed from 1 week pre-quit through 26 weeks post-quit. All participants received nicotine patches and individualized counseling. The primary outcome variable was continuous abstinence (ITT) through 1-week post-quit. At baseline and quit-day, participants completed demographic assessments, the Wisconsin Smoking Withdrawal Scale (WSWS), and a modified Stroop task that assessed attentional bias to smoking cues. Overall, blacks were not more likely to relapse during the first week than whites (OR = 1.25, 95% CI = 0.74, 2.11). Blacks reported lower income than whites ( $p < .01$ ). At the quitday assessment, blacks reported less withdrawal on the Wisconsin Smoking Withdrawal Scale (WSWS) when controlling for baseline withdrawal ( $p < .01$ ), and they exhibited less attentional bias to smoking cues on a modified Stroop task ( $p < .05$ ) when controlling for baseline. A multiple mediation analysis conducted using the Baron and Kenny causal steps approach, which is applicable in the absence of a significant direct effect, revealed 1) a significant specific indirect effect between race and 1-week relapse mediated by income, and 2) a significant specific indirect effect between race and 1-week relapse mediated by quit day withdrawal. Thus, blacks may experience greater income-related concerns, and this process lead to worse short-term cessation outcomes for blacks, compared to whites. Conversely, blacks experienced less withdrawal on quit day than whites, and this process lead to better short-term outcomes for blacks, compared to whites. The two specific indirect effects cancelled each other out. These findings highlight the need to understand the potentially complex mechanisms linking race and smoking cessation outcomes.

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## PA8-4

### EMOTION DYSREGULATION MEDIATES RELATIONS BETWEEN ANXIETY SENSITIVITY AND COGNITIVE-BASED SMOKING PROCESSES AMONG ADULT TREATMENT-SEEKING DAILY SMOKERS

Samantha G. Farris, Kirsten A. Johnson, Norman B. Schmidt, and Michael J. Zvolensky

Introduction: Although there is a well-documented association between anxiety sensitivity (AS; fear of anxiety-related sensations; McNally, 2002) and numerous aspects of cigarette smoking (Morissette et al., 2007), relatively little is known about the mechanisms that may account for such robust relations. Emotion dysregulation, which reflects difficulties in the ability to modulate intensity of emotional responses, is a promising construct within anxiety psychopathology and substance use disorder comorbidity research. Indeed, past work has demonstrated that emotion dysregulation is significantly related to certain smoking motives as well as perceived barriers to quitting smoking (Gonzalez et al., 2008). The present study sought to examine relations between AS and cognitive-based smoking processes (i.e., beliefs about and motives for smoking, perceptions of cessation-related difficulties) as well as the role of emotion dysregulation in terms of mediating these relations. Method: Participants ( $n = 198$ ; 57.5% male; Mage = 38.0) were daily smokers participating in a larger randomized control trial for smoking cessation. Results: After controlling for the theoretically-relevant factors of number of cigarettes smoked per day, past 30 day marijuana use, alcohol consumption, number of

current Axis I diagnoses, panic attack history and participant sex, results revealed that AS was significantly associated with each of the cognitive-based smoking processes. Moreover, emotion dysregulation significantly mediated relations between AS the three smoking-related processes (negative reinforcement smoking expectancies, negative affect reduction smoking motives, and barriers to cessation). Conclusions: The present study provides novel empirical information concerning AS and emotion dysregulation in terms of their relation to cognitive-based smoking processes. These present data point to the possible relevance of emotion dysregulation as a theoretically viable mechanism within models of AS-smoking comorbidity.

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## PAPER SESSION 9: VACCINES, GENES, AND ANXIETY: UNDERSTANDING NICOTINE DEPENDENCE

## PA9-1

### BETA2-NACHR OCCUPANCY BY NICOTINE AFTER TREATMENT WITH NICVAX

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Nicotine acts in the brain primarily by binding to the beta2-nicotinic acetylcholine receptors (beta2-nAChRs). The effects of nicotine from smoking one tobacco cigarette are significant (up to 80% of beta2-nAChRs occupied for >6h, maximal occupancy at 3h). This likely contributes to the maintenance of the addiction and low cessation outcomes. Development of nicotine vaccines has provided potential for alternative treatments. We used [123I]5IA-85380 and single photon emission computed tomography (SPECT) to evaluate the efficacy of NicVAX (Nabi Biopharmaceuticals) to prevent some nicotine from occupying beta2-nAChRs in smokers. Eleven smokers (7men, 32.7±3y; 4women, 30.6±4y) participated in 2 SPECT scan days: one before and one after treatment with 4 doses of NicVAX over a 4-mo period. On the day of each SPECT scan, 3 30-min baseline emission scans were obtained, followed by administration of IV nicotine (1.5mg/70kg) and subsequently up to 9 30-min emission scans. Beta2-nAChR availability was quantified as VT/fP and receptor occupancy was derived using the Lassen plot approach. Subjects were regular smokers (19±11cig/d for 10±7y) moderately dependent on nicotine (Fagerström Test of Nicotine Dependence=5.5±3; plasma nicotine 9.1±5ng/mL). After participation in NicVAX treatment, desire for a cigarette and the cigarette use were significantly reduced ( $p=.04$  and  $p=.01$ , respectively). Significant positive correlations were observed between beta2-nAChR occupancy by nicotine and nicotine injected pre- ( $r=0.60$ ,  $p=0.05$ ) but not on the post-treatment scan day ( $r=0.01$ ,  $p=0.98$ ). There was a significant 12.5% reduction in beta2-nAChR occupancy by nicotine post treatment as compared to pre treatment ( $p=0.03$ ). Preliminary results show a dose-dependent occupancy of the beta2-nAChRs by nicotine prior to NicVAX but not post treatment and a significant reduction of beta2-nAChR occupancy by nicotine, suggesting NicVAX inhibited some nicotine from reaching the brain and binding to the receptor. Clinical data show a significant reduction in desire for and use of cigarettes. Results should be confirmed with a larger clinical study that includes a placebo control group.

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## PA9-2

### NICOTINE DEPENDENCE MODIFIES THE ASSOCIATION BETWEEN DOPAMINE RECEPTOR GENES AND DEPRESSION

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Genetic influences on the association between nicotine dependence (ND) and major depressive disorder (MDD) have been investigated in a limited number of studies. The aims of this study were to investigate (1) association between lifetime DSM-IV diagnoses of ND and MDD among Finnish adult ever smoking twins; (2) magnitude of shared genetic factors influencing this co-morbidity; and (3) association of dopamine receptor genes with these phenotypes. The study sample was ascertained from the Finnish Twin Cohort study. Twin pairs born 1938-1957 and concordant for cigarette smoking history were recruited along with their family members, as part of the Nicotine Addiction Genetics consortium. Phenotype analysis was based on 1320 twins with data on both ND and MDD diagnoses. Individual level multiple logistic regressions were applied for the affected/non-affected phenotypes adjusted for sex, age, and alcohol use. Bivariate quantitative genetic models for ND and MDD in 112 monozygotic and 410 dizygotic pairs were used to estimate the genetic correlation between traits. The genetic study sample consisted of 1428 individuals from 735 families (mean age 55.6 years). A total of 70 tagging SNPs within the dopamine receptor genes (DRD1-5) were genotyped, stochastically imputed and analyzed for association for MDD diagnosis, number of DSM-IV depression symptoms, ND, as well as the co-morbidity of MDD and ND. Analyses indicated that individuals with ND diagnosis had significantly higher likelihood for lifetime MDD (adjusted OR=2.36; 95% CI 1.71, 3.26; p<.001). A high genetic correlation (rA=0.70, 95% CI -0.02, +1.00) suggested that shared genetic influences might underlie this association. We detected a significant association between rs2399496 at the 5' end of DRD3 and the co-morbidity of MDD and ND (p=0.000049). However, when analyzing the nicotine dependent and the non-dependent individuals separately for the rs2399496, the association signal for MDD originated solely from the nicotine dependent individuals. We conclude that nicotine dependence may modify the association of DRD3 with MDD. This novel finding needs to be replicated in another independent sample.

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## PA9-3

### RELATIONSHIP OF GENETIC VARIATION IN CYP2B6 IN COMBINATION WITH CYP2A6 AND CHRNA5-CHRNA3-CHRN4 ON SMOKING BEHAVIORS AND LUNG CANCER RISK

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Variation in the CYP2A6 gene and the nicotinic receptor subunit gene cluster, CHRNA5-CHRNA3-CHRN4, was independently and additively associated with nicotine dependence, cigarette consumption and lung cancer risk in a lung cancer case-control study of European American smokers (n=860). Here we extend our genetic risk model to CYP2B6 with each participant genotyped for CYP2B6 altered activity alleles. CYP2B6, like CYP2A6, can metabolically inactivate nicotine and activate tobacco specific nitrosamines including the lung procarcinogen 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone. Controlling for variation in CYP2A6 and CHRNA5-CHRNA3-CHRN4, CYP2B6 was not significantly associated with nicotine dependence or cigarette consumption. To investigate the combined impact of all three candidate genes on lung cancer risk, participants were classified as having 0, 1, 2 or 3 high-risk genotypes. For CYP2B6, we grouped participants into a low- versus high-risk cancer group based on genotype risk: CYP2B6\*6/\*6 versus all other CYP2B6 genotypes. For CYP2A6 and CHRNA5-CHRNA3-CHRN4, we employed the same low- versus high-risk genotype grouping as before with CYP2A6 reduced versus normal metabolizers, and

CHRNA5-CHRNA3-CHRN4 GG/GA versus AA (rs1051730 G>A), respectively. In our two-gene CYP2A6 and CHRNA5-CHRNA3-CHRN4 model the odds ratios for 1 and 2 high-risk genotypes compared to 0 were 1.15 (95% CI 0.80-1.64) and 2.01 (95% CI 1.20-3.37), respectively. In our three-gene model the odds ratios were higher and differed (P=0.05) between those with 1, 2, or 3 high-risk genotypes rising from 2.05 (95% CI 0.39-10.9) to 2.40 (95% CI 0.46-12.5) to 3.92 (95% CI 0.72-21.3). Odds ratios were adjusted for age, gender and cigarette pack years. For smoking, our findings indicate a minor role for CYP2B6 in smoking behaviors compared to CYP2A6 or CHRNA5-CHRNA3-CHRN4, which is consistent with a negligible role for CYP2B6 in peripheral nicotine metabolism. For lung cancer risk, variation in all three genes may additively increase the risk for lung cancer among smokers; this work furthers our understanding of mechanisms and sources of variation in cancer risk among smokers.

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## PA9-4

### INACTIVATION OF HIGH AFFINITY ALPHA4BETA2\* NICOTINIC ACETYLCHOLINE RECEPTORS ATTENUATES ANXIETY-LIKE BEHAVIOR IN A CONDITIONED EMOTIONAL RESPONSE ASSAY

S.M. Anderson\* and D.H. Brunzell, Virginia Commonwealth University

While many smokers report that smoking relieves anxiety, the mechanism remains largely unknown. This study tested the hypothesis that inactivation of high affinity alpha4beta2 subunit containing nicotinic acetylcholine receptors (a4b2\*nAChRs) promotes anxiolysis. Previous research shows that nicotine (NIC), a psychoactive agent in tobacco, both activates and desensitizes nAChRs; sub-activating doses preferentially desensitize (inactivate) nAChRs. Adult C57BL/6J male mice were tested in a conditioned emotional response (CER) test. CER evaluates the effect of an aversive conditioned stimulus (CS) on goal-directed behavior and has good face validity considering the stressors people encounter during their daily routines. Mice lever-pressed for a 10mM saccharin solution reinforcer under a variable schedule of reinforcement (VR5s or V15s) during 30 minute sessions. Once trained, subjects received two presentations of a 60s CS that co-terminated with a 0.1 or 0.3 mA, 0.5 sec unconditioned stimulus (US) footshock. Suppression ratios (SR) comparing CS to non-CS responding provided a measure of anxiety-like behavior with SR = 0.5 interpreted as low anxiety and SR = zero as high anxiety during the CS. According to a Latin square, within-subject design, mice received NIC (0, 0.003, 0.01, 0.03 or 0.1 mg/kg i.p.) or a selective a4b2\*nAChR antagonist (DHbE; 0, 0.1, 0.3, 1 or 3 mg/kg i.p.) before CER probe trials. Supporting the hypothesis that inactivation of nAChRs promotes anxiolysis, DHbE led to dose-dependent increases in SR; 3mg/kg DHbE resulted in significantly elevated SR compared to saline controls. Low doses of NIC also significantly increased SR in mice, but doses of NIC that support conditioned place preference, which requires activation of nAChRs, did not affect SR. Locomotor activity was not affected by low dose NIC or 3 mg/kg DHbE. These data support the hypothesis that inactivation of a4b2\*nAChRs promotes anxiolysis and suggest that low levels of nicotine may be sufficient to support smoking behavior in those who report that cigarette smoking relieves anxiety. These data further identify a4b2\*nAChR antagonism as a therapeutic strategy for relief of anxiety.

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**PAPER SESSION 10: THE BIOLOGY OF  
 NICOTINE AND WITHDRAWAL**

**PA10-1**

**NICOTINE DEPENDENCE INDUCES THE RECRUITMENT OF NEW CRF NEURONS IN THE VTA THAT ARE REQUIRED FOR NICOTINE WITHDRAWAL AVERSION**

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A central dogma in neuroscience is that once the brain reaches adulthood, the neuronal phenotype of a given nuclei is stable and that neurons always release the same set of neurotransmitters to maintain control over a specific cognitive or emotional function. Recently, it has been hypothesized that very discrete population of neurons, also known as reserve pool neurons, may change the identity of neurotransmitter they express with a gain or loss of function generated by transmitter respecification. However, the significance of this phenomenon in neuropsychiatry and in the development of mental disorders such as drug addiction is unclear. Here we show using *in situ* hybridization, immunohistochemistry, RT-PCR and animal models of nicotine dependence, that chronic exposure to nicotine leads to neo-synthesis of the stress peptide corticotropin releasing factor (CRF) in non-dopaminergic neurons in the ventral tegmental area (VTA), a brain region associated with reward processing and normally devoid of CRF neurons. Moreover, we show using viral-mediated downregulation of CRF mRNA and specific CRF1 receptor antagonist that this neosynthesis of CRF mRNA and activation of CRF1 receptors in the VTA is required for the motivational response to nicotine withdrawal but not nicotine reward in nicotine dependent mice. These results suggest that in addition to its role in drug reward, the VTA may be critically involved in the motivational response to drug withdrawal through the recruitment of a new local brain stress system composed of reserve pool neurons neosynthesizing CRF in the VTA and promoting aversion to withdrawal through activation of CRF1 receptors.

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**PA10-2**

**DEXTROMETHORPHAN ATTENUATES NICOTINE DEPENDENCE AND PREVENTS MECAMYLAMINE-PRECIPITATED WITHDRAWAL SYNDROME**

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Dextromethorphan (DM) is a commonly used cough suppressant which modulates opiate mechanisms and inhibits NMDA and alpha(3)beta(4) nicotinic receptors. These three mechanisms have been implicated in nicotine physical dependence. DM has also been reported to reduce nicotine self-administration in animal models. The present study determined whether DM might reduce physical dependence on nicotine in the rat, as indicated by reducing withdrawal signs precipitated by 1 milligram per kilogram (mg/kg) of the nicotinic antagonist mecamylamine. This is a dose which precipitates a withdrawal syndrome only in nicotine-dependent rats. Thirty-one rats were rendered nicotine dependent by 9 mg/kg/day nicotine bitartrate continuously infused via subcutaneous Alzet osmotic minipump. Twenty minutes prior to mecamylamine challenge, they were injected subcutaneously with 0, 3, 5, 7.5 or 10 mg/kg DM in saline. Somatically-expressed withdrawal signs were significantly reduced at all DM doses in comparison with saline controls. The maximum effect occurred with 5 mg/kg, which nearly eliminated withdrawal signs. The dose-response curve was biphasic with a significant quadratic trend. All individual categories of withdrawal signs were reduced by DM in comparison with saline controls, suggesting that DM interfered with fundamental mechanisms of nicotine physical dependence, as opposed to altering the expression of one particular withdrawal-induced behavior. A second experiment tested the possibility that DM by itself might precipitate withdrawal through its interaction with nicotinic receptors. However, the highest dose did not precipitate a meaningful nicotine withdrawal syndrome. The results

suggest that DM or other drugs with analogous neurochemical mechanisms might be useful in reducing nicotine physical dependence and managing nicotine withdrawal syndrome in smoking cessation.

*GlaxoSmithKline.*

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**PA10-3**

**NICOTINE ENHANCES THE EXPRESSION OF A CONDITIONED PLACE PREFERENCE**

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Nicotine can enhance the reinforcing efficacy of concurrently available stimuli through a non-associative mechanism. These effects have primarily been studied using an operant/instrumental paradigm. Recent research using Conditioned Place Preference (CPP), a Pavlovian paradigm, showed nicotine-related enhancement of a conditioned response after repeated, concurrent exposure to nicotine and a context (conditioned stimulus) paired with an unconditioned social reward. The current experiment was designed to determine if an associative history was necessary for reinforcement enhancement to occur in this paradigm and to generalize these findings to a different unconditioned reinforcer, sucrose. Procedures occurred in a three compartment CPP chamber over three phases that included 2 choice compartments (28 x 21cm) and one central acclimation compartment (12 x 21cm). The experiment progressed in three phases: Initial Preference test, Conditioning, and Final Preference test. The Initial Preference test (20 min) allowed rats moved freely between all three compartments, while time in the individual compartments was recorded. The four session (30 min) Conditioning phase alternated between conditioning and control sessions. Conditioning sessions exposed rats to sucrose in their non-preferred compartment (i.e., based on the Initial Preference test) and control sessions exposed rats to their preferred compartment without sucrose. The Final Preference test session (20 min) allowed rats to move freely between all three compartments. One group of rats received a single subcutaneous dose of nicotine (0.4 mg/kg)(N=10) immediately before the Final-Preference test and another group received saline (N= 10). Sucrose pairing significantly increased the percent of time spent in the non-preferred side (main effect of test: F<sub>1,18</sub>=37.8, p<0.001). Furthermore the increase was significantly greater for rats exposed to nicotine (test x drug interaction: F<sub>1,18</sub>=4.2, p<0.05). This outcome illustrates that nicotine enhances the expression of a conditioned place preference for sucrose and provides a method of assessing these effects of nicotine that is independent of operant responding.

*National Institute of Health: DA10464.*

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**PA10-4**

**PHYSIOLOGICAL RESPONSE TO NICOTINE AFTER ACUTE SMOKING ABSTINENCE: DIFFERENCES BY DEPRESSIVE SYMPTOMS STATUS AND MENSTRUAL PHASE**

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Accumulating evidence has linked depressive symptoms and sex hormones to risk for smoking relapse. This study characterizes a possible pathway for these observations – the physiological response to nicotine. Women between the ages of 18-40 who smoked ≥ 5 cigarettes/day were recruited to participate in a cross-over designed lab study. Eligibility criteria included stable physical/mental health and no psychotropic or hormonal medications. Participants were stratified into two groups: (1) Depressive Symptoms (DS; n=24), and (2) No Depressive Symptoms (NDS; n=23) per results from the Composite International Diagnostic Interview and the Patient Health Questionnaire-9. Participants were randomized to order of menstrual phase testing (Follicular (F), Luteal (L)). During each menstrual phase on the fourth day of biochemically verified smoking abstinence, a nicotine response lab was completed including nicotine nasal spray (Time 0) and collection of serum samples and measurement of blood pressure and heart rate (Time -1, 5, 10, 20, 30, 45 and 90 minutes). Outcome variables included maximum concentration of nicotine (C<sub>max</sub>), nicotine area under the curve (AUC), heart rate (HR), diastolic blood pressure (DBP) and systolic blood pressure (SBP). Change scores for HR, DBP and SBP were computed by subtracting baseline (Time -1) values from values observed at



Cmax. Analyses include descriptive statistics and random intercept models with fixed effects. Participants (n=47) were 29.1±6.8 years old and smoked 12.5±5.1 cigarettes/day. The interaction between depressive group and menstrual phase was significant for the following: Cmax (NDS-F: mean (SE)=3.9 (0.6), NDS-L: 2.3 (0.6), DS-F: 4.4 (0.6), DS-L: 4.5 (0.6); p=0.02), change in HR (NDS-F: 12.2 (2.0), NDS-L: 7.3 (2.0), DS-F: 10.2 (2.0), DS-L: 10.5 (2.0); p=0.05) and change in DBP (NDS-F: 6.2 (1.7), NDS-L: 2.6 (1.7), DS-F: 4.5 (1.7), DS-L: 7.8 (1.7); p=0.05). These results suggest that women who do not have depressive symptoms may have a greater menstrual phase difference in physiological response to nicotine. Additional research is needed to investigate how this information may be used in smoking cessation treatment.

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## PAPER SESSION 11: GETTING THE BIG PICTURE: POPULATION-BASED CESSATION

### PA11-1

#### USING NICOTINE PATCHES FOR THE RECOMMENDED DURATION HELPS SMOKERS QUIT: A POPULATION-BASED COHORT STUDY

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**BACKGROUND/OBJECTIVES:** Little is known about the impact of nicotine replacement therapy (NRT) use duration on smoking cessation in the general population. This study investigates if using nicotine patches (one of the five types of NRT) for the recommended duration (≥8 weeks) is associated with a higher likelihood of smoking cessation compared to not using patches and using patches for a suboptimal duration (<8 weeks) in the general population. **METHODS:** We used a population-based cohort of Ontario adult smokers who made at least one serious quit attempt during follow-up, from the Ontario Tobacco Survey longitudinal study. The association between patch use duration and smoking cessation was estimated by Poisson regression, adjusting for all confounding variables. **RESULTS:** Among the 1,368 current smokers at baseline who made at least one serious quit attempt at follow-up and were re-interviewed at 18 months of follow-up, 1,023 (75%) did not use nicotine patches, 281 (20%) used patches <8 weeks, and 64 (5%) used patches ≥8 weeks. The adjusted analysis showed that for the quitting outcome ≥1 month, those using patches ≥8 weeks were 1.7 times (relative risk (RR) = 1.7, 95% confidence interval (CI) 1.2-2.5, p=0.005) more likely than those not using patches and 1.9 times (95% CI 1.3-2.9, p=0.002) more likely than those using patches <8 weeks to quit. For the quitting outcome ≥12 months, those using patches ≥8 weeks were 2.8 times (95% CI 1.3-5.9, p=0.008) more likely than those not-using patches, and 4.5 times (95% CI 1.7-12.4, p=0.003) more likely than those using patches <8 weeks to quit. There was no difference between using patches <8 weeks and not using patches in terms of quitting ≥1 month or ≥12 months. **CONCLUSIONS:** The majority of smokers did not use nicotine patches for the recommended duration when they tried to quit smoking. When smokers used patches for the recommended duration, their likelihood of quitting smoking short-term (≥1 month) and long-term (≥12 months) was much higher than those who did not use patches or used patches for a sub-optimal duration. Efforts should be made to encourage smokers to use nicotine patches for the recommended duration.

*The Ontario Tobacco Survey is an initiative of the Ontario Tobacco Research Unit, which receives funding from the Ontario Ministry of Health Promotion and Sport.*

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### PA11-2

#### USE OF CONTRABAND TOBACCO ASSOCIATED WITH POORER SMOKING CESSATION OUTCOMES

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High tobacco prices typically achieved through taxation is an evidence-based strategy to reduce tobacco use; however, the presence of cheap contraband tobacco undermines

this effective intervention by providing an accessible alternative to quitting. This study assesses whether contraband tobacco use negatively affects smoking cessation outcomes. Baseline to twelve-month follow-up data were compiled on 2,786 respondents from the Ontario Tobacco Survey. Unadjusted and multivariable models examining the relationship between contraband tobacco use and cessation outcomes – making a quit attempt and 30-day cessation – were fit for both six and twelve-month follow-up periods, adjusting for the complex survey design. Compared to those who smoke premium or discount cigarettes, those smoking contraband cigarettes were significantly less likely to make a quit attempt over both the six and twelve-month follow-up periods in unadjusted models; however, when adjusted for covariates, these associations were no longer significant (6-months: RR=0.88, p=0.39; 1-year: RR=0.82, p=0.07). Smoking contraband cigarettes was also associated with a decrease in smoking cessation in unadjusted models. After adjusting for covariates, individuals who smoked contraband cigarettes at baseline were almost 40% less likely to report a period of 30-day abstinence during the following year (RR=0.61; p=0.03). Additionally, compared to smokers of premium or discount cigarettes, individuals who reported smoking contraband cigarettes on two consecutive follow-up interviews were 44% less likely to make a quit attempt in the following 6-months (RR=0.66; p=0.02), and 52% less likely to achieve a 30-day quit period (RR=0.48; p=0.04). Smoking contraband cigarettes has a negative impact on cessation outcomes, especially 30-day smoking cessation. Tobacco control policies which reduce or eliminate access to contraband tobacco may have a significant impact on population-level quitting behaviour.

*The Ontario Tobacco Survey is an initiative of the Ontario Tobacco Research Unit, which receives funding from the Ontario Ministry of Health Promotion and Sport.*

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### PA11-3

#### COMPARISON OF SMOKERS MAKING ASSISTED AND UNASSISTED QUIT ATTEMPTS AND 30 DAY QUILTS IN THE ONTARIO TOBACCO SURVEY

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**Background:** Population studies demonstrate that most former smokers quit without any form of pharmaceutical or clinical behavioral assistance. Few studies have examined the characteristics of these quitters versus those seeking or requiring direct intervention. This study compared the baseline characteristics of smokers in the Ontario Tobacco Survey (OTS) who reported a quit attempt or at least a 30 day cessation using pharmaceutical or behavioral assistance (assisted) to those who reported using none (unassisted). **Methods:** The OTS is a population-representative panel study of adult smokers recruited from 2005 through 2008 with bi-annual follow-ups over three years. Data on 2083 (50.9%) smokers who reported any quit attempt (1299 unassisted; 784 assisted) and 1068 (26.1%) smokers who reported at least a 30 day long cessation (780 unassisted; 288 assisted) during the 3 year follow-up were used. Weighted frequencies were calculated for baseline characteristics including: demographic characteristics, smoking history, quit attempts and prior use of pharmaceutical or behavioral intervention. Differences were assessed using Chi-square tests for categorical variables and t-tests for continuous variables. **Results:** Among smokers reporting any quit attempt, those using assistance were significantly older (p = 0.0005), more likely to be female (p=0.002), married (p=0.004), daily smokers (p<0.0001), report poorer health status (p=0.04), perceive themselves as addicted (p<0.0001) and score high on the heaviness of smoking index (p<0.0001) and report more previous quit attempts (p<0.0001) and using quit aids in the past (p<0.0001). Similar results were found when comparing smokers reporting at least a 30 day cessation; however, unassisted and assisted quitters in this group were not significantly different in terms of sex and marital status. **Conclusions:** Smokers quitting through assistance were distinctive from unassisted quitters in terms of demographics and smoking behaviors reported at baseline. Study results provide an indication of what types of variables will need to be controlled when attempting to compare outcomes of assisted and unassisted quitters.

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## PA11-4

### QUIT BEHAVIORS IN YOUNG ADULTS: COMPARING "SMOKERS" AND "SOCIAL SMOKERS"

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Young adults are more likely to have made a quit attempt in the past year compared to older adults, but they experience higher rates of failed quit attempts due to underuse of evidence-based cessation strategies. Additionally, rates of "social smoking" are increasing among young adults and compound the persistent difficulty in quitting in this age group. The current study uses baseline data from the Legacy Young Adult Cohort study to examine quit behaviors among young adults (ages 18-34) who self-identified as "smokers" or "social/occasional" smokers. Data were weighted to provide nationally-representative estimates. Differences in proportions and means were determined by non-overlapping 95% confidence intervals. In this sample of 930 smokers, 52% identified as social or occasional smokers. This group reported a significantly lower mean number of cigarettes per day than those who self-identified as smokers (2.8 vs. 12.2). They were also significantly more likely to report a greater mean motivation to quit (6.7 vs. 5.4 on a 10-point scale), any quit attempt within the past 12 months (61% vs. 46%), and a higher mean number of quit attempts in the past 12 months (7.1 vs. 3.6) compared to those who self-identified as smokers. They were significantly less likely to endorse experiencing any symptoms during a quit attempt (e.g., craving, irritability, anxiety) or to report having used nicotine replacement products, bupropion, or e-cigarettes to facilitate quitting. This study emphasizes the difficulty in cessation for young adult smokers, even at low levels of smoking. It points to the importance of providing greater access to evidence-based cessation treatments to young adults and tailoring cessation interventions for young adults who do not self-identify as smokers.

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## PAPER SESSION 12: STUDYING THE IMPACT OF TOBACCO CONTROL POLICIES

## PA12-1

### THE VALUE OF TOBACCO CONTROL

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This paper provides estimates of the impact of tobacco control policies on a statewide basis for all 50 U.S. states. For the U.S. as a whole, we estimate that the increase in life expectancy over the period 1966 to 2004 would be lower by 17.4 percent had prevalence rates in the U.S. remained at 1966 levels. Accordingly the value of the decline in prevalence, expressed as an annual willingness to accept payment, lies in the range of 400 to 600 billion dollars. For each additional percentage point decline in prevalence, average U.S. life expectancy rises by 2.64 weeks and has a monetary value of between \$2.47 and \$4.95 billion annually. Then for each state, we calculate the changes in smoking prevalence that arise from various tobacco control policies (tax increases, clean air laws, and program expenditures). Using these prevalence changes, projections on the long run changes in life expectancy are derived. Using an adaptation of the Murphy-Topel framework we estimate the monetary value of these changes in life expectancy. This monetary benefit of tobacco control is compared to the out of pocket cost of tobacco control. Our results have important policy implications for the efficacy of tobacco control and increases in the stringency of tobacco control.

*Robert Wood Johnson Foundation.*

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## PA12-2

### THE IMPACT OF LOCAL TOBACCO POLICIES ON YOUTH SMOKING: A METHOD TO QUANTIFY AND WEIGHT LOCAL TOBACCO POLICIES

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A significant challenge to studying the impact of local tobacco policies on youth smoking is quantifying policies and rating their potential effectiveness. Most studies have measured policy effects at the federal and state levels and previous efforts to quantify and weight tobacco policies have been limited to policies implemented at these levels. Important questions remain regarding the effects of local policies on preventing and reducing youth use and the relative impact of various types of local policies. This study describes the development of a method to quantify and weight tobacco policies implemented at the local level to discourage youth smoking. We demonstrate this method scoring and rating local tobacco policies in 50 communities in California. Our approach included the following steps. First, municipal tobacco codes of 50 California communities were reviewed and regulatory domains and sub-domain were identified. These included indoor clean air laws, outdoor clean air laws, retail licensure, and advertising and promotion. A measure to rate the importance and effectiveness of state and local tobacco policies was then developed, pilot tested, revised, and administered to an expert panel of 18 tobacco researchers and 22 prevention specialists (i.e., tobacco prevention directors of local health departments). Data collected from experts were used to develop a weighting system for each policy domain reflecting its effectiveness in discouraging youth smoking. We also compared beliefs and ratings of tobacco researchers with those of prevention specialists. This study provides an empirical-driven method that can be generalized for other research and tobacco control prevention efforts. Researchers can use the method to examine local policies in other states and their impact on various smoking outcomes. Tobacco control specialists can use the outcomes to help guide their selection and implementation of interventions in their local communities.

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## PA12-3

### DEVELOPMENT AND IMPLEMENTATION OF A MOBILE PHONE-BASED SYSTEM FOR SURVEILLANCE OF POINT-OF-SALE TOBACCO MARKETING TACTICS

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Background: Point-of-sale (POS) surveillance for tobacco products has relied upon paper-based surveys of retail outlets. These methods are potentially obtrusive and inefficient for rapid, flexible response to a changing tobacco sales landscape. Objective: To assess the feasibility of a mixed-mode data collection system (interactive voice response [IVR], Photo, Web, SMS) for POS surveillance, with an emphasis on scalability and adaptability. All licensed tobacco retailers in a major metropolitan area were surveyed to monitor regulated and unregulated marketing strategies. Methods: A brief mobile phone-based survey was conducted at all Washington DC outlets (n=1,080), focusing on price, placement, promotions and product. Fieldworkers surveyed the exteriors and interiors of outlets, using standard cellphone cameras to collect photographs of the storefront and the store's front counter. Analyses compared lowest pack price, promotions and placement for leading brands of menthol cigarettes and little cigars and cigarillos (LCCs), and the lowest pack price of any cigarette brand. Results: A leading menthol brand is available in almost all stores, but is cheaper and more heavily promoted in low-SES block groups. This brand is increasingly promoted alongside a new nonmenthol variant. The lowest-price brands are generic, but premium brands are sufficiently discounted through special promotions to be the cheapest available option. LCCs were significantly cheaper than cigarette brands of any type and were available in areas of the store where cigarettes are prohibited (e.g., front of counter, near candy). LCCs were also available as single-unit sales. Conclusions: This mobile-phone surveillance system is effective for identifying industry strategies to adapt to more constrained retail marketing environments. The promotion of a nonmenthol variant of a traditionally menthol-only brand, and concurrent promotion of menthol and nonmenthol brands reflects industry response to regulatory interest in menthol. Findings document

strategies to facilitate experimentation of unregulated LCCs through sale of individual units, cheaper prices, and direct physical access.

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## PA12-4

### MODELING FOR TOBACCO CONTROL STRATEGY EVALUATION: WHAT YOU NEED TO KNOW

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**BACKGROUND AND OBJECTIVES:** The strategies of comprehensive tobacco control interventions include changing individual behaviors and altering the social and political environments. The complexity of these intervention strategies poses significant challenges for tobacco strategy evaluation. Both traditional epidemiological methods (statistical models) and simulation models (system dynamics models) have been used to evaluate tobacco control policies. The information on what models can be used to evaluate which policies and the pros and cons of these models is lacking in the current literature. This study is trying to fill in this gap. **METHODS:** Critical literature review of peer-reviewed scientific papers. Combinations of key words were entered into the PubMed and the internet search engine Google. **RESULTS:** Statistical models (e.g., time-series analysis and Poisson regression) estimate parameters directly (e.g., coefficients and relative risk) and take into account individual variations. But they may be of limited effectiveness in distinguishing how the effects of policies depend on the other policies in place, and may not be suitable to evaluate non-linear changes of smoking behaviors. The majority of statistical models evaluate one policy at time. System dynamics models (e.g., SimSmoke model) can estimate the effects of multiple policies simultaneously; model non-linear changes; and deal with complexity by abstracting the key elements of the system and simulating their dynamic interrelationships over time. However, system dynamics models can be very complex. The models need to use many data sources and assumptions. The models heavily rely on the parameters from statistical models. Many assumptions are made implicit and may not be valid. Most of system dynamics models do not take into account individual variations other than age and gender. **CONCLUSIONS:** System dynamics modeling offers the greatest potential contribution to tobacco control strategy evaluation. However, users must be aware of the pitfalls in determining coefficients for estimating the effects of interventions. More work is needed to help estimate the synergistic effects of several interventions.

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## PAPER SESSION 13: INTERMITTENT SMOKERS: WHO'S ON AND WHO'S OFF?

## PA13-1

### GENETIC INFLUENCES ON DEVELOPMENTAL SMOKING TRAJECTORIES

Christina N. Lessov-Schlaggar\*, Sean D. Kristjansson, Kathleen K. Bucholz, Andrew C. Heath, and Pamela A. F. Madden, Department of Psychiatry, Washington University School of Medicine, St. Louis, MO

This study investigated the relative contribution of genetic and environmental factors on developmental smoking trajectory membership and tested whether individual smoking trajectories represent phenotypic thresholds of increasing genetic risk along a common genetic liability dimension. Trajectory models were fit to daily cigarette consumption data collected from a prospective study of a birth cohort of female like-sex twin pairs who completed diagnostic interview surveys 4 times from adolescence (average age 16) through young adulthood (average age 25) and who had smoked  $\geq 100$  cigarettes lifetime ( $n=1466$ ). A 4-trajectory class solution provided the best fit and was characterized by Low ( $n=564$ , 38.47%), Moderate ( $n=366$ , 24.97%), and High level smokers ( $n=197$ , 13.44%), as well as smokers who increased their smoking from adolescence to young adulthood ( $n=339$ , 23.12%). The best genetic model fit was a 3-category model that was

comprised of the Low, a combined Increasing + Moderate, and High trajectories. This trajectory categorization was highly heritable (72.7%) with no evidence for contribution from shared (family) environmental factors. This study showed that trajectory group membership is heritable, and genetically, there is no distinction between individuals who smoke at consistent moderate levels and individuals who increase their smoking in later adolescence. Individuals classified in both these trajectories were at intermediate genetic risk between individuals classified in the Low and those classified in the High smoking trajectories. These results suggest that phenotypic distinctions between developmental smoking trajectories do not reflect genetic distinctions between trajectories.

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## PA13-2

### DIFFERENCES BETWEEN COLLEGE AND COMMUNITY LIGHT AND INTERMITTENT SMOKERS ALONG THE U.S. / MÉXICO BORDER

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Understanding the differences between subgroups of smokers can lead to tailored and refined interventions to increase smoking cessation. Few studies have examined these differences in a predominantly Hispanic sample. This study assessed differences in demographic and smoking characteristics between predominantly Hispanic college student and community member light and intermittent smokers. One hundred seventy-two light and intermittent smokers (84% Hispanic; 51% males) between the ages of 18 and 66 ( $M=32.28$  years,  $SD=13.43$ ) were recruited from a family health clinic (58.7%) and a university (41.3%) on the U.S. / México border for a smoking cessation study. At baseline, participants completed measures assessing demographics, tobacco use and history, stage of change, perceived competence, and the Treatment Self-Regulation Questionnaire (TSRQ). Differences in age, amount smoked, number of times quit smoking, longest amount of time quit smoking, reason to quit, drinking frequency, perceived competence, stage of change, and motivation measured by the TSRQ between community and student smokers were assessed using MANOVA. Groups differed significantly on age ( $F(1,170) = 141.547$ ,  $p < .001$ ), drinking frequency ( $F(1,170) = 15.365$ ,  $p < .001$ ), stage of change ( $F(1,170) = 34.363$ ,  $p < .001$ ), and autonomous and controlled motivations ( $F(1,170) = 8.876$ ,  $p < .01$ ;  $F(1,170) = 7.002$ ,  $p < .01$ ). Student smokers were younger and drank more often than community smokers. Community smokers demonstrated higher levels of readiness and higher levels of autonomous and controlled motivation. These findings suggest that college student light and intermittent smokers may benefit from cessation intervention components that increase readiness to quit and meaningfully attend to co-morbid smoking and drinking (e.g., trigger management). Interventions targeted to community-based light and intermittent smokers may wish to capitalize on higher levels of motivation and include action-oriented components to promote cessation.

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## PA13-3

### DIFFERENCES BETWEEN ADULT "CONVERTED-INTERMITTENT" AND "NATIVE-INTERMITTENT" SMOKERS

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**Background:** Intermittent smokers (ITS) now make up a large proportion of current smokers in the US. Recent research has suggested that ITS are a heterogeneous group consisting of "converted-ITS" (those who previously smoked daily) and "native-ITS" (those who always smoked nondaily). Yet, little research has examined differences between these groups, particularly among adult (21 years+) smokers. **Objective:** Examine differences between "converted" and "native" ITS on demographic, tobacco-related (e.g. smoking history, dependence, quitting history), and psychosocial (e.g. motivation, confidence to quit, social influence) variables. **Methods & Analysis:** A sample of adult ITS were recruited through the community in Worcester, MA. Participants

completed a self-administered 40 minute questionnaire. Chi-square and t-tests were used to examine group differences. Results: Participants (N=95; 60% female, 70% caucasian, 70.5% "converted- ITS") were on average 35.0 yrs old (SD= 10.3, Range= 21-58), smoked 12.7 out of 30 days (SD= 7.4), and smoked 3.0 cpd (SD = 2.0) on days smoked. They were moderately motivated to quit (Contemplation ladder= 5.2, SD= 2.0); 30.9% reported wanting to quit in the next 30 days. Compared to "native" ITS, "converted" ITS smoked their first cigarette at a younger age (15.9 vs. 18.9;  $p < 0.005$ ), had lower rates of concurrent cigar use (11.9% vs. 33.3%,  $p < 0.05$ ), reported a shorter time before "needing" to smoke again (6 days vs. 21 days,  $p < 0.001$ ), had higher rates of trying to quit seriously (79.1% vs. 54.6%,  $p < 0.05$ ), were less confident in quitting (Confidence Scale; 98.8 vs. 110.1,  $p < 0.05$ ), reported a lower threshold of when smoking becomes harmful to one's health (smoking 1 cpd vs. smoking 3cpd,  $p < 0.05$ ), reported greater smoker identity (10pt scale; 4.5 vs. 3.6,  $p < .05$ ), and smoked more frequently while alone (27.4% vs. 3.8%,  $p < .05$ ). Conclusions: "Native" and "Converted" ITS did not differ on demographics, motivation to quit, and most nicotine dependence measures. Differences seen, however, suggest that this group distinction should be considered in potentially developing prevention and cessation programs for this growing population.

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### **PA13-4** **EXPERIENCES AND PERCEPTIONS OF SMOKING, QUITTING, AND CESSATION TREATMENT AMONG ADULT INTERMITTENT SMOKERS**

Rashelle B. Hayes, Ph.D., Taneisha S. Buchanan, Ph.D., Rachel Bernier, B.S., Pina Altomari, A.S., Judith K. Ockene, Ph.D., M.Ed., and Jasjit S. Ahluwalia, M.D., M.P.H., M.S., Division of Preventive and Behavioral Medicine, University of Massachusetts Medical School; Department of Medicine and Center for Health Equity, University of Minnesota Medical School

**Background:** Intermittent smokers (ITS) make up a large proportion of current smokers in the US, yet tobacco treatment guidelines have limited information on this group. Additionally, the majority of work on ITS has focused on young adults, who differ from adult ITS. Examination of perceptions of smoking, quitting, and cessation treatment among this group is needed. **Methods:** We conducted 8 focus groups (FGs) of adult ITS (21yrs+, n=45), stratified by gender. FGs explored 1) experiences and motivations for smoking nondaily (ND), 2) experiences and perceptions of quitting, 3) perceptions of risks to ND smoking, 4) social influences and smoker-identity that may contribute to smoking, and 5) attitudes toward cessation treatment and health education specifically related to ND smoking. **Results:** Participants were 55% female, 70% Caucasian, M age = 34.0 (SD= 9.6) yrs old, and smoked M=12.2 (SD = 7.6) days out of 30 days. Overall, preliminary qualitative themes suggest that adult ITS typically smoke in social situations or when alone, and smoke to alleviate stress or for pleasure. Most smoke ND for fear of becoming addicted. ITS may or may not plan intentional quit attempts, but do report wanting to quit in the future. Almost all believed that they could quit without difficulty. Most ITS acknowledged health risks to smoking, but not from their level of smoking; many could not relate to health messages of developing lung cancer or heart disease. Some ITS reported difficulty seeking treatment because providers said that they smoked "too little." Participants reported interest in using nicotine lozenges or gum and many requested health information that would help motivate them to seek treatment. No obvious differences between male and female ITS were noted. **Conclusion:** Our sample of adult ITS were not highly motivated to quit possibly due to the reinforcing value they get from smoking (e.g. alleviate stress, social facilitation), a lack of health information about low-level smoking, an overconfidence in their ability to quit, and a limited sense of smoker identity. Treatment may be enhanced by including targeted messages and methods to increase motivation to quit.

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### **PAPER SESSION 14: WHAT HAPPENS TO WITHDRAWAL WHEN DEPRESSION, AGGRESSION AND ANXIETY ARE ALSO IN THE MIX?**

#### **PA14-1** **NICOTINE WITHDRAWAL AND RELATIONSHIP AGGRESSION: FINDINGS FROM NESARC**

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Withdrawal from nicotine may be associated with increased aggression, due to such symptoms such as irritability and sleep deprivation. Even so, little attention has been given to a possible link between smoking and relationship aggression. This association may be relevant at the population level; a substantial portion of smokers attempt to quit each year, often multiple times, and many experience these withdrawal symptoms. This study examined the association between smoking cigarettes and relationship aggression among a nationally representative sample of adults in the U.S. Data were analyzed from wave two of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC; n = 25,649 respondents in a relationship). Multinomial logistic regression was used to compare the likelihood of reporting past year relationship aggression (victimization only, perpetration only, and both victimization and perpetration) between current smokers and never smokers. Odds ratio (OR) estimates were adjusted for sociodemographic variables, alcohol use and antisocial personality, and were weighted based on the survey design. Current smokers were more likely to report relationship aggression than never smokers (OR = 1.16, 1.26, 1.23, for victimization only, perpetration only, and both, respectively;  $p < 0.05$ ). Among current smokers (n = 7,933), OR's were calculated for cigarettes per day and withdrawal symptoms experienced in the past year (0-8 symptoms). A greater number of cigarettes per day was associated with an increased likelihood of victimization only (OR = 1.02,  $p < 0.05$ ), but was not significantly associated with reporting perpetration only or both perpetration and victimization. A greater number of withdrawal symptoms was associated with a greater likelihood of reporting victimization only, perpetration only, and both victimization and perpetration (OR = 1.16, 1.08, 1.08, respectively;  $p < 0.05$ ). Overall, results suggest there may be a link between symptoms of withdrawal from smoking and relationship aggression in the general U.S. adult population.

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#### **PA14-2** **NICOTINE WITHDRAWAL AND DEPRESSION EFFECTS ON SMOKING PERSISTENCE**

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While the effects of nicotine withdrawal (NW) and major depression (MD) on continued smoking has been of great interest in clinical studies of smoking cessation, these relationships have not been well-characterized in population-based samples. Our goal was to examine the independent and combined effects of DSM-IV defined lifetime NW and MD on persistent smoking (PS: any smoking in the last year in lifetime smokers) in two large-scale population based samples, which have extensive DSM-based lifetime assessments: 1) an Australian (AUS)-based young adult twin-cohort (N > 3000 smokers) and the National Epidemiologic Survey of Alcohol and Related Conditions (NESARC > 17,000 adult smokers). Multivariate logistic regression analyses (which controlled for heaviness of smoking, other forms of psychopathology and demographic characteristics) tested the effects of the following on PS: 1) a lifetime history of NW but no MD (+NW/-MD), 2) no lifetime history of NW but a lifetime history of MD (-NW/+MD), and 3) a lifetime history of both NW and MD (+NW/+MD), compared with no lifetime history of either (-NW/-MD). In AUS: +NW/-MD was associated with an adjusted OR of 1.8 (95% confidence interval (CI): 1.4-2.2) for PS, -NW/+MD an OR of 1.3 (95% CI: 1.0-1.7) and +NW/+MD an OR of 2.2 (95% CI: 1.6-2.9). Likewise, in NESARC, +NW/-MD was associated with an adjusted OR of 1.7 (95% CI: 1.6-1.9) for PS, -NW/+MD an OR of 0.98 (95% CI: 0.9-1.1) and +NW/+MD an OR of 2.2 (95% CI: 1.9-2.5). Thus, in both the

AUS and NESARC samples we detected a significant risk for continuing to smoke from NW alone and in particular with NW and MD combined, but less to no significant effect for MD alone. These results suggest that the effect of MD on PS, may, in part, be driven by the extent to which it co-occurs with NW.

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## PA14-3

### ANXIETY AND DEPRESSIVE SYMPTOMS AND PATTERNS OF ACUTE TOBACCO WITHDRAWAL

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People with emotional disorders may be more prone to tobacco dependence because they experience more severe tobacco withdrawal symptoms. However, extant research on this topic often characterizes anxiety and depression at the broad syndrome level, which is problematic due to the complex concordance and discordance across and within anxiety and depressive symptoms. The tripartite model of anxiety and depression was developed to address this issue and identifies general distress (shared components of anxiety [GDA] and depression [GDD]), anhedonic depression (AD; unique to depression), and anxious arousal (AA; unique to anxiety) as factors that characterize the underlying heterogeneity in emotional symptoms. This study examined associations of GDA, GDD, AD, and AA to acute tobacco abstinence effects. Adult smokers (N=74, ≥10 cig/day) attended a baseline session, in which emotional symptoms and other factors were assessed, and two subsequent laboratory sessions: one 16 hours post-abstinence and one after regular smoking (order counterbalanced), completing measures of mood, cigarette craving, and withdrawal symptoms. Separate regression models were tested for each abstinence score, controlling for non-abstinence score, demographics, and nicotine dependence. Those with higher AA and GDA experienced greater abstinence-induced changes in several withdrawal symptoms and mood states (betas >.24, ps <.05). AD was significantly associated with only abstinence-induced decreases in physiological symptoms (beta = -.23, p <.05) and arousal (beta = -.35, p <.01). GDD had no significant associations and none of the components associated with craving. When all components were entered simultaneously, unique associations were found between AS and drowsiness, confusion, and anger (ps <.05) and AD and physiological symptoms and arousal (ps <.05). These findings suggest that individuals with anxiety and depressive symptoms may experience different profiles of withdrawal symptoms, which may be specific to their type of emotional disturbance. These findings may be useful in tailoring smoking cessation treatments that target abstinence effects as a function of emotional symptomatology.

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## PA14-4

### AFFECTIVE TRAJECTORIES BEFORE AND AFTER A QUIT ATTEMPT IN SMOKERS WITH CURRENT DEPRESSIVE DISORDERS

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Smoking cessation for individuals with Major Depressive Disorder (MDD) represents an important clinical issue. It often has been hypothesized that smoking cessation notably worsens negative affect as part of the withdrawal process in this population. However, studies examining the impact of smoking cessation on changes in affect in smokers with MDD are limited and equivocal. The current study examined affective processes in smokers with MDD undergoing a 12-week smoking cessation intervention (N = 49). The PANAS was used to measure positive affect (PA) and negative affect (NA) trajectories of smokers with MDD over the course of a quit attempt. The primary aim of the study was to examine prolonged smoking abstinence at 3-month follow-up as a predictor of PA and NA at study endpoints and across time. Affective trajectories were modeled before and after a scheduled quit date at week 6. Mixed-effects models were used to examine study aims. First, prolonged abstinence status was examined as a predictor of positive affect (PA) and negative affect (NA) at end of treatment, 3-month follow-up, and 6-month follow-up. Only PA at 3-months showed a significant main effect with abstinence status. Second, the interaction of prolonged abstinence by time was also

examined on the post-quit PANAS (weeks 7-12) and no significant differences between abstainers and nonabstainers were found. Third, the interaction of prolonged abstinence by time was examined on the pre-quit PANAS (weeks 1-6). For the pre-quit period, prolonged abstainers reported a significant linear increase in PA but not NA over time, relative to nonabstainers. In conclusion, those who were prolonged abstainers showed significant pre-quit increases in positive affect and had higher levels of positive affect at the 3-month follow-up. The current study highlights important differences in affect between abstainers and nonabstainers that represent potential targets for treatment.

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## PAPER SESSION 15: OTHER TOBACCO PRODUCTS

## PA15-1

### HOOCAH HEADACHE: IS IT CARBON MONOXIDE TOXICITY?

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Background: Smokers of hookah (waterpipe) often report central nervous system (CNS) symptoms, such as "buzz," sleepiness, dizziness or headache ("hookah headache"), sometimes accompanied by nausea. These symptoms are attributed by smokers to everything from dehydration to the effects of nicotine. We investigated whether these symptoms could be the result of exposure to the high levels of carbon monoxide (CO) generated by the charcoal heat source. Methods: In this within-subjects study, established hookah smokers (n=36) arrived at the lab at least 4 hours abstinent from all tobacco/nicotine products. Each had two laboratory visits at approximately the same time of day, and a week apart. They smoked a research-grade hookah under two conditions: with quick light charcoal (high CO emitting condition) or with an electronic heating element (low CO emitting condition). Expired-air CO was measured at baseline, after 30 minutes of smoking and at end of smoking. CNS symptoms of 11 different measures (e.g., lightheadedness, headache) were measured at baseline and after smoking via 100 mm visual analog scales. The independent variable was CO boost, and the dependent variables were differences in CNS symptoms before and after smoking. Results: The sample was primarily male (69%), white (75%), and mean age was 24.6 years (s.d. 5.7). Half the sample owned their own hookahs, the mean age of initiation was 18.5 (s.d. 4.0), and 50% also smoked cigarettes. After adjusting for visit order, change in the following symptoms were significantly associated with CO level: lightheaded (p=.024), headache (p=.012), heart pounding (p=.002), confused (p=.025), and weak (p=.019). Three symptoms approached significance: nauseous (p=.09), nervous (p=.057) and sweaty (p=.051). Conclusion: Increases in five CNS symptoms after smoking hookah were positively associated with level of CO exposure. Because CO toxicity has such salience with the lay public, further conformation of this relationship and educating hookah smokers about the risk may help to interrupt the growing enthusiasm for hookah smoking.

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## PA15-2

### PRIMARY AND DUAL USERS OF CIGARS AND CIGARETTES; PROFILES, TOBACCO USE PATTERNS, AND RELEVANCE TO POLICY

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The Family Smoking and Prevention Tobacco Control Act provides an unprecedented opportunity to regulate tobacco in the U.S. However, restrictions on little cigars, cigarillos and large cigars are notably absent from the Act, which may create a favorable environment for increased dual-usage of cigars. This study used data from a cross-sectional nationally representative survey of 2,649 adult smokers and non-smokers to examine demographic profiles of primary as compared to dual-users of cigarettes and

cigars and examine its association with tobacco use behavior. Data indicate that 12.5% of cigarette smokers are dual-users of cigars. Dual-users are more likely to be male, 18-29 years of age, non-Hispanic black, of lower educational attainment and either unemployed or out of the work force. Adjusted regression analyses showed that dual-users were less likely than cigarette-only smokers to be daily cigarette smokers (OR=0.57, 95% CI: 0.32, 1.02), more likely to have made a recent quit attempt (OR=2.39, 95% CI: 1.44, 3.97), and more likely to have used at least one other alternative product (OR=2.26, 95% CI: 1.26, 4.05), including snus, e-cigarettes, dissolvables and chewing tobacco. As greater restrictions on cigarettes become implemented in the U.S., it will be critical to monitor increased dual-use of cigars in order to inform prevention and treatment strategies and guide more comprehensive policy efforts.

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### **PA15-3 MARKET AVAILABILITY AND PRODUCT DESIGN OF FLAVORED SMOKELESS TOBACCO PRODUCTS**

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**BACKGROUND:** In 2010, FDA implemented a ban on cigarettes containing characterizing flavors. The ban included candy, fruit, alcohol and herb flavors which have been found to appeal to youth. FDA excluded the removal of such flavors from smokeless tobacco products; an increasingly popular tobacco product category, especially among youth. **AIM:** This study set out to examine the impact of an extension of the cigarette flavor ban to smokeless tobacco by analyzing, (i) the extent to which flavored smokeless tobacco products are currently sold in the US; (ii) product design features of flavored smokeless tobacco; and (iii) smokeless tobacco brand preference among youth users. **METHODS:** Smokeless products were classified into four flavor categories: non-flavored; flavors banned in cigarettes; mint; and wintergreen. Availability of flavored smokeless tobacco products was assessed with nationally representative sales data from the 2010 AC Nielsen ScanTrack. Product design features were analyzed through 2010 disclosures to the Massachusetts Department of Public Health. Youth (12-17 years of age) data on smokeless brand preference were taken from the 2009 NSDUH survey. **RESULTS:** In 2010, over half of all smokeless tobacco products sold contained a characterizing flavor (55.4%) including flavors banned in cigarettes (7.6%), wintergreen (37.6%) and mint (10.2%). Flavored products accounted for 72.2% of Grizzly and 82.3% of Skoal sales, two brands that comprise over half of the youth market. Flavored products contained both lower mean free nicotine levels ( $p < .001$ ) and lower pH levels ( $p < .001$ ) than non-flavored products. **CONCLUSIONS:** Flavored smokeless tobacco products encompass substantial market share of all smokeless products sold. These products tend to contain lower levels of free nicotine and pH; features which lend themselves to 'initiation' products. Brand families preferred by youth are largely comprised of flavors banned in cigarettes due to their youth appeal. Elimination of all flavored tobacco products may present a public health benefit, by helping to reduce youth initiation of smokeless tobacco.

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### **PA15-4 DUAL USE OF CIGARETTES AND CHEW TOBACCO AMONG MALE ADOLESCENTS**

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The use of cigarettes in combination with other tobacco products is becoming increasingly prevalent. Yet, relatively little is known about dual users of cigarettes and chew/spit tobacco, particularly among adolescents. The purpose of this study was to examine differences in cigarette use and cessation between adolescent male dual users of cigarettes and chew/spit tobacco and adolescent male users of cigarettes only. Data were drawn from the 2011 Texas Youth Tobacco Survey, in which 6,152 6th through 12th grade students participated (50.5% male; mean age=14.75, sd=2.03). Of the male students, 14% were current (past 30-day) users of cigarettes and 6.4% were current users of chew/spit tobacco. Dual users of cigarettes and chew/spit were defined as males who used at least one cigarette in the past 30 days and at least one chew/spit

product in the past 30 days. Cigarette smokers were defined as males who smoked at least one cigarette in the past 30 days, but did not use chew/spit products in the past 30-days. Of the 3,107 males, 5.8% were dual users of cigarettes and chew/spit and 9.8% were cigarette-only users. Comparison of the two groups on demographics indicated that although they did not differ on age [ $F(1,448)=.05$ ], a greater percentage of dual users were non-Hispanic White in comparison with cigarette-only users [ $\chi^2(1)=16.15$ ,  $p < .0001$ ]. In comparison with cigarette-only users, dual users reported smoking on more days in the past 30 days [ $F(1,448)=25.55$ ,  $p < .0001$ ] and smoking more cigarettes per day in the past 30 days [ $F(1,429)=32.59$ ,  $p < .0001$ ]. Moreover, in comparison with cigarette-only users, a significantly smaller percentage of dual users reported planning to quit smoking in the next six months [ $\chi^2(1) = 4.98$ ,  $p < .05$ ] and being able to quit if they wanted to [ $\chi^2(1)=15.67$ ,  $p < .0001$ ]. However, there were no differences between the two groups on number of quit attempts in the past six months [ $\chi^2(1)=1.03$ ]. Findings indicate that adolescent male dual users of cigarettes and chew/spit tobacco are at elevated risk for the continuation of tobacco use and highlight the need for additional research investigating the reasons for dual use.

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### **PA15-5 INFLUENCES ON PRODUCT DEMAND AND CROSS-PRICE ELASTICITY FOR ALTERNATIVE SMOKELESS TOBACCO PRODUCTS**

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Although research suggests that smokeless tobacco (SLT) products are less hazardous than cigarettes, actual trial and adoption among smokers remain low. Using a behavioral economics approach within a web-based simulated purchase task design, we examined the demand and cross price elasticity (CPE) for SLT products among smokers. All participants (N=1062) began by completing questions on demographics, tobacco knowledge/beliefs, nicotine dependence, cravings, smoking expectancies, and delay discounting. Participants were randomly divided into two groups – an experimental group viewed ads for smoking alternatives and a control viewed ads for soft drinks. After viewing and rating their randomly assigned ads for SLT products or soft drinks, participants completed four single-product purchase tasks (one per product – Cigarettes, Camel Snus, Camel Dissolvables, and Commit Lozenges) assessing how many of each product they would use across a range of prices. Lastly, participants completed three comparative purchase tasks assessing CPE for alternative products, with alternative cost fixed at \$1 while the cost of cigarettes escalated. Generalized estimating equations revealed lower demand elasticity and greater peak consumption for cigarettes compared to all alternative products ( $p < 0.001$ ). Heavier smokers reported greater peak consumption of products (BQ0\_FTND=0.090,  $p < 0.001$ ) and less demand elasticity (BAlpha\_FTND=-0.074,  $p = 0.056$ ). A similar trend was seen in smokers reporting stronger craving (BQ0\_QSU\_fac1=0.06,  $p < 0.05$ ; BAlpha\_QSU\_fac1=-0.171,  $p = 0.001$ ). CPE did not differ across the three alternative products, but was significantly related to heaviness of smoking (BFTND=-0.026,  $p < 0.05$ ), craving (BQSU\_fac1=0.052,  $p < 0.05$ ) as well as peak consumption (BQ0=0.286,  $p < 0.05$ ), and demand elasticity (BAlpha=-1.660,  $p < 0.001$ ). These findings suggest that product type and strength of addiction characteristics may impact both consumption of a product and demand elasticity, possibly influencing consumers' willingness to purchase SLT products outside of a laboratory setting.

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**PAPER SESSION 16: ADDRESSING SECONDHAND SMOKE**

**PA16-1**

**FACTORS ASSOCIATED WITH TRANSITION IN HOME SMOKING RESTRICTION RULES AMONG RURAL SMOKERS**

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Home smoking restriction (HSR) can reduce risks related to second hand smoke and may facilitate attainment and maintenance of smoking abstinence. While a number of studies have examined factors associated with the presence of HSR, little is known about how HSR changes over time. In this study, we collected information on HSR every 6 months among 726 rural smokers engaged in a two-year smoking cessation program. We applied a Markov model to describe changes in HSR over time and jointly modeled factors associated with adoption and abandonment of HSR using logistic regression. On average, among smokers who had no HSR over the previous 6 months, 25.6% adopted new HSR and 74.4% continued to allow smoking in the home; among those who previously had HSR, 89.7% maintained existing HSR, and 10.3% abandoned existing HSR. Variables found to be positively associated with adoption of HSR included motivation to quit (OR=1.2, 95% CI 1.1-1.3, p = 0.0003) and Controlled Motivation (OR=1.03, 95% CI 1.01-1.05, p = 0.0002), whereas variables associated with abandonment of existing HSR included nicotine dependence (OR=1.6, 95% CI 1.1-2.3, p = 0.015), partner smoking (OR=1.5, 95% CI 1.02-2.14, p = 0.045), not being married (OR=2.1, 95% CI 1.4-3.0, p = 0.0004), absence of young children in the home (OR=2.1, 95% CI 1.2-3.8, p = 0.013), and low income (OR=1.7, 95% CI 1.1-2.5, p = 0.012). Our study shows that HSR is a dynamic process in which rules about HSR change over time. Efforts to help smokers adopt new HSR may need to address factors intrinsic to the smoker, whereas efforts to maintain HSR may need to focus more on social and environmental influences.

The research was conducted at the University of Kansas School of Medicine with support from NIH National Cancer Institute (R01 CA101963).

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**PA16-2**

**TOBACCO INDUSTRY STRATEGIES TO MINIMIZE OR MASK SECONDHAND SMOKE: OPPORTUNITIES FOR TOBACCO PRODUCT REGULATION**

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INTRODUCTION: The tobacco industry has modified cigarette design and used chemical additives to reduce the aversive qualities of second-hand smoke (SHS), while failing to reduce the harm associated with SHS exposure. Commercial patents filed by tobacco manufacturers and ancillary companies were reviewed to understand recent industry strategies to mask or reduce SHS emissions. METHODS: Patent records filed or published between 1997 and 2008 that related to SHS reduction were conducted using key word searches. The U.S. Patent and Trademark Office website was used to obtain issued patent awards and published domestic patent applications, and the World Intellectual Property Organization's Patentscope, and Free Patents Online websites were used to search international patents. International patents were cross-checked with their home country patent office when available. RESULTS: The search identified 106 relevant patents published by JTI, BAT, Philip Morris International, and other tobacco manufacturers or suppliers. The patents were classified by their locus of effect, including improved SHS odor (25%, n=27), improved visibility (16%, n=17) and reduced emissions (58%, n=62). Mechanisms of action identified included modifications to paper technology, tobacco blend, and filter. CONCLUSIONS: The tobacco industry continues to research and develop strategies to reduce perceptions of SHS, including the use of additives to make reduce SHS odor. Surveillance and regulatory response to industry

strategies to reduce perceptions of SHS should be implemented to ensure that the public health is adequately protected.

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**PA16-3**

**HOUSEHOLD ENVIRONMENTAL TOBACCO SMOKE EXPOSURE AND RISK OF RECURRENT ACUTE OTITIS MEDIA AND ITS CONSEQUENCES IN CHILDREN**

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Objective: Acute otitis media (AOM) is the most frequent outpatient diagnosis in children. Childcare attendance has been reported to be a risk factor for AOM in young children. However, the role of environmental tobacco smoke (ETS) as a predisposing factor in the development of AOM has not yet been completely clarified. Patients and method: The impact and possible determinant factors of exposure to environmental tobacco smoke (ETS) on AOM were assessed in a nationally representative sample of children. A survey of 412 non-randomly selected patients (6 months-14 yrs, mean: 5.81 yrs; SD: 3.87) with or without middle ear disease, living in smoking and non-smoking families was carried out at the largest children's hospital in Hungary, using standardized questionnaire method. Bivariate and multivariable regression analyses were performed on collected data. Results: We experienced that children whose parents smoke in the household had double the risk of two or more episodes of AOM (AOR = 2.05, 95% CI = 1.11 – 3.78) and as a consequence had increased number of related childhood ENT operations (AOR for 4 or more episodes of AOM infections = 24.0, 95% CI 6.79 – 85.0). Statistically significant correlation was found between increasing number of AOM infections and related hearing problems of children having at least one smoker in the household (AOR for 4 or more episodes of AOM = 5.15, 95% CI = 1.92 – 13.8). Moreover, higher prevalence of AOM infections in children living in smoking families was strongly associated with age in months, daycare attendance and increased number of cigarettes smoked per day by household smoker (AOR = 1.01, 95% CI = 1.002-1.02; AOR = 1.94, 95% CI = 1.3 – 2.89; AOR for increased half pack per day smoking by household member = 1.99, 95% CI = 1.13 – 3.50, respectively). Conclusion: Our results support a causal relationship between the exposure of ETS and prevalence of AOM in children. These data serve additional information to the research findings that ETS exposure could potentiate susceptibility to certain virus and bacterial infections, which are very common in communities, through dysregulation of immune function.

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**PA16-4**

**A PILOT STUDY OF SECONDHAND SMOKE EXPOSURE IN BOSTON PUBLIC HOUSING**

Douglas E. Levy, Ph.D.\*, Mongan Institute for Health Policy at Massachusetts General Hospital, Department of Medicine at Harvard Medical School

BACKGROUND: The Boston Housing Authority (BHA) is the largest public housing authority in the U.S. with plans to prohibit smoking in all residential units. We tested the feasibility of cotinine monitoring among non-smoking BHA residents and assessed the relationship between cotinine levels and self-reported secondhand smoke (SHS) exposure. METHODS: A convenience sample of non-smoking BHA residents (39 adults ≥18yo, 12 children 4-17yo) was recruited from 2 housing developments. After providing consent, participants or their parents completed a short survey about household smoking and exterior sources of SHS exposure, and all provided a saliva sample for cotinine analysis (Salimetrics, LLC using an immunoassay with a lower sensitivity threshold of 0.15ng/mL). We analyzed geometric mean (GM) cotinine levels as a function of self-reported sources of SHS exposure. RESULTS: The GM of all participants' cotinine was 0.52ng/mL. 88% of participants had detectable levels of cotinine, despite our assay's relatively high lower threshold of detection (compared to 0.015ng/mL attained by the CDC). Participants living in units with no smokers had lower cotinine levels than those

living with smokers (GM 0.42ng/mL vs. 1.57ng/mL,  $p=0.001$ ). Those living in units with home smoking bans had significantly lower cotinine levels than individuals living in units where smoking was permitted (GM 0.40ng/mL vs. 1.07ng/mL,  $p=0.005$ ). Residents of non-smoking households who reported that they smelled smoke in their homes had lower cotinine than those who did not smell smoke (GM 0.36ng/mL vs. 0.63ng/mL,  $p=0.043$ ). Residents who always smelled smoke in the hallways had lower cotinine levels than those who smelled smoke less often (GM 0.31ng/mL vs. 0.72ng/mL,  $p=0.014$ ). **CONCLUSIONS:** There is a high level of SHS exposure among residents of Boston public housing. The presence of smokers in the home and the absence of a no smoking rule in the home are significantly associated with SHS exposure. Those smelling smoke may be more sensitive to and more avoidant of SHS than others. Boston's proposed ban on smoking within apartment units is likely to reduce residents' exposure to SHS.

*Flight Attendants Medical Research Institute.*

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**PAPER SESSION 17: ALPHA BETA SOUP:  
 WHAT SNPS CAN TELL US**

**PA17-1**

**SEQUENCING NICOTINIC ACETYLCHOLINE RECEPTOR SUBUNITS FOR ASSOCIATION WITH DEPENDENCE VULNERABILITY**

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Numerous studies have implicated common SNPs in the nicotinic acetylcholine receptor genes (CHRN genes) as associated with drug behaviors (included nicotine, alcohol and cocaine phenotypes). Previous data on the Center for Antisocial Drug Dependence (CADD) sample has revealed that the most heritable phenotype in this sample is a measure of dependence vulnerability, which encompasses dependence symptoms associated with multiple drugs. Thus, the goal of this project is to identify novel rare variants in the CHRN genes in the CADD sample and to determine if rare variants are associated with this drug vulnerability phenotype. Ninety-four samples (47 case, 47 controls) representing the extreme tails of the phenotypic distribution were submitted for sequencing all 16 CHRN genes (CHRNA1-7, 9,10, CHRNB1-4, CHRND, CHRNG, CHRNE). The SureSelect target enrichment protocol was used to enrich for these genes from whole genome amplified buccal cell DNA. SOLiD sequencing was performed and Bowtie was used to align reads to the hg19 build of the human reference sequence prior to SNP calling with SOAPsnp. Preliminary analyses of the CHRNA3-5, CHRNB2, and CHRNB4 genes were performed to determine if there are more SNPs in either the cases or controls. Additionally, variants were classified using three categories: 1) common or rare (MAF < 0.05), 2) location within the gene (5' UTR, intron, coding, 3'UTR) and 3) predicted function of coding variants (missense, nonsense, synonymous) to determine if there are differences between cases and controls within these categories. The preliminary analysis revealed that a similar number of SNPs are present in both case and control individuals and there are no apparent differences among the location/functional categories. Further analysis will examine the other eleven subunits sequenced to determine if variants in these are associated with dependence vulnerability.

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**PA17-2**

**SIGNIFICANT ASSOCIATIONS OF CHRNA2 AND CHRNA6 WITH NICOTINE DEPENDENCE IN EUROPEAN-AMERICAN AND AFRICAN-AMERICAN POPULATIONS**

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The direct physiological effects which promote nicotine dependence (ND) are mediated by nicotinic acetylcholine receptors (nAChRs). In line with the genetic and pharmacological basis of addiction, many previous studies have revealed significant associations between nAChR subunit genes and various measures of ND at both the individual SNP and haplotype levels. We have previously shown that variants within several nAChR subunit genes, including CHRNA4, CHRNA5/CHRNA3/CHRNB4 gene cluster, CHRNB1, and CHR1, contribute to the etiology of ND in European Americans (EA) and/or African-Americans (AA). In this study we used an expanded family sample set (EAs = 1728 with 495 families, AAs = 1881 with 423 families) to investigate two nAChR subunit genes on chromosome 8p: CHRNA2 and CHRNA6. Three quantitative measures of ND were assessed: Smoking Quantity (SQ), Heaviness Smoking Index (HSI), and Fagerström Test for ND (FTND). Using a family-based association test, we found nominal associations for all seven SNPs of both genes with at least one ND measure in the EA population, and for two SNPs in CHRNA2 in the AA population. Of these, associations of SNPs rs3735757 with FTND ( $P = 0.0068$ ) and rs2472553 with all of three ND measures (with a P value being 0.0043, 0.0032, and 0.00086 for SQ, HSI, and FTND, respectively) continued to be significant in the EA population even after correction for multiple tests. Furthermore, we found several haplotypes which are significantly associated with ND in the EA population on CHRNA6, and in both the EA and AA populations on CHRNA2. Together, these findings indicate that both CHRNA2 and CHRNA6 may play a significant role in the development of etiology of ND in AA and EA smokers and further replication is thus warranted in additional independent samples.

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**PA17-3**

**INCREASED GENETIC VULNERABILITY TO SMOKING AT CHRNA5 IN EARLY-ONSET SMOKERS**

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**Context:** Recent studies have shown an association between cigarettes per day (CPD) and a nonsynonymous SNP in CHRNA5, rs16969968. **Objective:** To determine whether the association between rs16969968 and smoking is modified by age of onset of regular smoking. **Data Sources:** Primary data Study Selection: Available genetic studies containing measures of CPD and genotype of rs16969968. **Data Extraction:** Uniform statistical analysis scripts were run locally. Starting with 94,050 ever-smokers from 43 studies, we extracted the heavy smokers (CPD > 20) and light smokers (CPD ≤ 10) with age of onset information, reducing the sample size to 33,348. Each study was stratified into early onset smokers (onset ≤ 16) and late-onset smokers (onset > 16), and a logistic regression of heavy versus light smoking with rs16969968 genotype was computed for each stratum. **Meta-analysis** was performed within each age of onset strata. **Data Synthesis:** Individuals with the risk allele at rs16969968 who were early-onset smokers were significantly more likely ( $p=0.01$ ) to be heavy smokers in adulthood (OR=1.45, 95% confidence interval 1.36-1.55,  $n=13,843$ ) than carriers of the risk allele who were late-onset smokers (OR=1.27, 95% confidence interval 1.21-1.33,  $n=19,505$ ). **Conclusion:** These results highlight an increased genetic vulnerability to smoking among early-onset smokers.

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## PA17-4

### A SINGLE NUCLEOTIDE POLYMORPHISM OF THE ALPHA 5 NICOTINIC RECEPTOR SUBUNIT PREDICTS TITRATION TO NICOTINE DEPENDENT SMOKERS

David A. MacQueen, M.A.\*, Bryan W. Heckman, M.A., Melissa D. Blank, Ph.D., Kate Janse Van Rensburg, Ph.D., Jong Y. Park, Ph.D., David J. Drobes, Ph.D., and David E. Evans, Ph.D., Tobacco Research and Intervention Program, Moffitt Cancer Center

The CHRNA5-CHRNA3-CHRNA4 gene cluster has been associated with nicotine dependence and lung cancer (Tuesta et al., 2011). Several candidate genes from this region have been explored including a non-synonymous coding single nucleotide polymorphism (SNP) for the  $\alpha 5$  nicotinic receptor subunit (rs16969968). The minor allele variant (Asn398Asp) reduces the  $Ca^{2+}$  permeability of  $\alpha 4\beta 2\alpha 5$  receptors (Beirut et al., 2008, Kuryatov et al., 2011) and is associated with habitual smoking (Bierut et al., 2008) and nicotine dependence (Saccone et al., 2007; Weiss et al., 2008). Using a range of genetic manipulations, it has also been demonstrated that  $\alpha 5$  subunits in the medial habenula/interpeduncular nucleus tract are involved in nicotine self-administration in animals (Fowler et al., 2011). The present study investigated the moderating role of an  $\alpha 5$  subunit polymorphism on smoking topography measures (puff volume, puff duration, inter-puff interval and peak air velocity) in 67 smokers (26 minor allele carriers) asked to smoke 4 nicotine containing (nicotine yield = .60 mg) and 4 placebo (nicotine yield <.05 mg) cigarettes during separate experimental sessions. Random effects analyses were conducted on each dependent measure with dichotomized gene status (minor allele carrier or wild-type) and nicotine yield (.60 mg or <.05mg) as fixed effects and cigarette number (1-4) modeled as both a fixed and random effect. Nicotine containing cigarettes produced significantly lowered total puff volumes only amongst those not carrying the minor allele [gene x nicotine interaction;  $F(1,73)=3.77, p=.056$ ], suggesting that non-carriers titrate their smoking in response to nicotine content. Placebo cigarettes produced longer total puff durations and shorter inter-puff intervals irrespective of gene status. The present results suggest that the  $\alpha 5$  subunit is involved in nicotine titration in humans as is observed in animals. As an index of smoking intensity, smoking topography measures (such as total puff volume) may account for the relationship between  $\alpha 5$  polymorphisms and lung cancer not accounted for by other measures of smoking behavior (e.g. cigarettes per day, FTND).

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## PAPER SESSION 18: RAPID RESPONSE PAPER SESSION

## PA18-1

### SUCCESSFUL QUITTING AND SOCIAL NORMS

David Cowling, Ph.D.\*, California Tobacco Control Program

Background: State tobacco program planners often need evidence to support pursuing a population-level social norm strategy over individual behavior change approaches. Methods: Using a national population-based web survey of 18 to 55 year olds, 878 smokers were followed over the course of one to three years with 151 of them quit smoking over the course of the study. Secondhand smoke (SHS) and tobacco industry (TI) attitudes were assessed over time and were used to create separate SHS and TI social norm scores scaled from 0-100. Respondents were grouped into tiers based their state and the tobacco control initial outcome index. Results: Successful quitters had better SHS scores (46.4±4.0 vs. 39.1±1.8) and TI scores (52.2±3.6 vs. 48.7±1.6) when they entered the survey compared to non-quitters. Longitudinal regression analysis

suggests that initial SHS norms were associated with successful quitting ( $p<0.0129$ ), while TI norms were not ( $p=0.83$ ). Respondents with the best SHS scores were three times more likely to quit than those with the worst SHS scores. Although directionally suggestive and large, the changes in the SHS and TI scores over time were not statistically associated with successful quitting. Smokers who believed the percentage of people in their state that smoked was less than 20% were 90% more likely to quit ( $p=0.0076$ ) than those who believed it higher than 30%. Quitting was not associated with initial outcome index after controlling for the other variables. Conclusions: State tobacco control programs will have some evidence to guide decision makers that population-based approaches addressing social norms can achieve cessation outcomes. These results can be used to guide community and media intervention efforts.

*This work was completed while the author was at the California Tobacco Control Program.*

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## PA18-2

### AMBIVALENCE ABOUT SMOKING AND CUE-ELICITED NEURAL ACTIVITY IN QUITTING-MOTIVATED SMOKERS FACED WITH AN OPPORTUNITY TO SMOKE

Stephen J. Wilson, Ph.D.\*<sup>1</sup>, Kasey G. Creswell, M.S.<sup>2</sup>, Michael A. Sayette, Ph.D.<sup>2</sup>, and Julie A. Fiez, Ph.D.<sup>2</sup>, <sup>1</sup>The Pennsylvania State University; <sup>2</sup>University of Pittsburgh

Many cigarette smokers appear to experience both the desire to smoke and a wish to quit smoking. Research suggests that this ambivalence about smoking affects how smokers respond to cigarette-related stimuli, but many important questions remain about precisely how smoking ambivalence influences cognitive and affective processing during cigarette cue exposure. We used functional magnetic resonance imaging (fMRI) to address this knowledge gap by examining the relation between self-reported ambivalence about smoking and cue-reactivity in quitting-motivated smokers presented with an opportunity to smoke. Eighty-two quitting-motivated cigarette smokers completed a measure assessing their ambivalence about smoking. Subsequently, participants initiated an attempt to quit smoking and underwent an fMRI session, during which they were asked to hold and view a cigarette. Consistent with hypotheses, results indicated that self-reported smoking ambivalence was negatively correlated with cigarette-related activation in brain areas linked to reward-related processing, motivation, and attention (i.e., rostral anterior cingulate and medial prefrontal cortex, caudate nucleus, visual cortex). Self-reported ambivalence was not, however, correlated with activation in brain regions related to conflict processing. This pattern of results is discussed with respect to the process of change for those attempting to quit smoking.

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## PA18-3

### DEVELOPING AND VALIDATING A HUMAN LABORATORY MODEL TO SCREEN MEDICATIONS FOR SMOKING CESSATION

Sherry A. McKee, Ph.D., Andrea H. Weinberger, Ph.D., Julia Shi, M.D., Jeanette Tretrault, M.D., and Sabrina Coppola, B.A., Yale University School of Medicine

To facilitate translational work in medications development for smoking cessation, we have developed a human laboratory analogue of smoking lapse behavior. The first instance of smoking during a quit attempt (smoking lapse) is highly predictive of relapse and represents an important target for medications development. Our smoking-lapse paradigm models two critical features: the ability to resist the first cigarette and subsequent ad-libitum smoking once a decision is made to 'give in' and smoke. We present the results of two studies designed to develop and validate the effect of nicotine deprivation on smoking lapse behavior for the purpose of medication screening. Study 1 (n=30) was designed to develop the model parameters by examining varying levels of nicotine deprivation (1, 6, and 18 hours; within-subject) and identifying optimum levels of monetary reinforcement to provide while modeling the ability to resist smoking. Study 2 was designed to validate the model by screening smoking cessation medications with known clinical efficacy. Subjects (n=62) were randomized to either varenicline 2 mg/day, bupropion 300 mg/day, or placebo for 1-week, and following 18-hours of nicotine deprivation we modeled their ability to resist smoking and subsequent ad-libitum smoking. The model was found to be sensitive to medication effects among smokers who demonstrated a pattern of automated smoking (i.e., smoked within 5-minutes of waking). Ratings of craving, mood, withdrawal, and subjective cigarette effects are

presented as secondary outcomes with results mirroring clinical findings. Next steps in this line of research will focus on evaluating predictive validity.

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## PA18-4

### ESCALATION OF NICOTINE INTAKE REQUIRES EXTENDED ACCESS TO NICOTINE SELF-ADMINISTRATION WITH INTERMITTENT PERIODS OF ABSTINENCE AND IS INCREASED BY INHIBITION OF MONOAMINE OXIDASE

Ami Cohen\*, George F. Koob, and Olivier George, The Scripps Research Institute, La Jolla, CA

While established smokers have a very regular pattern of smoking behavior, converging lines of evidence suggest that escalation of smoking behavior is a critical factor in the development of dependence. However, the neurobiological mechanisms underlying escalation of smoking is unknown as no animal model exhibits stable escalation of nicotine intake. Based on the pattern of smoking behavior and on the presence of potent monoamine oxidase inhibitors in tobacco smoke, we hypothesized that escalation of nicotine intake may only occur when animals are given unlimited (21h/day) self-administration session after repeated periods of acute (24-48h) abstinence, and after chronic inhibition of monoamine oxidase using phenelzine sulfate (PLZ). Intermittent access (every 24-48h) to unlimited nicotine self-administration produced a robust escalation of nicotine intake, associated with increased responding under fixed and progressive ratio schedule of reinforcement, as well as increased precipitated somatic signs of withdrawal. Escalation of nicotine intake was not observed in rats with intermittent access to limited (1h/day) nicotine self-administration, or with continuous access (7d a week) to unlimited nicotine self-administration. Moreover, chronic inhibition of monoamine oxidase with daily administration of PLZ increasing nicotine intake by ~50%. These results demonstrate for the first time that escalation of nicotine intake only occurs in animals given intermittent period of abstinence with extended access to nicotine, and that inhibition of monoamine oxidase is a potential target to limit escalation of smoking. Compared to other drugs, the escalation of nicotine intake may be heavily dependent on its ability to alleviate the aversive symptoms of withdrawal.

This research was supported by the Tobacco-Related Disease Research Program (TRDRP) from the State of California (grant 17RT-0095), the Pearson Center for Alcoholism and Addiction Research, and the National Institute on Drug Abuse (DA023597).

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## PA18-5

### EFFECT OF VARENICLINE ON INDIVIDUAL NICOTINE WITHDRAWAL SYMPTOMS: A COMBINED ANALYSIS OF EIGHT RANDOMIZED PLACEBO-CONTROLLED TRIALS

Jonathan Foulds, Ph.D.<sup>1\*</sup>, Arthur Berg, Ph.D.<sup>1</sup>, Cristina Russ, M.D.<sup>2</sup>, Ching-Ray Yu, Ph.D.<sup>2</sup>, Kelly H. Zou, Ph.D.<sup>2</sup>, Aaron Galaznik, M.D.<sup>2</sup>, Mikael Franzon, Ph.D.<sup>2</sup>, and John Hughes, M.D.<sup>3</sup>, <sup>1</sup>Penn State University; <sup>2</sup>Pfizer Inc.; <sup>3</sup>University of Vermont

There have been concerns that varenicline may cause neuropsychiatric side effects, based on post-marketing pharmacovigilance. Some of these symptoms have been systematically measured in clinical trials on nicotine withdrawal scales (e.g. depression, irritability and poor-concentration). To test how varenicline influences these symptoms, we conducted an analysis of weekly individual symptom ratings on the Minnesota Nicotine Withdrawal Scale (MNWS) in 8 randomized placebo-controlled smoking cessation trials funded by Pfizer that used similar methods. The analysis included data from all 2403 participants allocated to varenicline treatment and 1434 participants allocated to placebo. The average age of participants was 42 years, they smoked an average of 22 cigarettes per day and 59% were male. Smokers with current psychiatric disorders were excluded from these trials. Ratings for the past 24 hours were obtained prior to quitting and starting treatment and then at weeks 1-6 and 11 weeks after the target quit day. The proportion providing symptom ratings ranged from 99.7% at baseline to 65% (of those randomized) at week 11 and analyses were based on all reported ratings, including participants who reported some smoking in the previous week. In multivariate analyses controlling for baseline, ratings of urges to smoke, depressed mood, irritability, anxiety, difficulty concentrating, and restlessness, were significantly lower ( $p < 0.01$ ) for varenicline than placebo at each of weeks 1-6 and week 11. However, ratings of increased appetite were significantly higher for varenicline than placebo ( $p < 0.05$ ) at each of these weeks

as were ratings of difficulty staying asleep for weeks 1-6. Other than sleep difficulties and increased appetite, marked increases in symptom severity ratings (e.g. from 0-2 at baseline to 4) were rare (less than 2% at each visit) and generally less frequent on varenicline than placebo. In conclusion, use of varenicline while trying to quit smoking increases sleep disturbance and appetite but does not increase, and actually reduces symptoms such as depression and irritability, as measured on the MNWS, in smokers without current psychiatric disorders.

All of the studies included in this analysis were funded by Pfizer Inc. No specific funding was provided for this analysis.

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## NEW INVESTIGATOR AWARD PAPER SESSION

## NIPA-1

### ELECTRONIC CIGARETTES DELIVER SIMILAR LEVELS OF NICOTINE AND REDUCE EXPOSURE TO COMBUSTION TOXICANTS AFTER SWITCHING FROM TOBACCO CIGARETTES

Maciej Lukasz Goniewicz, Ph.D.<sup>\*</sup>, Michal Gawron, M.Sc., Margaret Peng, Peyton Jacob III, Ph.D., and Neal Benowitz, Ph.D.

Significance: Electronic cigarettes (E-Cs) are purported to deliver nicotine vapor without any toxic combustion products present in tobacco smoke. Survey studies found that E-Cs are used by smokers to quit smoking or reduce number of cigarettes they smoke. There are no data on whether E-Cs are effective as exposure reducing tools. The aim of the study was to evaluate changes in nicotine delivery and selected toxicants exposure after switching from tobacco cigarettes to E-Cs for two weeks. Materials and methods: We recruited 20 cigarette smokers, average age of 31.1±9.7 years, 55% female, CPD 16.5±9.3, FTND 3.8±2.7, and history of regular smoking for 12.1±7.5 years. Subjects were provided with E-Cs with cartridges containing 16mg of nicotine and were asked to substitute their regular tobacco cigarettes with E-Cs for 2 weeks. Subjects provided urine samples at the day of switching (baseline) and after one and two weeks of using e-cigarettes. We analyzed urine for nicotine metabolites, NNAL (metabolite of tobacco-specific carcinogenic nitrosamine NNK), and hydroxyalkyl mercapturic acids (HAMAs, the main urinary metabolites of several alkylating substances that possess a carcinogenic potential). Results: All subjects reported significant reduction of tobacco cigarettes smoked during the study; CPD decreased from 16.2 (95%CI 13.8; 18.5) to 0.6 (95%CI -1.7; 3.0,  $p < 0.05$ ) and exhaled CO decreased from 15.6 (95%CI 7.4; 23.8) to 4.2 ppm (95%CI 2.4; 5.9,  $p < 0.05$ ) after two weeks of using E-Cs. There were no significant changes in urine total nicotine metabolites (50.0 (95%CI 37.2; 62.9) vs. 44.7 nmol/mg creatinine (95%CI 25.2; 64.2),  $p = 0.89$ ). Urine levels of NNAL decreased by 64% from 225 (95%CI 148; 303) to 80 pmol/mg creatinine (95%CI 48; 112),  $p < 0.05$ . The average reductions in HAMAs varied from 54% (metabolite of propylene oxide) to 89% (metabolite of 1,3-butadiene),  $p < 0.05$ . Conclusions: After switching from tobacco to electronic cigarettes nicotine exposure is unchanged while exposure to selected toxins is substantially reduced. Further research is needed to evaluate long term effects of switching, including the health effects of continued use of E-Cs.

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## NIPA-2

### GALANIN RECEPTOR 1 (GALR1) SNP IS ASSOCIATED WITH CRAVING AND SMOKING RELAPSE

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Galanin modulates dopaminergic neurotransmission in the mesolimbic dopamine system, thereby influencing the rewarding effects of nicotine. Variants in the GALR1 gene have been associated with nicotine dependence and retrospective craving severity (Jackson et al., *Neuropsychopharmacology*, 2011; Lori et al., *Neuropsychopharmacology*, 2011). This study investigated the association of rs2717162, based on the Lori et al. study, with quitting success and post-quit craving symptoms among treatment-seeking smokers. rs2717162 was genotyped in 410 smokers of European ancestry enrolled in a double-blind randomized placebo-controlled clinical trial of bupropion for 10 weeks. The primary endpoint was abstinence (7-day point prevalence, biochemically confirmed). Cravings and urges to smoke were assessed on the target quit day (TQD). Generalized estimating equation (GEE) regression was used to assess genotype associations with abstinence at the end of treatment (EOT) and 6-month follow-up, controlling for treatment, nicotine dependence, and sex. There was a significant decrease in the odds of quitting success with the presence of at least one minor (C) allele (OR = 0.52; 95% CI = 0.33, 0.83;  $p = 0.005$ ). Although the main effect of treatment was significant, genotype by treatment and genotype by time point (EOT vs. 6M) interactions were not significant. Cox regression analysis revealed a positive association of the C allele with time to first cigarette ( $p = 0.017$ ). Linear regression on TQD craving, controlling for the effect of treatment, revealed a positive association of the rs2717162 C allele with craving ( $p = 0.001$ ). Both genotype and craving were associated independently with relapse. Variation in GALR1 SNP rs2717162 is associated with quitting success, time to first cigarette, and post-quit craving in treatment seeking smokers, independent of bupropion vs. placebo treatment. Consistent with preclinical studies and two prior retrospective association studies, these prospective cessation data provide support for further research on GALR1, nicotine dependence, and quitting success.

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## NIPA-3

### SECONDHAND SMOKE EXPOSURE AND SERUM CYTOKINE LEVELS IN CHILDREN

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Background: Exposure to secondhand smoke (SHS) is associated with respiratory illness in children. Relative increases in Th2 cytokine expression, and suppression of adaptive immune responses, could explain this relationship, but has not been well-studied in children. Objective: To determine the association between SHS exposure and serum cytokine levels in healthy children. Methods: We recruited patients between the ages of 1-6 years undergoing routine operative procedures. A parent interview assessed medical history and SHS exposure. Children with asthma were excluded. A blood sample was collected during anesthesia. Samples were spun for serum, and stored at -80. A Luminex kit was used to test for L-1 $\beta$ , IL-4, IL-5, IL-6, TNF- $\alpha$ , IFN- $\gamma$ , CXCL8, IL-10, and IL-13; cotinine was determined using an enzyme-linked immunosorbent assay (ELISA). Children were categorized as no, moderate, or high exposure. A mixed-effects model was fit to determine differences in cytokines by exposure level; cytokine levels below the limit of detection were imputed using the assumption of log-normality. Analyses were done using WinBUGS. Results: Of the 40 children recruited, 50% (N=20) had SHS exposure; 9 had moderate exposure, and 11 had high exposure. There were no differences by gender, age, race, or procedure. In bivariate analyses, children who were exposed to SHS had lower mean concentrations of IL-1 $\beta$ , IL-4, CXCL8, and IFN- $\gamma$  than those with no exposure. In the mixed-effects model, children with some SHS exposure had significantly lower mean concentrations of IL-4 (7.85 pg/mL vs. 1.58 pg/mL) and

CXCL8 (6.43 pg/mL vs. 4.54 pg/mL) and children with high exposure had significantly lower mean concentrations of CXCL8 (6.43 pg/mL vs. 4.39 pg/mL) than children with no exposure. Conclusion: Our data suggest that SHS exposure decreases expression of CXCL8 in healthy children. We found decreased IL-4 as well; this is likely because of our exclusion of children with asthma. Further studies are needed with larger samples to characterize this relationship, however this adds more evidence that SHS exposure impacts children's immune systems, and should be prevented.

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## POS1-1

### SEL-068 A FULLY SYNTHETIC NANOPARTICLE VACCINE FOR SMOKING CESSATION AND RELAPSE PREVENTION

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Smoking is the leading cause of preventable death and morbidity. The majority of smokers who wish to quit are unable to do so despite available pharmacotherapies. Recently several groups have pursued anti-nicotine vaccines as a means to aid smoking cessation. Nicotine-carrier conjugates elicit antibodies against nicotine which prevent it from crossing the blood brain barrier. Recently reported clinical trials of two anti-nicotine vaccines have demonstrated that a correlation between subjects that attained high anti-nicotine titers and smoking abstinence. However, the majority of subjects showed inadequate titers and no benefit over placebo controls. These results suggest the therapeutic potential for a vaccine that can induce high titers. Here we describe SEL-068, a novel targeted synthetic vaccine nanoparticle (TSVP) that induced high titer antibodies in mice and two species of non-human primates. SEL-068 are rationally designed, fully synthetic and self-assembling nanoparticles comprising four components: 1) a biodegradable polymer matrix; 2) a synthetic TLR7/8 agonist; 3) an encapsulated universal antigen (Ag) peptide for T helper cells; and 4) nicotine that is covalently conjugated to the nanoparticle surface. The nanoparticles are designed to flow freely to the lymph nodes enabling direct and concomitant delivery of all required components to the responsive cells of the immune system. The novel T cell helper peptide showed good T cell recall responses in PBMC from 50 of 50 human donors. Encapsulation and controlled release of the TLR agonist in the nanoparticle minimized generation of systemic inflammatory cytokines that were observed when the TLR agonist was admixed with non-adjunct-containing particles. SEL-068 was evaluated in a repeat-dose GLP safety and efficacy study in 62 cynomolgus monkeys, with a total of 46 animals each receiving five doses of SEL-068. SEL-068 was well-tolerated at all tested doses. A robust and dose dependent induction of anti-nicotine antibodies was demonstrated, with animals in the top three dose groups obtaining titers in excess of 1,000,000. SEL-068 is expected to enter Phase 1 clinical trials in 2011.

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## POS1-2

### BEHAVIORAL ECONOMIC ANALYSIS OF NICOTINE SELF-ADMINISTRATION IN MALE AND FEMALE RATS DURING PROGRESSIVE UNIT DOSE REDUCTION

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Reducing the nicotine content in tobacco products is being considered by the FDA as a policy to reduce the addictiveness of tobacco products. Understanding individual differences in response to nicotine reduction will be critical to developing safe and effective policy. Animal and human research suggests that there are sex differences in the reinforcing effects of nicotine, implying that males and females may respond differently to nicotine-reduction policies. However, no studies have directly examined sex differences in the effects of nicotine unit-dose reduction per se on nicotine self-administration (NSA) in animals. The purpose of the present study was to examine this issue in rats using a behavioral economic analysis that has proven to be very accurate in describing dose-response relationships for other drugs of abuse, but has not yet been applied to NSA in animals. Male and female rats were trained to self-administer nicotine (0.06 mg/kg) under an FR 3 schedule during daily 23 hr sessions. Rats were then exposed to saline extinction and reacquisition of NSA, followed by weekly reductions in the unit dose until extinction levels of responding were achieved. Exponential demand-curve analysis was conducted to compare the sensitivity of males and females to increases in the unit price (FR/unit dose) of nicotine (i.e., elasticity of demand or reinforcing efficacy). Males and females were also compared with respect to baseline levels of intake, resistance to extinction, degree of compensatory increases in responding during dose reduction, and the threshold reinforcing unit dose of nicotine. Although females exhibited higher baseline intake and less compensation, there were no sex differences in the other aspects of NSA. Dose-response relationships were very well described by the exponential demand function ( $r^2$  values typically  $> 0.9$  for individual subjects). These findings suggest that females may exhibit less compensatory smoking in response to nicotine reduction policies, even though their nicotine reinforcement threshold and elasticity of demand may not differ from males.

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## POS1-3

### REINFORCEMENT-ENHANCING EFFECTS OF SUBCUTANEOUS NICOTINE ALONE AND IN COMBINATION WITH TRANILCYPRROMINE

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Recent studies have examined the role that MAO inhibition plays in nicotine (NIC) reinforcement. NIC has two reinforcement-related effects: 1) NIC acts as a primary reinforcer and 2) NIC, non-associatively, enhances reinforcement from concurrently available stimuli. Previous research suggests that brain MAO inhibition augments NIC's primary reinforcing effect particularly in rats with high locomotor activity in a novel environment. The present study sought to determine if: 1) the MAO inhibitor tranilcypromine (TCP) exaggerates NIC's reinforcement-enhancing effect and 2) initial locomotor activity can predict individual differences in this effect. After undergoing 20-min activity screening sessions, rats completed daily 1h sessions in which responding was reinforced with a moderately reinforcing visual stimulus (VS). Once behavior stabilized on an FR5, rats were divided into 10 groups corresponding to pre-session ip (saline (SAL) or TCP) and sc injections (SAL or NIC): SAL + SAL, SAL + NIC (0.01, 0.03, 0.1 or 0.3 mg/kg), TCP + SAL or TCP + NIC (0.01, 0.03, 0.1 or 0.3 mg/kg). All TCP doses were 1 mg/kg. Rats were tested under these conditions for 13 days followed by progressive ratio (PR) testing for 4 days. To assess heterogeneity in response to NIC, all NIC-pretreated rats were returned to an FR5 and injected with 0.1 mg/kg NIC for 7 days. Results revealed that responding for the VS increased with NIC dose on both FR5 and PR schedules ( $p < .001$ ). Analysis of the effects of TCP on NIC's reinforcement enhancing effects indicated a small and non-significant trend only at 0.1 mg/kg NIC. When all NIC rats were switched to 0.1 mg/kg, a significant interaction between locomotor activity and TCP emerged ( $p < .05$ ). TCP potentiated the effects of NIC in rats with low to middle ( $p < .005$ ), but not high ( $p = .40$ ), activity during pre-screening. These results suggest that TCP impacts the reinforcement-enhancing effects of NIC in addition to its effect on primary reinforcement and that these two effects may occur in somewhat different animals. Future studies will need to assess whether these effects of TCP are related to MAO inhibition per se or other pharmacological actions.

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## POS1-4

### SPECTRAL EXAMINATION OF CRYSTALLIZED SONG IN THE ADULT MALE ZEBRA FINCH BEFORE AND AFTER ADMINISTRATION OF NICOTINE

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Like humans, zebra finches (*Taeniopygia guttata*) learn structured vocalization during critical developmental stages. This learning process is dependent on both social interaction and auditory experiences, derived from external (other male mentors) and internal cues (song memorization processing). The male zebra finch develops specific song and auditory nuclei that are involved in acquisition and production, and in the maintenance of their song, respectively. At around 120 days of age the song is crystallized and remains unchanged for the entirety of the bird's life. Recently, the presence of nicotinic acetylcholine receptors was demonstrated in song nuclei that are involved in learning and maintenance of song, which implies that nicotine can interfere with vocalization. We showed that a 7-day treatment with nicotine (0.18 mg/kg, s.c.) caused a shortening of syllable length along with an increase in inter-syllable duration when measured in adult male zebra finches. Basically this means that the birds sang with longer pauses and shorter sounds. In this study, we examined the effects of nicotine on crystallized song focusing on spectral features (Weiner Entropy, Pitch, and Amplitude). Baseline recordings were made for a week in 16 adult male birds ( $> 120$  days old). Then the animals were given control injections (saline, 0.03 ml/10 gr BW) twice a day, for 5-days. Next, the birds were randomly divided in two equal groups, and twice a day for 7-days, one group received nicotine and the other one received saline. Recordings were made during all injections. After cessation of injections the birds were recorded for three consecutive months. Spectral analysis of the song data showed a prominent change in Weiner Entropy and Pitch in the nicotine exposed animals, which was not observed in their age matching controls. This effect could be due to an impaired auditory processing feedback-loop. Conditions associated with disturbed auditory

processing disorder in humans include dyslexia, autism (spectrum disorders), attention deficit disorders and specific language impairment. Our data could help to understand the underlying mechanism of auditory processing disorders.

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## POS1-5

### NICOTINE SELECTIVELY INCREASES APPROACH RESPONSES TOWARD A SIGN STIMULUS ASSOCIATED WITH SUCROSE REWARD

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Nicotine (NIC) facilitates reward-related learning and responding with conditioned reinforcement, presumably because nicotine increases the incentive properties of reward-associated stimuli. While nicotine robustly and consistently increases operant responses, the previously observed effect of nicotine on Pavlovian conditioned approach responses have been much more limited in size and scope. Therefore the present study sought to determine whether nicotine could robustly increase Pavlovian conditioned approach. Rats were randomly assigned to 1 of 3 unconditioned stimulus (US) groups (0, 5, or 20% sucrose) and 1 of 2 drug conditions, NIC (0.4 mg/kg base) or SAL (0.9% saline). Drug or saline treatments were administered 15 min prior to each 1-h test session. Conditioning took place in standard operant chambers fitted with 2 liquid dippers and receptacles located on opposite sides (left and right) of the same wall. Each receptacle was fitted with a light stimulus and an infrared detector to measure the conditioned response (CR) – entry into the dipper during the CS. During the initial acquisition phase, all rats received 30-s presentations of the conditioned stimulus (CS, illumination of the light in the right dipper) followed by 5-s delivery of the assigned US (0, 5, or 20% sucrose) delivered in the same location (right dipper). NIC sped acquisition of approach behavior in rats with access to 5 and 20% sucrose, but by the end of testing (12 days) CRs were similar across drug conditions. We then conducted additional tests in which the US location ('goal') was shifted to the opposite dipper and receptacle (left side), but the CS remained in the same location ('sign', right side). Rats in the 5 and 20% sucrose groups learned to approach the new goal area during the CS and NIC treatment did not alter acquisition of approach to the goal. Approach to the CS location declined as approach to the US location increased, but only for rats pretreated with SAL. For rats pretreated with NIC there was no decline in approach to the CS. The findings suggest that NIC treatment may cause perseverative approach responses toward stimuli that have been paired with rewards in the past.

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## POS1-6

### NICOTINE PERSISTENTLY ACTIVATES VENTRAL TEGMENTAL AREA DOPAMINERGIC NEURONS VIA DESENSITIZATION-RESISTANT NICOTINIC ACETYLCHOLINE RECEPTORS

Liwang Liu, Rubing Zhao-Shea, J. Michael McIntosh, Paul D. Gardner, and Andrew R. Tapper\*

Nicotine is reinforcing because it activates dopaminergic (DAergic) neurons within the ventral tegmental area (VTA) of the brain's mesocorticolimbic reward circuitry. This increase in activity can occur for a period of several minutes up to an hour and is thought to be a critical component of nicotine dependence. Acutely, nicotine activates neuronal nicotinic acetylcholine receptors (nAChRs), ligand gated cation channels that are robustly expressed in DAergic neurons. However, nicotine concentrations that are routinely self-administered by smokers are predicted to desensitize high affinity nAChRs on the order of seconds. Thus, how physiologically relevant nicotine concentrations persistently activate VTA DAergic neurons is unknown. We show that nicotine can directly and robustly increase the firing frequency of VTA DAergic neurons for several minutes. In mouse midbrain slices, 300 nM nicotine elicited a persistent inward current in VTA DAergic neurons that was blocked by alpha-conotoxin MII (E11A), a selective antagonist of nAChRs containing the alpha-6 subunit. Alpha-conotoxin MII (E11A) also significantly reduced the long-lasting increase in DAergic neuronal activity produced by low concentrations of nicotine. In addition, activation was grossly absent in mice that did not express either alpha-4 or alpha-6 nAChR subunits. These data indicate that nicotine persistently activates VTA DAergic neurons via desensitization-resistant

nAChRs containing alpha-4 and alpha-6 subunits. Our data provide mechanistic insight into how a bolus of nicotine, as achieved by smoking a cigarette, can activate DAergic neurons for extended periods of time.

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## POS1-7

### SMOKE IN THE WATER: EVALUATION OF PHARMACOLOGICAL TOOLS USED FOR THE STUDY OF NICOTINE'S EFFECTS ON ZEBRAFISH BEHAVIOR

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Zebrafish (*Danio rerio*) are used to study the effects of nicotine on locomotor and stress responses and cognition (Levin 2009). To date, the interpretation of such studies has relied on the assumption that pharmacological tools will operate upon molecular substrates in the fish in the same ways that they have been demonstrated to work in mammalian systems. We have cloned the zebrafish nicotinic acetylcholine receptor (nAChR) subunits and obtained functional expression of the key nAChR subtypes in *Xenopus* oocytes. We determined the potency and efficacy of nicotine compared to acetylcholine (ACh) for neuronal  $\alpha 4\beta 2$ ,  $\alpha 2\beta 2$ ,  $\alpha 3\beta 4$ , and  $\alpha 7$  nAChRs and for the fish muscle nAChR ( $\alpha 1\beta 1\beta e\delta$ ). Consistent with studies of mammalian nAChRs, nicotine was relatively inactive on muscle-type receptors, having both low potency and efficacy. It had high efficacy but low potency for  $\alpha 7$  receptors and the best potency and good efficacy for  $\alpha 4\beta 2$  receptors. We also evaluated the effects of cytosine, which has become a key lead compound for the development of smoking cessation agents. Cytosine is a full agonist for mammalian  $\alpha 7$  and  $\alpha 3\beta 4$  receptors, but a full agonist only for the fish  $\alpha 7$ , with surprisingly low efficacy for  $\alpha 3\beta 4$ . We hypothesize that the reduced  $\alpha 3\beta 4$  efficacy of cytosine may be due to a Y to F difference in the E-loop of the  $\beta 4$  ligand binding domain. The efficacy of cytosine for  $\alpha 4\beta 2$  was somewhat greater than typically reported for mammalian  $\alpha 4\beta 2$ . Several studies of nicotine's effects on zebrafish behavior have utilized the ganglionic blocker mecamylamine. In acute co-application experiments, mecamylamine was most potent for blocking ganglionic type  $\alpha 3\beta 4$ , least potent for  $\alpha 7$ , and roughly equipotent for the muscle receptors and the  $\beta 2$ -containing nAChRs. However, the block of  $\beta 2$ -containing receptors was slowly reversible, consistent with effective targeting of these CNS-type receptors in vivo. Three prototypical  $\alpha 7$ -selective agonists, choline, tropane, and 4OH-GTS-21 were tested, and these agents were observed to activate both fish  $\alpha 7$  and  $\alpha 4\beta 2$  nAChRs. Our data therefore indicate that while some pharmacological tools used in zebrafish may function as expected, others will not.

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## POS1-8

### LOCOMOTOR ACTIVITY IN A NOVEL ENVIRONMENT PREDICTS NICOTINE SELF ADMINISTRATION IN RATS

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Previous research has suggested that underlying behavioral phenotypes may predispose animals to drug self-administration or cue-induced reinstatement. Two paradigms assessing response to novelty, high locomotor activity to a novel environment and preference for a novel environment, have been considered predictors of drug addiction behavior. The current experiment aimed to determine relations between the aforementioned behavioral phenotypes and their ability to predict nicotine self-administration, as well as nicotine and cue-induced reinstatement. Adult male Sprague-Dawley rats (n=72) were pre-screened in two paradigms. Locomotor response to a novel environment (LRNE) was measured as distance traveled in a 43.2 x 43.2 cm open field chamber during a 2-hr session. Novelty place preference (NPP) was measured as the

proportion of time spent in a novel environment versus an environment to which the rat had been previously acclimated. In the self-administration phase (FR5), rats nose-poked for IV infusions of 0.06 mg/kg nicotine with (n=41) or without (n=31) a paired conditioned stimulus (CS, 15-sec cue light). After acquisition, nicotine dose was decreased to 0.03 mg/kg and 0.01 mg/kg before returning to 0.06 mg/kg. Behavior was then extinguished via replacement of IV nicotine with saline and cessation of CS presentation upon active nose poke. LRNE significantly predicted self-administration at all doses of nicotine (0.06:  $r=.363$ ,  $p<.05$ ; 0.03:  $r=.378$ ,  $p<.05$ ; 0.01:  $r=.679$ ,  $p<.01$ ) and nicotine reinstatement ( $r=.410$ ,  $p<.01$ ), but only for rats whose self-administration was paired with the CS. NPP did not predict drug outcomes regardless of cue condition, with the exception of self-administration at the 0.01 mg/kg dose ( $r=-.319$ ,  $p<.05$ ). Although both NPP and LRNE have previously been conceptualized as testing response to novelty, results of the two tests were not correlated, which suggests they measure different constructs. LRNE effectively predicts nicotine self-administration in the presence of a cue condition, suggesting that the presence of nicotine-associated cues underlie the relationship between LRNE and self-administration.

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## POS1-9

### EFFECT OF NICOTINE ON THE ACQUISITION OF SENSORY REINFORCEMENT IN RATS

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Nicotine (NIC) increases operant responding for non-drug reinforcers and reward-associated stimuli in rodents. It is unknown whether NIC alters what is learned about non-drug reinforcers. This study examined whether acquisition of reinforcement by a visual stimulus (VS) differed depending on whether learning occurred after NIC or placebo (SAL) injections. Rats were randomly assigned to one of two groups who received subcutaneous (sc) NIC (0.4 mg/kg base, n=9) or 0.9% saline (SAL, n=9) exposure during acquisition of responding for the VS. All rats had access to nose-key operants and meeting the fixed ratio 3 (FR3) schedule requirement on the active nose-key resulted in extinction of all lighting for 30 s (VS); inactive nose-key responses had no programmed consequence. No pre-training or food-shaping procedures were used. Assigned injections were administered 15 min prior to testing. The NIC group made more active responses, earned more VS presentations, and more rats met the acquisition criterion relative to the SAL group. Both the groups then received NIC injections (0.4 mg/kg base) prior to 7 additional sessions. Responding for the VS increased in the SAL group and both groups were responding for the VS at similar rates by the end of this test phase. Both groups were then shifted to placebo pretreatments. Responding for the VS decreased over testing sessions and no differences in responding were observed between the NIC and SAL groups (FR3). Additional tests were conducted under a Progressive Ratio (PR) schedule, in order to measure the motivation to obtain the VS (i.e., "breaking"-point). Although both groups were tested after placebo injections, NIC group (which learned to respond for VS under the influence of NIC) earned significantly more VS presentations and reached higher breaking points than the SAL group. These results provide preliminary evidence that NIC can skew reinforcement learning and alter the basal motivational status of a non-drug reward.

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## POS1-10

### RESPONSE TO NOVELTY AS A PREDICTOR OF THE REINFORCEMENT-ENHANCING EFFECT OF NICOTINE

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Not all individuals respond similarly to nicotine (NIC). This variation may be, in part, related to response to novelty. Two paradigms have been used to assess response to novelty as a predictor of drug reinforcement: 1) locomotor response to a novel environment (LRNE) and 2) novelty place preference (NPP). The present study sought to determine whether these measures can predict the reinforcement-enhancing effect of NIC (i.e., the ability of NIC to non-associatively enhance the reinforcing effects of nonpharmacological stimuli). Adult male Sprague Dawley rats (N=52) were prescreened for both LRNE and NPP. LRNE was assessed in a 43.2 X 43.2 cm chamber for two

hours. NPP was assessed by allowing rats to acclimate to a chamber and then choose between the acclimated chamber and a novel chamber. Following these procedures, rats were allowed to nose-poke for a moderately reinforcing visual stimulus (VS) during 1-hour daily sessions. Once responding for the VS stabilized on an FR5, rats were injected pre-session with saline, then NIC (0.4mg/kg sc), in separate sessions. There was no correlation between the distance traveled in the open field test and time spent in the novel chamber during the NPP test ( $r=0.004$ ,  $p=0.98$ ), but both measures correlated positively with the average responses over the last 3 days of the NIC phase of VS responding ( $r=0.329$ ,  $p<0.05$ ;  $r=0.410$ ,  $p<0.01$ ; respectively). Distance traveled also correlated positively with the baseline and saline phases of VS responding ( $r=0.528$ ,  $p<0.001$ ;  $r=0.457$ ,  $p<0.01$ ; respectively); indeed, responding in the NIC phase was not significantly correlated with distance traveled when accounting for responding after saline (partial  $r=0.199$ ,  $p=0.205$ ). In contrast, NPP did not correlate significantly with the earlier phases ( $r=-0.037$ ,  $p=0.795$ ;  $r=0.124$ ,  $p=0.38$ ; respectively), and its significant correlation with the NIC phase persisted when accounting for responding after saline (partial  $r=0.395$ ,  $p<0.01$ ). Cumulatively, these findings suggest that response to novelty may predict the magnitude of the reinforcement-enhancing effect of NIC but that the manner in which response to novelty is assessed is critical.

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## POS1-11

### MECAMYLAMINE PRECIPITATES WITHDRAWAL SIGNS IN RATS FOLLOWING A SINGLE DOSE OF NICOTINE: PRECLINICAL EVIDENCE FOR THE RAPID DEVELOPMENT OF NICOTINE PHYSICAL DEPENDENCE

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While development of nicotine physical dependence has typically been thought to require long-term, heavy smoking, recent evidence suggests that nicotine withdrawal symptoms may occur following only a few cigarettes. Whether acute exposure to nicotine can induce physical dependence in animals has not been well established. The goal of this study was to examine whether the nicotinic antagonist mecamylamine can precipitate withdrawal signs in rats following acute exposure to nicotine. Mecamylamine (3.0 mg/kg, s.c.) administered 2 hr after a single dose of nicotine (0.5 mg/kg, s.c.) elicited increases in intracranial self-stimulation (ICSS) thresholds and somatic signs, two well-established effects of withdrawal from chronic nicotine exposure. Magnitude of these effects remained constant when this procedure was repeated across 5 consecutive days. Repeated exposure to mecamylamine (3.0 mg/kg) alone had no effects on ICSS thresholds, but it did produce a progressive increase in somatic signs. These studies demonstrate that mecamylamine can precipitate signs of nicotine withdrawal in rats following just a single dose of nicotine. These studies support the hypothesis that nicotine withdrawal may occur during initial tobacco use, and provide a model for studying mechanisms underlying the earliest stages of nicotine physical dependence.

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## POS1-12

### THE EFFECTS OF NICOTINE ON FREQUENCY DEPENDENT PLASTICITY IN FREELY MOVING RATS

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The hippocampus is thought to encode episodic memory, and the general hypothesis we test is that drugs of addiction influence processes of learning and memory to perpetuate drug use. Cortical activity coding place and spatial information is conveyed to the hippocampus through the entorhinal cortex (EC), which projects to the dentate gyrus (DG), the first synapse in the trisynaptic loop within the hippocampus. Changes in synaptic strength in the EC-DG circuit are proposed to underlie aspects of learning and memory. Previous studies from Tang and Dani (2009) demonstrated that acute injections of nicotine produce long term potentiation (LTP) by recruiting mesolimbic dopamine neurons, which provide a sparse but powerful projection to the hippocampus. Further, evidence from cultured hippocampal preparations demonstrated that dopamine broadens the temporal window of spike timing dependent plasticity (Zhang, Lau, Bi 2009

PNAS). Based in part on these observations, we asked whether nicotine influences the frequency dependence of plasticity in vivo. A theta burst protocol, in which a 400 Hz train is pulsed every 5 Hz, potentiates this circuit. Here, we examine the combined effects of nicotine and varying theta-burst stimulation paradigms on plasticity of the EC-DG circuit in freely moving rats. Plasticity is measured from the population spike of hippocampal field recordings from the granule cell layer of the DG in response to electrical stimulation of the medial perforant path. Acute, systemic administration of nicotine enhanced the population spike amplitude of this response for up to 50 minutes in rats, and significantly increases EEG theta. We will further test whether a low dose of nicotine enhances LTP induced by a subthreshold theta-burst paradigm, and whether these agents block LTD induced by low frequency stimulation paradigms. In these experiments we will test the hypothesis that drugs of addiction that recruit dopaminergic signaling in the hippocampus broaden the temporal window of plasticity in vivo.

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## POS1-13 AXONAL GROWTH AND PLASTICITY MEDIATED BY ALPHA 7 NICOTINIC RECEPTORS

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Axonal growth and plasticity contributes to synaptic properties that drive various behaviors including drug addiction. Recently we have shown that alpha7 nicotinic receptors (nAChRs) can direct axonal growth in neurons via a direct interaction with the cytoskeleton and the components of the G protein-signaling network including G protein regulated inducer of neurite outgrowth-1 (Gprn1). Here we demonstrate that the alpha7/Gprn1 complex is a key regulator of axonal growth, navigation, and growth cone dynamics within the developing hippocampus. Using a microfluidic platform to compartmentalize somatic and dendritic from axonal compartments, we find that alpha7 nAChRs expressed along the axon can regulate axonal growth and growth cone behavior via a mechanism of Gprn1 targeting of filamentous actin (F-actin) within the neurite. These findings shed light on a novel presynaptic property of nAChRs in the brain and suggest a therapeutic direction in the treatment of developmental, neurodegenerative, as well as addictive disorders via the targeting of alpha7 nAChRs.

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## POS1-14 NICOTINE AND VARENICLINE ENHANCE GABAERGIC SYNAPTIC TRANSMISSION IN RAT CA1 HIPPOCAMPAL AND MEDIAL SEPTUM / DIAGONAL BAND NEURONS

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The FDA approved smoking cessation aid, varenicline (Chantix®), is a partial agonist at heteromeric alpha4/beta2\* neuronal nicotinic acetylcholine receptors (nAChRs). The mechanism of varenicline's action as a smoking cessation aid involves release of the neurotransmitter dopamine via activation of heteromeric nAChRs, and attenuation of nicotine stimulated release. Just like nicotine, varenicline has also been shown to improve cognitive function suggesting additional sites of action for this drug. The aim of this study was to examine the effects of nicotine and varenicline on GABA<sub>A</sub> receptor mediated synaptic transmission in two brain regions important for learning and memory, the hippocampus and medial septum/diagonal band (MS/DB). Using whole-cell patch-clamp recordings in acutely prepared brain slices from these regions, we examined the effects of bath applications of nicotine, varenicline and their combinations, on GABA<sub>A</sub>-mediated synaptic transmission by measuring asynchronous, spontaneous inhibitory postsynaptic currents (mIPSCs). Indicative of increased GABA release, nicotine (10 microM) significantly enhanced mIPSC frequency measured as inter-event intervals in hippocampal and MS/DB slices (K-S test,  $P < 0.01$ ). Mean frequency was increased by nicotine in 54% and 64% of CA1 pyramidal and MS/DB neurons, respectively. Similar to nicotine, varenicline (10 microM) significantly enhanced mIPSC frequency in hippocampus and MS/DB (K-S test,  $P < 0.01$ ). Mean frequency was increased by varenicline in 78% and 46% of CA1 pyramidal and MS/DB neurons, respectively. Nicotine's enhancement of mIPSC frequency was effectively attenuated by varenicline consistent with partial agonism, but when nicotine was added to varenicline

exposed slices, little effect was observed consistent with varenicline's higher affinity for heteromeric alpha4/beta2\* nAChRs. GABA<sub>A</sub> receptor mIPSC amplitude and decay kinetics were not consistently altered. These data suggest that varenicline acts as a partial agonist at heteromeric nAChRs influencing GABAergic synaptic transmission in both the hippocampus and MS/DB, potentially explaining its role in improving cognitive function.

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## POS1-15 EFFECTS OF MOOD MANIPULATIONS ON SMOKING MOTIVATION: A META-ANALYSIS

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Affective processing has been purported to be the prepotent motive maintaining drug dependence (Baker et al., 2004). This theory proposes that an individual acquires negative affect (NA) as an interoceptive cue, following repeated drug use aimed to alleviate the aversive withdrawal syndrome. These associative processes appear to increase smoking motivation and precipitate post-cessation relapse (Brandon et al., 2007). Although cue-provoked cravings have been reliably demonstrated to increase when smokers are exposed to smoking-related cues (Carter & Tiffany, 1999), the influence of affect-related cues has yet to be systematically quantified. Thus, the aim of the current study was to estimate the magnitude of cue-provoked cravings produced by affective cues (or manipulations). Separate random effects meta-analyses were conducted for cues specific to negative (18 studies) and positive affect (PA; 10 studies). Only those studies that incorporated a direct comparison of NA (or PA) and neutral conditions on self-reported craving were included. Summary effect sizes are reported in Hedge's  $g$ , which is a version of Cohen's  $d$  that is corrected for bias, and can be interpreted comparatively (.2 = small, .5 = medium, .8 = large). NA cues produced a small-to-medium effect ( $g = .36$ ; CI: .25-.47;  $p = .001$ ), indicating that NA exacerbates craving. No effects were found for PA cues ( $g = -.03$ ; CI: -.16-.10;  $p = .66$ ). Notably, the effect size observed for NA cues was much smaller than that previously observed for smoking-related cues ( $d = 1.18$ ; Carter & Tiffany, 1999), perhaps because they serve as distal rather than proximal cues for smoking (Conklin et al., 2008). Discussion will address potential moderators, study limitations, theoretical and clinical implications, and future directions for cue-reactivity research.

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## POS1-16 SOCIAL INFLUENCES AND SUPPORT FOR QUITTING: THE ROLE OF GENDER

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**BACKGROUND:** The importance of smokers' social relationships in motivating quit attempts and in providing support during quitting is not well elucidated. Moreover, whether these social processes differ as function of gender is unknown. **METHODS:** An online survey was voluntarily completed by 2142 smokers who visited the American Cancer Society's Great American Smokeout (GASO) webpage for cessation information. **RESULTS:** Among smokers planning to quit within the next 6 months ( $n=779$ ), 80% reported being told in the last 6 months to quit. Female smokers reported being told to quit by a greater number of people than were men,  $t(557) = -2.18$ ,  $p = .03$ . Male smokers, however, were significantly more likely to be told they should quit by their romantic partners than were female smokers [20.3% vs. 15.4%; Chi-sq (1,  $N = 1481$ ) = 5.4,  $p = .02$ ]. Female smokers, compared to males, however, were more likely to be told they should quit by other family members (36.8% vs. 24.3%; Chi-sq = 22.5,  $p = .0001$ ), or health professionals (19% vs. 13.6%; Chi-sq = 6.4,  $p = .01$ ). Smokers who had made a prior quit attempt reported levels of partner support received that were lower than what first-time quitters expected from their romantic partners ( $M = 2.9$  vs. 3.4,  $p = .01$ ). The greater the support that smokers received from their romantic partners the last time they quit the sooner they attempted to quit again ( $B = .32$ ,  $t = 2.4$ ,  $p = .02$ ), but this relationship did not differ by gender. **CONCLUSION:** Advice to quit may be influencing smokers' motivation to attempt quitting and males and females differ in



who in their social networks advises them to quit. The support smokers expect from romantic partners during a quit attempt may not be forthcoming, however, even though this support may increase the likelihood that they make repeated future attempts to quit. Results from this study can inform mass media campaigns that target smokers through their social relationships.

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## POS1-17

### DIRECT AND MODERATING EFFECTS OF TRAIT MINDFULNESS IN THE RELATIONSHIPS BETWEEN WEIGHT CONCERNS AND SMOKING AMONG FEMALE SMOKERS

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Weight concerns often trigger smoking and interfere with smoking cessation in female smokers. Mindfulness (paying attention to present-moment experience with an attitude of nonjudgmental acceptance) may aid smokers in coping with weight concerns. This study investigated relationships between trait mindfulness, weight concerns, smoking, and eating habits, and assessed trait mindfulness as a moderator in the relationship between weight concerns and smoking. Female undergraduate smokers (N=113) completed the Five Factor Mindfulness Questionnaire (FFMQ), Smoking Status Questionnaire including a one-item measure of postcessation weight gain concern, Eating Inventory-26, Bulimia Test-Revised, and Body Shape Questionnaire. Height and weight were measured. Hierarchical multiple regression analyses, controlling for age, body mass index, and race, were conducted predicting smoking frequency, postcessation weight gain concern, and eating disorder measures from the five FFMQ factors (Observing; Describing; Acting with Awareness; Nonreactivity; Nonjudging). Results indicated that FFMQ Describing predicted lower postcessation weight gain concern ( $p=.01$ ); Acting with Awareness predicted lower symptoms of Anorexia Nervosa ( $p=.01$ ); Describing ( $p=.01$ ), Acting with Awareness ( $p=.03$ ), and Nonjudging ( $p=.01$ ) predicted lower symptoms of Bulimia Nervosa; and Describing ( $p=.02$ ) predicted lower body image disturbance. Describing also moderated the relationship between postcessation weight concern and smoking frequency ( $p=.01$ ). Among participants with low Describing scores, weight concern predicted higher smoking frequency ( $p=.003$ ). However, among those with high Describing scores, weight concern was unrelated to smoking frequency ( $p=.56$ ). Mindfulness may have both direct benefits and moderating effects in the relationships between weight concerns and smoking. Women who describe and label their feelings with words may be better equipped to cope with weight concerns, which could lead to lower smoking frequency. Mindfulness-based interventions may reduce the extent to which weight concerns trigger smoking urges and interfere with smoking cessation.

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## POS1-18

### FEAR OF FATNESS VERSUS DRIVE FOR THINNESS PREDICTS SMOKING STATUS IN COLLEGE WOMEN

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Research has identified Fear of Fatness (FF) as a related yet distinct construct from Drive for Thinness (DT) in predicting dieting behavior and eating patterns associated with clinically significant eating disorders. Both Anorexia Nervosa (AN) and Bulimia Nervosa (BN) include fear of weight gain as diagnostic features. FF and DT have also been related to distinct behavioral and cognitive coping styles: DT with need for approval and an "approach" tendency, and FF with avoidance of disapproval and avoidant problem-solving. In the present study, we predicted that FF would be significantly associated with cigarette smoking, and that DT would not, even while controlling for variables such as body mass index (BMI) and nicotine dependence. Our hypothesis was based on literature showing fear of postcessation weight gain and studies in which women report smoking to control their appetite and weight (not weight loss per se). Also, smoking and substance use disorders (SUDs) have a significantly higher comorbidity rate with BN than AN, and avoidant coping style is prevalent among smokers and individuals with SUDs. Study participants were female undergraduates (N = 289),  $m = 19.9(1.5)$  years of

age,  $m=22.9(4.3)$ , BMI, 93% Caucasian; 6% African American. Smoking status groups were formed: nonsmokers ( $n=84$ ); triers ( $n=78$ ); infrequent ( $n=77$ ); daily smokers ( $n=50$ ). Daily smokers smoked 7.2(5.2) cigarettes per day (CPD), for  $m = 2.8(1.9)$  years, had Fagerström Test for Nicotine Dependence (FTND):  $m = 1.6(1.6)$ , and carbon monoxide levels of  $m = 6.5(8.2)$  ppm. Groups differed significantly on Body Shape Questionnaire (BSQ), Bulimia Test-Revised (BULIT-R), Eating Disorder Inventory (EDI) Drive for Thinness (DT) scale, and FF, such that daily smokers > infrequent smokers > triers > non-smokers. Hierarchical regression analyses confirmed that FF was more predictive than DT in ever smoking a cigarette and in CPD. These results suggest that while both DT and FF appear important in smoking behavior, FF in particular plays a significant role and therefore may have applied as well as theoretical significance in cigarette smoking in this population.

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## POS1-19

### THE USE OF HUMAN SERA AS A NOVEL EXPOSURE SYSTEM FOR IN VITRO MODELS EXAMINING THE EFFECTS OF CIGARETTE SMOKING ON CARDIOVASCULAR DISEASE

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**INTRODUCTION:** In vitro models of smoking-related diseases may provide screening tools for novel cigarettes with altered smoke toxicant levels. Commonly used exposure agents for in vitro models include extracts of particulate matter and smoke vapours. However, these may not realistically represent cardiovascular system exposure to smoke and may not be entirely appropriate for use with cardiovascular disease models. We have examined the use of human sera as an exposure agent for in vitro models of cardiovascular disease. **METHODS:** Human umbilical vein endothelial cells were grown to confluency, serum-starved, and a scratch wound created with a pipette tip. Cells were exposed for 24 hours to sera (1:1 in media) obtained from 10 healthy smokers or 10 healthy non-smokers. Informed consent was obtained from all volunteers. Endothelial migration (a model of vascular damage repair) was monitored using IncuCyte imaging apparatus. After 24 hours, media and cells were harvested for gene (TaqMan) and protein (MesoScale Discovery) expression analyses. **RESULTS:** Endothelial migration rate in cells exposed to smokers' sera was significantly increased compared to cells exposed to non-smokers' sera. Exposure to smokers' sera caused a significantly greater secretion of both monocyte chemoattractant protein-1 (MCP-1) and interleukin-6 (IL-6), compared to cells exposed to non-smokers' sera. In addition, smokers' sera caused significantly greater expression of genes for IL1-R1, TGFβ1 and VEGFA, which encode proteins involved in inflammatory cell invasion and vascular disease progression. MCP-1 and IL-6 gene expression levels were also greater in cells exposed to smokers' sera although these effects were not statistically significant. **CONCLUSIONS:** Human sera provide a suitable additional exposure system when examining disease-relevant endpoints in cardiovascular disease models. This approach displays the sensitivity to distinguish between the sera of smokers and non-smokers. Additional studies are required to further investigate sensitivity of this approach using sera from those who quit smoking or who switch to products developed with the potential to reduce risk.

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## POS1-20

### THE EFFECT OF EXPOSURE TO CIGARETTE SMOKE ON THE MODULATION OF CARDIAC GENES IN RATS

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The most important determinants of human health trends are the increase in smoking related morbidity and mortality. Tobacco related deaths are expected to increase to 10 million within the next 20-30 years, of which approximately 70% will occur in the developing countries. Tobacco smoking is responsible for over 90% of cardiovascular diseases (CVD), which are still considered the main cause of death in the western world. The particles of cigarette smoke contain thousands of chemical compounds, among which the polycyclic aromatic hydrocarbons (PAHs), ubiquitous environmental

toxic contaminants, are believed to be major constituents. Recent studies reported that tobacco PAH is able to differentially modulate the expression of certain genes. yet the precise molecular alterations of cardiac genes induced by smoking have remained obscure. Therefore, the main objectives of the current study was to determine the effect of exposure to cigarette smoke on the expression of cardiac genes involved in CVD in vivo using rat animal model. For this purpose, Sprague-Dawley (SW) rats were exposed to passive smoke (cigarette with a tar/ nicotine content of 7.0 mg/0.75 mg were burned in a day 30 min each, for a 2-hr total exposure for 7 days) using a closed plastic chamber (50x65x35 cm) with and 12 ventilation holes (2 cm in diameter). Rats were sacrificed, and the mRNA expression of cardiac hypertrophic, cytochrome P450 (CYP) enzymes, oxidative stress markers was determined by RT-PCR. Our results showed that exposure to cigarette smoke caused significant induction of mRNA expression of several cardiac hypertrophic genes, such as ANP, BNP, and beta-MHC, with a significant inhibition of the anti-hypertrophic, beta-MHC, mRNA level. This was accompanied with dramatic induction of cardiac CYP1A1, 2C11, 2E1, and 3A2, whereas inhibited 1A2. On the other hand, tobacco smoke differentially modulated the oxidative stress-mediated genes, such as HO-1, NQO1, GST1a2, and ROS. In conclusion, tobacco smoke differentially modulated the expression of CVD-mediated cardiac genes that could be one of the mechanism by which the exposure to cigarette smoke induces cardiotoxicity and CVD.

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## POS1-21

### EFFECTS OF 7.5% CARBON DIOXIDE CHALLENGE ON CARDIOVASCULAR OUTPUT AND ANXIETY IN DAILY CIGARETTE SMOKERS AND NON-SMOKERS

Angela S. Attwood, Ph.D.\*, and Marcus R. Munafò, Ph.D., University of Bristol.

Cigarette smokers frequently report that smoking is anxiolytic, and that exposure to stress increases the likelihood of relapse during a quit attempt. Cigarette smoking and affective disorders are also highly co-morbid. We explored this relationship in smokers and non-smokers using a carbon dioxide (CO<sub>2</sub>) challenge, which acts as a robust anxiogenic stimulus in healthy volunteers. Twenty-four (50% male) daily smokers (non-deprived) and non-smokers underwent two 20-minute inhalations of medical air and 7.5% CO<sub>2</sub>-enriched air (order counterbalanced). After each inhalation physiological measures of heart rate and blood pressure, and subjective measures of mood and anxiety were taken. There were significant gas x smoking group interactions on systolic (F [1, 22] = 7.81, p = 0.011) and diastolic (F [1, 22] = 4.63, p = 0.043) blood pressure. Following CO<sub>2</sub> inhalation non-smokers reported significantly higher systolic (t [11] = 6.01, p < .001) and diastolic (t [11] = -2.67, p = 0.022) blood pressure, compared to air, with no effects in daily smokers (ps > 0.11). Subjective ratings of anxiety and negative mood were higher and positive mood was lower after CO<sub>2</sub> compared to air (Spielberger State-Trait Anxiety Inventory, Positive and Negative Affect Schedule, visual analogue scales). In line with the physiological data, there was a consistent pattern across subjective measurements that reactivity to the gas was greater in non-smokers than smokers, which reached or approached significance for ratings of "happy" (p = .014), "relaxed" (p = .058) and "worried" (p = .076). These data are the first to explore the effects of smoking status on the response to a stress challenge, and suggest that non-deprived smokers may be less responsive to a stressor than non-smokers. This supports an anxiolytic effect of recent smoking, which may promote maintenance of smoking and precipitate relapse, particularly during a stressful event. Future research will examine whether stress reactivity in smokers is heightened during nicotine withdrawal.

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## POS1-22

### RANGES OF MAINSTREAM SMOKE BENZO[A]PYRENE YIELDS FROM CONTEMPORARY CIGARETTE PRODUCTS

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Benzo[a]pyrene (B[a]P) is a Group 1 IARC carcinogen present in cigarette smoke. Concerns over its potential contribution to smoking related diseases have led to

proposals for limits on the ratio of B[a]P to nicotine yields as measured under Health Canada Intense (HCI) machine smoking conditions. (Burns et al., 2008). However, there is surprisingly little published data on B[a]P yields from contemporary cigarettes; of the thousands of cigarette brands on sale globally there are around 150 recent published ISO B[a]P smoke yield values (and fewer HCI smoke yields) covering relatively few countries. The current work was conducted to substantially enhance the size of the available yield database, and to provide greater clarity on the ranges of B[a]P yields commonly obtained from contemporary cigarette products. ISO B[a]P smoke yield data was assembled from published data (with control products and duplicate brands removed), and British American Tobacco (BAT) measured products. ISO data was assessed for normality of distribution and analysed by quantile regression using SAS. There was insufficient HCI B[a]P yield data to conduct quantile analysis, however sufficient data is available to conduct an analysis of the ratio of HCI B[a]P to nicotine yields. The limited HCI ratio dataset was found not to be normally distributed, therefore an empirical cumulative density analysis was conducted on the ratio values. 700 ISO B[a]P yields have been assembled from the following sources: UK benchmark (25 brands), Health Canada 2004 survey (60), Health Australia (15), Counts et al. 2005 (48) and BAT measured brands (552 brands) covering 69 geographical areas. Quantile analysis of ISO data has provided median, quartile, and major percentile values for B[a]P yields at ISO tar from 1 to 18 mg. Similar data has been generated from B[a]P/nicotine values under HCI conditions. In conclusion this work extends considerably the database of available B[a]P smoke yield data. Statistical analysis approaches have provided numerical frameworks which allow for greater clarity on the range of benzo[a]pyrene yields commonly found with contemporary cigarette products.

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## POS1-23

### INFLUENCE OF USAGE TIME ON EXPOSURE OF SNUS USERS TO NICOTINE, NNN, AND NNK FROM SNUS POUCHES

Kevin McAdam\*, Nathan Gale, Helena Digard, and Justine Williamson

Objectives: Measuring the amount of constituents extracted by consumers of snus during use is a valuable step in estimating exposure of snus users to tobacco constituents. A factor potentially influencing the extent of exposure is the length of time that individual consumers keep snus pouches in their mouths during use. A recent survey of snus use in Sweden established that, on average, use of pouched snus extends from approximately 30 minutes to just less than 2 hours. The objective of this study therefore was to quantify the importance of use duration on constituent transfer from snus to the consumer over this time-scale. Method: 30 volunteer pouched snus users took part in a central location trial in Sweden, each using portions of snus over ten different duration periods (from 5 to 120 minutes), randomly ordered over 3 sessions. Used and unused portions were analysed for nicotine and tobacco-specific nitrosamines; the differences in measured quantities provided an absolute and % measure of transfer from pouch to consumer during use. Results: Transfer of nicotine, NNN and NNK was found to increase with increasing usage duration, with a mean transfer of 5% after 5 minutes use increasing to about 50% after 120 minutes use. Regression analysis confirmed a statistically significant (p<0.001) relationship between percentage transfer and usage duration. Analysis indicated the general operation of first order kinetics. The observations are also consistent with recent pharmacokinetic studies (e.g. Digard et al., SRNT 2011, Lunell & Lunell, 2004), which showed that t<sub>max</sub> for peak plasma nicotine concentration also appears to be linked to duration of snus use. Conclusion: Exposure of snus users to tobacco constituents such as nicotine, NNN and NNK increases significantly with the duration of use.

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## POS1-24

### VALIDATION OF IN VITRO MODELS OF TOBACCO-RELATED HARM AND THEIR ROLE IN EVALUATING MODIFIED RISK TOBACCO PRODUCTS

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INTRODUCTION: In vitro models that relate to disease associated with tobacco use may be useful tools as part of a weight-of-evidence approach for the assessment

of potential modified risk tobacco products (MRTPs). However, to ensure models are fit for purpose, in-house validation studies are being conducted. Validation, defined as the process by which the relevance and reliability of a test method is established, can be assessed through ruggedness and robustness measurements using a multivariate approach. This approach allows for the effects of multiple parameters to be simultaneously addressed. In the current study in-house validation of a cardiovascular disease (endothelial cell migration) and a chronic obstructive pulmonary disease (bronchial epithelial cell mediator secretion) model was undertaken. **METHODS:** Endothelial cell migration and bronchial epithelial cell (NCI-H292) mediator secretion were measured with respect to changes in operator, the effect of batch and age (1 or 8 days) of cigarette smoke particulate matter (PM), cell passage number, incubation time and cell density using a Plackett-Burman factorial design approach. Cells from each model were exposed to sub-toxic concentrations of PM derived from 3R4F reference cigarettes and the effect on cell migration and mediator secretion analysed using the general linear model. **RESULTS:** PM caused a dose-dependent inhibition of cell migration, independent of operator and PM batch. Similar PM effects were observed for NCI-H292 cells in addition to a significant effect of cell density and incubation time on mediator secretion. **CONCLUSIONS:** For reliability testing of in vitro models of tobacco-related harm, a Plackett-Burman design is an efficient approach to determine the main effects of several experimental parameters. In the current study, although PM age, batch and operator had no significant effect on the response of either in vitro model of harm, experimental parameters such as passage number, incubation time and cell density need to be set prior to any future work with these models.

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## POS1-25

### ASSESSMENT OF DNA DAMAGE IN LYMPHOCYTES OF WATERPIPE SMOKERS

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**Objectives:** The aim of this study was to investigate genotoxicity of waterpipe smoking in the lymphocytes of waterpipe smokers using chromosomal aberrations (CAs) assay. **Materials and Methods:** Fifty waterpipe smokers and 18 healthy nonsmokers volunteered to participate in the study. Additionally, 18 heavy cigarette smokers were recruited for comparison. Chromosomal aberrations (CAs) assay was used to evaluate DNA damage in lymphocytes. **Results:** The results showed that similar to cigarette smoking, waterpipe smoking significantly increased the frequencies of CAs ( $P < 0.01$ ). In addition, the frequencies of CAs increase with more waterpipe use. **Conclusions:** Waterpipe smoking causes DNA damage to lymphocytes and the damage increases with more waterpipe use.

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## POS1-26

### THE DEVELOPMENT OF THE SMOKELESS TOBACCO EXPECTANCIES QUESTIONNAIRE (STEQ)

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Research has shown that individuals' expectancies can predict substance use outcomes. Several measures exist that have been developed to examine individuals' expectancies regarding the effects of various substances of abuse, including nicotine, alcohol, and narcotic pain medication (Brandon & Baker, 1991; Brown et al., 1980; Ilgen, et al. 2011). Despite the interest in the area of expectancies and substance use, there is not yet a measure designed to evaluate individuals' expectancies concerning smokeless tobacco (SLT) use. This is surprising given that approximately 8 million Americans currently report using SLT. Alarming, use of SLT is on the rise (Johnson et al. 2010) and individuals aged 18-25 use this product at nearly twice the rate of older adults (NIDA, 2009). This is problematic as this trend suggests that these individuals may be at risk for health consequences related to SLT use at an early age. The current study sought to develop a measure of SLT expectancies. Initially, 155 individuals were asked to list what they expected to occur if they were to use SLT products. These data were compiled to create the Smokeless Tobacco Expectancies Questionnaire (STEQ), which was then given to a sample of 315 individuals (101 SLT users, 105 cigarette

smokers, and 111 non-tobacco users). Following a factor analysis using a maximum likelihood equimax rotation, 27 items were found to best account for individuals' SLT expectancies. Consistent with research on cigarette smoking, both users and non-users have negative expectancies regarding SLT use, with STEQ items fitting into three factors: 1) Health Consequences, 2) Social Consequences, and 3) Positive Reinforcement. Future research in this area should confirm these findings as well as utilize nicotine specific biomarkers (i.e., Cotinine) to examine the correlation between SLT and cigarette smoking expectancies.

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## POS1-27

### VARIATIONS IN NICOTINE DEPENDENCE AMONG NON-DAILY SMOKERS

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**Background:** Non-daily smokers (ITS) are an increasingly prevalent segment of the smoking population within the U.S, yet it is unknown whether or how dependence severity may vary across ITS. **Method:** 236 ITS and 215 daily smokers (DS) were recruited. ITS smoked between 4 and 27 days per month. Subjects completed questionnaires on demographic characteristics, smoking patterns, and nicotine dependence (time to first cigarette, FTND, NDSS, WISDM, and HONC), and reported whether they had ever smoked daily. Regression analyses examined associations between dependence and subject characteristics. **Results:** DS had significantly higher dependence scores than ITS, although ITS and DS score distributions overlapped at least 20% for all measures. All subsequent results refer to ITS participants only. There was considerable variability in nicotine dependence scores across individuals for all dependence measures. Cigarettes per day on smoking days (CPD-SD) also varied across participants (Mean=4.99, SD=3.61, IQR=4.00), as did smoking days per week (DPW)(Mean=3.87, SD=1.53, IQR=2). Greater CPD-SD and DPW were significantly associated with higher dependence scores across all measures (both  $p < 0.001$ ), although variance in dependence scores explained by both CPD-SD and DPW ranged considerably across measures (e.g., HONC:  $R^2=0.11$ ; NDSS:  $R^2=0.37$ ). Having ever smoked daily was also associated with higher dependence across all measures ( $p < 0.001$ ) except time to first cigarette ( $p=0.27$ ). Controlling for CPD-SD and DPW - accounted for the relationship between ever daily smoking and dependence for all measures except the HONC. **Conclusion:** ITS demonstrate variability in nicotine dependence and should not be considered 'non-dependent' smokers. Cigarette consumption is related to dependence within ITS, although level of consumption cannot fully account for variations in dependence. Future studies should examine behavioral correlates of dependence (e.g., cessation failure) in relation to different dependence measures in order to determine which measures may be best suited to characterizing dependence within ITS.

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## POS1-28

### MOTIVATIONS TO SMOKE AND NOT TO SMOKE: PROFILES OF RISK AND BENEFITS OF SMOKING IN A SAMPLE OF CHILEAN YOUTH

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Researchers have described the role of perceived risks and benefits associated with smoking cigarettes among youth (Baker et al., 2000). These researchers have described the role that the perceived consequences of smoking and the benefits associated with cigarettes on actual smoking behavior. In this study we examined the role that different risks (e.g., immediate health, long term health, social relations) and benefits (e.g., improve mood, control weight, social relations) in a sample of 671 of youth who were part of a longitudinal study that has been examined the role of psychosocial determinants on cigarette use among youth. We conducted a cluster analyses and found that the best solution included four different clusters, one low on both risks and benefits, one low on benefits and high on risks, one high on both risks and benefits, and a cluster high on health risks and on negative affect and sensation seeking benefits. Using ANOVA and chi square we examined differences across cluster in different measures of cigarette use (lifetime and weekly use) and on some demographics. We found that participants differed on their weekly tobacco use ( $F = 2.692, p < 0.05$ ) status and lifetime smoking

( $F = 10.279$ ,  $p < 0.01$ ) according to the cluster membership. We also found age, sex differences. Discussion focuses on motivators to smoke among youth and how these can be addressed to reduce smoking among youth.

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## POS1-29

### DEVELOPMENTAL GENETIC EPIDEMIOLOGY OF ADOLESCENT SMOKING

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Previous studies have suggested a changing role for the contributions of genetic and shared environmental factors to liability of smoking initiation during adolescence. However, individual studies were often underpowered to estimate these factors reliably, especially in early adolescence partly because of the rapidly increasing prevalence of ever smoking. The current study combines data from the major twin registries in the US (Virginia, Colorado, Minnesota) and around the world (Europe & Australia) to jointly estimate the mean level of smoking initiation ("have you ever smoked a cigarette") and the causes of individual differences in smoking initiation. Sample sizes ranged from 1000 to over 3000 individuals at any given age between ages 11 and 17. Structural Equation Modeling was used to fit alternative genetic models in OpenMx. Prevalence of smoking initiation increased gradually from 5% at age 11 to approximately 50% at age 17. Cross-sectional twin correlations suggested that both additive genetic and shared environmental factors influenced the liability of smoking initiation across the adolescent age range. Similar results were obtained for current smoking and substantial overlap existed between the genetic influences on smoking initiation and current smoking. These results may have important implications for prevention/intervention efforts to decrease the consequences of smoking.

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## POS1-30

### THE ASSOCIATION BETWEEN SMOKING CONSEQUENCES AND PREDICTORS OF SMOKING CESSATION AMONG DAILY-SMOKING ADOLESCENTS

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The four domains of smoking consequences expectancies (i.e., negative consequences, positive reinforcement, negative reinforcement, appetite-weight control) have shown to differentiate between successful and non-successful smoking cessation outcomes among adolescents. To better understand how these constructs are related to smoking cessation, we assessed the association between these domains and other known predictors of smoking cessation. 192 high school-aged adolescent daily smokers completed the Smoking Consequences Questionnaire (SCQ; Myers et al., 2003; composed of negative consequences scale, positive reinforcement scale, negative reinforcement scale, and appetite weight control scale), Modified Fagerstrom Tolerance Questionnaire (mFTQ; Prokhorov et al., 2000), Minnesota Nicotine Withdrawal Scale (MNWS; Hughes et al., 1986), The Contemplation Ladder (Biener et al., 1991), and questions about smoking behaviors (i.e., age first started smoking, number of cigarettes currently smoking). Multiple regression analyses were conducted with each subscale of the SCQ as separate dependent variables, and gender and the Contemplation Ladder, MNWS, mFTQ, and smoking behaviors as independent variables. Results showed that (1) negative reinforcement subscale was positively associated with female gender ( $B = 6.06$ ,  $p < 0.01$ ), mFTQ ( $B = 2.34$ ,  $p < 0.01$ ), and MWS ( $B = 2.38$ ,  $p < 0.01$ ), (2) the negative consequences subscale was positively associated with female gender ( $B = 3.07$ ,  $p < 0.01$ ) and The Contemplation Ladder ( $B = 0.60$ ,  $p = 0.01$ ), (3) the positive reinforcement subscale was negatively associated with The Contemplation Ladder ( $B = -1.52$ ,  $p < 0.01$ ) and positively associated with mFTQ ( $B = 1.97$ ,  $p = 0.01$ ), and (4) the appetite-weight control subscale was positively associated with female gender ( $B = 5.98$ ,  $p < 0.01$ ), MWS

( $B = 3.51$ ,  $p < 0.01$ ), and negatively associated with The Contemplation Ladder ( $B = -1.05$ ,  $p = 0.02$ ) and the number of cigarettes currently smoking ( $B = -0.29$ ,  $p = 0.02$ ). Smoking consequences were differently associated with predictors of smoking cessation, and better understanding these associations may inform future smoking cessation interventions.

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## POS1-31

### COMPARING DIFFERENT MEASURES OF IMPULSIVITY BETWEEN REGULAR SMOKERS, CHIPPERS, AND NON-SMOKERS

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Amongst smokers, the amount and frequency of smoking is highly variable: occasional smoking, regular light smoking, regular heavy smoking and all the in between. The majority of occasional smokers eventually become nicotine dependent. However, a fraction remains as non-dependent occasional smokers. These smokers, known as tobacco chippers, do not differ in nicotine absorption or metabolism from regular nicotine-dependent smokers. Studies comparing regular smokers and non-smokers have shown that specific traits are associated with nicotine dependence. However, few studies have analyzed the relationship between delay discounting, questionnaire measures of personality, and smoking levels by including chippers. This study aimed to address this gap. Participants between 25 and 55 years of age were recruited from the general population. Based on the number of cigarettes smoked daily and the Fagerstrom Test for Nicotine Dependence, three study groups were defined: non-smokers with no history of regular smoking, chippers, and regular smokers. Impulsivity measures were obtained using a computer-based delay discounting task. Self-response questionnaires measuring personality traits included the NEO Five-Factor Inventory, the Sensation-Seeking Scale, the Kentucky Inventory of Mindfulness Skills, and the Perceived Stress Scale. Nicotine dependent scores were significantly different between groups. As reported previously, smokers were significantly more impulsive than non-smokers in that they discounted delayed rewards more steeply and endorsed more impulsive options on the impulsivity and risk-taking questionnaires. However, while chippers showed similar discounting rates to regular smokers, they exhibited significantly lower levels of impulsivity and risk-taking on the self-reported questionnaires. This disconnect between different measures of impulsivity and risk-taking suggests that delay discounting might not be necessarily linked to nicotine dependence but might be associated with some degree of nicotine exposure.

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## POS1-32

### DELAY DISCOUNTING AND TIME PERSPECTIVE IN SMOKERS AND NONSMOKERS

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When offered a choice between a small monetary reward available immediately (SmallNow) versus a larger reward available after a delay (LargeLater), smokers select the SmallNow alternative more than nonsmokers. That is, smokers discount the value of the delayed rewards more steeply than nonsmokers. It has been suggested that heightened delay discounting may be associated with a foreshortened time horizon and there is some evidence that smokers exhibit a shorter future time perspective (FTP) as nonsmokers. However, few studies have directly compared measures of future time perspective and delay discounting, particularly in a population known to differ on these measures. In the present study we examined the relationship between measures of delay discounting and a measure of future time perspective in a sample of regular smokers and nonsmokers. Thus, 28 smokers and 26 nonsmokers completed a task including SmallNow versus LargeLater choices and SmallSoon versus LargeLater choices, a modified version of Wallace's Future Events Test to measure FTP, as well as several questionnaire based measures of impulsivity and time perspective. Data replicate previous findings showing that smokers discount the LargeLater reward more than nonsmokers when the smaller reward is available immediately and this difference was also seen for the SmallSoon versus Large Later choices. Smokers and non-smokers

did not differ measures on FTP measured from the Future Events Test, but smokers tended to exhibit longer future orientation scores based on a questionnaire measure. Further, discounting gradients were not correlated with measures of time horizon. Delay discounting measures and measures of future time perspective were independently related to several of the questionnaire measures. These findings suggest that steeper discounting in smokers may not be explained solely by a foreshortened time horizon.

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## **POS1-33**

### **ORDER EFFECTS IN CUE REACTIVITY RESEARCH WITH YOUNG ADULT SMOKERS**

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Cue reactivity studies examine changes in craving, physiology, and mood by manipulating environmental stimuli associated with smoking. Most cue reactivity studies in which multiple cues are manipulated, do not counterbalance the presentation order or do not analyze to determine if order effects have occurred. This study examined the nature and extent of order effects on subjective craving and physiological responses to a series of smoking-related and smoking-unrelated cues in a sample of young adult smokers. Each participant completed four 90 s experimental tasks in counterbalanced order, during which they manipulated in-vivo smoking (a preferred cigarette and lighter), and in-vivo neutral cues (a straw and eraser), and watched smoking-salient (pictures of smokers in natural environments) and neutral picture (e.g., fan, lightbulb, basket) slideshows. Participants were assigned to one of four conditions who completed the tasks in different orders. We hypothesized that in-vivo smoking cues would elicit greater responses than in-vivo neutral cues and pictorial smoking cues. Fifty-six young adult smokers who were not actively attempting to quit and were deprived of cigarettes for at least two hours completed the study. The sample was 52% female, 80% Caucasian, and 49% single, with 51% earning less than \$10,000 per year. Mean smoking initiation occurred at age 14, with mean regular use at age 16. Mean cigarettes per day = 15; Mean number of years smoking = 7.4; Mean FTND score = 4. Task order was included as a between-subjects factor to determine the presence of order effects. Heart rate and craving reactivity were not influenced by order of task presentation. Skin conductance was influenced by order effects. Significantly greater skin conductance level to in-vivo smoking cues compared to pictorial smoking cues was only observed for one of the four task orders. We conclude that carryover effects and the stimulus properties of the in-vivo neutral task materials caused differential responding in the four different task orders. Limited statistical power also precluded further clarification. This study highlights the need to analyze for order effects.

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## **POS1-34**

### **DIMENSIONS OF IMPULSIVITY AND OLDER ADOLESCENT CIGARETTE AND MARIJUANA USE**

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With rates of cigarette and marijuana use converging over time, understanding differences between older adolescent cigarette and marijuana smokers is critical. Four relevant groups include those who use both marijuana and cigarettes, those who use one only, and those who use neither. Of particular conceptual interest are individuals who have used marijuana or cigarettes only. Impulsivity, which is characterized by facets including negative urgency, positive urgency, lack of premeditation, lack of perseverance, and sensation seeking, is one relevant construct for discriminating these groups. To examine differences in impulsivity, data was used from a larger study of 116 college freshmen (ages 18 or 19 at study enrollment) who ever had a period of time in which alcohol was consumed at least once per week (mean age=18.13, 50.3% male, 71.2% White). Impulsivity was examined using the UPPS Impulsive Behavior Scale and cigarette smoking and marijuana use were defined as ever using these substances. Results indicated that individuals who used both marijuana and cigarettes

were highest and those who used neither were lowest in lack of premeditation and perseverance ( $p < .05$ ). However, individuals who smoked only marijuana were higher in lack of premeditation and perseverance than individuals who smoked only cigarettes ( $p < .05$ ). No differences emerged on other impulsivity dimensions across these four groups. However, across groups, individuals who ever smoked a cigarette were higher on positive urgency than those who never smoked ( $p = .05$ ). Potential covariates such as gender did not alter results. Impulsivity differences, particularly in lack of premeditation and perseverance, exist for youth with a history of only smoking cigarettes as compared to those who have only smoked marijuana. Specifically, youth who have ever used marijuana exhibit greater impulsivity across these dimensions than youth with a history of cigarette use. Further, individuals who have ever smoked a cigarette are more positively urgent than those who have never smoked. These facets of impulsivity may be relevant for understanding substance use initiation and substance preferences.

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## **POS1-35**

### **SUBJECTIVE AND PHYSIOLOGICAL RESPONSES TO IN-VIVO AND PICTORIAL SMOKING CUES IN YOUNG ADULT SMOKERS**

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Cigarette craving is often cited as a reason for cessation failure. Cue reactivity studies examine changes in craving and physiological responses to environmental stimuli associated with smoking. Few cue reactivity studies have examined these responses solely in young adult smokers and no studies have compared commonly used in-vivo cues to pictorial cues. Young adult smokers are unique in having shorter smoking histories, different current smoking patterns, and being less likely to endorse some indicators of nicotine dependence. This study investigated craving and physiological responses to smoking-related and smoking-unrelated cues in a sample of young adult smokers. Each participant completed four 90 s experimental tasks in counterbalanced order, during which they manipulated in-vivo smoking (a preferred cigarette and lighter), and in-vivo neutral cues (a straw and eraser), and watched smoking-salient and neutral picture (e.g., fan, lightbulb, basket) slideshows. We hypothesized that in-vivo smoking cues would elicit greater responses than in-vivo neutral cues and pictorial smoking cues. Fifty-six young adult smokers (29 female) who were deprived of cigarettes for at least two hours completed the study. The sample was 52% female, 80% Caucasian, and 49% single. Mean smoking initiation occurred at age 14, with mean regular use at age 16. Mean cigarettes per day = 15; Mean number of years smoking = 7.4; Mean FTND score = 4. Inconsistent with expectations, no differences were observed for heart rate reactivity to in-vivo smoking cues compared to both in vivo neutral cues and pictorial smoking cues. Craving was significantly greater for smoking-salient cues compared to neutral cues, and for in-vivo cues compared to pictorial cues. Skin conductance was significantly greater for in-vivo smoking cues compared to picture smoking cues, but not in-vivo neutral cues. These findings are generally consistent with those from studies with older smokers, save for heart rate. Young adults' heart rate responses appear to be different from older smokers'. In-vivo cues were more robust at eliciting changes in craving and skin conductance than pictorial cues.

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## **POS1-36**

### **VISUAL SEARCH AND ATTENTIONAL BIAS FOR SMOKING CUES: THE ROLE OF FAMILIARITY**

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Despite decades of work, findings on the relationship between drug cues and actual drug use remain mixed. This has led researchers to consider myriad explanations why this connection may not be as strong as was initially indicated. One promising area of further research is the role of cognitive processing, including attentional bias for drug cues. Unfortunately, the most commonly used measures of attentional bias have a number of limitations, which has impacted our understanding of how attentional bias develops and hindered progression to clinical applications. A visual search task that

has previously been used to study attentional bias in anxiety and eating disorders was modified to assess attentional bias for smoking cues. The present study investigated attentional bias on this task amongst non-smokers, smokers who continued smoking ad libitum, and smokers who had abstained for twelve hours. Results revealed biases for both initial orienting and maintenance of attention on smoking cues, though effects were observed in both smokers and non-smokers. Critically, attentional bias for smoking cues was strongly associated with previous environmental exposure to tobacco smoke, but not smoking-behavior variables. Additional exposure to smoking stimuli was associated with a larger orienting bias but smaller maintenance bias. This may help explain some inconsistencies in prior work, and also raises questions about whether the traditional interpretation of attentional bias as an index of the incentive value of smoking cues is appropriate. Further work will be needed to determine if this effect generalizes to other attentional bias paradigms or is limited to visual search.

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## POS1-37

### ASSESSING SMOKING CUE-REACTIVITY IN A NATURALIZED ENVIRONMENT USING MOBILE EYE-TRACKING TECHNOLOGY

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Understanding smokers' reactions to smoking related cues in the environment continues to be a focus of research trying to understand the role cue-reactivity plays in smoking behavior. Mobile eye-tracking technology was used to assess smokers (n=13) and non-smokers (n= 8) visual attention to cues in a naturalized environment. Participants were told they were participating in a study looking at the effects of smoking on a visual coding task. Non-smokers attended one session, smokers attended two sessions a week apart, one after abstaining for 12 hours and after smoking as usual. Participants were asked to sit in a room for 10 minutes and complete a simple coding task while wearing a mobile eye-tracker. The room was set up to resemble a research assistant office space with various objects placed on the desks and walls, including a pack of cigarettes with a lighter and a poster of someone smoking. The task was designed so that it could be completed in 2-3 minutes and for the remaining time participants could freely look around the room. Analyses looked at the number of fixations to the smoking cues and the mean duration of these fixations during the 10 minutes the participant was in the room. A series of t-tests were ran to test if smokers differed on these variables across smoking conditions and if smokers differed from non-smokers. Results indicated that smokers did not differ on the number of fixations or mean duration of fixations between smoking conditions,  $t_s < 1$ . However, compared to non-smokers, smokers, during both smoking conditions, had a significantly higher number of fixations (smoking,  $t(18) = -2.7, p < .05, M = 5.6$ ; abstaining,  $t(17) = -2.3, p < .05, M = 6.7$ ; non-smoker mean = 2.7) but not significantly greater mean fixation durations ( $t_s < 1$ ). Results suggest that in a more naturalized environment smokers will look more often at smoking objects than non-smokers, however smokers' do not look more or longer when they are deprived vs. non-deprived. Discussion will include implications related to smoking cessation, importance of utilizing more natural environments to study cue reactivity and the limitations of the study and mobile eye-tracking techniques.

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## POS1-38

### SMOKING-SPECIFIC COGNITION, INTENTION TO SMOKE, IMPULSIVITY, AND NEGATIVE AFFECT AMONG MIDDLE SCHOOL-AGED ADOLESCENTS

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Identifying factors that contribute to intention to smoke in middle school aged-adolescents is crucial because smoking initiation rates increase by threefold from middle to high school. Thus, we examined whether cognitions regarding smoking, negative affect, and impulsivity are associated with intention to smoke, and whether negative affect and impulsivity would interact with smoking-specific cognitions to heighten the effect of cognitions on intention to smoke among a middle school sample. We analyzed cross-sectional survey data of 847 adolescents (53% girls; 11-14 years) from three

schools in Connecticut. The survey contained the Fishbein/Ajzen-Hanson Questionnaire (Hanson, 1997), the Negative Affect Subscale (NA) of the Negative and Positive Affect Scales (Wills et al., 1999), and the Barratt Impulsiveness Scale (Patton et al., 1995). The logistic regression model included intention to smoke as a dependent variable, attitude, subjective norm (i.e., perception of others' approval of smoking), and behavioral control, negative affect and impulsivity as independent variables and 7 interaction terms (Imp x attitudes, Imp x behavioral control, Imp x social norms, x attitudes, x behavioral control, x social norms). Intention to smoke was associated with positive attitude about smoking (OR=1.50,  $p < 0.01$ ), higher subjective norm (OR=1.56,  $p < 0.01$ ), lower behavioral control over future smoking (OR=1.56,  $p < 0.01$ ), and greater impulsivity (OR=1.04,  $p < 0.01$ ). Negative affect interacted with attitude about smoking ( $p < 0.01$ ), indicating that those with higher positive attitude about smoking and greater negative affect (OR=1.55) were most likely to report intention to smoke compared to those with lower positive attitude with either higher (OR=0.66) or lower negative affect (OR=0.67). Impulsivity did not interact with any of the smoking-related cognitions. In conclusion, smoking prevention efforts may be individualized to target a subset of middle schools students who have positive attitudes toward smoking and greater negative affect.

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## POS1-39

### EFFECTS OF NICOTINE ABSTINENCE AND EXTERNAL DISTRACTERS ON COGNITIVE FUNCTIONING

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Nicotine abstinence is anecdotally expected to impact cognitive functioning as awareness of withdrawal symptomatology acts as an internal distracting stimulus. External stimuli such as music and voices can also serve as distracters (though not always) which might influence cognitive functioning. The aim of the present study was to examine these two factors on several tasks that assess cognitive functioning. It was hypothesized that higher levels of distraction would be associated with decreased performance on a memory task and an attention task and that this distraction effect will be more pronounced when smokers have refrained from cigarette smoking for 24 hours. In addition, on a decision making task, we expected participants would attach higher values to immediate hypothetical rewards than delayed hypothetical rewards (be more impulsive) at higher levels of distraction. Thirty-six regular smokers completed two counterbalanced, experimental sessions. Prior to one session, smokers smoked as normal. Prior to the other session, they abstained from smoking for 24 hours. On each session, participants completed a battery of questionnaires and computer tasks under three different distracter conditions: silence (no distracter), while listening to music with lyrics, and while listening to music without lyrics; order counterbalanced. Subjects reported typical subjective effects of nicotine withdrawal. However, the robust subjective withdrawal effects were not accompanied by decreases in performance on any of the experimental tasks and no significant main effects or interactions with the distraction manipulation. In conclusion, the current study establishes that nicotine withdrawal does not necessarily lead to increased distractibility and poorer cognitive functioning, despite smokers' self-reports to the contrary. Further research is needed to develop a more fine-grained model of the relationship between nicotine withdrawal and distractibility, and to determine which facets of selective attention and working memory (if any) are susceptible to the negative effects of nicotine withdrawal.

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## POS1-40

### THE STABILITY OF SMOKING PUFF TOPOGRAPHY IN LOW-LEVEL SMOKERS

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Some theories of addiction propose that smoking behavior should become more stable as a function of prior exposure to cigarettes. Cigarette topography measures (including puff number, puff duration, and inter-puff interval) are extremely stable in heavy, daily smokers. It is uncertain, however, if low-level smokers also show such stability. We measured smoking topography variables in 125 low-level adult smokers across 6 study

sessions. To be eligible, participants had to smoke between 1-29 of the last 30 days and have smoked no more than 15 cigarettes on the days they smoked, which yielded a wide range of smokers. Participants attended 6 laboratory sessions; the first 5 sessions were each 1 week apart and the final session was 8 weeks after the 5th session. At each session, participants smoked one cigarette of their preferred brand using a handheld puff-topography device that measured number of puffs, puff duration, puff volume, and cigarette duration. Participants also answered questions about their smoking history and recent patterns of cigarette consumption. Participants reported smoking approximately 18 of the last 28 days, and they averaged 4 cigarettes on the days they smoked. Most variables showed a significant relationship across all weeks; Pearson's  $r$  ranged from 0.18-0.73; puff duration had the highest average correlations (average  $r = 0.50$ ). Based on total cigarettes smoked in the last 28 days, we divided the low-level sample into "lower" ( $M = 12.3$ ), "medium" ( $M = 45.8$ ), and "higher" ( $M = 150$ ) levels of smoking. In preliminary analyses, the stability of puff number, puff volume, average puff duration, and cigarette duration did not vary systematically across the smoking level groups. We also plan to analyze the stability of other smoking topography measures (e.g., inter-puff interval) and investigate whether variables in a person's smoking history (e.g., lifetime cigarettes, years smoking) may moderate the stability of smoking topography in these smokers. In sum, we found smoking topography to be fairly stable in these low-level smokers, and we did not find that stability varied as a function of the number of cigarettes smoked in the past month.

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## POS1-41

### IDENTIFICATION OF SMOKERS THAT ARE RESPONSIVE TO CESSATION BY GLOBAL GENE EXPRESSION ANALYSIS

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We describe here the results of a global gene expression study as part of a clinical study designed to assess reversibility of biomarkers in a cohort of smokers participating in a smoking cessation program. A cessation study was conducted at the Centre of Research and Information on Smoke, Messina, Italy with approval of the local ethical committee and according to principles of GCP. 43 smokers successfully completed this study. Clinical assessment at the time of screening and at days 28, 90 and 180 following cessation included analysis of blood, urine and physiological tests. In addition, peripheral blood mononuclear cells (PBMCs) were isolated for global gene expression analysis. Following extraction of total RNA, biotinylated cRNA was prepared and hybridized to Affymetrix HGU133 Plus2.0 arrays. Data were analyzed using GeneSpring v11.5, SAS v9.2 and SAS Enterprise Guide v4.2. Repeated measures ANOVA showed that 109 genes were differentially expressed in quitters over time ( $p \leq 0.001$ ). Little differences were seen at screening and day 28. However, expression of this gene signature markedly increased at day 90, remaining at similar levels at day 180. Clustering revealed that some quitters responded clearly after entering the cessation program, whereas others showed no or little detectable changes in gene expression. Further analysis showed that there is a dose-response relationship between the gene signature and total nicotine, total cotinine, exhaled CO and mean corpuscular hemoglobin concentration (MCHC). The gene signature of quitters with MCHC above 33 g/dL showed a dose-dependent increase in median intensity over time, while this was not seen in quitters with MCHC below 33 g/dL. Individual genes that appeared to drive this dose-response included those of the HIF1 and AHR pathways. Based on these results, hypoxia is proposed to be a major molecular mechanism that experiences reversibility upon cessation as reflected by changes in clinical measures such as MCHC. Further, these results suggest that smokers with MCHC above 33 g/dL possibly benefit, in terms of the pathways we identified, more from cessation than those with MCHC below 33 g/dL.

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## POS1-42

### VARIABILITY IN BIOMARKER OF EXPOSURE LEVELS IN A STUDY OF SMOKERS SWITCHED TO REDUCED TOXICANT PROTOTYPE CIGARETTES

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We have conducted a clinical study that analysed biomarkers of exposure (BoE) in smokers switched to prototype cigarettes which, when measured on smoking machines, produced lower levels of some toxicants compared to conventional cigarettes. The six week study, undertaken in Germany, involved short periods of clinical confinement. One hundred smokers of 6mg ISO tar cigarettes were recruited. After two weeks smoking a commercial 6mg ISO tar yield product, 50 were switched to a 6mg ISO tar Reduced Toxicant Prototype (RTP) cigarette containing diluent sheet in the blend. In addition, 150 smokers of 1mg ISO tar commercial cigarettes were recruited, 50 of whom were switched to an RTP containing the diluent sheet and 50 to an RTP with tobacco treated to reduce polyphenols and proteins. Reductions in toxicant levels found in smoke chemistry correlated well with reductions in BoE. For the majority of the measured BoE, reductions from baseline were found at two weeks and generally maintained for the additional two weeks of the study. For example the levels of monohydroxy-3-butenyl mercapturic acid (MHBMA), the BoE for 1,3-butadiene was  $4028 \pm 3961$  ng/24hr the day before switching (Day 14),  $1347 \pm 1446$  ng/24hr two weeks after switching to the 6mg RTP (at Day 28) and  $1487 \pm 1729$  ng/24hr nearly four weeks after switching (Day 41). The reductions in this BoE were significant ( $p < 0.0001$ ) between days 14 and 28 and between Days 14 and 41, but the values found at Days 28 and 41 were not statistically significantly different ( $p = 0.625$ ). There was considerable variability in the absolute levels of BoE across subjects. Female subjects tended to have lower absolute levels of BoEs, but both sexes showed reductions in levels of biomarkers of exposure for several smoke toxicants following a switch from a conventional cigarette to an RTP.

British American Tobacco, a tobacco company.

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## POS1-43

### A LONGITUDINAL STUDY TO TRACK CHANGES IN SMOKING BEHAVIOUR OF SMOKERS OF 10MG ISO TAR CIGARETTES IN GERMANY – THIRD TIME POINT

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The long-term health effects of cigarette smoking have been extensively investigated and are well known. Some studies have investigated subjects' smoking behaviour and whether nicotine intake changes during the short- or long-term (compensation). However, few long-term studies have been conducted involving the monitoring of cigarette consumption, uptake of nicotine and other smoke constituents, whilst tracking spontaneous product switching. In most cases smoking behaviour was only assessed at the start and finish of the study, and so the causes of changes in smoking behaviour were not well understood. We report data from the third time point (18 months) of a 5 year longitudinal study of smoking behaviour, which started with over 1000 smokers of a 10mg tar cigarette (their usual cigarette) (clinical trial number ISRCTN95019245). Results for the 614 subjects who have continued to smoke the original product (paired t-test, on an intention to treat basis) are as follows. Cigarette consumption (determined by counting smoked filters from cigarettes consumed during a 24 hour period) did not change from a mean of 15.8 cigarettes/day (sd 6.7) to 15.4 (sd 7.0) ( $p = 0.079$ ). Mouth level exposure to nicotine (measured by filter tip analysis) decreased from a mean of 24.3mg/day (sd 13.3mg/day) to 23.4mg/day (sd 12.6mg/day) ( $p = 0.042$ ). Nicotine uptake (based on nicotine + 5 metabolites in 24-hour urine) decreased from a mean of 14.4mg/day (sd 9.3mg/day) to 12.9mg/day (sd 9.2mg/day) ( $p < 0.001$ ). Nicotine uptake from measurement of salivary cotinine increased from a mean of 270ng/mL (sd 169ng/mL) to 288ng/mL (sd 177ng/mL) ( $p < 0.001$ ). Additional data for the 58 smokers who switched sideways to 27 other 8-10mg tar cigarettes and the 72 smokers who switched to 16 other cigarettes with lower tar yields (ISO tar 3-7 mg/cigarette) will be presented and issues of study protocol compliance will be discussed.

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## POS1-44

### WATERPIPE TOBACCO AND CIGARETTE SMOKING IN JORDAN

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In this study, we characterized the relative prevalence of waterpipe tobacco and cigarette smoking among university students in Jordan and analyzed the demographic and environmental factors associated with each form of tobacco use in this population. We surveyed 1845 students randomly recruited from four universities in Jordan regarding smoking of waterpipe tobacco and cigarettes and demographic and environmental covariates. Multivariable logistic regression controlling for clustering of individuals within universities was used to determine independent associations between covariates and each type of tobacco use. The results showed that waterpipe tobacco smoking rates were 30% in the past 30 days and 56% ever, and cigarette smoking rates were 29% in the past 30 days and 57% ever. While smoking of both substances was higher at private universities compared with public ones, differences had greater magnitude for cigarettes. Compared with males, females had substantially lower odds of being current waterpipe (OR=0.12, 95% CI=0.10-0.15) or cigarette (OR=0.08, 95% CI=0.05-0.14) smokers. Current cigarette smoking was significantly associated with all markers of high socioeconomic status (increased income, smaller households, and a larger number of rooms in the house), while waterpipe tobacco smoking was only weakly associated with the highest level of monthly household income. In conclusions, waterpipe tobacco smoking is as common as cigarette smoking among Jordanian university students. Both waterpipe and cigarette smoking are most common among older, male individuals. Cigarette smoking is consistently associated with markers of high socioeconomic status, while waterpipe tobacco smoking is more evenly distributed across various sociodemographic and environmental characteristics.

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## POS1-45

### MEASURING EXPOSURE TO WATERPIPE TOBACCO SMOKE: A WATERPIPE-SPECIFIC CALIBRATION FACTOR FOR THE SIDEPAK AEROSOL MONITOR

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**Background:** The TSI SidePak AM510 Personal Aerosol Monitor is a portable, battery-operated device using a built-in sampling pump drawing air inside the device where the particulate matter in the air scatters the light from a laser. The mass concentration of particles is then calculated based on the amount of light scattered. However, the relationship between the amount of scattered light and mass concentration varies based on the type of aerosol sampled. A custom calibration factor of 0.29-0.32 has been determined for the Sidepak when measuring cigarette-SHS to ensure accurate measurements. However, there is no known waterpipe-specific calibration factor for the Sidepak. **Methods and Results:** This study carried out 6 controlled experiments where volunteers smoked a waterpipe ad libitum in an enclosed room (40m<sup>3</sup>) for 3 hour sessions. Two SidePaks and two sampling trains for gravimetric PM<sub>2.5</sub> sampling were present during smoking. Sidepaks were equipped with 2.5 micron impactors to measure PM<sub>2.5</sub>. Gravimetric sampling pumps ran at 10 lpm and were connected to 2.5 micron PEMs (SKC Inc.) loaded with 37mm PTFE filters. Filters were weighed before and after in a certified laboratory. One positive control experiment was conducted with burning cigarettes (Marlboro Reds), which produced a calibration factor of 0.30. This calibration factor found is consistent with the previous literature. Results from the 6 waterpipe smoke experiments yielded a simple mean calibration factor of 0.37 (SD=0.09). The waterpipe smoke concentration was varied by changing the number of waterpipes smoke (1-3) and the ventilation rate. The range of unadjusted mean Sidepak PM<sub>2.5</sub> readings from the five experiments was 480 to 4,520 µg/m<sup>3</sup>. **Conclusions:** The SidePak, when used with the factory calibration setting of 1.00, overestimated gravimetrically determined PM<sub>2.5</sub> levels from waterpipe smoke. An appropriate calibration factor of 0.37 was determined for the SidePak when measuring waterpipe smoke. Using the established calibration factor, field assessments can be conducted in locations with waterpipe smoke and an accurate particle exposure concentration can be determined.

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## POS1-46

### DESIGN, DEVELOPMENT, AND VALIDATION OF A RESEARCH-GRADE HOOKAH

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Commercially available hookahs and their components vary widely in design and durability, including differences in fabrication materials used for stems, bases, bowls, and hoses; sealing joint designs and degree of leak-tight fit; and diameter of flow path. It is not known which components of the hookah have the greatest impact on the user's exposure to toxins. In order to systematically evaluate exposure, it is necessary to use a standardized and ruggedized research-grade hookah when conducting clinical and laboratory-based trials. We developed a research-grade hookah from commercially available and specially fabricated components. To reduce memory effects and aid in cleaning, all wetted materials are either Pyrex®, stainless steel, Delrin®, or Teflon®. The tubing is made of a corrosive-resistant plastic that is designed to minimize particle adsorption. The hookah is configured with an in-line topography system that allows real-time measurement and recording of the smoke volume drawn through the hookah during a smoking session. Data are processed manually using a graphical interface or automatically in batches to produce reports describing the volume, duration, average and peak flow rates for each puff, and interval duration between puffs. The topography system is based upon a fixed orifice pneumotach that offers minimal draw resistance and performs well even when measuring flows of the sugary, high humidity aerosol that is characteristic of mainstream hookah smoke. The hookah was calibrated across the flow rate range expected for hookah smoking, 0 – 35 L/min, using a scroll pump. Calibration verification was performed for known puff volumes using a smoking machine equipped with syringe pumps. Sham (unlit) machine smoking of the hookah over the expected range (0 – 750 mL) yielded puff volumes with less than 10% deviation from the true value and replicate measurements varied <6% across the puff volume range tested. During machine smoking, measured puff volumes showed excellent precision and accuracy over a 60 min smoking session, during which 164 puffs (500 mL each, 3 s duration, 20 s interval) yielded an average of 528.2 ± 20.2 mL.

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## POS1-47

### COMPARISON OF HOOKAH SMOKERS' EXPOSURES WHEN USING HARM REDUCTION ACCESSORIES

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Hookah smoking is widely practiced in the Middle East and North Africa, and is gaining popularity with high school and college age youth in North America and Europe. Harm perception survey data indicate that users believe that hookah smoking is less addictive and hazardous than smoking cigarettes, but studies and information on addiction potential, chemical composition, toxicity, and carcinogenicity of hookah smoking are sparse. In addition, there has been no systematic evaluation of whether hookah accessories, advertised to reduce harm, result in lower levels of biomarkers of acute exposure. We conducted a cross-over study of 36 experienced hookah smokers using three hookah configurations: standard (i.e., with charcoal), standard with electric coal, and standard equipped with bubble diffuser, and collected smoking topography, environmental carbon monoxide (CO), heart rate and biomarkers of acute exposure, including expired air CO, exhaled VOCs and plasma nicotine boost. There was no significant difference in time participants spent smoking (34 ± 17 min) and tobacco consumption (21 ± 7%) across the three configurations, and none in coal consumption (56 ± 10%) between the standard and bubble diffuser configurations. Average exhaled CO (50 ± 20 ppm) and benzene (8.3 ± 5.1 ppbv) boost, defined as the participant's post-minus pre-smoking level, was higher for standard and bubble diffuser configurations versus the electric coal (p < 0.0001 in each case). Exhaled CO boost averaged 0.1 ± 1.3 ppm, whereas exhaled benzene was largely undetected in participants who smoked using the electric coal. For the standard and bubble diffuser configurations, exhaled CO and benzene boost were moderately correlated (r = 0.48, p < 0.0001), and neither was significantly related to time spent smoking, indicating mainstream smoke was the primary driver for exposure. Heart rate change, defined as post- minus pre-smoking level



divided by time spent smoking, was significantly lower with the electric coal configuration compared to the other two configurations. Smoking topography and plasma nicotine data will be discussed.

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## **POS1-48**

### **FACTORS ASSOCIATED WITH HOOKAH USE AMONG COLLEGE STUDENTS**

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Hookah (i.e., tobacco smoked from a waterpipe) is being increasingly used in the US, particularly among the college-age population. However, little research has examined the sociodemographic, other risk factor, psychosocial, and personality characteristics associated with hookah use among college student smokers. The current study aims to address this gap in the literature. In 2010, students at 6 colleges in the Southeast were recruited to complete an online survey. Of students who invited to participate, 20.1% (N=4,849/24,055) returned a completed survey. Hookah users (versus nonusers) were younger ( $p<.001$ ), were more likely to be male ( $p=.004$ ), were more likely to be white or other ethnicity rather than black ( $p<.001$ ), were more likely to have parents with greater education ( $p<.001$ ), were more likely to be current smokers (either nondaily or daily smokers;  $p<.001$ ), consumed alcohol more frequently ( $p<.001$ ), had more sexual partners in the past year ( $p=.04$ ), were more likely to have significant depressive symptoms ( $p=.001$ ), perceived marginally greater stress ( $p=.07$ ), reported higher levels of sensation seeking ( $p<.001$ ), and reported greater extraversion ( $p=.03$ ), less conscientiousness ( $p=.002$ ), and marginally greater openness ( $p=.06$ ). In the multivariate model indicating factors associated with hookah use, significant factors included being male ( $p<.001$ ), being a nondaily or daily smoker versus a nonsmoker ( $p<.001$ ), greater sensation seeking ( $p<.001$ ), lower levels of conscientiousness ( $p<.001$ ), and greater openness ( $p=.01$ ). Understanding the psychological profiles of hookah users may allow public health practitioners and health care providers identify high-risk individuals and provide targets for interventions targeting hookah use.

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## **POS1-49**

### **INCREASING HOOKAH RATES AMONG ADOLESCENTS IN THE STATE OF FLORIDA, 2007-2010**

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Recent research has indicated that hookah (also commonly known as water pipe, shisha, and narghile) tobacco smoking is emerging as a popular phenomenon among adolescents and young adults in the United States. While very few population-based studies have examined hookah tobacco smoking trends, the Florida Youth Tobacco Survey (FYTS), an anonymous, school-based survey administered annually to a random sample of Florida public middle and high school students began collecting data on hookah use among adolescents in 2007. Data support an upward trend among high school students for ever hookah use from 2007 (11%), 2008 (14%), 2009 (16%), to 2010 (17%); a 55% increase across four time points. For 12th graders, numbers were as high as 16% in 2007. However, by 2010, these rates have significantly increased to an alarmingly high 25% among high school seniors; a 56% increase. In 2009, FYTS added the question, "Have you smoked or used hookah in the past 30 days," to capture current use. For both 2009 and 2010, 8% of all high school students and 12% of high school seniors indicated smoking hookah in the last 30 days; numbers approaching hookah use rates reported by college students. While some leading tobacco experts have dismissed the hookah phenomenon as a fad that will soon pass, the rates in Florida indicate a steady increase with no signs of a passing fad over the past 4 years. Continued efforts

are needed to attempt to slow the rates of hookah use among adolescents, which has the potential to lead to general openness toward a sweetened and less harsh product and even multiple tobacco product use. Focus by professionals and health care providers is needed regarding the role of hookah in the spread of infectious diseases, long-term chronic disease risks, and dispelling myths regarding the safety of this form of tobacco use.

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## **POS1-50**

### **DOES THE USE OF SNUS CHANGE UNDERLYING COGNITIONS KNOWN TO INFLUENCE THE UPTAKE OF CIGARETTES AMONG ADOLESCENTS?**

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In the discussion of snus as a possible gateway to later uptake of cigarettes it is important to identify potential mechanisms that could explain a behavioral change. We wanted to explore if the use of snus could influence underlying psychological processes in terms of smoking expectancies, known to influence smoking initiation. Data stems from a longitudinal study among Norwegian male adolescents aged 15-18 (M= 16) with two measuring points ('06-'07). The respondents were grouped as (1) snus initiators (non users at T1 who were snus users at T2), (2) snus users, (3) smokers and (4) non users of nicotine. The questionnaire contained 27 smoking expectancy items with 7 latent expectancy constructs, e.g. negative affect reduction. A confirmatory factor analysis (CFA) was run using AMOS. There were conducted several t-tests to reveal any changes on average expectancy measures between T1 and T2 within the four groups of respondents. The CFA showed good fit to the model (RMSEA= .04). The t-tests revealed no significant changes in average smoking expectancy scores from T1 to T2 in any of the groups. Smokers had however significantly more positive expectancies to smoking compared to the other groups at both time points. There were no changes in cognitions known to influence the uptake of cigarettes among the group of snus users from T1 to T2. The results do not lend support to the gateway hypothesis between the use of snus and later uptake of cigarettes.

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## **POS1-51**

### **ADOLESCENT AND ADULT PERCEPTIONS OF TRADITIONAL AND NOVEL SMOKELESS TOBACCO MARKETING IN RURAL OHIO APPALACHIA**

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**Introduction:** In recent years, tobacco companies have started to market smokeless tobacco (ST) products to an urban, female, and professional audience. Novel ST products such as snus and dissolvable tobacco have also been introduced. This qualitative research study examined adolescent and adult perceptions of ST marketing approaches in Appalachia, Ohio. **Methods:** Focus groups and qualitative interviews were held with residents (n=101) of Appalachian Ohio counties. Participants were shown a variety of traditional (i.e., Grizzly®, Timberwolf®, Skoal®) and novel (Camel Snus®, Orbs Dissolvables®, Orbs Sticks®) ST products and asked about product familiarity and perceptions of packaging, price and quality, and target audience. Content analysis of transcriptions was performed independently by two individuals. Inter-rater agreement was 89.6%. Discrepancies were resolved by a third coder. **Results:** Most adolescents and adults were familiar with Skoal® and Copenhagen® products; adults were more familiar with novel ST products than adolescents. ST packaged in metal containers was perceived as more expensive and higher quality than those packaged in plastic. Metal containers were viewed as more durable, more likely to keep product fresh, and less likely to spill snuff than plastic containers. ST products with images were also perceived as lower quality and less expensive. Participants were attracted to the unique, smaller-sized packaging of novel ST products that resembled candy and mints. Traditional ST products were associated with a rural, male, and outdoors market and novel ST products with adolescents, novice smokers, and women. **Discussion:** In 2009, the Food and Drug Administration placed restrictions on ST product labeling and advertising. Given their significant role in shaping adolescent and adult perceptions of ST products

and consumer behavior, aspects of product packaging such as color, size, and images should be regulated.

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## POS1-52

### A MULTI-DIMENSIONAL APPROACH TO MEASURE SMOKELESS TOBACCO DEPENDENCE

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**Background:** The Fagerstrom Tolerance Questionnaire (FTQ) and Fagerstrom Test for Nicotine Dependence (FTND) based scales are the most widely used measures of nicotine dependence for both ST users and smokers. These scales were initially developed to measure physical dependence and tolerance and not to assess other salient dimensions of dependence such as craving, compulsion, or withdrawal, as defined by DSM-IV and ICD-10. A relatively newer measure of nicotine dependence among smokers, the Wisconsin Inventory of Smoking Dependence Motives (WISDM-68) measures multiple motives for smoking that contribute to compulsive use and result in nicotine dependence. The aim of this study is to develop and validate a multidimensional scale that has better content coverage, factor structure, and psychometric properties to measure dependence among ST users. **Methods:** 100 adult male smokeless tobacco users were recruited through email distribution lists and community referral. Following an initial telephone screening to verify eligibility and obtain consent, study materials were mailed to participants. Participants completed four different nicotine dependence questionnaires and provided information related to their tobacco use and demographic characteristics. They also provided a saliva sample for cotinine measurement. In order to develop the new ST scale, subscales and items were selected based on correlation and factor analysis of the modified WISDM-68. Reliability and validity of the new scale was also assessed. **Results:** The new ST scale identified seven latent constructs including 23 items to measure ST dependence. Internal consistency as measured by Cronbach's coefficient ( $\alpha=0.925$ ) indicated better reliability of the new ST scale than FTND-ST. Concurrent validity of the new ST scale as evaluated by comparing it with DSM-IV diagnosis and FTND-ST was affirmative. There was a significant correlation between the new ST scale and the cotinine levels and tobacco use characteristics among study participants. **Conclusion:** The new ST scale possesses better psychometric properties and provides an effective and efficient tool to measure ST dependence as a multidimensional construct.

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## POS1-53

### "IF YOU'RE GOING TO BE A COUNTRY BOY, RUB SNUFF": FACTORS INFLUENCING SMOKELESS TOBACCO USE IN RURAL OHIO APPALACHIA

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**Background.** The burden of smokeless tobacco use disproportionately impacts males in rural Ohio Appalachia. The purpose of this qualitative research study was to describe the cultural factors generating this disparity and to articulate the way in which culture impacts initiation into and use of smokeless tobacco among boys and men in Ohio Appalachia, exploring both interpersonal factors (ie. social norms and social networks) and neighborhood and community factors (ie. marketing and availability). **Methods.** Thirteen focus groups and thirty-one individual qualitative interviews were conducted with adult (n=53) and adolescent (n=48) residents in Ohio Appalachian counties to ascertain information regarding background factors associated with smokeless tobacco use and the impact of smokeless tobacco marketing. Transcriptions were independently coded according to questions and themes. **Results.** Cultural standards dictate that smokeless tobacco use is a necessary rite of passage in the development of masculine identity in Ohio Appalachia. Interpersonal factors provide the greatest influence into initiation and use of smokeless tobacco. Ohio Appalachian boys either emulate or are actively encouraged to use smokeless tobacco through male family and peer networks. Users perceive their acceptance into the male social network as predicated on smokeless tobacco use. Community factors, including advertisement and access, reinforce and normalize underlying cultural values. **Discussion.** In addition to policy aimed at reducing

tobacco marketing and access, interventions designed to reduce smokeless tobacco use in Ohio Appalachia should incorporate efforts to 1) shift the perception of cultural norms regarding smokeless tobacco use and 2) address male social networks as vehicles in smokeless tobacco initiation

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## POS1-54

### EXAMINING THE TOBACCO INDUSTRY'S MAJOR MARKETING STRATEGIES: A COMPARISON AND CONTENT ANALYSIS OF CIGARETTE AND SMOKELESS TOBACCO PRINT ADVERTISEMENTS IN PLAYBOY AND SPORTS ILLUSTRATED

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**Introduction:** In 2006, the five major smokeless tobacco (ST) manufacturers in the US spent \$354.1 million on advertising and promotion, up 41.2% from 2005, while cigarette corporations spent on average \$12.5 million. This study examined the marketing strategies of cigarette and ST ads by comparing the themes/cues present in both types of ads in print advertisements. In addition, this study characterized the most influential themes/cues encouraging tobacco use. **Methods:** Ads included six randomly selected issues of Playboy and Sports Illustrated per year (2003 through 2009) that were independently reviewed by two or more trained researchers using an established coding framework. STATAv 9.1 was used in data analysis to perform Pearson Chi Square tests of association. **Results:** Over 60% of cigarette ads (n = 102) demonstrated smoking as the means to obtaining social desirability and acceptance. Of the ST ads (n = 77), none promised any health benefit or risk reduction, as compared to smoking. The most popular attractiveness cue for both types of ads was "Expression of Masculinity." Almost all tobacco product (cigarette vs. ST) comparisons for the presence or absence of themes/cues showed statistical significance. **Conclusions:** Overall, the tobacco industry portrays smoking as a low-risk, entertaining and socially acceptable action. While the themes in ads were different by product, there was evidence that the tobacco industry is marketing cigarette and ST products in a similar way that promotes the notion of 'dual use', especially in situations where smoking is banned.

NIH R21 CA129907 *Smokeless Tobacco Marketing Approaches in Ohio Appalachia.*

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## POS1-55

### COMMUNITY BASED PARTICIPATORY RESEARCH METHODS EMPLOYED AMONG ALASKA NATIVE RURAL COMMUNITIES TO STUDY EXPOSURE TO NICOTINE AND CARCINOGENS AND GENETIC VARIATION AMONG ALASKA NATIVE CIGARETTE SMOKERS AND SMOKELESS TOBACCO USERS

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Community Based Participatory Research (CBPR) is infrequently employed among Alaska Native communities. The prevalence of tobacco use among Alaska Native (AN) people is among the highest of any ethnic group in the United States. This study was a CBPR project initiated by regional Alaska Native health leaders and a multidisciplinary academic team of scientists to better understand factors that may be associated with the high rates of tobacco use and cancer. We will describe the methods and actions by which the research was planned, designed, approved, and conducted working with and among Alaska Native people and how the study aims, data collection tools and consents were jointly written to answer the questions of importance to both the AN and scientific communities. Further, we will outline how communication over the study timeline included working side by side with community members to enable the team to determine levels of carcinogens and nicotine in smokeless and smoked tobacco products, including a locally homemade product, iqmik, and biomarkers of exposure associated with use of these products for the first time. We will also describe how, at the request of the community, genetic profiles associated with nicotine and carcinogen

metabolism among the AN population was undertaken, and how long term specimen storage was included as an option to participants. Furthermore, we will describe how easily understandable descriptions of the findings are being approved, disseminated and to what extent they will reach community members of the rural region in which the study was conducted. Finally we will describe how the outcomes of the CBPR activities are leading to the next steps for the team.

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## POS1-56

### SENSATIONS EXPERIENCED DURING INITIAL CIGARETTE AND SNUS USE AND RISK OF FUTURE REGULAR TOBACCO USE.

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Prior studies suggest that initial smoking pleasure influences future smoking behavior. To our knowledge, no studies have evaluated initial reactions to Swedish smokeless tobacco (snus). Data from a large, population-based study in Sweden were used to describe sensations experienced during initial cigarette smoking and snus use, and to examine associations between these sensations and risk of becoming a regular user of each tobacco type. Participants were 20-47 years old and reported the types of tobacco they had used in their lifetime and the kind of user they considered themselves to be (never, just tried, occasional, or regular user). Regular users were compared to those who just tried; never, occasional and dual users of cigarettes and/or snus were excluded resulting in a sample size of 4,602. The Early Smoking Experience questionnaire captured physiologic reactions to initial cigarette or snus use separately: pleasant sensations, unpleasant sensations, nausea, relaxation, dizziness, pleasurable buzz, coughing and difficulty inhaling. Binary recursive partitioning (BRP) was used to identify combinations of initial reactions predictive of regular use of each tobacco type. All analyses were stratified by sex. Among cigarette users (n=3,214), 30% of men and 37% of women were regular smokers, whereas among snus users (n=1,388), 77% of men and 46% of women were regular snus users. BRP identified dizziness as the strongest predictor of regular smoking among both men and women. Pleasant sensations was the only classification factor associated with regular snus use among women, and no initial reaction added significantly to classification by regular snus use among men. Our findings support the hypothesis that those who progress to regular tobacco use may be more sensitive to the rewarding effects of nicotine, manifested particularly through dizziness and pleasurable sensations. Among snus users, especially men, we found a high prevalence of regular snus use regardless of initial reactions.

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## POS1-57

### FACTORS ASSOCIATED WITH LITTLE CIGAR AND CIGARILLO USE AMONG COLLEGE STUDENTS

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Use of novel tobacco products, such as little cigars and cigarillos, has increased in the United States as rates of cigarette use have declined. Though as harmful as cigarettes, evidence suggests these products are perceived as less harmful and less addictive and are growing in popularity among young adults. We examined the prevalence of use of these types of cigars, termed small cigars, among a sample of 4840 young adults attending six colleges and universities in the southeast United States. We compared small cigar smokers to nonusers on demographic, tobacco and substance use, and psychosocial variables. Measures assessing demographic characteristics; past 30-day tobacco use (i.e., cigarillos, little cigars, cigarettes, cigars, smokeless tobacco, hookah); other substance use (i.e., alcohol, marijuana); perceived harm of cigars, cigarillos, and little cigars; sensation-seeking; perceived stress; and depressive symptoms were assessed in an online survey. Of the 4840 respondents, 12.1% (n=529) reporting smoking small cigars during the past 30 days. Of these, 5.1% (n=224) reported smoking

cigarillos, and 10.2% (n=446) reported smoking little cigars, indicating that 3.2% (n=141) reported smoking both cigarillos and little cigars. Small cigar use was associated with being younger (OR=0.93, 95% CI 0.90,0.96); male (OR=0.71, CI 0.54,0.93); African American (OR=6.49, CI 4.56, 9.22) or "Other" race (OR=3.36, CI 2.27,4.99); current cigarette (Daily: OR=7.30, CI 4.54, 11.74; Nondaily: OR=14.33, CI 10.37, 19.81), cigar (OR=3.72, CI 2.35, 5.91), hookah (OR=2.66, CI 1.71, 4.13), and marijuana use (OR=3.81, CI 2.85, 5.09); lower perceived harm of smoking (As harmful: OR=0.41, CI 0.27, 0.62; More harmful: OR=0.38, CI 0.24, 0.59), greater sensation seeking (OR=1.18, CI 1.02, 1.38), and higher perceived stress (OR=1.04, CI 1.00, 1.09). Young adult small cigar smokers are engaging in concurrent use of other tobacco products and substances. Evidence-based programs addressing co-occurrence of tobacco and other substance use among young adult small cigar smokers may be needed.

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## POS1-58

### CHARACTERISTICS OF SWEDISH AND AMERICAN MADE SNUS PRODUCTS SOLD IN THE U.S.

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**Background:** U.S. cigarette manufacturers have introduced Swedish-styled snus products and have marketed these products to American cigarette smokers. Snus products have the potential to reduce exposure to tobacco product toxicants, and in Sweden, snus use has reportedly contributed to lowered smoking prevalence and a reduction in tobacco-related death. Comparison of American with Swedish snus brands is required to understand the potential for new US brands to support complete switching from cigarettes to snus. **Methods:** Snus brand product disclosures submitted in 2010 to the Massachusetts Department of Public Health by their manufacturers were examined. US brand families (and number of sub brands) analyzed were: Marlboro Snus (n=4) and Camel Snus (n=4). Swedish snus brands included were General (n=13), Grovsnus (n=4), Ettan (n=3), Kronan (n=2), Catch (n=5), and Goteborgs (n=5). The brand families examined represented 85% and 99% of the 2010 snus market share in Sweden and the US, respectively. Total free (unionized) nicotine (mg/g), % free nicotine, % moisture and pH were analyzed. **Results:** Median free nicotine levels for the Swedish brands were approximately twice as great as those of the US brands: Goteborgs (6.2 mg/g; range: 6.0-6.4 mg/g), General (6.2 mg/g; range: 2.0-10.2 mg/g), Ettan (6.1 mg/g; range: 5.9-6.9 mg/g), Govsnus (6.0; range: 5.9-10.0), Kronan (6.0 mg/g; range: 5.8-6.2 mg/g), and Catch 5.6 mg/g; range: 3.2-6.1 mg/g); compared with Camel (2.9 mg/g; range: 2.8-3.1 mg/g) and Marlboro (0.9 mg/g; range: 0.5-1.2 mg/g). Swedish brands also reported higher median levels of percent free nicotine, moisture and pH, compared to US brands. **Conclusion:** The contrasting levels of free nicotine (total and %) and pH, between U.S. and Swedish snus brands, suggests that these products are designed to promote different use behaviors. The lower levels of nicotine in American products may not be sufficient to enable complete switching, and instead may promote dual use with cigarettes, which may not reduce harm.

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## POS1-59

### PSYCHOLOGICAL PREDICTORS OF MALE SMOKELESS TOBACCO USE ACQUISITION AND CESSATION: A 15-YEAR LONGITUDINAL STUDY

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**Objective:** Smokeless tobacco use, 90% of which occurs among males, typically escalates to daily use in adolescence and then experiences significant levels of cessation by the end of young adulthood. To test a theory of why young males start and then stop SLT use, as well as to identify factors to target in interventions, this study tested the hypothesis that psychological factors consistent with the Theory of Triadic Influence (TTI) would longitudinally predict male SLT acquisition and cessation. This is the first known study to test these predictions. **Design:** TTI psychological risk factors (parental noncompliance, friend compliance, rebelliousness, and thrill seeking) were assessed

in a population-based cohort of Washington State males participating in a 40 school district tobacco prevention trial. To predict acquisition of daily use, never SLT users had their risk factors assessed at age 13. Their daily SLT use was then assessed at age 18 (N = 2,468; 94.8% 5-year retention). To predict cessation, all daily SLT users had their risk factors assessed at age 18. Their SLT cessation status was then assessed at age 28 (N = 182; 86.9% 10-year retention). All models were tested with logistic regressions adjusting for experimental condition, team sport participation, parental education, and clustering among participants in the same school district. Results: Scoring high on the following psychological factors at age 13 increased the odds of daily SLT use at age 18: 156% increased odds for friend compliance (OR = 2.56; p < .001), 116% for rebelliousness (OR = 2.16; p < .001), and 133% for thrill seeking (OR = 2.33; p < .001). Parent noncompliance was not a significant predictor (p = .33) of SLT acquisition. None of the psychological factors at age 18 predicted SLT cessation at age 28 (p value range: .13 to .94). Conclusion: This study provides the first evidence that friend compliance, rebelliousness, and thrill seeking strongly predict SLT acquisition among male youth. However, there was no evidence that the psychological factors measured predicted SLT cessation. Targeting the identified psychological predictors of SLT initiation may help prevent SLT use among young males.

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## POS1-60

### NEW CHALLENGE FOR CESSATION OF SMOKELESS TOBACCO AMONG WOMEN USERS IN INDIA

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With 18.4% using smokeless tobacco, GATS India has reported a startling trend of smokeless tobacco use among Women. Focus group research undertaken with low SES women following GATS has revealed that this could go unchecked unless very urgent action is taken. Women in the focus group (ages 22 to 37) have been using smokeless tobacco for 3 to 7 years. Although their first encounter was not pleasant, they kept on. Except for one all picked the use watching their friends use it. This woman indicated that she used to feel uncomfortable after a meal and someone recommended the use to her. It turned out to be a blessing!!!! They all continue because they like it. They say they have no reason to stop its use. It helps them to do hard work. Also many times they have to skip a meal, and tobacco protects them from cramps. Their community accepts it. A few "high browed" rich people object even though they might be using it themselves. They prefer to quit the job than quitting tobacco. They enumerated some down-side to this habit. They are so used to it that sometimes they have to borrow money to buy the product. One woman reported that she has to be careful to use the product when her school-going son is around as he dislikes the smell. Without chewing they cannot concentrate. None of them feel a need to take treatment to quit the use. For them it was a funny question, why should anyone take a treatment to quit—if at all they can quit when they want. The question as to who can help them to quit, appeared silly to them. They wondered why anyone should object to their use. The product is not free. They buy it and shops sell it and the product is promoted and is sold everywhere. One woman remarked that if she stops chewing tobacco, she will not be able to work and another one said, she will have problem sleeping and yet a third one said she will not be able to pass bowels. These findings reveal that the level of knowledge on the harmfulness of smokeless tobacco is extremely low and a user-based strategy to educate publics should be a policy decision.

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## POS1-61

### TOBACCO CONTROL POLICIES AND TRANSIT AUTHORITIES – REGULATING OUTDOOR AND QUASI OUTDOOR SMOKING AND SMOKELESS TOBACCO USE

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INTRODUCTION: Transit authorities have a history of being at the forefront of tobacco control policies. Many transit systems in the US restricted smoking in vehicles decades before cities or states enacted comprehensive workplace and public place clean air laws. Currently, there are no systematic descriptions of tobacco control policies

in transit systems available that describe the extent to which tobacco use is allowed in outdoor or quasi-outdoor aspects of transit systems. METHODS: Authors reviewed the state of smoke-free restrictions in outdoor & quasi-outdoor transit environments, and policies that could regulate the use of smokeless tobacco (SLT) within the transit system including spitting policies. The ten largest public transit authorities in the US were identified from the American Public Transit Association (2010) and included systems in NY, Chicago, Philadelphia, Miami, San Francisco, Boston, Atlanta, LA, Baltimore, and Washington DC. A systematic search of web-based policies was conducted to understand tobacco control policies, and these were confirmed by telephone and email correspondence with staff at the respective authorities. RESULTS: All systems had policies that made outdoor or partially enclosed outdoor transit environments like train platforms smoke-free. Most transit systems have smoke-free transit shelters; however, the authority in Philadelphia (SEPTA) permits smoking in these shelters. Only three systems had smoke-free doorways to station entrances. The Metrorail system in Miami, Florida was the only system to state that no one is able to use tobacco or spit aboard a bus. Many authorities reported they have a no-spitting rule however some systems explained the policies only restrict spitting on property vs. spitting in a jar. CONCLUSIONS: Transit authorities continue to lead with comprehensive smoke-free policies that regulate smoking in outdoor or quasi-outdoor spaces. Yet, opportunities remain for expansion of tobacco-free policies including smoke-free transit shelters and stops, as well as buffer zones around transit stations. There are further opportunities to explicitly restrict the use of smokeless tobacco on systems.

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## POS1-62

### SECOND-HAND SMOKE POLICIES IN CORRECTIONS FACILITIES: A REVIEW OF THE LITERATURE

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Despite the progress in reducing tobacco use and limiting public exposure to second-hand smoke (SHS), studies show that current smoking rates are more than doubled in incarcerated populations (range 42-93%) and levels of SHS concentration far exceed those measured in smokers' homes. While many correctional facilities have smoke-free policies, there is limited knowledge of whether these policies are implemented or enforced. This review will synthesize the literature regarding SHS policies in the U.S. corrections system and identify research gaps to direct the future of SHS policy interventions in this population. A systematic literature review was conducted to identify studies published from 1985-2011 addressing smoke-free policies or cessation efforts in county, state and federal corrections facilities. From July-August of 2011, we searched PubMed, Embase, EconLit and Social Services Abstracts. Studies on incarcerated populations outside of the US and adolescents were excluded. Among the 70 studies identified, all 50 state Department of Corrections and the Federal Bureau of Prisons have policies restricting tobacco use and more than two-thirds of state prison systems have policies that completely ban smoking on facility grounds. Evidence suggests enforcement varies greatly, even among prisons in the same state with the same policy. Studies assessing policy enforcement speculate that lack of staff and administrative support is a major barrier to policy enforcement. Findings suggest concerns regarding tobacco black markets may reduce staff support and corrections staff who smoke are less likely to support smoking bans. As in public settings, enforced smoking bans are effective at reducing indoor tobacco smoke concentrations and the associated health risks among inmates and corrections staff. Corrections system's smoke-free policies are often under enforced. Future studies should empirically examine barriers to enforcing such policies. By enforcing policies that significantly reduce exposure to SHS and promote cessation, corrections facilities have an opportunity to improve the health of staff and incarcerated adults and potentially reduce healthcare costs.

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## POS1-63

### ATTITUDES, EXPERIENCES, AND ACCEPTANCE OF SMOKE-FREE POLICIES IN MULTI-UNIT HOUSING ESTABLISHMENTS: A NATIONAL STUDY OF MULTI-UNIT HOUSING OPERATORS AND RESIDENTS

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Secondhand smoke (SHS) can transfer between units in multi-unit housing buildings, mitigating the effectiveness of personal smoke-free home policies. Chi square and logistic regression modeling assessed differences in attitudes, experiences, and acceptance related to smoke-free policies in multi-unit housing (MUH) using nationally representative samples of MUH operators (n=347), MUH residents (n=418), and single-family household (n=491) residents. Operators were interviewed through mail-based questionnaires, while MUH residents and single-family residents were obtained through random digit dialing of landline and cell phones. Among operators who reported having "any" smoking restrictions (n=191), 42% managed at least one smoke-free unit and 36% had at least one smoke-free building. Among operators who specifically did not manage smoke-free units (n=267), 38% were somewhat or very interested in implementing smoking restrictions in individual units. Almost all MUH operators with smoke-free units (96%) plan to continue offering them. In addition, 66% plan to implement further smoking restrictions. Major barriers cited to smoke-free policy implementation include higher vacancy rates and decreased market base. However, 81% of operators with smoke-free units cited no difficulties in renting them. In addition, 30% of MUH residents report living in smoke-free buildings and the majority of MUH (78%) and single-family (84%) residents already have voluntary smoke-free home policies. However, among MUH tenants with smoke-free home policies (n=339), 42% reported experiencing a SHS incursion in their home within the past year. In addition, support for smoke-free building policies was high among all MUH tenants and single-family residents interviewed (56%). This study demonstrates that in spite of widespread adoption of smoke-free home policies, many MUH residents are not fully protected from SHS. MUH operators should be encouraged to implement smoke-free building policies given the high level of support among residents and strong effectiveness of smoke-free policies in reducing SHS exposure.

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## POS1-64

### MODERATION OF INTERVENTION EFFECTS TO REDUCE SECONDHAND SMOKE EXPOSURE IN PRETEENS

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Identifying moderators of intervention effects can help determine the personal characteristics or circumstances of individuals for whom treatment will be effective. This study investigated potential moderators in a randomized clinical trial that tested provision of coaching and cotinine feedback to preteens for reducing their secondhand cigarette smoke exposure (SHSe). Ten baseline factors were selected as theoretically appropriate candidates for moderating the influence of the intervention on any of three experimental outcomes: (1) preteens' cotinine levels, and (2) their exposure to secondhand smoke as reported by (a) the preteens and (b) their parents. In a separate model for each potential moderating factor, we added the baseline-only measure of the factor and its 2-way and 3-way interaction terms with treatment group and time, and tested for baseline to posttest effects. Moderation was assessed as a significant 3-way interaction. Complete bans on smoking in the home as reported by the preteen and the parent were the only baseline variables to exhibit a moderating influence on outcomes. Absence of a household ban at baseline enhanced the differential effect that the coaching/feedback intervention had on SHSe reduction, as measured by preteen urine cotinine. To a limited extent, this was also true for exposure as measured by self-report, though only for certain combinations of preteen and parent reports. We infer that families who lacked pre-existing bans stood to benefit most from intervention efforts to promote restrictive smoking rules.

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## POS1-65

### EVALUATION OF THE EFFECTIVENESS OF SMOKING POLICIES IN RESTAURANTS AND BARS IN BEIJING, CHINA: A FIVE-YEAR FOLLOW UP STUDY

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Introduction: In 2007, an advocate on voluntary smoking bans in restaurant was initiated in Beijing; in 2008, the Beijing government implemented a smoking regulation, requiring big restaurants to prohibit or restrict smoking. A five-year follow-up study was conducted to evaluate the effectiveness of these smoking policies. Methods: The study monitored secondhand smoke (SHS) from 92, 85, 94 and 79 restaurants and bars in 2006, 2007, 2008 and 2010, respectively, using convenience sampling. Measurements of SHS derived fine particulate matters (SHS-PM) and observations on patrons' smoking behavior were conducted during peak patronage time. In 2010, one-hour area nicotine sampling and one-day personal air nicotine sampling were also conducted. Results: Smoking was commonly observed in theoretically nonsmoking venues or sections in 2008 and 2010. The median SHS-PM was 53, 83, 18 and 27  $\mu\text{g}/\text{m}^3$  in 2006, 2007, 2008 and 2010, respectively. From 2006 to 2007, none of the 23 venues followed up changed their smoking policies and no significant reduction was observed on SHS-PM, patrons' active smoking density (ASD) or active smoking rate (ASR). Comparing to 2007, 31 venues adopted stricter smoking policies in 2008 and 33 in 2010, with the median SHS-PM decreased 79% and 72%, respectively; ASD and ASR also reduced in these venues. None of SHS-PM levels, ASD or ASR changed significantly in the 44 venues followed-up in 2008 and 2010. Both air nicotine and SHS-PM in nonsmoking sections were about 70% of that in smoking sections. The median air nicotine exposed by nonsmoking servers was 2.49, 2.54 and 3.01  $\mu\text{g}/\text{m}^3$  in venues theoretically prohibiting, restricting and allowing smoking, respectively. Conclusions: Voluntary smoking policy is rarely adopted and cannot protect people from SHS exposure in restaurants and bars. The 2008 smoking regulation failed to significantly reduce SHS exposure shortly or two years after its implementation. Restricting smoking to designated sections cannot eliminate SHS exposure.

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## POS1-66

### SECONDHAND SMOKE EXPOSURE: PREVALENCE, VALIDATION AND EFFECTS

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The 2006 U.S. Surgeon General report on secondhand smoke (SHS) exposure highlights the deleterious health effects of SHS on human health. However, individuals are frequently unaware of their SHS exposure, and well validated self-report measures of SHS exposure are not readily available. Study objectives included: 1) validation of self-reported SHS exposure by comparing reported responses with salivary cotinine and hair nicotine levels, and 2) determination of which SHS exposure indicators correlate most strongly with health outcomes. A 20-minute telephone interview assessing a variety of sources of SHS exposure, respiratory disease diagnoses and symptoms, and quality of life (as measured by the EuroQol-5D (EQ5-D)) was completed in 100 non-smokers recruited from Florida's 2010 Behavioral Risk Factor Surveillance System (BRFSS) Study participants. Following the interview, each participant was asked to return hair and saliva samples by mail. Participants were re-interviewed and re-sampled two weeks after their initial interview to determine test-retest reliability. Test-retest correlations for salivary cotinine and hair nicotine values were  $r=0.85$  and  $0.81$ , respectively; these two measures were also highly correlated at baseline and at follow-up (0.63 and 0.60, respectively). However, a range of self-reported SHS indicators (e.g., in the home, in public settings, etc) correlated poorly with these exposure biomarkers (most correlations  $<0.10$ ). Test-retest kappa values for EQ5D, respiratory symptom and respiratory disease diagnosis questions based on the previous 30 days demonstrated good to excellent reliability (weighted kappa range: 0.44-1.00). Hair nicotine and salivary cotinine values correlated somewhat with two factor analysis-derived measures of respiratory symptoms at baseline and at follow-up (0.06-0.11 and 0.13-0.25, respectively). Self-reported SHS questions did not correlate with these outcome measures. Results indicated that

biomarkers of SHS exposure (not just self-report of exposure) are needed to accurately determine individual-level exposure levels and to effectively examine associations with potential adverse health associations.

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## POS1-67

### SMOKING IN TAXIS: A QUANTITATIVE AND QUALITATIVE ASSESSMENT

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The purpose of the study was to assess compliance with the provincial Smoke-Free Ontario Act (SFOA) within taxis in a Canadian city and to inform a public health intervention to address compliance issues. The research explored the extent of smoking in taxis and used a mixed-methods approach. To assess evidence of smoking, surface nicotine levels were measured in a sample of 42 taxis using a standardized analysis protocol adopted from Matt et al. (2008). To further assess physical evidence of smoking, an observational checklist was completed for each taxi vehicle (adapted from Matt et al. 2008, and with input from local tobacco enforcement officers). To assess passenger, taxi driver and taxi administrator perceptions of smoking in taxis, three data collection methods were included: (1) Taxi passenger surveys (n=60); (2) Taxi driver focus groups (participants: n=21) and; (3) Taxi administrator interviews (n=4). To categorize vehicles in which smoking does and does not occur, a combination of observational physical evidence of smoking and self-reported driver smoking status was used to create a binary variable representing the occurrence of smoking in taxis(Y/N). More than half of taxis assessed were categorized as vehicles in which smoking had occurred (n=25, 60%). The median nicotine level was highest in these taxis (664 micrograms/m2). The surface nicotine level in 90% of taxis exceeded 8 micrograms/m2, which is the mean surface nicotine level reported by Matt et al. (2008) in a study on used cars. About one-third of taxi passengers surveyed witnessed a taxi driver (32%) or passenger (37%) smoking in a taxi while in use during the past year, and the majority of participants (70%) reported having smelled tobacco smoke in a taxi in the past year. Taxi drivers and administrators reported barriers to maintaining a smoke-free taxi, such as non-compliant passengers. Factors associated with compliance included awareness of the SFOA and mandated no-smoking stickers on taxi vehicle windows. Our findings suggest that, even with bans on smoking in taxis, compliance is still a major problem. Additional approaches are required to eliminate smoke exposure in taxis.

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## POS1-68

### SMOKE-FREE HOME RULES ADOPTION BY SMOKERS AND NON-SMOKERS: MINNESOTA 1999-2010

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Background: Smoke-free workplace policies have successfully limited indoor exposure to secondhand smoke. Exposure still exists in other indoor locations, most notably in the home. Purpose: This paper discusses the change in the public's awareness of secondhand smoke harm, exposure to secondhand smoke, and prevalence of smoke-free home rules between 1999 and 2010 in Minnesota. Methods: The Minnesota Adult Tobacco Survey is a statewide, cross-sectional, random digit dial telephone based survey. The survey measures tobacco use, behaviors, attitudes, and beliefs among adults aged 18 and older in 1999, 2003, 2007 and 2010. Results: There was a significant decrease in exposure to secondhand smoke among all non-smokers in Minnesota from 2003 (60.9%) to 2010 (37.7%) (p<0.05). The prevalence of smoke-free home rules adoption among all Minnesotans increased significantly between each of four time points: 1999 (64.5%), 2003 (74.8%), 2007 (83.2%), 2010 (87.2%). While smokers tend to adopt smoke-free home rules at rates lower than non-smokers, the percentage of smoke-free home rules among smokers has nearly doubled between 1999 (31.4%) and 2010 (58.1%). Conclusions: Over 10 years, Minnesotans reported a significant decline in exposure to secondhand smoke and a significant increase in voluntary smoke-free home rules. Such a trend is notable as virtually all public tobacco control efforts were aimed at raising awareness and support for smoke-free policies

within workplaces. These findings demonstrate positive changes in social norms and illustrate that behavior change in generally public settings can also be translated into practice in private settings.

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## POS1-69

### THE BABY'S BREATH PROJECT: A PILOT TRIAL TO REDUCE SECONDHAND SMOKE EXPOSURE IN HIGH RESPIRATORY RISK INFANTS IN THE NEONATAL INTENSIVE CARE UNIT

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The adverse effects of secondhand smoke exposure (SHSe) in children are well documented and include higher risks of respiratory illnesses, asthma, middle ear disease and SIDS. Infants admitted to a neonatal intensive care unit (NICU) are particularly vulnerable to the effects of SHSe, typically exhibiting respiratory or chronic lung conditions prior to discharge. The primary aim of this investigation is to test the feasibility and efficacy of a hospital-based, motivational interviewing intervention for reducing SHSe in a low-income, multi-ethnic population of NICU infants, with followup at 1, 3, and 6 months post-discharge. A total of 144 families with an infant at high respiratory risk in the NICU who reported at least one smoker in the household were randomized to MI, Usual Care (UC), or Usual Care with Reduced Measurement (UC-RM; abbreviated baseline and no 1 or 3 month assessments were conducted). The MI intervention included two 30-45 minute counseling sessions in the NICU. Outcomes included self-reported smoking in the home via Timeline Followback (TLFB) and air nicotine monitors. Of the 947 families approached in the NICU, 26% reported a household smoker in the home, 20% refused to participate in the study and another 8% failed to attend the baseline assessment. Six infants died prior to randomization. Of the MI participants, 86.4% attended Session 1, and only 71.2% attended both sessions. At 6-months post-discharge, according to TLFB and monitor data, 51.4% and 58.8% of the MI and UC homes were smoke-free, respectively. However, only 37.5% of the UC-RM group had smoke-free homes. We conclude that recruitment and intervention with NICU parents in a SHSe study is feasible, although improvements are needed. MI as implemented did not increase effects over assessment alone. Thus, assessment and discussion of SHSe in the NICU may increase the likelihood of a smoke-free home post-discharge, yet more intensive intervention is needed to strengthen effects. Effective interventions to reduce SHSe in households with NICU infants at high respiratory risk could result in substantial decreases in adverse health effects and the very large associated costs.

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## POS1-70

### A FAITH-BASED INTERVENTION FOR SECONDHAND SMOKE EXPOSURE AMONG KOREAN AMERICANS

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OBJECTIVE: Culturally appropriate interventions are recommended to reduce disparities in secondhand tobacco smoke exposure (SHSe) among immigrant subgroups, such as Korean Americans. Many Korean Americans prefer to speak Korean and lack health insurance and access to health care. Most attend church regularly; the church serves as a religious, social, cultural, and educational hub. The church might be an effective setting for health promotion, however, there is little to no research involving Korean churches for SHSe prevention. METHODS: We conducted a pilot study to explore the feasibility of a faith-based intervention to reduce SHS exposure. The intervention was designed based on results from the telephone surveys, focus groups, and key informants, and was guided by the Behavioral Ecological Model. The intervention consisted primarily of group level activities conducted in the church and 5-6 brief, individual motivational interviewing (MI) sessions over the telephone every 1-2 weeks. Twelve churches were randomly assigned to one of two groups: a group that receives the SHS-reduction intervention, or a group that receives unrelated health information. Baseline and post-intervention measures were conducted by telephone. RESULTS: Over 70 participants

have completed the study. Process and outcome measures, as well as lessons learned, will be presented. Most of the participants preferred Korean language. Most participants rated the church activities and the MI sessions as helpful or very helpful. Ten percent of the participants in the intervention group reported that someone that they usually spent time with had quit smoking during the course of the study. At post-intervention, the SHS intervention group reported a dramatic reduction in their SHS exposure overall in contrast to the control group which did not report a decrease overall. **CONCLUSIONS:** Early pilot results show that collaborations with churches to reduce SHSe are feasible and promising, and merit further study.

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## **POS1-71**

### **SECONDHAND SMOKE INCURSIONS INTO NONSMOKING RENTERS' APARTMENTS**

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Many nonsmokers living in multi-unit buildings report incursions of secondhand smoke (SHS) into their units from elsewhere in or around their building. Few jurisdictions have ordinances prohibiting smoking in such buildings. Past research has documented air movement between units, but little work has monitored SHS directly. This project sought to quantify nonsmoking renters' exposure to SHS in their homes. Participants were recruited from a commercial list, with eligibility limited to those who said SHS sometimes came into their unit. A control group was recruited from a list of non-smoking buildings. Participants' units were monitored for one week in winter and again in mild weather if possible. Control units were monitored for one week only. The particle phase of SHS was traced using dual-channel Aethalometers, which collect particles on a filter and measure their absorbance of ultraviolet (UV) and near-infrared (NIR) light in real time. The ratio of UV to NIR absorbance was used to discriminate SHS from other types of particles based on chamber experiments and previous laboratory research. Gas phase samples were collected on Tenax in stainless steel tubes and analyzed by thermal desorption gas-chromatography with nitrogen-phosphorus detection. Tracers selective to SHS and covering the range of volatility of SHS constituents were analyzed. Residents were also asked to log SHS and other relevant events. Usable data were collected from 64 participants' units (of which 45 were re-monitored in mild weather) and 22 control units. Participants reported an average of 3.3 SHS events per monitoring period in winter and 4.2 SHS events in summer. Controls reported no SHS events. Over 1,200 particle events of all types were recorded. The distribution of UV to NIR ratios was significantly different for events in participant and control units (Wilcoxon rank-sum test  $p = 0.007$ ). Specifically, a much higher fraction of events in participants' units rose above a threshold absorbance ratio typical of SHS events (chi square  $p = 0.001$ ). Participant and control distributions of SHS gases were significantly different for some tracers but not others.

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## **POS1-73**

### **PREDICTORS OF HOUSEHOLD SMOKING RESTRICTIONS IN THE URBAN CHINESE FAMILIES WITH YOUNG CHILDREN**

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This study assessed the predictors of household smoking restrictions in the urban Chinese families. We interviewed 350 household members who had at least one smoker (self-reported smoking of one or more cigarettes daily for the past 30 days) and a child 5 years of age or less at home. Subjects were household members who and live together with the child in the same household. Of households ( $n=350$ ), only 37% had had smoking restrictions at home and only 27% were concerned about SHS

exposure risk to children's health. Logistic regression revealed that the predictors of having household smoking restrictions were: asking others for not smoking around the child (OR=3.40; 95% CI: 1.76-6.56), being asked by other for not smoking around them (OR=2.09; 95% CI: 1.64-4.09), those who reported smoking indoor around children should be against law (OR=6.57; 95% CI: 4.04-14.22), those who do not take measures to less expose non-smokers to smoking (OR=0.18; 95%CI: 0.09-0.55) and respondents who were not highly dependent to nicotine (OR= 0.21; 0.08-0.54). The findings shows that a high proportion of Chinese household with a child at home do not adopt any home smoking restrictions. Perception of risk about child's exposure to SHS was also law. There is a need to develop a household-based intervention that will promote SHS exposure reduction to children at home.

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## **POS1-74**

### **FILTER-BASED ASSAYS AS A MEASURE OF SMOKING TOPOGRAPHY AND EXPOSURE TO SMOKE CONSTITUENTS**

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A variety of spent filter assays have been proposed as an indirect means of estimating mouth-level smoke exposure to smoke constituents. These include color intensity and pattern analysis of filter images, fluorescence of tar eluted from filters, and concentrations of solanesol and nicotine trapped by filters. A recent review found that filter assays may prove useful in estimating smoking behaviors such as filter vent blocking and puffing intensity, and may have utility as proxy measures of mouth-level smoke exposure in clinical trials, concluding that comparisons among the different proposed assay schemes and correlation to validated human exposure biomarkers were necessary. The current study sought to compare the relative strengths and weaknesses of four different filter based assays (digital imaging, tar fluorescence, solanesol, and nicotine) in terms of reliability and predictive validity in estimating exposure to cigarette smoke constituents. The four filter based assays were conducted using previously published methods. Study 1 assessed intra-assay reliability and cross-assay validity for examining total particulate matter, smoke volume, and effective filter ventilation with reference cigarettes smoked under a range of machine smoking conditions. Study 2 examined relationships among the four filter-derived measures, objectively-measured smoking topography, and biomarkers of exposure using specimens obtained from human smokers. Findings reveal a strong relationship between filter stain color and total particulate matter under machine smoking conditions ( $r > .90$ ). Preliminary analysis with human-smoked samples found that as filter color darkens and filter solanesol and nicotine increase, puff volume increases, consistent with prior findings. We also noted that as stain uniformity increases (indicating lower effective ventilation), CO boost increases, consistent with existing literature relating vent blocking to increased CO exposure. Filter-based assays relate to measures of smoke exposure. These measures may prove useful in large-scale epidemiological studies, where collection of biospecimens for exposure assessment may be difficult and/or costly.

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## **POS1-75**

### **PUFFING TOPOGRAPHY AND EXPOSURES FROM ELECTRONIC CIGARETTES: A PILOT STUDY**

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Electronic cigarettes (Ecigs) are nicotine-delivering devices containing no tobacco and present a new and emerging issue for tobacco control. Ecigs have been advertised as safer alternatives to cigarettes, a way to quit smoking, or deal with indoor smoking restrictions. Little is known about Ecig characteristics, human exposures, or behaviors

during product usage. Here, we examined puffing topography and exposures to CO and nicotine among current cigarette smokers temporarily switched to Ecigs (Fifty-One TRIO, VaporCorp, Fort Lauderdale, FL). Participants visited the laboratory 3 times over 5 days. During the 2nd visit, participants were asked to abstain from cigarettes for 72 hours and switch to Ecigs. Participants smoked an Ecig through a CReSS device to record measures of smoking topography. CO readings were taken before and after smoking at each visit. Saliva samples were taken during the 1st (pre-Ecig use) and 3rd (post 72 hour use) visits. Participants (N=29; N=22 complete; N=14 compliant) completed questionnaires including the 32-item Questionnaire on Smoking Urges (QSU) and cigarette evaluation scales at each visit. Initial analyses showed a significant difference in puff count ( $p<0.05$ ; Rcig 12.8 & Ecig 6.4), average flow ( $p<0.001$ ; Rcig 36.7 ml/s & Ecig 56.4 ml/s), and peak flow ( $p<0.001$ ; Rcig 52.8 ml/s & Ecig 84.7 ml/s). CO Boost ( $p<0.001$ , V1 4.1 & V3 -0.1) and saliva cotinine ( $p<0.001$ , V1 403.0 & V3 240.3) both dropped significantly between visits 1 and 3. QSU craving scores dropped significantly when smoking own brand cigarettes but not Ecigs. Puffing topography on the Ecig was not significantly different at Visit 3, after more experience of use, compared to initial use. Consistent with laboratory analyses, flow rates were higher on Ecigs compared to cigarettes. Since CO and cotinine levels decreased between Visits 1 and 3, the Ecig does not appear to deliver CO and appears to deliver less nicotine than cigarettes, consistent with prior published findings. These pilot results, while in need of replication and extension, provide new insights into initial Ecig use behavior and user puffing patterns.

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## **POS1-76**

### **DO CANADIAN MICROBLUETM FILTER CIGARETTES HAVE REDUCED TOXICANT LEVELS IN THE MAINSTREAM SMOKE?**

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**Background:** Recently, there has been growing interest in the concept of modified-risk tobacco products. In Canada, a variety of tobacco products with novel filter designs which claim to reduce the emissions of one specific compound, or classes of compounds, in tobacco smoke have been introduced. Among these, was the recent introduction of new cigarettes brands containing a new filter technology called the MicroBlue™ filter, which is claimed to be effective in removing carcinogens from tobacco smoke. Although a reduction in harm or risk for developing tobacco-related diseases has not been demonstrated with the use of these cigarettes, these cigarettes may be perceived by the consumer as a reduced harm product. **Objective:** To compare the mainstream smoke emissions of Canadian cigarettes with and without the MicroBlue™ filter using two smoking conditions (ISO and Canadian Intense), in order to determine whether those containing the MicroBlue™ filter have reduced toxicant levels in mainstream smoke emissions. **Results and Discussion:** The mainstream smoke emissions of the cigarettes containing the MicroBlue™ filter were comparable to three Canadian brands; all the brands chosen for comparison had similar physical properties. In contrast to claims by the manufacturer of the MicroBlue™ filter, there were no observed difference in the levels of benzo[a]pyrene, crotonaldehyde and ammonia in the mainstream smoke emissions of cigarettes containing the MicroBlue™ filter. **Conclusions:** While it is important to examine the pattern of use as well as understand the interaction between product designs and smoking behaviour in humans when evaluating the risk of a tobacco product, the results from this study indicate that mainstream smoke emissions from Canadian cigarettes manufactured with a MicroBlue™ filter are comparable to regular Canadian cigarettes. Therefore, cigarettes manufactured with a MicroBlue™ filter should not be considered a reduced harm product.

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## **POS1-77**

### **BRIEF INTERVENTIONS FOR SMOKING CESSATION: A PRELIMINARY STUDY ON THERAPIST SELF-EFFICACY AND PRACTICE**

Charlene M. Key, Ph.D.\*, Lee M. Cohen, Ph.D., and Joseph Vanderveen, M.A.

Research indicates that brief interventions by health care professionals can change smoking behavior (Colby, et al., 2005; Salize, et al., 2009). The Clinical Practice Guidelines: Treating Tobacco Use and Dependence have been developed for all health care providers and outline appropriate treatment of nicotine-use disorders (Fiore, M., et al. 2008). Despite the fact that mental health care providers are trained in interventions designed to change maladaptive behaviors, the guidelines are not utilized in psychological practice (Phillips & Brandon, 2004; Leffingwell & Babitzke, 2006). Reasons cited include lack of training, low self-efficacy for provision of smoking interventions, and the belief that this practice does not fall within the domain of a psychologist's professional responsibility. This study sought to increase: 1) Therapist knowledge about the relationship of cigarette smoking and psychopathology, 2) Skills in conducting brief smoking interventions, 3) Therapist self-efficacy concerning their ability to provide brief smoking interventions, and 4) therapist attitudes about actually conducting interventions with their cigarette smoking clients. **METHODS:** Forty student therapists were recruited from three APA-accredited doctoral programs in October, 2009. Training was implemented for half the student therapists to increase knowledge, skills, and acceptance of brief interventions for smoking cessation and to elicit use of procedures in a psychology training clinic as outlined in the guideline. **RESULTS:** Repeated measures analysis of variance (ANOVA's) yielded a significant interaction for an increase in knowledge [ $F(2, 76) = 63.51, p < .001$ ], skills [ $F(2, 76) = 12.56, p < .001$ ], and acceptance of professional responsibility ( $ps < .05$ ). The training was found to be educational and increased perceived skills, however therapist interventions were not implemented unless clients reported being motivated to quit and behavioral change indicators were not significant. Future research should focus on underlying factors contributing to therapist resistance to provide brief health-oriented interventions.

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## POS2-1

### SMARTPHONE APPS FOR SMOKING CESSATION: A CONTENT ANALYSIS

Lorien Abrams<sup>1</sup>, Lee Westmaas<sup>2</sup>, and Jeuneviete Bontemps-Jones<sup>2</sup>, <sup>1</sup>George Washington University; <sup>2</sup>American Cancer Society

With the proliferation of smartphones, mobile phones are being used in novel ways to promote smoking cessation. This study set out to examine the content of smoking cessation, smartphone applications (apps) in the iPhone App Store and the Android Market that were commercially available in September 2011. This study expands upon a previous one by looking at apps for the Android as well as the iPhone and by updating the previous analysis from June 2009. Each app in the current sample was coded for its (1) approach to smoking cessation and (2) adherence to the U.S. Public Health Service's 2008 Clinical Practice Guidelines for Treating Tobacco Use and Dependence. Where available, each app was also coded for its (3) frequency of downloads. Preliminary results indicate that the quality of currently available smartphone apps have improved since the earlier analysis from 2009.

*K Award from NCI to Dr. Lorien Abrams.*

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## POS2-2

### COMBINING VIRTUAL REALITY AND BEHAVIORAL ECONOMICS TO UNDERSTAND CRAVING FOR TOBACCO: INITIAL FINDINGS

John Acker, B.A.\*, and James MacKillop, Ph.D., University of Georgia

Behavioral economics in psychology utilizes diverse methodologies to quantify human behavior (e.g., commodity consumption) in response to various environmental influences (e.g., commodity price). A Cigarette Purchase Task (CPT) is one such approach and examines cigarette consumption as a function of escalating prices, providing several objective facets of behavioral economic demand. These include intensity (i.e., consumption at zero cost); breakpoint (i.e., price at which consumption is suppressed to zero); O max (i.e., maximum expenditure); and, P max (i.e., price associated with O max). The aims of the present study were twofold: 1) to investigate the impact of neutral vs. tobacco cue reactivity conditions administered via virtual reality (VR) on behavioral economic demand for tobacco; and, 2) to determine the incremental validity of demand for cigarettes in relation to smoking behavior during a tobacco self-administration protocol. Participants underwent a neutral cue reactivity condition, followed by a tobacco cue reactivity condition consisting of visual, olfactory, and imaginal tobacco cues presented in a tobacco "paraphernalia" room. After each cue exposure, participants were assessed for subjective tobacco craving, alcohol craving, and affect using a visual analog scale, as well as for demand for cigarettes using a state oriented CPT. Next, participants completed a tobacco self-administration protocol, consisting of the opportunity to delay smoking, followed by the opportunity to purchase and consume cigarettes. Preliminary results (N = 5) indicate a significant, trend-level effect of VR tobacco cues on subjective tobacco craving,  $t(4) = 2.5, p = .062$ . Pearson correlations between change scores in subjective craving, affect, and demand in relation to tobacco self-administration parameters revealed significant association between number of cigarettes purchased and change in Breakpoint, as well as between time until first cigarette and change in O max. These results provide preliminary evidence as to the incremental validity of specific facets of behavioral economic demand in relation to post-tobacco cue smoking behavior.

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## POS2-3

### FEASIBILITY OF OFFERING EXTENDED COURSES OF NICOTINE REPLACEMENT THERAPY TO PREVENT RELAPSE BY SMOKERS WHO HAVE RECENTLY STOPPED

Shade Agboola, M.P.H.\*, Ann McNeill, Ph.D., Tim Coleman, FRCGP, Jo Leonardi-Bee, Ph.D., and Jessica Turner, UK Center for Tobacco Control Studies, University of Nottingham, Nottingham, UK

NHS Stop Smoking Services (NHS SSS) are effective and cost effective; however although 15% of smokers quitting with services' help are still smoke-free at 1 year, most relapse back to smoking. Relapse prevention interventions (RPIs) have recently been shown to be extremely cost-effective. These are not routinely used in the NHS but could

substantially reduce SSS relapse rates. We assessed the feasibility, acceptability and uptake of offering extended courses of nicotine replacement therapy (NRT) to smokers who were already abstinent. Method Between April 2010 and January 2011, smoking cessation advisors offered eligible smokers who had achieved at least 8 weeks abstinence an additional 12 weeks NRT. NRT was issued in four-weekly batches. Participants completed monthly follow-up questionnaires inquiring about smoking status; this was validated with expired air carbon monoxide readings in the first 3 months. At 6 months, smoking status was collected via telephone. A selection of participants gave their views in semi-structured interviews. Results 260 eligible participants were offered relapse prevention treatment over a 9 month period. 115 (44%, 95% confidence interval CI 38% to 50%) accepted this treatment. For every year increase in the age of the quitter, there was a significant 4% increase in the odds of the quitter accepting the offer of NRT for relapse prevention thus quitters who accepted extended treatment were more likely to be older than those refusing treatment. Quitters who had never worked/unemployed were less likely to accept the offer of relapse prevention (76% and 95% reduction in odds respectively). At six months follow-up 32% (95% CI 24%-42%) of participants were still abstinent. Framework analysis of interview transcripts revealed that a large number of interviewees felt that extended treatment with NRT was mainly responsible for their ability to remain quit. Conclusion For the first time, the acceptability of RPIs has been assessed. The moderately high acceptance rate of extended NRT treatment amongst quitters who have achieved abstinence suggests that if introduced across the NHS, RPIs would be widely used.

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## POS2-5

### PREVALENCE OF SMOKING AND ATTITUDE TOWARD SMOKING CESSATION AMONG COMMUNITY PHARMACISTS, SAUDI ARABIA

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Background: Although the percentage of the population that smokes has declined in the US and other countries, it is increasing in Third World countries. In Saudi Arabia, despite warnings on every packet of cigarettes indicating health hazards related to smoking, this habit is increasing rapidly, particularly among the younger population. Objective: To assess the prevalence and risk factors of smoking among community pharmacists and explore their attitudes toward issues related to smoking cessation. Methods: A survey was conducted in November 2003 in community pharmacies in Riyadh City, Saudi Arabia. Community pharmacies were randomly selected from the Ministry of Health Registers List. A self administered questionnaire was used for data collection. Results: The survey revealed a 19.9% prevalence rate of cigarette smoking among community pharmacists. Lung diseases, including cancer, and cardiovascular diseases were mentioned as the main risk factors of cigarette smoking. The majority of the surveyed pharmacists agreed with banning smoking in common places and they are willing to support patients who want to quit smoking. They also believe that the pharmacist can play a positive role in smoking cessation. Conclusions: Although pharmacists who participated in this survey were fully aware of the health hazards related to smoking, we found that their activities in promotion of smoking cessation were far from exemplary. Based on these findings, there is a need to put more emphasis on pharmacists to devote time for anti-smoking counseling.

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## POS2-6

### EXPLORING THE AVAILABILITY AND ACCESSIBILITY OF SMOKING CESSATION SUPPORT FOR PREGNANT AND POSTPARTUM WOMEN IN ONTARIO

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Background: In 2008, about 15% of pregnant women (15-49) in Ontario smoked during pregnancy. While this is relatively low compared to Canada's other provinces, rates vary greatly among the local public health unit (PHU) regions (5% - 34%). Further, in most regions the highest prevalence of smoking is found among women under the age of 20 (over 40%). A study was conducted to: determine the availability and reach of various cessation services for pregnant and postpartum women at the provincial and local levels; examine the needs of this subpopulation and barriers to uptake of cessation services; and highlight directions for research, policy and practice. Methods:

An environmental scan of province-wide cessation services was conducted using a web-survey of Ontario's 36 public health units, administrative data analyses and key informant interviews (n=13). Local environmental scans (administrative data analysis and key informant interviews) were conducted in three PHU regions, which represented the jurisdictions with respectively high, moderate and low rates of smoking during pregnancy. In-depth interviews were also conducted with pregnant and postpartum women in the three PHU regions. Results/Outcomes: There is a lack of support to pregnant and postpartum women due to the absence of a provincial cessation strategy, lack of capacity to run cessation services and service providers' reluctance to address tobacco with this subpopulation. Awareness and use of services and quit aids vary among the three PHU regions examined, but is generally low. Barriers to quitting and accessing services commonly encountered by women include: stigma, dependency upon smoking to cope with stress, smoking by partners and family members, misconceptions about the safety of quitting during pregnancy, easy access to cheap cigarettes, high level of awareness of the E-cigarette among teenage participants, and rationing of cigarettes by partners. Conclusions: The needs of pregnant and postpartum women with smoking experience are not being met adequately at the provincial and local levels in Ontario. Strategies and measures to improve programs and services for this subpopulation are discussed.

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## POS2-7

### INTEGRATING SMOKING CESSATION INTO NURSES' DAILY PRACTICE IN CANADA: ACHIEVEMENTS AND CHALLENGES

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Since 2007, the Registered Nurses' Association of Ontario (RNAO) has delivered a Nursing Best Practice Smoking Cessation government-funded program. This program involves a provincial smoking cessation (SC) initiative, which was recently expanded across Canada. Utilizing a multi-pronged approach, both the Ontario and National Initiatives aimed to build nursing capacity to integrate smoking cessation best practices into daily practice through the leadership of Public Health Nurses (PHN), knowledge transfer activities, dissemination and use of the RNAO resources, specifically the clinical best practice guideline (BPG) "Integrating Smoking Cessation into Daily Nursing Practice" (RNAO, 2007). An evaluation study was conducted to explore the effectiveness of the Initiatives. A mixed-method approach was utilized, using quantitative method (web survey) to capture nurses' changes in SC practices as well as qualitative information (key informant interviews and case studies) to better understand the implementation processes and obstacles to successful adoption of the BPG by nurses and practice settings. The evaluation revealed the critical leadership role of PHNs in increasing nurses' knowledge base and skills in addressing SC, and promoting the project and the BPG uptake. Other key achievements include: acceptance and use of the BPG by the majority of nurses participated in the Initiatives, an increase in nurses' perceived levels of comfort and confidence in addressing SC, and nurses' widespread use of minimal SC interventions in their daily practice. Key barriers to BPG implementation and sustainability of cessation practices at the individual and organizational levels include: lack of staff time, funding, buy-in from senior management and limited availability of cessation resources. Findings support the value of utilizing a multiple pronged approach to develop and implement SC best practices. Overall, the Initiatives have made a remarkable progress in increasing nurses' capacity to consistently integrate SC interventions into daily practice. Organizational support is needed to ensure higher priority for SC and increase uptake of the BPG within practice settings.

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## POS2-8

### PERSONAL TRAINER FACILITATED REGULAR EXERCISE AND SMOKING CESSATION SUPPORT AS AN APPROACH TO QUITTING SMOKING

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Studies suggest that regular supervised exercise can improve quit rates and reduce nicotine withdrawal symptoms and cravings. Yet, further research is needed to understand how best to integrate the exercise and smoking cessation programs to enhance abstinence rates. Quit & Get Fit is a pilot study to examine whether a personal trainer led intervention that combines regular physical exercise and behavioural support for smoking cessation can lead to higher quit rates than a personal trainer facilitated exercise intervention alone. A parallel two-arm experimental design was applied and 197 male and female smokers were randomised to either an experimental arm (EA) or control arm (CA) –active comparator. Participants randomized to EA received 16 one-hour sessions during an 8 week period, combining both exercise and behavioural cessation support with personal trainers; those in CA received only 16 one-hour sessions of exercise support from personal trainers over the same period of time, plus a self-help smoking cessation booklet. Data were collected through web-based base-line and follow-up surveys. At the end of intervention, the self-reported 30-day smoking abstinence was 41.3% (the intention-to-treat (ITT) quit rate–23.9%) in EA and 36.4% (ITT–22.7%) in CA. However, no group differences were found. Smokers in both arms reduced their average daily cigarette consumption (from 12.2 to 6.7, P=0.001 in EA; from 12.9 to 8.1, P=0.001 in CA), although no significant differences were found between the arms. Smokers and quitters in both arms tended to increase their level of physical activity over time: median time spent doing vigorous physical activities increased from 120 to 180 minutes per week. Contrary to our hypothesis, participants in EA and CA were equally likely to report smoking cessation at the end of treatment. The study results suggest that supervised physical exercise combined with minimal self-help cessation support may be a useful strategy to promote quitting, reduce cigarette consumption, and increase physical activity levels. Additional participant follow-up (3 and 6 months post-intervention) is underway to verify these results.

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## POS2-9

### SMOKING BEHAVIOR AND PERCEIVED SMOKING PREVALENCE AMONG RESIDENTS OF A HIGH CANCER RISK COMMUNITY

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Research shows that African Americans suffer disproportionately from tobacco-associated morbidity and mortality. The purpose of this study was to examine smoking prevalence (actual and perceived), behaviors, and smoking-related social networks in an African American community in South Florida at high risk for tobacco-related cancers. Hypotheses included: 1) smokers would perceive the smoking prevalence in their community to be higher among adults and youth, compared to non-smokers; and 2) smoking-related social networks (friends and household) would be associated with perceived smoking rates. Method: SatSCAN geospatial modeling was used to identify areas of Florida that had high incidence rates of tobacco-related cancers. Cross-sectional data were collected by face-to-face interviews in an urban, low-income South Florida community with high rates of tobacco-related cancers (N = 220). The survey instrument, adapted from the Behavioral Risk Factor Surveillance System (BRFSS), assessed cancer-risk behaviors including: smoking, cancer screening, and dietary behaviors. Results: Participants were African American, mostly female (61%), middle-aged (M = 40), unemployed (60%), with a high school education (61%). In this sample, 34% of respondents were current smokers, 4% former smokers, and 62% non-smokers. There were no differences between smokers and non-smokers in their perceptions of prevalence of adults or youth who smoke (p>.05); both rated the prevalence in their community to be high. There was a significant difference between smokers and non-smokers in relation to social networks; smokers lived with more smokers (M = 1.5, SD=1.3, p = .01) and had greater numbers of friends (M = 3.0, SD=2.0, p = .01) who smoked. Networks were associated with perceived smoking prevalence among adults (p< .01) and youth (p<.01). However, only number of friends was a significant predictor, such that individuals in this community with more smoking friends estimated high smoking prevalence. In conclusion, this study highlights the need

to promote educational awareness about accurate smoking prevalence and provide resources for smoking cessation in high-risk, underserved communities.

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## POS2-11

### FACTORS THAT AFFECT SMOKING PHENOMENON: A CASE STUDY IN ALEXANDRIA

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**Background:** The aim of this study is to investigate the factors that affect smoking phenomenon in Alexandria and to assess the level of knowledge, attitudes and behavior of citizens about smoking problem. **Methods:** The study applied a descriptive, cross-sectional study with a random stratified sample based on Alexandria districts, the sample of the study divided into seven major strata based on the districts and Date collected through using individually administered questionnaire. The target population is smokers and non-smokers in Alexandria city aged 15 years and above. **Results:** The prevalence of smoking in Alexandria is 35% (51% among males, 11% among females). Cigarettes are the most widespread approximately 63.5% and the proportion of consumption is a pack of cigarettes per day. The phenomenon of smoking is in an inverse relation with educational level. The primary motivator to started smoking, whether male or female is their smokers' friends influence (30 % for males and 23 % for females), and the first reasons to quitting for both males and females is the health hazard of smoking (50 % for both). 85% of the population of Alexandria wants to make public places smoke-free by 70% endorsement by smokers and 96% of non-smokers. **Conclusions:** This first comprehensive survey in Alexandria shows a strong community support for smoke-free environment. Efforts are needed to implement tobacco control policies, especially smoke-free policies in Alexandria.

*Tobacco Free Initiative WHO Representative's Office in Egypt.*

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## POS2-12

### SOCIOECONOMIC DISPARITIES IN THE PREVALENCE OF SMOKING IN THE UNITED STATES (1985-2009)

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**BACKGROUND:** Substantial reductions in smoking rates have been observed in the US over the past four decades. Nevertheless, reductions in smoking prevalence may not have occurred among all sections of the population. While disparities in tobacco-related morbidity and mortality have long been identified between racial/ethnic groups in the US population, less is known about disparities in smoking prevalence. **AIM:** Temporal trends in adult smoking prevalence were characterized by smoker demographic and socioeconomic (SES) status, to quantify cross-sectional SES disparities as well as changes in SES disparities over the past 25 years. **METHODS:** Nationally representative data on the prevalence of adult current smoking was taken from Behavioral Risk Factor Surveillance Survey from 1985 through 2009. SES was defined by level of educational attainment; prevalence estimates were tabulated by demographic group crossed with SES. Average Annual Percent Change (AAPC) was computed to summarize the rate of change in prevalence, and the relative index of inequality (RII) was utilized as a measure of population health disparity regressing prevalence rates along a continuous measure of SES. **RESULTS:** While decreases in prevalence were observed across all SES levels, the rate of decline was steeper in the highest SES group (AAPC -3.7, 95% CI: -4.3,-3.2) compared with the lowest (AAPC -1.0, 95% CI: -1.4,-0.7). The RII analysis revealed that, at present, adults from the lowest SES group were 2.80 (95% CI: 2.61, 3.01) times more likely to smoke compared with highest SES adults. This observed disparity was consistent among SES strata within both genders and all racial/ethnic groups. **CONCLUSIONS:** Controlling for race and ethnicity, low SES is a significant contributor to disparities in smoking prevalence. Low SES individuals were three times more likely to smoke than high SES, among nearly all demographic groups. This disparity worsened among whites and blacks, but not Hispanics, over 25 years. In order for all sections of

the US population to reach the Healthy People 2020 goal of 12% prevalence, renewed efforts to address smoking uptake and use among low SES groups are needed.

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## POS2-13

### RESULTS FROM A FEASIBILITY AND ACCEPTABILITY TRIAL OF AN INTERACTIVE WEB-BASED INTERVENTION FOR NONDAILY SMOKING AMONG COLLEGE STUDENTS

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Despite dramatic increases in nondaily smoking among young adults, no research has focused on developing successfully interventions targeting nondaily smoking within the young adult population. Thus, we aimed to test the feasibility, acceptability, and potential effectiveness of a cessation intervention for nondaily smokers within the young adult population. We recruited 33 nondaily smokers (i.e., smoking between 4 and 25 days in the past 30 days) who responded to an online survey in Fall, 2010. Participants were emailed weekly for 4 weeks to respond to two questions, which asked for a timeline follow-back report of the number of cigarettes/day and drinks/day for the past seven days. Participants also completed a web-based survey at baseline, end-of-treatment, and 6-week follow-up. Each module covered a different topic specifically relevant to nondaily smoking (self-identification of a smoker vs. social stigma of smoking; bother and health risks of secondhand smoke [SHS] exposure; social influence and alcohol use influencing smoking; health consequences and progression of nondaily smoking). Each module included graphical tailored feedback regarding smoking and drinking; targeted information related to the week's topic; and a humorous one- to two-minute video illustrating the week's message. Significant changes were found from baseline to end-of-treatment measures in number of days smoked and days drank in the past 30 days, motivation and confidence in quitting smoking, perceptions of health risks and burden of SHS exposure, difficulty in drinking alcohol without smoking, and perceived health risks of nondaily smoking (ps<.05). We maintained adherence of 87% across the four-week period. Participants also reported that the intervention was acceptable, such that the messages were relevant, understandable, interesting, and influential in their motivation to quit smoking. This study suggests that messages specific to the nondaily smoking young adult population may be critical in delivering meaningful and effective cessation interventions among this population.

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## POS2-14

### CHANGES IN TOBACCO USE OVER A ONE-YEAR PERIOD AMONG COLLEGE STUDENTS

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Little is known about the transitions that occur in tobacco use among college students. The aim of the current study was to examine changes in tobacco use among college students over the course of a one-year period among college students, specifically examining if prior cigarette users were more likely to initiate use of other tobacco products (i.e., cigars, little cigars, cigarillos, chew, snus, hookah) and marijuana and the impact of alcohol use on progression of tobacco use among college students. We recruited 2,115 participants who completed a survey in Fall, 2010 to complete an online survey in Fall, 2011. We recruited all participants who reported any form of tobacco use in the past 30 days on the 2010 survey (n=1615) and 500 participants who reported no use of any tobacco product in the past 30 days on the 2010 survey. We achieved a response rate of 31.8% (n=673/2,115). We assessed any experimentation with tobacco products or marijuana in the past year, number of days of use of each tobacco product and marijuana in the past 30 days, alcohol use (days of drinking, average number of drinks per day, and days of binge drinking), and sociodemographic information. Bivariate analyses indicated that any baseline cigarette use in 2010 predicted experimentation of other tobacco use and marijuana use in the past year, higher levels of alcohol consumption in the past 30 days at 2011 assessment, and higher levels of cigarette consumption in the past 30

days at 2011 assessment ( $p < .05$ ). We also found that use of other tobacco products (except cigarettes) predicted experimentation with cigarettes and marijuana ( $p < .05$ ). Multivariate analyses indicated that greater increases in cigarette consumption was related to experimentation with other tobacco products, experimentation with marijuana, and greater increases in alcohol consumption ( $p < .05$ ). This study highlights the need to understand and predict increases in cigarette consumption and experimentation with other tobacco products and marijuana and the role of alcohol consumption in this process.

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## POS2-16

### WHO WANTS TO QUIT: PILOT TEST OF THE RECENT TOBACCO USE QUESTIONNAIRE (RTUQ)

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The Web is an inexpensive, immediate venue to help smokers quit. A new Web tool, The Recent Tobacco Use Questionnaire (RTUQ), provided stop-smoking recommendations for 2,586 current and former smokers at smokefree.gov in 2010-11. The RTUQ assessed smoking patterns and explored personal and environmental factors and gave tailored advice. Questions were adapted from national and state surveys and the authors' prior research and were based on the Theory of Planned Behavior. RESPONDENTS: All U.S. states and varied income levels were represented. More than half of respondents were from low-income areas. Demographics reflected diversity in age, location, and education, but not in race. Common threads were motivation to quit and concern about health effects and expense of smoking. 90% used cigarettes; 87% smoked an average of 18/day. 2/3 were women, most ages 26-55 with post-high school education. 20% had ever been quit longer than a year. 67% said withdrawal symptoms were a barrier to quitting. DATA QUALITY: Analyses examined response quality, determined by indications of confusion, difficulty responding, inadequate responding, and abandons. Extreme responses occurred only in estimating cigars/day. Inappropriate straightline responding on grid questions occurred in 2 cases. Analysis of completion time identified 3 respondents with low-percentile completion time. Abandonment mid-questionnaire occurred on a question about reasons for wanting to quit. Also, endorsing an "other" response category increased instances of abandonment. RESULTS: Respondents were dependent smokers anxious to quit but wanting help. The 32% ever-use of cigars and 18% of smokeless supported the advisability of providing quitting recommendations for multiple types of tobacco. 66% of smoker respondents said they were very likely to quit within 6 months, although 36% expressed low confidence. Reasons for quitting were health (90%), cost (80%), desire to be active (71%), and pressure from others (66%). CONCLUSION: With careful design and psychometric rigor, Web-based tools can attract and engage smokers hoping to quit and provide them with tailored advice.

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## POS2-17

### RESULTS OF A RANDOMIZED TRIAL COMPARING AN ONLINE SMOKING CESSATION PROGRAM TO A SELF-HELP BOOKLET AND TELEPHONE QUIT LINE AMONG YOUNG ADULTS

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The Internet is a promising channel for smoking cessation but comparisons to established methods are limited. An online cessation program, Real e Quit (REQ), was developed with tailored counseling, e-cards for social support, quitting testimonials, and a cessation blog. REQ was compared against a self-help booklet and telephone quit

line in a randomized pretest-posttest trial with 12- and 26-week follow-up. Young adult smokers (<30; n=3,310) were recruited in the U.S. (64% female; 83% non-Hispanic white, 62% employed; mean=16.6 cigarettes/day). Pretests and randomization occurred online and posttests, online with telephone and mail follow-up. Smokers could request a 2-week supply of free nicotine patches (NRT). The findings indicated that at 12-weeks, actual use of REQ and the quit line increased quits (used either service=18.1%; not used=13.9%;  $p < 0.034$ ) but surprisingly booklet use decreased quits (read booklet=13.2%; not read=20.0%; used REQ=16.9%, not use=14.5%; condition  $x$  use  $p = 0.046$ ). However, overall quit rates did not differ significantly by condition (REQ v. quit line 12-week  $p = 0.189$ , 26-week  $p = 0.363$  REQ v booklet  $p = 0.061$ ,  $p = 0.320$ ), possibly due to limited actual usage of the treatments when provided. The benefit of using REQ and quit line was moderated by NRT use ( $p = 0.019$ ). When NRT was used for  $\leq 2$  weeks, more smokers who used either REQ or telephone quit line quit (use=15.6%, not use=7.6%), but when NRT was used for 3+ weeks, again surprisingly, fewer smokers who used either service quit (use=24.2%, not use=32.0%). The effect of REQ on quitting was not different from that of quit lines for young adults and is potentially effective when used without NRT. Mechanisms for increasing use of such programs must be found. The negative effect of using the booklet generally and of using any cessation service when using NRT suggests that some smokers sought help only when having problems quitting on their own or when medication was not working. This may be unique to young adults. They often do not seek help quitting, smoke lightly, or have low motivation to quit, so they may try the simplest method—quitting on their own—and seek help only when that fails.

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## POS2-18

### EFFECT OF NICOTINE REPLACEMENT THERAPY ON QUITTING BY YOUNG ADULTS AND PREDICTORS OF USE FROM A TRIAL COMPARING SMOKING CESSATION SERVICES

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Nicotine replacement therapy products (NRT) can improve quitting but many smokers do not use NRT. Young adult smokers (<30; n=3,310; 64% female; 83% non-Hispanic white, mean=16.6 cig./day) enrolled in a randomized trial comparing cessation services (website, telephone quit line, self-help booklet) could request a 2-week supply of free nicotine patches. Use of NRT was assessed in 12- and 26-week posttests. Among completers (12-week n=1,448, 26-week n=1,131), 35.0% and 29.9% did not use NRT, 35.4% and 33.1% used it for 1-2 weeks, and 29.6% and 37.0% used it for >2 weeks, respectively. At 26-weeks, smokers who used NRT for >2 weeks had continuous abstinence rates (31.3%) twice as high as those using NRT for 0-2 weeks (15.3%,  $p < .001$ ; 12-weeks: 28.7%, 10.4%,  $p < .001$ ). At both posttests, NRT use for >2 weeks was significantly higher ( $p < .05$ ) among young adult smokers who were assigned to the self-help booklet, were older, binge drank alcohol less frequently, and did not smoke marijuana. At 12 weeks, NRT use for >2 weeks was higher ( $p < .05$ ) for those who spent more time on the Internet and had higher nicotine dependence, while at 26-weeks, it was higher ( $p < .05$ ) among non-Hispanic white smokers, and those who lived in homes where smoking is allowed for some places, times or people. NRT appears to help young adult smokers quit, but only a minority used it >2 weeks. NRT was used most by those quitting on their own with a self-help booklet. Use might have been higher if more than a 2-week supply was available for free. Boosting NRT use among younger, minority, and less dependent smokers may increase successful quitting in this population. Binge drinkers and marijuana users may be less motivated to quit so they use NRT less.

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**POS2-19**

**STUDENT INTEREST IN INCENTIVE-BASED TOBACCO PREVENTION/ CESSATION PROGRAMS IN MIDDLE SCHOOLS**

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There is growing interest in using behavioral incentives to encourage smoking cessation in older adolescents, but the acceptability of incentives to promote a tobacco-free lifestyle in younger adolescents is unknown. In the process of developing a novel incentive-based intervention, we ascertained, in middle school students, whether interest in and perceptions of this program differed by tobacco-use status and intention to smoke. We surveyed middle schools students attending three Connecticut middle schools (grades 6-8) (n=988). Information was collected regarding level of interest in a school-wide incentive-based program, perceptions of optimal program design, tobacco use behaviors, and intention to smoke (Fischbein & Azjen's intention to smoke subscale). Six percent of students reported current/ever use of tobacco and 14.3% reported future intention to smoke. The majority of students (61.8%) reported probable/definitive interest in program participation. Younger students (ages 11-12) were more likely to report program interest than older students (ages 13-15) (p=0.003). Interest did not vary by gender, race, or tobacco use status, but a larger proportion of students without positive intention to smoke reported interest (65.1% vs. 50.3%; p=0.002). Students with ever/current tobacco use (63.9% vs. 31.9%; p<0.001) and with positive intention to smoke (60.7% vs. 31.6%; p=0.0008) reported greater interest in a larger value incentive (\$100) than students without tobacco-use history or intention. Gender, age, and race did not predict the amount of incentive necessary to join the program. Middle school students reported high levels of interest in an incentive-based program to encourage a tobacco-free lifestyle. These results provide formative data that can inform the design of incentive-based smoking cessation and prevention programs in middle schools.

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**POS2-20**

**EXPERIMENTAL STUDY OF GRAPHIC WARNING LABELS OVER TIME EXAMINED BY RACE/ETHNICITY AND SOCIOECONOMIC STATUS**

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A compelling body of research has emerged in recent years demonstrating the effectiveness of graphic warning labels on cigarette packages for encouraging cessation among adult smokers. Yet few experimental studies have examined the efficacy of text and pictorial warning messages across diverse racial/ethnic and socioeconomic groups. Further, there is little data on how individuals of any racial/ethnic or socioeconomic group respond to warning statements and graphic images with multiple exposures over time. In June 2011, the U.S. Food and Drug Administration issued final regulations on the 9 warning statements and pictorial images that are required under the 2009 Family Smoking Prevention and Tobacco Control Act. The objective of the current study is to evaluate the relative efficacy of the 9 text warning statements compared with text warning statements + graphic images across a racially/ethnically and socioeconomically diverse sample over time. An online randomized experimental study is currently being conducted among a sample of 2,900 smokers with approximately equal distributions across race/ethnicity (White, African-American, Hispanic) and socioeconomic status (< 150% of federal poverty level [FPL], between 150-300% of FPL, > 300% of FPL). Individuals were randomized into 1 of 18 groups (9 experimental and 9 control) and will view a single warning statement or warning statement + graphic image at baseline; participants will view the same text or text + graphic image at 2 weeks and 4 weeks. At each time point, we will assess participants' responses to the text or text + image (e.g., emotional and cognitive reactions, perceptions of effectiveness, intentions to quit, health-related beliefs, recall of quitline 1-800 number). Generalized estimating equations will be used to examine the impact of text versus text + graphic image, as well as changes in impact over time across defined groups. Findings will provide valuable information to researchers and policymakers interested in the effect of new federal warning label policy across diverse populations.

This study was conducted by Legacy Foundation.

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**POS2-21**

**NO SMOKERS LEFT BEHIND: USING INTERACTIVE VOICE RESPONSE TECHNOLOGY TO RECYCLE LOW INCOME SMOKERS BACK TO QUITLINE TREATMENT – A RANDOMIZED CONTROL TRIAL**

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Tobacco dependence is a chronic relapsing condition that typically requires multiple quit attempts and extended treatment including behavioral counseling and pharmacotherapy. Unfortunately, tobacco cessation treatment is rarely designed to address the chronic nature of tobacco dependence. We will present results of a randomized control trial testing the efficacy of Interactive Voice Response (IVR) in recycling low income smokers who used Quitline (QL) support in the past in a new QL supported quit attempt. The sample of 2985 individuals who had called two state QLs in the past were randomized to receive IVR screening for current smoking (control condition) or IVR screening and – for those reporting current smoking - automated questions aimed to identify barriers to re-engagement in QL support followed by brief tailored messages to address these barriers and an offer to be re-enrolled in the QL (either automated transferred to a live coach or to receive a call back by the QL staff later). The IVR system successfully reached 715 (23.9%) participants. Of those, 194 individuals reported to the IVR system that they had quit smoking (defined by "not a single puff in the last 30 days") and were therefore excluded from the study and analysis. The trial final sample was comprised of 521 current smokers. The re-enrollment rate was 3.3% for the control group participants and 28.2% for the intervention condition (p<.001). Logistic regression results indicated an 11.2 times higher odds for re-enrollment of the intervention group than the control group (p<.001). Results did not vary significantly by gender, race, ethnicity or level of education, but recycled smokers tended to be older than smokers that declined a new treatment cycle. The main barriers reported for not engaging in a new treatment cycle were low self-efficacy and lack of interest in quitting. After delivering IVR messages targeting these reported barriers, 32 % of the smokers reporting low self efficacy and 4.8 % of those reporting lack of interest in quitting re-engaged in a new QL treatment cycle. IVR is a promising tool to engage relapsed smokers in a new cycle of treatment.

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**POS2-22**

**CIGARETTE CHARACTERISTIC VARIATIONS ACROSS HIGH-, MIDDLE- AND LOW-INCOME COUNTRIES**

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Previous studies have shown that as a country's income level increases, cigarettes become more highly engineered (O'Connor et al 2010). To further examine cigarette product modifications to low- and middle-income countries, cigarettes (N=111) were purchased during 2008-2010 from 11 low-, middle- and high-income countries. Physical dimensions, tobacco moisture and weight, paper porosity, filter ventilation and pressure drop were measured. Basic descriptive statistics, analysis of variance and stepwise linear regressions were performed using SPSS 16.0. Consistent with earlier work, mean ventilation varied across low- (7.5%), middle- (15.3%), and high-income (26.2%) countries (p=0.00). Differences in physical cigarette parameters across income levels were also seen in cigarette length (p=0.001), length of the tipping paper (p=0.01), filter weight (p=0.017), number of vent rows (p=0.003), per cigarette tobacco weight (p=0.04), and paper porosity (p=0.008). A stepwise linear regression of tar by income level show ventilation and tobacco length as predictors for differences of cigarettes in low- (p = 0.909, 0.047) and middle-income (p = 0.012, 0.001) countries, while ventilation (p=0.0), per-cigarette weight (p=0.0), cigarette length (p=0.055), filter diameter (p=0.004), number of rows (p=0.009), and length of tipping paper (p=0.015) determined differences in tar in high-income countries. Regression of nicotine by income level showed ventilation (low-income, p= 0.385; middle-income, p= 0.004; high-income, p= 0.0) and per cigarette weight (low-income, p= 0.013; middle-income, p= 0.0; high-income, p= 0.003) as the first two predictors, with filter weight (p=0.078), number of vent rows (p=0.0), and tobacco length (p=0.046) as the third factors in low-, middle- and high-income countries, respectively. Similar to previous research done on the topic, cigarette engineering differs by a country's economic development. Health officials in low- and middle-income countries must continue to work toward understanding the role of cigarette design, in

order to provide context to measures of smoke constituents, so as not to repeat mistakes made over decades in high income countries.

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## **POS2-24**

### **AN ANALYSIS OF 388 COMMERCIAL ANTIQUE POSTCARDS (1900-1934) PORTRAYING THE EARLY SOCIETAL EVOLUTION OF WOMEN'S SMOKING BEHAVIOR**

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During the first 35 years of the 20th century, millions of U.S. and European novelty postcards covering a wide variety of topics were shipped annually to world-wide markets. Under today's scrutiny, these cards provide a valuable source of information regarding societal issues, behavioral patterns and trends in tobacco use. The authors have accumulated and studied 388 distinct, antique, commercial postcards which portray adult women smoking. Dated between 1900 and 1934, none of them had been issued by tobacco companies. **FINDINGS:** Of this sample, 149 (38%) are actual photographs and 239 (62%) are drawings. These cards, from 21 countries, are listed here by production percentage: United States (32%); France (22%); Germany (19%); England (14%); Belgium and Italy (both 4%), and Sweden (2%). Algiers, Austria, Czechoslovakia, Egypt, Holland, Hungary, Martinique, Mexico, Norway, Philippines, Russia, Spain, Switzerland and Tunisia individually produced less than 1 percent. In spite of the strong moral opposition to women's cigarette use during that period, these novel postcards were not basically designed to be either judgmental or promotional. Rather, they emphasized three themes: romance, fantasy, and women's emancipation. In our collection, 93 cards (24%) illustrate men experiencing romantic reveries of attractive women, bellowing from their exhaled smoke. Forty postcards (10%) depict men and women intimately smoking together, while twenty four (6%) show women who are engaged in tobacco-induced flights of fancy. Only eighteen cards (5%) showed women smoking with other women. By 1918, these beautiful, daring females were becoming significant role models for gender equality, a goal which included the right to smoke openly.

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## **POS2-25**

### **IS SMOKING THE LEAST OF THEIR PROBLEMS? CHANGES IN ATTITUDES AMONG SOCIAL WORKER TOWARDS SOCIALLY VULNERABLE PEOPLE AND SMOKING CESSATION**

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Smoking cessation among socially vulnerable people (drug addicts, mentally ill, homeless people) pose a challenge to both public health professionals and social workers. As part of a national intervention project in Denmark, we conducted two surveys – before and after the intervention – on attitudes among social workers towards the socially vulnerable and smoking cessation. The first survey consisted of a questionnaire with 25 questions relating to smoking patterns and attitudes. The study population included a total of 1059 managers, staff members, and socially vulnerable citizens. The follow-up questionnaire included 35 questions on smoking, attitudes as knowledge gained from training seminars. The study population was 707 managers, staff members, and socially vulnerable citizens. In the pre-intervention study, only 19 % of managers and staff members believed that the socially vulnerable wish to quit smoking and as few as 16 % of staff members believed that socially vulnerable people are able to quit smoking. In the follow-up study, there was a significant change in both attitudes: 34 % of managers and staff believe that the socially vulnerable are able to quit smoking. And 29 % believe that the socially vulnerable wish to quit. During the intervention period, members of staff participated in training seminars where facts about socially vulnerable and smoking cessation were presented and discussed, including findings from the initial survey. The underlying idea was that helping smoking cessation along is a task for all members of staff. The seminars provided skills to identify opportunities to talk about smoking as well as techniques for short motivational interviewing. Results from the follow-up study

show that two-thirds of attendees at training seminars received new knowledge and skills. Those who report to have gotten new knowledge in turn express different attitudes compared to those who have received little or no new knowledge. In conclusion, attitudes among social workers can be a barrier to successful implementation of smoking cessation programmes but attitudes can be changed by a focused intervention.

*The research is part of an intervention, "Freedom from smoking for everybody", which is funded by the Danish Ministry of the Interior and Health.*

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## **POS2-26**

### **PUBLIC ATTITUDES REGARDING BANNING OF CIGARETTES AND REGULATION OF NICOTINE**

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The Food and Drug Administration's (FDA) new authority to regulate tobacco products under the Family Smoking Prevention and Tobacco Control Act (FSPTCA) precludes the banning of cigarettes; but the law does allow the FDA to reduce nicotine in cigarettes, the primary substance that leads to addiction. The Tobacco Product Scientific Advisory Committee, established by the Act is responsible to make recommendations to the Secretary regarding the effects of altering nicotine yields of cigarettes, and whether or not a threshold level exists below which a tobacco product does not produce dependence. Knowledge of current public opinion is valuable to the FDA as it applies the best scientific evidence available to tobacco product regulation within a highly politicized environment. A nationally representative public opinion survey of U.S. adults, ages 18 years and older, obtained by bilingual random-digit-dialing of landline telephones in households and cell phone numbers was conducted May 18th - June 5th, 2011. Respondents were asked how strongly they agreed or disagreed with the statement that cigarettes should be banned in the U.S.; and which if any actions by the FDA regarding nicotine in cigarettes they would support. Of 2,913 respondents, 1,021 qualified to complete the interview. Approximately two in five persons (43%) supported the banning of cigarettes, two in three (65%) persons supported reducing nicotine in cigarettes to non-addictive levels, and more than three in four persons, (77%) smokers and non-smokers alike, reported supporting the reduction of nicotine if it could prevent fewer children from becoming addicted or hooked on cigarettes. The FDA and its advisory committee should move promptly to investigate reducing nicotine in cigarettes to non-addictive levels as mandated by FSPTCA. Considering scientific understanding of nicotine dependence, prior experience of government regulatory actions that reduced substance abuse of cocaine and opium, the purpose of the FSPTCA, and broad public support, the FDA should begin a process that could at least better protect children by removal over time of all but non-addictive cigarettes from the marketplace.

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## **POS2-27**

### **SUBSTANCE ABUSE AND ADDICTION MEASURES IN THE PHENX TOOLKIT**

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The PhenX (consensus measures for Phenotypes and eXposures) Toolkit (<https://www.phenxtoolkit.org/>) offers 295 high-quality, well-established, standard measures of phenotypes and exposures selected by expert scientists. The Toolkit provides detailed protocols, rationale for selection, references, and other information. There is no cost for using the Toolkit, and most measures are relatively low burden for both investigators and study participants. A PhenX measure is defined as a standardized way of collecting data on a certain characteristic, such as a question, variable, or biospecimen from a well-established protocol. When multiple studies include the same

PhenX measures, it is easier to combine data sets (following the notion that data are only directly comparable if the same protocol is used to collect the data), thus increasing statistical power and the ability to detect more subtle and complex associations among variables. Currently, the Toolkit addresses 21 research domains, including an Alcohol, Tobacco, and Other Substances domain with 14 measures related to substance abuse and addiction (SAA). A project was launched in early 2011 to create six "Specialty" Collections (sets of measures related by a specific topic and grouped together) and one "Core" Collection of SAA-related measures. A SAA Scientific Panel of 10 academic and federal governmental scientists was assembled to select and define the initial scope of the six Specialty Collections: (1) Assessment of substance use and substance use disorders; (2) Substance-specific intermediate phenotypes; (3) Substance use-related neurobehavioral and cognitive risk factors; (4) Substance use-related psychosocial risk factors; (5) Substance use-related community factors; and (6) Substance use-related co-morbidities and health-related outcomes. SAA working groups (WGs) of experts recommend up to eight high-priority measures for each Specialty Collection, followed by a consensus-based process that includes input from the scientific community. We present the rationale and preliminary results from the SAA Scientific Panel and the three WGs. Up to 48 new SAA measures will be added to the Toolkit by spring 2012.

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## POS2-28

### HARDENING OF THE TARGET? LOOKING FOR THE ANSWER FROM STATE QUITLINE DATA

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There has long been concern that, as smoking prevalence decreases, there will be a "hardening of the target." That is, the remaining smokers are a "hard core" group who will have greater difficulty in quitting. Population data have not supported this hardening hypothesis. However, there is evidence from clinical trials that quit rates have decreased over time among treatment-seeking smokers. Differences between clinical and population findings may reflect differences in the smokers that are included in the analyses. Clinical trials often use restrictive eligibility criteria whereas population surveys are designed to be representative of smokers at large. Telephone based state cessation quitlines provide individual treatment to a large and diverse population of smokers and use few restriction criteria. As such, these programs bridge the clinical and population approaches. This study examined data from the California Smokers' Helpline for evidence of increased difficulty in quitting among treatment seekers. The quitline conducts ongoing evaluation of a randomly selected sample of callers each month using a procedure that has been consistent over 5 years. In this study we compare quit outcomes from an earlier randomized trial to quit outcomes for each of the last five years. As expected, there is some variability in the numbers over the years, but there has been no significant change in the 30-day point prevalence rate. The percent of subjects who were quit for 30 days or more at the time of the 7 month evaluation was 23.6% in the trial and 23.9%, 26.4%, 22.0%, 22.5%, and 24.4% for the last 5 years, respectively, Chi Square (5, 5740) = 4.72,  $p = 0.45$ . Over the same time there has been an increase in the number of low SES callers who are often seen as having a harder time quitting. This presentation will address the "hardening hypothesis" as well as implications for quitline intervention and reach.

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## POS2-29

### DO SMOKERS CONCEAL THEIR SMOKING STATUS FROM HEALTH CARE PROVIDERS?

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An unintended consequence of the success of tobacco control in marginalizing smoking is that smokers may conceal their smoking status from those who are best positioned to help them quit: health care providers (HCPs). We identify the prevalence of nondisclosure of smoking to HCPs using a large, nationally representative sample. Factors related to differential nondisclosure were examined. Data were obtained

from a cross-sectional survey of adults from a nationally representative Knowledge Networks online panel in March-April 2011. Current and former smokers ( $n=2,803$ ) were asked questions about nondisclosure, tobacco use, cessation behavior, and perceived social unacceptability of smoking. All variables significantly related ( $p$ -value  $< 0.05$ ) to nondisclosure in bivariate logistic regression were included in the multivariate logistic regression model, which also adjusted for gender, age, race, marital status and education. Approximately one in ten smokers (12.9%) has withheld their smoking status from HCPs. Respondents who were 18-34, those who had talked to a nurse, doctor, or dentist and those who had used a program, class, or support group in their last or final quit attempt, and those who were uncomfortable discussing smoking with their HCP were more likely to keep their smoking status a secret than those in their respective comparison groups. Respondents who perceived either medium or high smoker-related stigma ( $OR=1.69$ , 95%  $CI=1.03, 2.77$  and  $OR=2.39$ , 95%  $CI= 1.44, 3.98$ , respectively) and those who reported keeping smoking a secret to gain benefits from health insurance were also significantly more likely to have kept smoking a secret from an HCP ( $OR=5.82$ , 95%  $CI= 2.13, 15.91$ ). Because disclosure of smoking is essential for HCPs of many different specialties, smokers should be encouraged to be forthcoming about their smoking in order for practitioners to offer treatment and services that increase smokers' chances of quitting.

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## POS2-30

### TARGETING "CONNECTORS" IN A STATEWIDE TOBACCO CONTROL MEDIA CAMPAIGN

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Introduction: Interpersonal conversation can act as a powerful diffuser of information. When an individual talks about a health campaign in his or her social network, the number of people exposed to campaign ideas increases exponentially. However, when it comes to spreading information, some people may matter more than others. Recent research suggests that "connectors", people with large social networks and strong community ties, are more likely to talk about campaign messages, and have greater influence on others when doing so. In this abstract, we present data from a statewide study that attempted to stimulate interpersonal communication among connectors for the purposes of spreading campaign messages. Method: A state-wide, representative survey was conducted in May 2011 as part of a larger 18 month longitudinal study on the impact of ClearWay Minnesota's tobacco control media campaign. Results: Results suggest the campaign did stimulate interpersonal conversation. Participants with confirmed awareness of the 4 campaign ads talked more frequently about the negative consequences of tobacco than those without confirmed awareness ( $p < .05$ ). Based on factor analysis, connectivity consisted of two sub-scales: level of activity in various groups and level of influence among peers. Participants high in both activity and influence reported greater campaign awareness than non-connectors ( $p < .05$ ). Influencers also talked about the negative consequences of tobacco more frequently than non-influencers ( $p < .05$ ). Discussion: Overall, the campaign was able to stimulate interpersonal conversation. Those reporting ad awareness were more likely to talk about the negative aspects of tobacco use. Furthermore, results suggest that connectors were both more likely to be aware of campaign content, and on the influence side, more likely to talk about the content than non-connectors. This suggests that the campaign was successful in not only stimulating talk, but stimulating talk among the "right" people. This study provides an important illustration of the importance of stimulating interpersonal conversation among connectors in health media campaigns.

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## POS2-31

### IDENTIFYING DEMOGRAPHIC AND SMOKING CHARACTERISTICS OF NON-ESTABLISHED SMOKERS—NSDUH 2008-2009

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Recent estimates suggest that intermittent smoking is becoming more common smoking pattern among US adult smokers. Yet, the standard adult definition of current smoking (smoked  $\geq 100$  lifetime cigarettes and currently smoke daily or some days) frequently used in public health surveys may fail to identify intermittent smokers who would otherwise be classified as non-smokers. Since any amount of smoking poses health risks, an analysis that identifies the proportion of the US adult population who smoke intermittently may determine how well the current definition of smoking identifies all smoking patterns. We used data from 2008-2009 National Survey on Drug Use and Health (NSDUH), an annual household survey of US civilian, non-institutionalized population. We used the 100-cigarette criterion to classify adult ( $\geq 18$  years) established (EST; smoked  $\geq 100$  cigarettes + smoked  $\leq 30$  days in past month) and non-established (N-EST; smoked  $< 100$  cigarettes, smoked within past year, but may or may not smoked in past month) smokers. We calculated weighted proportions and logistic regression to examine demographic (sex, age, race), smoking and substance use behaviors (initiation, cigarette type, poly-tobacco, and other drug use) as predictors of N-EST smoking. Preliminary results showed that current smokers encompass 23.3% EST and 3.6% N-EST smokers. Majority of N-EST smokers were male (54.0%), white (56.1%), 18-25 year olds (57.4%). Significant sex, race, and age differences were found across various demographic groups and smoking behaviors. Compared to EST smokers, Blacks, Hispanics, and Asians (ORs= 1.4, 1.6., 2.0), those 18-25 year olds (OR=12.4), those who initiate smoking as adults (OR= 3.8), and smoke menthol (OR=1.2) were more likely to be N-EST smokers. Sex, poly-tobacco use, alcohol, and illicit drug use were not significant in the model. 3.6% of adults would have been considered non-smokers using the standard adult smoking definition and rates continue to vary by demographic groups. Research focusing on the psychosocial and behavioral predictors of N-EST smoking, particularly among 18-25 year olds, and future trajectory of this smoking pattern is still needed.

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## POS2-32

### YOUNG ADULT SMOKING CESSATION: WHAT PREDICTS SUCCESS?

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Background: Across North America, smoking prevalence is highest among young adults. Understanding the cessation behaviors in this population is critical given their higher smoking rates; however, there is a paucity of prospective studies from a population-based sample of young adult smokers. Objectives: Characterize young smokers and identify the rate of making a quit attempt and smoking cessation among a representative sample of young adult smokers. Guided by the Social Cognitive Theory, this study examines the interpersonal predictors of cessation in early adulthood. Methods: Self-report data on 592 young adult smokers were compiled from the Ontario Tobacco Survey baseline and six-month follow-up interviews. Smoking cessation behavior was measured using these ordinal levels: made no attempt to quit, made a quit attempt that lasted for less than 30 days, and successfully quit for 30 days or longer. Design-based analyses examined the characteristics of young smokers; making a quit attempt and smoking cessation were modeled on interpersonal factors while accounting for the complex study design. Results: One in four young adult smokers made a quit attempt while 14% successfully quit for 30 days or longer; 61% made no attempt to quit smoking. Having an intention to quit smoking and having made two or more lifetime quit attempts predicted making an attempt to quit; the use of smoking cessation resources and knowledge of the benefits of stop smoking medications also contributed to making a quit attempt. Self-efficacy, use of smoking cessation resources and having support were positive predictors of young adult smoking cessation whereas high levels of addiction was a negative predictor. Conclusions: Different factors predicted making a quit attempt and smoking cessation among young adults. Smoking cessation interventions for this population should provide social support and skills to build and maintain self-efficacy to quit. Young adult smokers must have effective smoking cessation aids and services that are appropriate and easily accessible. We need research to understand long-term smoking cessation and relapse in this vulnerable population.

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## POS2-33

### IMPACT OF HAWAII'S SMOKE-FREE LAW ON TOURISM

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Objective: To determine the association between changes in indicators of tourism and the Hawaii smoke-free law. Methods: Data regarding the number of tourist arrivals, length of tourist stay, average daily spending and average monthly spending was obtained from Hawaii's Department of Business, Economic Development & Tourism website for overall tourists, and those specifically from Japan. Descriptive statistics were reported before and after the law and linear regression was used to assess the relationship between the implementation of the law and changes in indicators of tourism while adjusting for underlying economic factors. Results: Regression analyses that controlled for underlying economic trends revealed that arrivals to Hawaii have increased since the implementation of the law and that declines in arrivals and tourist spending are associated with economic trends, such as increasing unemployment percentage in the United States. Among Japanese tourists, increases in the Nikkei stock index volume were associated with increased arrivals to Hawaii, and the March 2011 Tsunami was associated with a decline in visitor arrivals. Conclusions: There is no evidence that the smoke-free law significantly harmed the tourism industry of Hawaii as a whole. Other economic factors and natural disasters may be the driving force for any observed decline in tourist arrivals and tourist spending.

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## POS2-34

### VARIABLES PREDICTING CURRENT SMOKERS WHO SUPPORT SMOKEFREE POLICIES

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Introduction: In the general population, support for tobacco control issues such as smokefree policies or price increases on tobacco products is highest among never smokers, then former smokers, and lowest among current smokers. Interestingly, our survey studies always find a significant minority of current smokers do support tobacco control issues. Purpose: To determine variables that predict current smokers who support comprehensive smokefree policies. Method: Using survey data from 3453 attendees of five 2011 Pride Festivals, a logistic regression model examines predictors of support for comprehensive smokefree policies among current smokers including: age, race, education, SGM status, subtype of current smoking (light, moderate, heavy daily smoker; some days smoker), readiness to quit, partner smoking status, smoking policy at home, smoking policy while in a car, alcohol use, and frequency of attending bars. Results: The current smoking rate of the sample is 37% with 44% of smokers indicating support for smokefree workplace laws. Variable predicting support for smokefree policies include those persons trying to quit or planning to quit are more likely than those not thinking about quitting smoking ( $p = .004$ ); Smokers who do not allow smoking in their home ( $p = .0009$ ); and a smoker who does not allow smoking in any vehicle when they travel compared to those who will sometimes allow smoking ( $p = .032$ ) or always allow smoking ( $p < .0001$ ). Conclusion: Current smokers with increased readiness to quit and personal rules that prohibit smoking in selected private environments predict support for comprehensive smokefree policies.

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## POS2-35

### ASSESSING PUBLIC OPINION ON TOBACCO POLICIES IN NEW YORK CITY

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**Background:** Since 2002, New York City (NYC) has had a comprehensive tobacco control program. To measure current and short-term changes in public opinion on these policy initiatives and inform community outreach and advocacy activities, a longitudinal survey of smokers and non-smokers was conducted. **Methods:** A longitudinal random-digit-dial cross-sectional phone-survey of landline and cell-phones of 1,440 adults in two waves was conducted in NYC. Wave I, August 2010, included 685 smokers and 762 non-smokers; Wave II, April 2011, included 715 smokers and 725 non-smokers. Smoking behaviors, awareness of tobacco regulations, and attitudes toward tobacco control policies were assessed. Smokers were over-sampled and results weighted to NYC's current smoking prevalence. **Results:** Overall, broad support existed in both waves for limiting access to tobacco products, price increases, and limiting areas where smoking is allowed. Several statistically significant increases at the  $p < 0.05$  level were observed from Wave I to Wave II. Support for tax increases on cigarettes if funds are used for programs to prevent and treat smoking increased from Wave I to II (71% to 75%). Increases in other areas were only among non-smokers. Among non-smokers, support for raising the legal minimum age to purchase cigarettes from 18 to 21 years increased (67% to 72%). Small increases in support among non-smokers were also seen related to regulating smoking in public places: prohibiting smoking in all outdoor areas on college and university campuses (53% to 58%), public parks (52% to 58%), recreational areas such as basketball courts and baseball fields (62% to 64%), in front of entrances to buildings (60% to 64%), and on sidewalks (43% to 51%). **Conclusions:** There are high levels of support among smokers and non-smokers for tobacco control policies that can contribute to decreases in smoking initiation, consumption and prevalence. While responses from smokers remained consistent from Wave I to II, support among non-smokers for some policies increased. This survey was conducted after eight years of a comprehensive tobacco control program in NYC, which could explain the high baseline support.

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## POS2-36

### AWARENESS AND IMPACT OF TOBACCO HEALTH WARNING SIGNS AT THE POINT OF SALE

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**Background:** To increase knowledge of smoking-related health risks and provide smoking cessation information at the point of sale (POS), in 2009 New York City (NYC) required the posting of graphic POS tobacco health warnings in tobacco retailers. Signs depict graphic images of lung cancer, stroke and tooth decay and provide smoking cessation assistance information. In 2010 NYC was sued over the requirement to post warning signs and the law was overturned and never enforced. NYC is currently appealing this decision. This study is the first to report findings from an evaluation of the impact of POS tobacco health warning signs. **Methods:** Cross-sectional street-intercept surveys were conducted among adult current and recent former smokers before and after signage implementation to assess the awareness and impact of the signs. A total of 1,007 surveys were conducted among participants as they exited tobacco retailers (about 10 participants were surveyed at each of 50 tobacco retailers before and after signage implementation, in November of 2009 and August-September of 2010). Multivariate risk ratios (RR) were calculated to estimate awareness and impact of the signs. **Results:** Most participants (86%) were current smokers, and there were similar percentages of whites, blacks and Hispanic/Latinos (range of 27% - 32%); about half (52%) reported an annual income of less than \$25,000. In multivariate analysis, awareness of tobacco health warning signs at the POS more than doubled following signage implementation (adjusted RR = 2.01, 95% confidence interval (CI): 1.74 - 2.33). Signage posting was associated with an 11% increase in the extent to which signs made respondents think about quitting smoking 'a lot' (adjusted RR = 1.11, 95% CI: 1.01 - 1.22). **Conclusions:** Graphic health warning signs increased awareness of health risks of smoking and stimulated thoughts about quitting smoking. Additional research aimed at evaluating the

effect of new tobacco control measures in the retail environment is necessary to provide a strong rationale for implementing these interventions and countering legal challenges from the tobacco industry.

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## POS2-37

### TEACHABLE MOMENT FACTORS RELATED TO POSTPARTUM ABSTINENCE

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Pregnancy is a strong natural motivator for quitting, with the majority of smokers quitting prior to becoming pregnant or early in pregnancy. However, rates of postpartum relapse are exceedingly high. More effective interventions are needed to help women who quit for pregnancy to maintain abstinence postpartum. Teachable moments (TM) are natural increases in motivation that can occur when a smoker experiences heightened risk perception, strong emotional responses, and changes in self-image. There is limited research on TM factors in relation to abstinence in early postpartum. It is important to examine TM factors in relation to early postpartum abstinence to strengthen relapse prevention interventions for pregnant women. Data for this research comes from the Quit for Two Study, a relapse prevention intervention for women in Central NC. Eligible women were between 28 and 33 weeks of pregnancy and had quit smoking for pregnancy. Women completed surveys at baseline and 6-weeks postpartum. We explored TM predictors of smoking abstinence: risk (perceived risk, outcome expectations), self-image (smoker self-image, attributions), and emotional reaction (negative affect, positive affect, stress, worry, depression). Mean age was 25.5, 47% were white, 53% had completed HS or less, 51% were not married, and 51% first time mothers. At 6 weeks postpartum, 60% of women were abstinent. Bivariate relationships between demographics, TM factors, self-efficacy and motivation and postpartum abstinence were examined and those with  $p$  value  $< .10$  were included in the multivariable model. Women who were older (OR=1.3, 95% CI=1.0-1.6,  $p=.05$ ), viewed themselves as a non-smoker (OR=1.8, 95% CI=1.0-3.0)  $p=.04$ ), or felt staying off cigarettes was under their control (OR=2.4, 95% CI=1.4-4.1),  $p=.002$ ) were more likely to be abstinent at 6-weeks postpartum. In this exploratory analysis, the variables measuring the TM construct of self-image were predictive of abstinence at 6 weeks postpartum. More research is needed to understand the role of self-image in postpartum abstinence and how interventions might emphasize this to increase women's motivation to stay smoke free.

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## POS2-38

### REACTIONS TO FDA REGULATION OF TOBACCO PRODUCTS: FINDINGS FROM THE 2009 ITC UNITED STATES SURVEY

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**Background:** In June 2009, the US FDA was granted authority to regulate tobacco products. Little data is available on smokers' attitudes and beliefs on issues relevant to the FSPTCA and how the tobacco industry may be adapting to new regulations. **Methods:** Between November 2009 and January 2010, a telephone survey among a nationally representative sample of 678 smokers in the US was performed as part of the International Tobacco Control project. Participants answered questions on their attitudes and beliefs about the FSPTCA. Daily smokers who consumed 5 or more cigarettes per day were asked to mail a pack of their cigarettes to us for visual inspection ( $n=320$ , 80% response). **Results:** Most (70%) smokers were unaware of the new FDA tobacco legislation. Smokers indicated support for banning cigarette promotion and nearly a quarter supported requiring tobacco companies to sell cigarettes in plain packaging. Seventy percent of smokers supported reducing nicotine levels to make cigarettes less addictive if nicotine was made easily available in non-cigarette form. We collected cigarette packs from smokers and found that descriptive terms such as "light" and "mild" had been removed on many packs in advance of the FDA ban. Of the packs received, 45

(14%) used a color rather than a linguistic descriptor such as "light" or "mild" to designate a particular variety. Despite the removal of the misleading descriptors, 56% of smokers who sent us a pack with a color descriptor printed on it still used terms such as "light" and "mild" when asked to name the variety of cigarettes they were sending. Conclusions: Most smokers were uninformed about the FDA authority to regulate tobacco products and were limited in their understanding of efforts to regulate tobacco products in general. Smokers were supportive of efforts to better inform the public about health risks, restrict advertising, and make tobacco products less addictive. Cigarette manufacturers appear to be using pack color as a way to communicate information to smokers about product strength, thus perpetuating misperceptions about so-called light and low tar cigarettes.

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## POS2-39

### ATTITUDES AND BELIEFS ABOUT NICOTINE AND POLICY AMONG US SMOKERS: RESULTS FROM THE 2009 AND 2010 ITC 4 COUNTRY SURVEY

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**Introduction:** The US FDA is now able to set performance standards on specific constituents of tobacco, including the level of nicotine in cigarettes, if deemed to benefit public health. Policymakers might be interested in smokers' attitudes toward policies aimed at reducing levels of nicotine in cigarettes. **Methods:** During the 2009 ITC US Supplemental Survey and 2010 ITC 4 Country Survey, US participants were asked a series of questions designed to measure opinions and beliefs about potential policies related to reducing the addictiveness of cigarettes. The total sample size for the 2009 survey was 678 participants who reported smoking 10 or more cigarettes per day during the 2008 survey. The sample size for the 2010 survey was 1,144 smokers. Descriptive statistics and chi-square tests were used to measure levels of support for several proposed policies. **Results:** A relatively large proportion of participants indicated support (70% in 2009; 74% in 2010) for policies aimed at reducing the amount of nicotine in cigarettes. These levels of support or opposition were consistent across both surveys. Smokers who plan to quit smoking were significantly more likely to support a policy that would reduce levels of nicotine in cigarettes than participants who reported no plans to quit (78% vs. 62%; chi-square < .001). Otherwise, no statistically significant associations were observed in comparisons of demographic characteristics and smoking behavior and support for this proposed policy. **Conclusions:** These results suggest that many smokers support policies designed to make cigarettes less addictive. Previous research has demonstrated that reducing the level of nicotine in cigarettes could make it easier for smokers to quit. These results should be considered when determining whether lower nicotine levels in cigarettes would have a positive impact on public health.

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## POS2-40

### MENTHOL USE AMONG SMOKERS WITH PSYCHOLOGICAL DISTRESS: FINDINGS FROM THE 2008 AND 2009 NATIONAL SURVEY ON DRUG USE AND HEALTH

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**Background:** The FDA has the authority to regulate menthol cigarettes. Adults with mental distress smoke cigarettes at high rates and have a shortened lifespan due to tobacco-related diseases, yet little is known about their use of menthol. **Purpose:** In a national sample of 24,157 adult smokers, we examined the association of psychological distress and menthol use controlling for sociodemographic factors and smoking intensity. **Methods:** Data were from the 2008 and 2009 National Survey on Drug Use and Health. Past month smokers were categorized for menthol or nonmenthol use. Psychological

distress was categorized as none/mild, moderate, or severe on the Kessler 6-item scale. Analyses were weighted to calculate population estimates and account for the stratified sampling method and nonresponse patterns. **Results:** The prevalence of menthol use was 32.2%, 34.0%, and 37.5% among smokers with none/mild, moderate, and severe psychological distress, respectively, chi-square=27.3, df=2, p=0.007. The prevalence of menthol smoking was higher among women, younger respondents, African Americans or Native Hawaiians, persons with fewer years of education and of lower income, unmarried respondents, the uninsured, and lighter smokers. In a multivariate model controlling for sociodemographic factors and smoking rate, smokers with severe (odds ratio [OR]=1.26, 95% CI: 1.07-1.50, p=0.007) but not moderate (OR=1.05, 95% CI: 0.94-1.17, p=0.44) psychological distress were significantly more likely to smoke menthols compared to smokers with none/mild distress. **Conclusions:** Study findings indicate, in a nationally representative sample of smokers, an elevated risk of menthol smoking among adults with serious mental distress that holds even when controlling for sociodemographic and tobacco use characteristics. Persons with elevated distress are another group that would benefit from the regulation of menthol cigarettes.

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## POS2-41

### TAILORING, PLACEBOS, COGNITIVE PROCESSING, AND SMOKING CESSATION: THE LIGHTS OUT STUDIES

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Computer-tailored smoking cessation materials have been found to be more effective compared to standard (or generic) materials. Our previous research used a "placebo tailoring" design to examine underlying mechanisms of tailoring. We found superior content evaluations, readiness to quit, smoking-related knowledge, and behavior change among those who received messages that they believed were individually-tailored. The current RCT tested the efficacy of placebo tailoring for actual smoking cessation. We also examined cognitive processing as a moderator by applying the heuristic-systematic model of information processing. Heuristic processing leads to persuasion with superficial assessment of surface features of communications, whereas systematic processing emphasizes detailed examination of the content. We hypothesized that placebo tailoring would result in greater odds of 7-day point prevalence abstinence (ppa) and 28-day prolonged abstinence (pa) compared to standard messages. Moreover, heuristic processing would moderate these relationships. Adult smokers (Final N =334) were randomly assigned to receive 4 placebo tailored or standard self-help guides over 3 months. Participants received two priming phone calls to enhance their expectations for either tailored or standard interventions. Results demonstrated a placebo effect for smoking cessation, such that at the 3-month follow-up, 7-day ppa was significantly greater in the Placebo Tailored condition compared to the Standard condition. No differences were found at 6-months, or for 28-day cessation. As hypothesized, cognitive processing style moderated the relationship between condition and cessation. Specifically, heuristic processing was associated with greater odds of 7-day ppa at 3 months among those in the Placebo Tailoring condition; the opposite association was found in the Standard condition. This is the first study to show that standard self-help materials designed to appear as tailored can facilitate short-term smoking cessation, and that cognitive processing style predicts outcome. Theoretical and applied implications for tailoring will be discussed.

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**POS2-42**

**ASSOCIATIONS BETWEEN AFFECT, SOCIAL SUPPORT, AND COPING AMONG AFRICAN AMERICAN SMOKERS ENROLLED IN A RANDOMIZED TRIAL**

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African American smokers have greater difficulty quitting smoking compared to white smokers. Although the disparity in cessation rates has been attributed to sociodemographic factors, a greater understanding of the factors related to smoking cessation is needed. The development of adaptive coping skills is a component of behavioral tobacco interventions. Irrespective of the quitting method, the ability to cope with abstinence is essential. No previous studies have focused on coping strategies among African American smokers. The current study examined affect (positive and negative) and social support (from family, friends, and significant other) in relation to coping strategies (adaptive and maladaptive). Our sample consisted of 181 African American adult smokers enrolled in an RCT for smoking cessation. At baseline, smokers completed the Positive and Negative Affect Schedule, the Multidimensional Scale of Perceived Social Support, and the Brief COPE, which assesses adaptive and maladaptive coping strategies. Participants were mostly single (65%), women (62%), who were at least high school educated (78%), and low-income (59% household income less than \$10,000). They were middle aged (M=46, SD=9), smoked 22 (SD=13) cigarettes/day for 24 (SD=11) years, and were moderately nicotine dependent. Bivariate associations indicated that adaptive coping was positively correlated with positive affect and social support (from family, friends, and a significant other). Maladaptive coping was positively correlated with negative affect, and inversely related to positive affect, and social support. Multivariate analyses revealed that positive affect and social support were independently associated with adaptive coping strategies. In contrast, maladaptive coping was independently associated with negative affect, but not social support. Additionally, several aspects of coping were related to affect and social support. We conclude that harnessing existing positive resources, such as social support and positive mood may facilitate coping. Also, addressing negative affect among African American smokers may be important to reduce maladaptive coping strategies.

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**POS2-43**

**SEDENTARY LIFESTYLE AND TEEN SMOKING: A CASE FOR MULTIPLE BEHAVIOR CHANGE STRATEGIES**

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An increasing body of evidence suggests that multiple-behavior change interventions may be more impactful than single-behavior interventions on adolescent health. To illustrate, smoking and physical inactivity often go hand in hand. However, studies show both negative, non-significant and positive associations between smoking and physical activity among teens. Because of the limited knowledge about the physical activity profiles of teens who are motivated to quit smoking, it is difficult to determine what types of strategies may optimally address multiple health behaviors—in this case, a simultaneous intervention for physical inactivity and smoking. To address this research gap, the present study explored demographic and physical activity characteristics of teens enrolled in a smoking cessation intervention, including gender differences. Study data were collected from baseline assessments of 14-19 year-old high school youth (N=233) who participated in a randomized smoking cessation trial in 19 West Virginia (WV) high schools. Sedentary screen watching, sports participation, and overweight/obese measures assessed physical activity levels. Study teens ages were also compared to WV and national averages among general youth populations on equivalent variables. In summary, both study males and females were less physically active than their peers in the WV and U.S. reference groups. Further, study females were less physically active than study males as well as less active than female peers in WV and U.S. referent groups. Similar trends were found for sports participation. A higher percentage of study females were obese compared to both study males and females in the WV and U.S. samples. Findings confirm other research suggesting that adolescent smokers,

particularly girls, are at risk for sedentary lifestyles. Findings may inform methodology and content for multiple behavior interventions among teen smokers.

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**POS2-44**

**RECRUITING PARTICIPANTS INTO A WEB-BASED SMOKING CESSATION INTERVENTION TRIAL: DOES RECRUITMENT SOURCE MATTER?**

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Background: Web-based smoking cessation interventions are now being tested in randomized trials because they can reach millions of people 24 hours a day at a lower cost than traditional cessation intervention modalities. One critical source of potential bias in the interpretation of health intervention trials is the following: differences in baseline characteristics of participants recruited via different sources can impact the response to the intervention and thereby the generalizability of the results (Sherman, 2009). Besides Graham et al. (2008), no published studies have examined this topic. Objective: To address this potential problem, we examined to what extent participants recruited into a web-based smoking cessation trial from web-based media, traditional media, and word of mouth differ in terms of demographics and key variables known to predict smoking cessation. Methods In 2010, WebQuit.org enrolled participants (n=222) into a clinical trial comparing two cessation programs. The recruitment sources were: web-based media, [i.e., health related internet searches (n=48) and Facebook (n=11)]; traditional media [i.e. print, news, and radio (n=30)]; and word of mouth [i.e. employee listerv e-mail (n=24)]; friend or doctor referral (n=26)]. The remaining participants (n=83) listed a different or unidentifiable recruitment source. Results: There were no significant differences in age, sex, race, ethnicity, marital status, employment status, and education across the recruitment sources (all p>0.05). There were no significant differences in key baseline predictors of smoking cessation: first cigarette within five minutes of waking up, smoking more than half pack per day, smoking 10 or more years, or quit attempts in the last 12 months (all p>0.05). Conclusion: There was no evidence of any meaningful differences in the recruitment sources that would bias the interpretation of the intervention effects. Nevertheless, researchers are advised to monitor the potential for such biasing effects in future web-based intervention trials.

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**POS2-45**

**DOES RACE INFLUENCE SMOKING AND DEVELOPMENT OF LUNG CANCER?**

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Introduction: The effect of race on smoking and development of lung cancer is unclear. Methods: The National Health Interview Survey (NHIS) is conducted annually by the CDC and is designed to provide representative US estimates of health information. The 2010 data were queried for smoking status, lung cancer, race and other sociodemographic factors to examine the relationship among race, smoking, and lung cancer development. Results: Of the 24,725 participants surveyed in 2010, 66 (0.25%) had a history of lung cancer. Of these, 58 (90.6%) reported smoking 100 cigarettes or more (p<0.001). Race was associated with smoking; 43.1% of Caucasians, 34.4% of African-Americans, 22.4% of Asians and 50.5% of other racial groups reported smoking 100 cigarettes or more (p<0.001). Race was not associated with lung cancer in this cohort (p=0.701). In the cohort of ever smokers race was associated with lung cancer; 0.56% of Caucasians, 0.63% of African-Americans, and 0.54% of Asians developed lung cancer (p<0.001). Considering potential smoking-related lung cancers, race was significantly related to the development of lung cancer (p<0.001). Race was associated with amount of cigarettes smoked per month with 66.4% of Caucasians smoking less than 150 cigarettes per month versus 63.3% of African-Americans (p<0.001). Multivariate analysis controlling for amount of smoking, age and gender found that race was no longer significantly related to development of smoking-related lung cancers (p=0.711), but number of cigarettes per month had a significant impact (p=0.009). Conclusion: Although race was associated with smoking-related lung cancers in a univariate model, when controlling for amount of cigarettes smoked in multivariate analysis, the relationship was no longer significant.

The development of smoking-related lung cancers is more strongly related to smoking history, and race is not independently associated with lung cancer development when amount of smoking is taken into account.

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## POS2-46

### PROCESS AND OUTCOMES OF A NOVEL PHARMACOTHERAPY GUIDANCE PROCEDURE TO INCREASE MEDICATION USE FOR SMOKING CESSATION

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**Objective:** Most smokers do not use medications to quit. As part of a broader study comparing video to telephone counseling for smoking cessation, we provided pharmacotherapy guidance to help all participants select and obtain cessation medications. **Methods:** At baseline, staff sent participants' health status information, insurance information, and current prescription drug use to a pharmacist to screen for insurance coverage and medical eligibility. Counselors entered this information onto a pharmacotherapy guidance form, provided the form to participants, and helped participants choose a cessation medication based on personal preferences, resources and medical eligibility. Staff provided a recommendation to participants' physicians that included the preferred medication and information on medical eligibility, and participants obtained prescriptions and medications using their own resources. Counselors applied to pharmaceutical assistance programs to obtain medications for participants who were eligible. Cessation medication use was assessed 3-months post randomization. **Results:** Insurance coverage. Among 473 participants with complete data, most (65%) had some form of health coverage (37% private, 18% Medicaid, 22% Medicare, 4% other). Many (57%) had some form of medication coverage. Of these, most (44%) had coverage for at least one cessation medication, for an overall prevalence of 208/473 participants with cessation medication coverage. Many study participants (52%) were income-eligible for pharmaceutical drug assistance programs. Medical eligibility. Many (72%) had at least one caution and/or contraindication for bupropion, 52% for varenicline, and 33% for NRT. **Outcomes.** At follow up, 50% used a cessation medication (17% varenicline, 18% NRT, 10% bupropion, 6% combination). The average length of use was 5.6 weeks with an average out of pocket cost of \$106. **Conclusion:** An autonomy-supportive mechanism for facilitating pharmacotherapy use could increase medication use and cessation, especially as coverage rates improve under health care reform. Guidance could be implemented by quitlines, internet sites, and other population-based cessation programs.

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## POS2-47

### ADHERENCE TO EVIDENCE-BASED TOBACCO TREATMENT GUIDELINES IN U.S. SUBSTANCE ABUSE FACILITIES: THE INDEX OF TOBACCO TREATMENT

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**Background:** Few U.S. drug treatment facilities treat tobacco dependence. **Objectives:** To develop an efficient and sensitive measure to track service provision and evaluate dissemination of services. **Methods:** A cross-sectional survey was conducted within a nationally representative stratified sample of 405 outpatient facilities. One person in a leadership position was surveyed via mail or phone. The entire survey consisted of 36 questions. Response categories were in terms of the percentage of smoking clients to whom the facility provided each service. To operationalize "routine" provision of care, we report the proportion of facilities that provided each service to "many" or "nearly all" (75%-90%) of their clients. We also sum 6 items as a tobacco treatment "Index" that assess 1) asking about tobacco use, 2) advising clients to quit, 3) assessing interest in quitting, 4) providing brief motivational intervention to those not ready to quit, 5) assisting cessation via group/individual counseling, and 6) assisting cessation via recommending the use of medications. The Index yields an overall score ranging from 1 (lowest) to 5 (highest). **Results:** Many facilities (87%) asked most-nearly all of their clients' smoking status. However, a minority of facilities routinely assessed clients' readiness to quit (38%) or advised clients to stop smoking (48%). Counseling: Few routinely provided

brief intervention to motivate clients to quit (23%), or counseling to help clients quit (23%). Very few provided referrals and/or recommendations for tobacco treatment (9%-18%). Medications: Few (18%) routinely recommended clients use medications but only 7% routinely referred clients to an off-site provider to obtain medications. Only 3% of facilities routinely provided and/or prescribed quit smoking medications to clients. Provision Index Score: The mean score across all facilities was 2.7 (median=2.6; mode=2.0); only 2% achieved the highest score (5). **Conclusions:** As found in other surveys, few drug treatment facilities routinely offer key components of screening and treatment. The 6-item Index appeared to be sensitive to low and high rates of service provision.

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## POS2-48

### A LONGITUDINAL STUDY OF THE TOBACCO STOPS WITH ME CAMPAIGN

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**Introduction:** Tobacco companies spend more than five billion dollars annually to advertise their products, thus counter marketing is critical. The primary aim of this study was to evaluate the Tobacco Stops With Me (TSWM) media campaign in Oklahoma by determining awareness and saliency of campaign messages and impact on tobacco-related attitudes, knowledge and behavior among both tobacco users and non-users. **Methods:** A 2-year longitudinal study of 4001 Oklahomans ages 18-54 was conducted. Baseline data were collected through landline and cellular phone contact in 2007 prior to the launch of the campaign, followed by two additional surveys at 1-year intervals. Data were analyzed using methods appropriate for weighted data. **Results:** Overall campaign awareness was highest among tobacco non-users (83%), whites (83%), college graduates (86%) and those ages 25-34 (84%). Exposure to TSWM doubled quit attempts among tobacco users and increased knowledge about the harms of SHS in tobacco users and non-users. Tobacco non-users exposed to TSWM were 1.5 times more likely to help someone quit using tobacco than those not exposed. Tobacco non-users exposed to TSWM were more likely to report that tobacco is a serious problem in Oklahoma, believe that tobacco companies should not be allowed to give away free samples or advertise at public events, and believe that smoking should be banned at public outdoor places. These findings were statistically significant and independent of competing explanations. **Discussion:** This study is one of few that have incorporated both a longitudinal design and a cell phone sample to evaluate the impact of a statewide tobacco counter marketing campaign. It demonstrates that campaigns can successfully increase awareness about the danger of tobacco use, and can successfully impact attitudes, knowledge and behavior among both tobacco users and non-users.

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## POS2-49

### USING SMOKING LITTER TO EVALUATE THE IMPACT OF NEW YORK CITY'S SMOKE-FREE PARKS AND BEACHES LAW

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**Background:** On May 23, 2011, an expansion of the 2002 New York City Smoke-free Air Act took effect that banned smoking in all NYC parks and beaches. The NYC Department of Health and Mental Hygiene conducted a study to evaluate the effect of the law on the prevalence of smoking litter in a sample of city parks and beaches. Although smoking bans in outdoor spaces have become quite common there is limited research describing the impact of these policies. No previous research has examined smoking litter as an outcome. **Methods:** Litter was audited in a sample of NYC parks and playgrounds, and sections of beaches three times between the summer of 2010 and the summer of 2011. Playgrounds, where smoking was banned in 2002, provide a non-equivalent comparison area. The first audit was conducted in the summer of 2010. The same locations were surveyed a second time in spring 2011, immediately before the law was implemented. Post-law data were collected in the summer of 2011. Surveyors counted all visible smoking-related litter, which included cigarette and cigar butts, cigarette and cigar packaging, lighters and matches. The remaining litter was categorized as non-smoking litter. **Results:** The pieces of smoking-related litter per acre

were analyzed controlling for non-cigarette litter. On beaches, smoking litter decreased between the summer of 2010 (Mean = 265) and the summer 2011 (Mean = 100),  $p < .001$ . There was no reliable decrease in smoking-related litter in parks,  $p = .30$ . There was an unexpected decrease in smoking litter in playgrounds between summer 2010 (Mean = 121) and summer 2011 (Mean = 39),  $p = .001$ . The results did not vary by borough. Controlling for borough, day of the week and time of the day when data were collected did not change the results. Conclusions: The ban was associated with a significant reduction in smoking litter on beaches but not parks. Litter might not have decreased in parks because it lingers longer on grassy unpaved surfaces. The methods and findings from this study may be useful for other jurisdictions interested in passing and evaluating smoking bans in outdoor spaces.

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## POS2-50

### ADVERTISEMENT AND MARKETING EFFECTS ON ALTERNATIVE SMOKELESS TOBACCO DEMAND

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Evidence suggests that although alternative smokeless tobacco (SLT) products are a comparatively safer substitute to cigarettes, actual trial and adoption among smokers remain low due to public perception. Using a web-based survey, this study aimed to explore how receiving advertising information influences the demand for smokeless products relative to cigarettes. All participants ( $N=1062$ ) began by completing questions on demographics, tobacco knowledge/beliefs, nicotine dependence, cravings, smoking expectancies, and delay discounting. Participants were randomly divided into two groups – an experimental group viewed ads for SLT (Camel Snus, Camel Dissolvables, and Commit Lozenges) and a control group viewed ads for soft drinks (Coca-Cola, Vitamin Water, and Orange Juice). Upon viewing, participants rated their reactions to the ads using a 5-point scale Self-Assessment Manikin measuring both feeling and arousal. Using a 4-point scale, participants then rated their likeliness to try each product featured in the ad. After viewing ads for all products, participants selected the product they were most likely to try. Finally, participants completed a series of purchase tasks. Generalized estimating equations revealed that SLT product type, believability of the ad message, and emotional response to the ad significantly impacted their likeliness to try the product ( $p < 0.001$ ). The more the participant believed in the ad, the more likely they were to try the product ( $B=0.049$ ,  $p < 0.001$ ). Likewise, the more positively the ad made the participant feel, the more likely they were to try the product ( $B=0.169$ ,  $p < 0.001$ ). After seeing the all ads, participants were more likely to want to try Commit Lozenges (66%) over Camel Dissolvables (21.6%) or Camel Snus (12.1%). These findings suggest that ad perception and affect on the viewer, as well as product type, may play a role in a person's likeliness to try a product. These results could translate to an individual's willingness to purchase an SLT product.

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## POS2-51

### USE AND EFFECTIVENESS OF STOP-SMOKING MEDICATIONS: FINDINGS FROM THE INTERNATIONAL TOBACCO CONTROL FOUR COUNTRY COHORT SURVEY

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Introduction: Numerous controlled clinical trials have demonstrated the efficacy of nicotine replacement therapy, bupropion, and varenicline in increasing smoking cessation rates. However, comparatively fewer studies exist on the effectiveness of these medications among the general population. The purpose of this study was to evaluate the "real-world" effectiveness of stop-smoking medications using a large-scale population-based sample of smokers. Methods: Participants included 7,436 adult smokers from the United Kingdom, Canada, Australia, and the United States, who were interviewed as part of the International Tobacco Control Four Country Survey (ITC-4)

between 2002 and 2008. Repeat cross-sectional logistic regression analyses, utilizing the generalized estimating equations (GEE) approach, were performed to describe the characteristics of those who used medication when attempting to quit smoking, and to evaluate the association between use of stop-smoking medications and smoking cessation (defined as not smoking for at least 30 days at the time of interview). Results: Groups least likely to use medications when trying to quit were: young smokers, those of low SES, and minorities. A strong positive association between use of varenicline and smoking cessation was found, and smaller yet positive associations were found with bupropion use and with nicotine patch use. Longer duration of use of any given medication was associated with higher rates of smoking cessation. Under-dosing was common among nicotine gum users and was associated with a cessation disadvantage. Conclusions: In general, findings support clinical trial results showing that use of stop-smoking medication, when used as recommended, is associated with increased quit rates compared to cessation rates among those attempting to quit without medication. However, even with the use of medication, relapse back to smoking remains the norm and continued efforts are needed to develop and deliver more effective treatments to help smokers overcome their nicotine addiction.

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## POS2-52

### A TRUE STORIES CAMPAIGN UNIFORMLY INCREASED AWARENESS OF STATE-ASSISTED SMOKING CESSATION PROGRAMS IN MASSACHUSETTS

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Background: Media campaigns are used to increase awareness of public health programs that assist smoking cessation (e.g. telephone quitline and insurance benefits). The True Stories Campaign launched in Massachusetts (MA) from Nov-Dec 2006 promoted the use of the telephone quitline and a new Medicaid insurance benefit that provided low-cost cessation treatment as part of Health Care Reform. Objective: We evaluated the effectiveness of the True Stories Campaign on awareness of 1) the state telephone quitline and 2) the Mass Health smoking cessation benefit among the target population and by select demographic characteristics. Methods & Analyses: MA adults age 18-98 were surveyed at baseline ( $n=3,000$ ) and 2 months later (post-campaign,  $n=3,000$ ). Awareness of the quitline and MassHealth benefit prior to and post-campaign were estimated and compared using proportion tests and logistic regression models. Results: Awareness of the quitline increased from 26.6% at baseline to 52.5% after the campaign (Odds Ratio (OR)= 3.1,  $p < .001$ ). Such increases were largely invariant by respondent gender (men: OR = 3.3, women: OR=2.8), race (white/non Hispanic: OR=2.9, minorities: OR=3.7), insurance status (MassHealth recipient: OR=4.3, other insurance: OR=2.8), smoking status (former: OR=2.9, nondaily: OR=3.1, daily: OR=3.9) and age group (18-44: OR=2.7, 45-64: OR=3.1, 65+: OR=5.0). The campaign also increased awareness of the MassHealth Benefit from 15.7% to 23.7% (OR=1.7,  $p < 0.001$ ) across many subpopulations including gender (OR=1.7 for both gender), race (OR=1.7 for all groups), insurance status (MassHealth recipient: OR=2.0, other insurance: OR=1.6), and slightly varied among age group (18-44: OR=2.7, 45-64: OR=1.9, 65+: OR=1.6). The results were robust to whether respondent correctly recalled their exposure to the campaign. Conclusions: The brief media campaign increased awareness of the state telephone quitline and the new insurance benefit in the target population. It was effective across several demographic groups, suggesting the applicability to the general adult population and potential cost-effectiveness of a larger campaign.

*Massachusetts DPH Tobacco Control Program.*

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## POS2-53

### RECRUITING TOBACCO USERS AND DELIVERING CESSATION SERVICES ACROSS MODALITY

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This study compares utilization of cessation services by smokeless tobacco users who were recruited via telephone or the web. Those recruited by phone were enrolled into one study, and those recruited via web were enrolled into another study. But the two studies used exactly the same randomized design, in which subjects had equal chance of being randomized into telephone counseling or web-based intervention. Telephone counseling was provided by the California Smokers' Helpline and the web-based program was designed and managed by Oregon Research Institute. Almost 70% of subjects recruited through the telephone and assigned to the telephone condition received counseling. Of subjects recruited through the web and assigned to telephone condition, 41% were counseled. For those who were counseled, there was no difference in the median number of counseling calls (Median = 3) based on recruitment method. Of those who were recruited through the telephone and assigned to the web condition, 43% logged onto the website. Of subjects recruited through the web and assigned to the web condition, about 90% logged onto the website. Once they logged on, there was no difference in utilization of the website based on recruitment method. The median number of page visits (Median = 2) was the same and time spent on the web was similar (about 22 minutes). Not surprisingly, it was easier to deliver an intervention using the same modality as that used for recruitment (i.e., telephone to telephone or web to web). However, it also proved feasible to deliver an intervention across modality (i.e., telephone to web or web to telephone) which suggests that telephone counseling can be used to extend and enhance the impact of a web intervention and vice versa.

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## POS2-54

### THE TOBACCO-FREE POLICY SCORING TOOL: A RATING SYSTEM FOR COLLEGE CAMPUSES

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Purpose: Cigarette smoking prevalence among college students remains between 16% - 26%. Policy interventions to reduce exposure to secondhand smoke in workplaces have gained momentum in the United States, but the prevalence of such policies in colleges is likely underestimated at 530 100% smoke-free policies. Little is known whether the existing policies include attributes recommended in the American College Health Association's policy statement. We developed a college tobacco-free policy scoring tool to characterize to describe the indoor and outdoor tobacco-free policy environment, and rate the comprehensiveness of tobacco control policies on college campuses. Methods: We conducted a systematic census of all NC colleges (n=110) to identify the tobacco-related policies using campus web sites and online student handbooks. In NC, there were public university (n=16), community college (n=58) and private college/university (n=36) tobacco-free campus policies. Using the developed 13-item policy score system, two reviewers independently coded written policies to identify the prevalence of policies and quantify policy strength. Results: Policy analysis shows that virtually all indoor areas on public university, community college, and private college/university campuses are smoke-free. The great majority (94 of 110 colleges and universities [85%]) regulate smoking and/or tobacco use in some or all outdoor areas. A quarter of both public and private colleges/universities and over 50% of community colleges are smoke-free in all indoor and outdoor areas. Less than 20% of campuses had restrictions on campus industry marketing, promotion and tobacco sales. On average, campuses had enacted policies for 35% of the possible policy score options. Conclusion: The application of a novel tobacco-free policy scoring tool has potential to provide useful information on how well college campuses are adhering to the expert recommended policy standard for tobacco-free indoor and outdoor areas for college campuses.

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## POS2-55

### LOCAL CLEAN INDOOR AIR POLICY ADOPTION -- LESSONS LEARNED FROM KEY INFORMANTS IN APPALACHIAN COMMUNITIES

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Purpose: For the majority of residents in Appalachian states, clean indoor air (CIA) policies are not in place at the state, county or other local level, so residents are not adequately protected from secondhand smoke exposure in workplaces or other public locations. There has been limited examination of elements that may promote CIA policy adoption at a local level. Descriptive data are needed to clarify factors that promote or hinder the adoption of local CIA policies in rural, Appalachian communities which may have an entrenched resistance to this type of public health regulation. Methods: Within a random selection of communities in six Appalachian states, qualitative phone interviews were completed with individuals identified as being knowledgeable about local tobacco control policy activities from communities both with (n=15) and without (n=12) local clean indoor air ordinances. Seventeen semi-structured, guiding questions were used to collect information regarding the local efforts to establish CIA policies. Each interview was recorded, transcribed, and a content analysis was conducted by three independent reviewers. Results: Eight key themes emerged from the qualitative interviews, including the a) role of a community coalition, b) influence of the local context, c) support from outside of the coalition, d) outcomes of local activities, e) procedure to pass an ordinance, f) process of passing an ordinance, and g) role of a state CIA policy. Conclusion: Activities attributed to bolster the process adoption of a local clean indoor air policy will be discussed.

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## POS2-56

### CHARACTERISTICS OF U.S. OCCASIONAL SMOKERS

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According to the U.S. 2009 National Health Interview Survey data, an estimated 10.2 million of adults who were current smokers reported occasional smoking (i.e., nondaily). National estimates suggest that the growth in the number of occasional smokers in the U.S. is possibly due to social pressure, limited access to cigarettes, increased cigarette prices, and smoke-free policy restrictions. The purpose of this study is to describe the prevalence, and price paid per cigarette pack by daily and occasional smokers. Data was taken from the 2006/2007 U.S. Tobacco Use Supplement to the Current Population Survey (TUS-CPS) (n=15,133 men and n=16,368 women). We described the proportion of U.S. adults ≥18 years of age by smoking frequency: 1) Occasional smokers (those who smoked >100 cigarettes in their lifetimes and currently smoke some days) and 2) Daily smokers (those who smoked >100 cigarettes in their lifetimes and now smoke everyday) by select demographics (sex, race/ethnicity, age, education) and smoking intensity (light, moderate, heavy). We calculated the median self-reported price to estimate price paid per cigarette pack by smoking frequency and intensity. Logistic regression was used to examine demographics and smoking behaviors associations among occasional smokers, adjusting for age, race/ethnicity, and education. Approximately 20.0% of U.S. adults were classified as occasional smokers (20.5% men, 19.4% women). Among men and women, the majority of occasional smokers were between 25 to 44 years of age, white, had a high school diploma and were employed. Among occasional smokers, 59.3% of men and 60.6% of women were light smokers (consumed <5 cigarettes per day). The median price paid per cigarette pack was significantly lower for a daily smoker than for an occasional smoker (\$3.80 vs. \$3.99 respectively; p<0.05). Occasional smokers pay more per pack of cigarettes than daily smokers. Further research is needed to examine the influence of current tobacco control policies by smoking frequency since occasional smokers may be less easily dissuaded by price than adults who smoke on a daily basis.

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**POS2-57**

**USE OF INTERNET-BASED SOCIAL MEDIA SOURCES AMONG CURRENT SMOKERS WHO ARE CONSIDERING QUITTING IN THE NEXT 6 MONTHS**

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Cigarette smoking continues to be the a leading cause of morbidity and mortality in the U.S and current public health guidelines emphasize the need to target smoking cessation strategies. Cessation services include telephone quitlines and web-based cessation programs. Since almost ¾ of all U.S. adults use the Internet, new technologies are now available to provide current smokers who want to quit with alternative cessation options. Data from the 2007 Health Information National Trends Survey were used to examine cessation behaviors of adult (>18 years) current smokers (n=1,248). We examined current smokers' use of telephone quitlines in addition to other social media options to guide expansion of cessation services in order to capture adult smokers' needs. Respondents were asked about their desire to quit and use of telephone quitlines, online support groups, blogs, and social networking sites. Multivariate logistic regression analysis was conducted to identify correlates associated with use of a telephone quitline. In 2007, 67.9% of current smokers were considering quitting within the next 6 months. Among current smokers, 24.3% said that it was very/somewhat likely that they would call a telephone quitline in the future, and 58.5% said that it was very/somewhat unlikely. We found that 8.1% of current smokers had called a telephone quitline, and those who used a quitline tend to be women, middle-aged, white, and college educated. Data showed that 64.7% of current smokers used the Internet. Among current smokers who used the Internet, the proportion who used an on-line support group was 5.7%, used an on-line diary or blog was 11.5% and used a social networking site was 40.3%. This study provides rationale for expansion of smoking cessation services, and demonstrates that Internet-based social media sources may increase the reach to current smokers who want to quit.

*Work was supported by the internal funds of the U.S. Centers for Disease Control and Prevention.*

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**POS2-58**

**A LONGITUDINAL STUDY OF MEDICAID COVERAGE FOR TOBACCO DEPENDENCE TREATMENTS IN MASSACHUSETTS AND ASSOCIATED CHANGES IN EMERGENCY DEPARTMENT USE**

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Background: Massachusetts adopted comprehensive coverage of tobacco cessation medications for Medicaid subscribers in July 2006. In the first 2.5 years after implementation of the benefit, over 75,000 Medicaid subscribers used the benefit which was estimated to be nearly 40% of adult smokers in this population. Smoking prevalence dropped from 38% to 28%. Our previous work showed that hospitalization claims for acute myocardial infarction and acute coronary heart disease dropped 46% and 49% respectively on an annualized basis. This study examines whether use of tobacco cessation medications by Medicaid subscribers was also associated with decreases in emergency department use. Methods: Using claims data and generalized estimating equations, we compared the probability of an ED visit among MA Medicaid beneficiaries before and after use of tobacco cessation medications, adjusting for demographics, comorbidities, seasonality, influenza cases, and the implementation of the statewide smoke-free air law. Likelihood estimates were compared to a baseline calculation that showed an overall reduction in ED claims per capita in the post health reform period. ED claims were examined for 15 diagnostic categories with at least 1,000 claims. Results: A claim for tobacco cessation medications was followed by a significant decrease in ED claims for non-specific chest pain (point estimate: 15%; 95% CI: 2%-27%, p<.05) and mood disorders (point estimate: 21%; 95% CI: 7%-32%, p<.01). No other diagnostic category of ED claims showed any change compared to baseline. Conclusion: The finding of a reduction in ED claims for non-specific chest pain is consistent with earlier findings of reduced hospitalizations for acute myocardial infarction and acute coronary heart disease following use of the MA Tobacco Cessation Medicaid benefit. Additional costs savings would be likely. Mood disturbance is a common symptom associated with smoking cessation, but our results show a decrease in mood disorder diagnoses. In the

absence of literature supporting a reduction in ED visits for mood disorders following use of tobacco cessation medications, this result may be due to multiple testing.

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**POS2-59**

**INVESTIGATING SMOKER IDENTITY AMONG OCCASIONAL SMOKERS: FINDINGS FROM A STATE-WIDE TOBACCO SURVEILLANCE SURVEY**

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While the overall smoking prevalence has declined in the past decade, non-daily or occasional smoking has been increasing. Many of these occasional smokers do not view themselves as smokers. Previous research has suggested that about half of college students who report smoking cigarettes do not consider themselves smokers. This has led to the use of the term "deniers" to describe occasional smokers who do not consider themselves smokers. Much of the discrepancy between smoking behaviors and smoking identity among occasional smokers has evolved through studies of convenience samples and subgroups (college students). We had an opportunity to study deniers in a state-wide sample of adult smokers over an 8-year period (2003 – 2010). The Minnesota Adult Tobacco Survey (MATS) provides a population-based estimate of occasional smokers who deny being smokers. We found that among occasional smokers, approximately 45% did not consider themselves to be smokers. This proportion has increased from 39% in 2003. We observed consistent demographic characteristics across 3 rounds of MATS (2003, 2007, and 2010); deniers were more likely to be male (57% – 59%), younger (18 – 24: 21% - 27%), and more educated (college graduate and above: 19% - 25%). Deniers were also very light smokers, smoking on 6 days in the past 30 days and fewer than 5 cigarettes per day. Consistent with previous findings, deniers have higher intention to quit smoking and more positive perceptions about their health, yet they show a significantly lower rate of past 12 month quitting than occasional smokers who admit being smokers. Findings indicate that a considerable proportion of occasional smokers do not self-identify as smokers. As of 2010, this group constitutes 10.5% of current smokers in Minnesota and the proportion is anticipated to continue to increase. While deniers are seen as very light smokers, they should be considered a high risk group because their optimistic beliefs about quitting may lead to discounting negative consequences of smoking. Hence future communication efforts should consider addressing deniers as a unique group based on characteristics identified by this research.

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**POS2-60**

**TOBACCO ENVIRONMENT FOR SOUTHEAST ASIAN AMERICAN YOUTH: RESULTS FROM A PARTICIPATORY RESEARCH PROJECT**

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Despite reports of high rates of smoking among Southeast Asian refugees in the U.S., few studies have described environmental aspects of tobacco use among this population, particularly for the second generation of youths. This absence is notable, as the social environment within which second-generation youths are exposed to tobacco products differs radically from the natal environment of their parents. We describe results of a youth-led community participatory research project for Southeast Asians in Northern California. Using multiple data sources, including PhotoVoice, survey research and

tobacco outlet surveys, second-generation youths documented the salience of tobacco products in their social environment, notably products such as “blunts” and mentholated cigarettes.

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## POS2-61

### QUITLINE NETWORKS IN MOTION: EVOLVING SIGNALING PATHWAYS FOR KNOWLEDGE EXCHANGE IN THE NORTH AMERICAN QUITLINE CONSORTIUM

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**Background:** This study is designed to better understand the network and communications mechanisms by which stakeholders in the North American Quitline Consortium (NAQC), share new knowledge, make decisions about how and when to implement new knowledge, and adopt practices that they believe will improve quitline outcomes. Data on network relationships were collected from the 63 quitlines in North America in the first two of three years of data collection. We previously reported on the basic structure of the quitline network from year one (Leischow et al, AJPH, in press), and we here report on changes in quitline network structure and function changes from our first to the second survey. **Results:** There appears to be a significant shift in the network between 2009 and 2010. 2009 could be characterized by 3 groups: two multi-state U.S.-based service providers and Canadian quitlines with a fairly dense central core consisting primarily of Service Providers and THE NAQC central organization. 2010 could also be characterized by 3 groups: one multi-state service provider, Canadian quitlines, and all other organizations. the single service provider group appears to be a hub/spoke structure while the group containing all other organizations appears to be forming a more densely connected sub-group. Funders appear to be playing more of an information broker role in this new structure or at least this role may be becoming more discernable in the maps. **Discussion:** Between the two surveys, there was a major merger of quitline providers such that a single U.S.-based service provider now provides quitline services to more than half the states in the US. Funding shifts have also occurred. This single provider appears to be playing a more central role with the funders in states for which it provides services, with those funders having less information-sharing connections with each other. The other organizations in the network seem to be developing more information-sharing connections with each other without relying on a central information source. Network maps and potential reasons for these changes will be discussed.

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## POS2-62

### USE OF ECOLOGICAL MOMENTARY ASSESSMENT (EMA) TO MEASURE COLLEGE STUDENTS' EXPOSURE TO PRO-TOBACCO MARKETING AND MEDIA

Steven C. Martino, Deborah M. Scharf, Claude M. Setodji, and William G. Shadel\*

The aims of our study were to validate ecological momentary assessment (EMA) as a method for measuring exposure to tobacco-related marketing and media, and to use this method to provide detailed descriptive data on college students' exposure to pro-tobacco marketing and media. Participants in this study were college students (n=134; ages 18-24) who recorded their exposures to pro-tobacco marketing and media on handheld devices for 21 consecutive days. Students also recalled exposures to various types of pro-tobacco marketing and media at the end of the study period. Retrospectively-recalled and EMA-based estimates of pro-tobacco marketing exposure were found to capture different information. The correlation between retrospectively recalled- and EMA-logged exposures to tobacco marketing and media was moderate (r = 0.37, p < .001), and EMA-logged exposures were marginally associated with intention to smoke at the end of the study whereas retrospective recall of exposure was not. EMA data showed that college students were exposed to pro-tobacco marketing through multiple channels in a relatively short period: Exposures (M = 8.24, SD = 7.85) occurred primarily in the afternoon (42%), on weekends (35%), and at point-of-purchase locations (68%) or in movies/TV (20%), and exposures to Marlboro, Newport and Camel (the most popular brands among this age group) represented 56% of all exposures

combined and 70% of branded exposures. These findings support the validity of EMA as a method for capturing detailed information about youth exposure to pro-tobacco marketing and media that are not captured through other existing methods. Such data have the potential to highlight areas for policy change and prevention in order to reduce the impact of tobacco marketing on youth.

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## POS2-63

### INTERACTING EFFECTS OF PEER EXPOSURE AND SPORTS PARTICIPATION ON SMOKING BEHAVIOR AMONG MINORITY ADOLESCENTS: RISK AND PROTECTION

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**Background:** Adolescent sports participants are less likely to smoke cigarettes, and sports participation may prevent smoking among young people. Research suggests the relationship between sports participation and smoking may vary by race/ethnicity, and is possibly moderated by exposure to peer smoking. **Methods:** We investigated these relationships in a sample of adolescents (n = 311) age 13 – 21 presenting for well-visits at an urban adolescent medicine clinic. Participants completed valid, self-reports of demographics, sports participation, exposure to peers who smoke, and cigarette smoking behavior. The primary outcome was smoking status (never smoked, tried smoking, experimental/established smoker). Ordinal logistic models were stratified among white (n = 122) and non-white (n = 189; 70.3% Black, 14.2% Latino, 15.3% other) adolescents to test study hypotheses. **Results:** Among white adolescents, sports participants had a significantly lower risk for smoking than non-sports participants (OR = 0.39, 95% CI = 0.17, 0.89, p < .05), independent of age, gender, and peer smoking. For non-white adolescents the adjusted effect of sports participation on smoking was dependent upon exposure to peers who smoke: sports participants with no exposure to peer smoking had significantly lower risk for smoking than non-sports participants (OR = 0.13, 95% CI = 0.03, 0.64, p < .01), while sports participants with exposure to peer smoking had a significantly higher risk (OR = 3.95, 95% CI = 1.61, 9.75, p < .01). **Conclusions:** Smoking prevention interventions incorporating sports participation should consider race/ethnicity-based differences to address disparities in smoking-related disease. Sports are universally protective against smoking among white adolescents, but not among minority adolescents, where exposure to peer smoking can block protection.

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## POS2-64

### CHARACTERISTICS OF THE SEXUAL AND GENDER MINORITY(SGM) CURRENT SMOKER

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Smoking rates in the SGM community are higher than the general population. Less information is available on smoking subtypes in this population. Characterizing these differences is important in order to designing appropriate interventions. Participants (N= 3,453) completed a survey at five 2011 Pride Festivals in Missouri. Questions about sexual orientation, gender, and transgender-transsexual status determined sexual and gender minority status. Current smokers were categorized as daily or some days smokers. Daily smokers were further categorized by cigarettes smoked per day (light smoking 1-5; moderate smoking 6-19; heavy smoking 20 or greater). Of the 3,453 participants, 2,794 identified as SGM. Current smoking status for SGM (37%) varied from lesbians at 35% to bisexual males and transgender individuals at 44%. Of current smokers: 8% were light smokers; 35% moderate smoke 6-19; 30% smoke a pack or more; and 27% are non-daily smokers. Both difference in age starting smoking (in year) and length of smoking (in years) were statistically significantly different between the some days smoker and daily smoker. There are significantly more SGM white compared to African American SGM daily smokers who engage in heavy smoking. High rates of smoking in the SGM community are in part a reflection of the high rate of non-daily smokers. The importance of encouraging occasional non-daily smokers to quit is



particularly important in order to reduce the health burden of tobacco use on the SGM community. Understanding smoking behavior by SGM subgroups, as well as other characteristics, such as age, race, educational level, and intention-to-quit status will contribute to developing appropriate tobacco interventions.

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## POS2-65

### EVALUATION OF WEB-BASED ADS TO MOBILIZE YOUNG ADULT SMOKERS TO USE EVIDENCE-BASED CESSATION TREATMENT ONLINE

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Despite an expressed interest in quitting, young adult smokers have low use of evidence-based cessation treatments, perhaps due to a lack of awareness of effective treatments or to the belief that treatments are not relevant for young adults. The present study developed and evaluated tailored, web-based ads that would "drive" young adult smokers to evidence-based treatment online. Following qualitative thematic ad development, we designed six ads to evaluate two message themes (3 ads/theme): 1) "Someone like you" appealing to young adults' identification and intrinsic motivation; and 2) "Create your own plan" appealing to young adults' sense of need for their own, unique approach to quitting. Young adult smokers were recruited online (Craigslist, Facebook) to participate in a web-based survey with \$10 iTunes credit as incentive. Eligibility criteria were: ages 18 to 26, current smoker (smoking on some or every day in the past 7 days), and motivated to quit (>3 on a 10 point scale). After screening and quality control checks, smokers were randomly assigned to one of 7 conditions: 3 ad conditions for the "someone like you" theme; 3 ad conditions for the "create your own plan" theme; and one control group (no ad exposure). All participants completed a baseline survey. Participants in the active ad conditions then viewed one ad, with the option to "click" on it and link to a cessation program web site. "Click" rate was the primary outcome variable. Participants in the control group did not view an ad, but rather, were asked if they were interested in signing up for a program; those with a "yes" response were offered a link to the same program web site. Participants were 510 smokers (mean age 21.9, 49% female, 67% non-Hispanic white) with a mean smoking rate of 8.9 cigarettes/day; 54% had made 3 or more quit attempts, and 43.9% had prior use of evidence-based treatment with 7% using an online cessation program. Click rates for the two ad themes were similar (29.8% for "Someone like you," 30.8% for "Create your own plan"), and significantly greater than the control group (20.5%; chi-square = 3.08, df=1; p<.05). Subjective ad ratings were high for both ad groups.

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## POS2-66

### PURE POLICY: TOBACCO PACKAGE LABELLING IN 16 COUNTRIES

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**INTRODUCTION:** Cigarette packaging has emerged as a primary marketing tool for cigarette manufacturers, strained with increased restrictions on advertising. The Framework Convention on Tobacco Control (FCTC) contains guidelines on health warning and promotional labelling, which have been incorporated into national legislation in many countries. **OBJECTIVE:** Assess compliance of package labelling and national legislation with FCTC guidelines from 16 countries across levels of economic development. **METHODS:** Researchers from 16 countries involved in the Prospective Urban and Rural Epidemiological (PURE) study were asked to provide packs of at least 10 different types of the cheapest brands of cigarettes between June 2010 and June 2011. The countries included: Canada, Sweden, UAE (High Income Countries - HIC); Argentina, Brazil, Chile, Malaysia, Poland, South Africa, Turkey (Upper-Middle Income Countries - UMIC); China, Colombia, Iran (Lower-Middle Income Countries - LMIC); India, Pakistan, and Zimbabwe (Low Income Countries - LIC). A total of 275 packs were inspected using a structured data collection instrument. **RESULTS:** Health warnings were present on all packets; 91.6% had warnings on the front or back panels (defined

collectively as the principal display area [PDA]), the remainder 8.4% being on the side panels only. Only 6 of 16 countries met or exceeded the FCTC recommended size of 30% or more of the packs PDA. Cigarette packs from HIC had an average of 2.7 labels/pack compared to 2.3 in UMIC, 1.6 in LMIC, and 1.7 in LIC. Promotional labels were present on all packs and more numerous than health warning labels in all countries except in Canada, Chile, China, and Malaysia. Cigarette packs from HIC had an average of 5.4 labels/pack compared to 3.2 in UMIC, 2.9 in LMIC, and 4.3 in LIC. Deceptive terms such as "light" and "mild" were observed on 25.8% of all packs examined. **CONCLUSION:** Higher income countries were more compliant with FCTC recommendations and national legislation on health warnings; lower income countries had poor compliance. Deceptive terms were found in packs from all countries and there was poor compliance across all income groups.

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## POS2-67

### RACIAL DIFFERENCES IN PERCEIVED SMOKING-RELATED HEALTH RISK OF LUNG CANCER

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Perceived risk of smoking-related health (PSRHR) consequences is important to smoking behavior change. Few studies have explored racial differences in PSRHR and whether these differences may explain the observed increased risk of smoking-related lung cancer among AA. Preliminary evidence suggests that African Americans (AA) may have lower PSRHR for some diseases. In this study we evaluate racial differences of PSRHR for lung cancer. Non treatment-seeking daily smokers (N = 162, 33.3% AA) reported their general (average smoker) and personal PSRHR for lung cancer using a Likert scale (1-5, higher scores indicating stronger agreement) and cigarettes per day (CPD). Smokers were also asked the number of CPD (1, 5, 10, 20 or 30) needed to increase lung cancer risk by a factor of 2, 4, or 10 as compared to a non-smoker. A relative PSRHR score was calculated by subtracting each participant's CPD of their PSRHR for lung cancer from their own reported CPD. Lower (negative) scores indicated that the CPD perceived to do harm was higher than the subject's own CPD, suggesting lower PSRHR. AA smoked fewer CPD than Caucasians (14.23 ± 5.67 and 16.99 ± 6.39; p<0.005). AA and Caucasian smokers had similar perceptions of general and personal PSRHR for lung cancer. Compared to Caucasians, AA reported requiring more CPD to double and quadruple their risk of lung cancer. However, AA demonstrated higher relative PSRHR than Caucasians to double (p<.002) and quadruple (p<.02) risk for lung cancer. Relative to their own smoking, AA believe that they are not at increased risk of lung cancer, whereas Caucasians do. This corresponds to results for PSRHR that is not corrected for reported CPD, personal which shows that AA have lower PSRHR than Caucasians at a given CPD. These results indicate that evaluating PSRHR relative to one's own cigarette consumption may be important for understanding racial differences in PSRHR and in self-exempting beliefs that deny personal risk.

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## POS2-68

### EXAMINING TRUST BY MEDICAID SMOKERS IN APPALACHIA OHIO USING THE TRUST IN PHYSICIAN SCALE

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Trusting relationships between the physician and patient promote communication of relevant information between provider and patient, and higher degrees of trust have been shown to predict patients who seek out preventive care. The goal of this study was to assess the level of trust in physicians among Medicaid smokers in Ohio Appalachia who participated in a tobacco dependence treatment program that targeted Medicaid providers. A secondary objective was to explore the relationship between trust in physicians and provider counseling to quit. Medicaid-enrolled smokers were recruited to participate in the study from 8 health clinics as they came in for a medical appointment. Smokers were eligible to enroll if they were age 18 years or older, a current daily smoker, and enrolled in Medicaid. Following consent, participants were given a baseline survey, which included the Trust in Physician scale, which is a validated instrument. This scale

has a range of 0 to 55, and is often transformed to a 0 – 100 scale. One week later, a research nurse called participants to ask questions about whether the physician asked them about tobacco use, advised them to quit, and assisted them in a quit attempt. An ANOVA model was used to examine demographic, socio-economic, and tobacco-related predictors of level of trust. A logistic regression model was used to determine the relationship between trust and provider counseling. Of 188 individuals enrolled, data were complete for 183 at baseline and 178 patients at one-week. The mean total trust score was 21.1 (38.3 when transformed to 0-100 scale). Trust was not related to any participant characteristics, or found to predict differences in physician behavior with regards to smoking cessation counseling. Importantly, this mean trust score is considerably lower than any other reports in the literature. Given the low scores, being a smoker in a Medicaid program may be a determinant of lack of trust in physicians. Further research needs to be conducted to explore the role trust plays in shaping interactions between rural smokers and healthcare providers, particularly in Ohio Appalachia.

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## POS2-69

### YOUTH SMOKING INTENSITY IN THE NOT-ON-TOBACCO (N-O-T) PROGRAM

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Studies of youth smoking behavior typically focus on discussions about youth basic demographics, smoking history and status, and intervention readiness (motivation and confidence to quit, and stages of changes) factors. However, so far there is no comprehensive analysis about youth smoking intensity in smoking cessation program designed specifically for them such Not-On-Tobacco (N-O-T) program. This study examined the differences in youths smoking intensity based on those factors. Youths included in this study were students (N=7,130) with ages of 14-19 years old, smoked at least one cigarette during weekdays and/or weekend days in the past 30 days, and have participated in the N-O-T research projects, in five states: FL, NC, NJ, WI and WV between 1997 and 2009. Smoking intensity was measured by the number of cigarettes smoked per day. Majority of youths were female (55.7%) and in 10th grade or lower (54.2%). On average, they were 16.0 years old (Standard Deviation (SD)=1.2 years) and started to smoke cigarettes at 12.1 years old (SD=2.4 years). In intensity comparison, females smoked less cigarettes per day than males (p<.001), and the older the youths were the more they smoked (p<.001). Youths who smoked at a younger age smoked more than those who started later (p<.001) and those who had high smoking exposure smoked more cigarettes than those who either had moderate or low/no smoking exposure (p<.001). The creation of intervention readiness (IR) index as the summation score of motivation, confidence, and stages of changes showed that 53.7% of youths had moderate readiness. Youths with low readiness smoked more than those who had moderate and high levels of readiness (p<.001). The youth demographics, smoking history and exposure, and IR factors have been identified as significant factors related to smoking intensity. Further exploration on youth factors beyond individual-level data is needed, in addition to more advanced statistical modeling. A better understanding of the relationship between smoking intensity and youth smoking behavior can help in designing strategies and planning more effective cessation programs to meet the quitting needs of youth smokers.

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## POS2-71

### PREFERENCES FOR MENTHOLATED CIGARETTES: PERSPECTIVES OF SMOKERS AND SELLERS IN A MIGRANT POPULATION IN IDI-ARABA SABONGARI AREA OF LAGOS

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Tobacco use has become a rapidly growing problem in many developing countries including Nigeria. Available data on smoking patterns in Nigeria suggest that the smoking rates in northern Nigeria is higher than in the south. Anecdotal reports also indicate that smokers from the northern parts of the country have a preference for mentholated cigarettes. We therefore sought to assess the attitudes and beliefs regarding the use of mentholated cigarettes among a migrant population from northern Nigeria who are residents of Idi-Araba Sabongari area of Lagos. We conducted twenty in-depth interviews (IDI) among cigarette sellers and three focus group discussions (FGD) among current smokers (have smoked at least 100 cigarettes in a lifetime and currently smoked at least one cigarette per day). Questions were designed to explore the sales patterns for all classes of cigarettes and the overall consumption pattern and preference for mentholated cigarettes in this population. Interviews were audio-taped and transcribed. All the sellers interviewed were males in the age range 15-65 years. The overwhelming majority of sellers (95%) sold cigarettes in addition to other items. The volume of sales ranged from 5 sticks to four packs (80 sticks) per day. Cigarette sales formed the fourth highest product sold for the majority of sellers. Sale of mentholated cigarette brands was about 20% of total sales in 90% of sellers interviewed. All the participants in the FGDs were male, with an age range between 22 and 37 years. None of the respondents had completed secondary school education. Most respondents reported that they started smoking due to peer influence. Users of mentholated cigarette brands reported increased mental alertness as one of the reasons for use and thought that mentholated cigarettes were more addictive. All respondents had made at least one quit attempt in the past one year. The findings of the study provide initial insights into preferences for and sale of mentholated cigarettes among a low socio-economic sample. Future studies are needed to better understand factors associated with preferences for mentholated cigarettes in developing countries such as Nigeria.

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## POS2-72

### PILOT STUDY OF A HEALTH ADVOCATE INTERVENTION FOR SMOKING CESSATION AMONG PUBLIC HOUSING RESIDENTS

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Although the Clinical Practice Guidelines for Treating Tobacco Use and Dependence have validated the synergistic efficacy of medication and counseling together in smoking cessation, these programs are underutilized especially by smokers with low socioeconomic status. This pilot study promotes Tobacco Treatment Advocates (TTAs) trained in patient-centered Motivational Interviewing (MI) where participants decide if and when to change a behavior. The MI-trained TTAs tailor their counseling to individual subjects' readiness to change, and help navigate them through the process. The study describes participants' baseline characteristics, assesses how effectively participants transitioned from recruitment to active study involvement, and elucidates participants' receptivity to smoking cessation resource referrals. 19 participants, 5 males and 14 female smokers, were enrolled from 2 Boston public housing developments and completed baseline questionnaires. TTAs then attempted to set up meetings with participants. Enrollees received incentives for completing questionnaires. TTAs started to contact participants for first meetings 5 days from baseline, average time from baseline to the first visit was 17 days (range 8-28days). Of the twelve participants visited by a TTA, 10 said they were ready to quit and made appointments with at least one referred smoking cessation resource. Two of these ten completed their appointments. Four of the twelve participants also had second visits from the TTA with an average time to 2nd TTA visit of 13 days. One participant completed 7 visits in 1½ months. Asthma, depression, and heart disease were the most common illnesses among participants. Before TTA visits, the most common quit method used was quitting 'cold turkey', and the most common quit medication used was the patch. After TTA visits, participants were more likely to

use professional help to quit smoking. Twelve of the nineteen participants were actively interested in the referred resources. The MI-trained TTAs are elemental in encouraging participants to follow through with the referrals and maximize utilization of the resources.

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## POS2-73

### PREDICTORS OF INTENTION TO QUIT SMOKING IN HUNGARY

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Background: Promoting smoking cessation must be a public health priority in Hungary because smoking is the leading, preventable risk factor for premature death and disability in this country. We describe factors associated with intention to quit among a population-based sample in Hungary in an effort to identify opportunities to promote cessation. Methods: A cross-section of individuals aged 16-70 years was selected from the seven geographical regions of Hungary (n=2,250). An in-person, self-administered questionnaire was used to collect information on demographics, smoking behavior, knowledge of health risks of smoking, quitting, and intention to quit. Multivariable logistic regression models were used to assess individual (e.g., demographics, prior quit behavior) and environmental (household and workplace smoking policies) factors associated with intention to quit. Results: One in three respondents were current smokers (33.2%), while 17.6% and 49.1% were former or never smokers, respectively. Current smoking was significantly higher among younger people, in males and among lower educated respondents. 48.0% of smokers wanted to quit. Intention to quit was positively associated with number of previous quit attempts (OR: 2.99, 95%CI: 2.37 to 3.77, p<.001), perceived health risks of smoking (OR: 2.16, 95%CI: 1.48 to 3.16, p<.001), and presence of a household smoking ban (OR: 1.95, 95%CI: 1.11 to 3.42, p<.05). Age, gender, education, and workplace smoking policies were unrelated to intention to quit. Conclusions: Identifying the determinants of smokers' intentions to quit smoking can support tailored approaches for smoking cessation programs. Increasing perceived health risks and encouraging household policies may increase the likelihood of future quit attempts.

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## POS2-74

### CIGARETTE SMOKING AND DRUG USE AMONG A NATIONALLY REPRESENTATIVE SAMPLE OF HIV-POSITIVE INDIVIDUALS

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Background: The prevalence of cigarette smoking among HIV-positive populations is approximately three times higher than that of the general population. Until recently, little attention has been given to the intersection of tobacco use and HIV/AIDS, largely due to reduced life expectancies of persons living with HIV/AIDS (PLWHA). More effective medical treatments have resulted in increased life expectancies among PLWHA, but premature death is still common, partially due to tobacco use. Methods: Smoking, drug use, and psychological problems are assessed among HIV-positive individuals from the 2005-2009 National Survey on Drug Use and Health (NSDUH). Adjusting for complex survey design, descriptive statistics are presented for the entire sample; smoking characteristics are presented for current smokers. Drug use characteristics stratified by smoking status are presented, and chi-square tests are used to describe differences between never, former, and current smokers. Results: Among the 248 HIV-positive participants, 46% (98% CI = 36-57) were current smokers and 20% were former smokers (98% CI = 12-32). A majority (63%; 98% CI = 46-77) of current smokers were nicotine dependent according to the Fagerström Test for Nicotine Dependence (FTND). Current smokers reported a significantly greater percentage of any past year drug use, as compared to never smokers (65% vs. 27%; p < 0.001). Conclusions: Cigarette

smoking and drug use were reported among this population at rates much higher than is observed in the general population. Understanding and addressing other health concerns, like cigarette smoking and drug use, may further extend life and increase quality of life of people living with HIV/AIDS.

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## POS2-76

### DEVELOPMENT OF A TOBACCO CESSATION PROGRAM FOR PEOPLE WITH DISABILITIES: A CBPR APPROACH

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The purpose of presentation is to describe the development of a tobacco cessation program designed by and for people with disabilities (PWD). Approximately 50 million Americans (22%) suffer from some form of disability, with evidence suggesting that smoking rates within the disabled community are 50% higher than the general population. The higher incidence of tobacco use among PWD has been shown to be directly related to barriers to tobacco cessation treatment. Using Community-Based Participatory Research (CBPR), we sought to modify a program that was developed based on the CDC's Best Practices for Comprehensive Tobacco Control. First, a Community Advisory Board (CAB) panel was recruited to include individuals with disabilities who can provide insight into the barriers associated with tobacco treatment. After forming the group, members were asked to review an existing tobacco cessation group program. Specifically, CAB members were asked if the program: 1) appears to be applicable to PWD, 2) could be used for individuals across all disability groups, 3) needs modifications to become more applicable for PWD, and 4) could lead to continued tobacco cessation for a people with disabilities. Additionally, qualitative interviews were conducted with 10 people with disabilities to identify barriers to tobacco cessation. Following qualitative interviews and multiple CAB meetings, the tobacco cessation program was modified across several areas including: decreasing text density, adding personal vignettes from PWD, adjusting for person-first language, adding disability-specific issues, and incorporating appropriate counseling strategies. Finally, the curriculum was presented to a panel of experts experienced in developing and implementing tobacco cessation programs. The revised curriculum addressed a critical need for a disability-specific tobacco cessation programs. Additionally, this study demonstrates the effectiveness of CBPR to modify treatment programs for PWD. Study findings will set the stage for a subsequent controlled pilot study examining the efficacy of a CBPR-based tobacco treatment program for PWD.

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## POS2-77

### META-ANALYSIS OF VARENICLINE USE AND TREATMENT EMERGENT CARDIOVASCULAR EVENTS

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Smoking is the leading cause of preventable death in the US. Most smokers die from cardiovascular disease (CVD). Varenicline, a first-line medication treatment for smoking addiction, is FDA-approved for use in smokers with stable CVD. A recent meta-analysis by Singh et al. (2011), however, concluded that varenicline increases the risk of serious CVD events. Several methodological issues raise doubt about the study's conclusions, namely: inclusion of CVD events well beyond the treatment period; exclusion of trials with no events; and use of the Peto Odds Ratio [OR], which has known bias under conditions of unbalanced design and rare events, present in a majority of the reviewed trials. The current meta-analysis examined treatment-emergent serious CVD events in all published, double-blind, randomized controlled trials of varenicline for smoking cessation, adding 8 trials to the 14 previously analyzed. Treatment-emergent CVD

events were defined as occurring during the drug treatment window or within 30 days of discontinuation. Summary estimates based on the Mantel-Haenszel (MH) risk difference and relative risk statistics are compared with the Peto OR. Twenty-two randomized controlled trials of varenicline use for smoking cessation were identified with 9755 participants; 8 trials had no CVD events. The rates of serious treatment-emergent CVD events were 34/5805 (0.59%) on varenicline and 17/2950 (0.58%) on placebo. The MH risk difference of 0.27% (95% CI: -0.08%, 0.62%) was neither clinically nor statistically significant. For comparison, MH relative risk=1.42 (0.83, 2.43) and Peto OR=1.64 (0.93, 2.89), both based only on trials with events, also indicated no significant difference between active and placebo drug groups. Tobacco use carries significant risk of heart disease and stroke. This meta-analysis, which includes all published trials, focuses on events occurring during drug exposure, and compares findings to two additional summary estimates, indicates no significant increase in serious CVD events associated with varenicline use. Notably, with rare events, summary estimates based on relative effects appear inflated compared with absolute effects.

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## POS2-78

### CIGARETTE BUTTS AS LITTER: SMOKERS' ATTITUDES AND BEHAVIORS

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Cigarette butts are consistently the most collected items in litter clean-up efforts, which are costly to local economies. In addition, tobacco waste may be detrimental to our natural environment. The tobacco industry has conducted or funded numerous studies on smokers' littering attitudes and behavior, however, non-industry sponsored research is rare. We sought to examine whether demographics and smokers' attitudes about cigarette waste as litter predicts littering behavior. Smokers aged 18 and older (n=1,000) were interviewed about their beliefs and attitudes about cigarette waste as litter. Respondents were members of the Research Now panel, an online panel of over three million respondents in the United States. Multivariate logistic regressions were constructed to determine factors significantly predictive of past-month or ever littering (p-value<0.05). The majority (74.1%) of smokers reported ever littering their cigarette butts by disposing of them on the ground or throwing them out of a car window. Over half (55.7%) reported disposing of cigarette butts on the ground, in a sewer/gutter, or down a drain in the past month. Those who did not consider cigarette butts to be litter were over three and half times as likely to report ever littering cigarette butts (OR=3.68, 95% CI= 2.04, 6.66) and four times as likely to have littered cigarette butts in the past 30 days (OR=4.00, 95% CI= 2.53, 6.32). Males were also significantly more likely to litter cigarette butts in the past month compared with females (OR=1.49, 95% CI= 1.14, 1.94). Nearly three-quarters of smokers reported ever littering their cigarette butts. Belief that cigarette butts are not considered litter was the only attitude/belief in this study that predicted ever- or past-30-day littering of cigarette waste. Messages in anti-cigarette-litter campaigns should clarify that cigarette butts are indeed litter and are harmful when disposed of improperly. These results also have important implications for campaigns which could combine anti-litter and quit-smoking messages to reduce both tobacco use and related litter.

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## POS2-79

### WHAT ABOUT THE SMOKERS WHO ARE NOT "SKINNY"? AN ANALYSIS OF NHANES DATA TO EXAMINE DIFFERENCES BETWEEN OBESE AND NON-OBESE SMOKERS

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Background: Previous literature has consistently demonstrated that current smokers have a lower BMI than former smokers. This overall finding likely masks subgroups in which this relationship does not hold. Studying these groups may add to our understanding of factors which contribute to the discrepancy between current and former smokers. Method: For this study, we compared overweight/obese current smokers (OCS, n=2326) to normal/underweight current smokers (NCS, n=2664) based on measured BMI. Using data from the NHANES-III (1988-94), a nationally representative,

cross sectional study of the United States population, we assessed the potential impact of a number of demographic and behavioral factors including self-reported diet and physical activity. Bivariate and adjusted analyses were completed using SUDAAN to account for the complex sampling frame. Approximately 46% of the sample were OCS. Results: Based on the bivariate analyses, OCS were more likely to be heavy smokers compared to NCS. After controlling for sex, age, and amount smoked, in the adjusted analysis using logistic regression, OCS exercised significantly less (p<0.05) and ate fewer fruits and vegetables (p<0.07). In addition, OCS who drank more than 5 alcoholic beverages at one sitting during the last year were less likely to be obese (p<0.05). To examine more recent data, we also conducted additional analyses using the Continuous NHANES (1999-2008). The results from this analysis were consistent with the results from the NHANES-III. Conclusion: The results of this study suggest that factors which differentiate OCS from NCS are consistent with those which differentiate obese from non-obese individuals in the general population. This finding has important implications for intervention and demonstrates the need to target multiple health behaviors. These results also highlight that blanket statements regarding BMI differences between current and former smokers mask underlying individual variation and support the hypothesis that behavioral factors associated with weight may contribute to post-cessation weight gain.

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## POS2-80

### THE EFFECTIVENESS OF AN ONLINE CESSATION WEBSITE TO PROMOTE QUIT BEHAVIOR

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To harness the ability of the internet to deliver evidence-based cessation information to consumers, Legacy created BecomeAnEX.org, a free branded smoking cessation website designed to engage smokers through videos, interactive content, a personalized quit plan, and an online community of smokers. With over 400,000 registered users, we sought to evaluate the website's effect on quit behavior. An online study system recruited 1035 new registrants to the BecomeAnEX.org (bex) website beginning in January 2011. Quit behavior was assessed through surveys at 1, 3, and 6 months follow-up. Logistic regression was used to determine the association between increased online activity and quit behavior. Results for the first 3 months of the study are presented here. The sample consisted primarily of daily smokers (93.1%) who smoked an average of 16.4 cigarettes per day. This was a highly motivated group of individuals; at baseline, 72.3% endorsed having made at least one quit attempt in the past 12 months, 97.2% said that they had been thinking about quitting a lot recently, and 71.6% intended to quit in the following 30 days. Users visited the website an average of 3.85 times within the first 30 days of the study. At the 3-month follow-up, 77.7% of the respondents endorsed making a quit attempt between baseline and 3-months, and there was a 7-day abstinence rate of 18.1% and a 30-day abstinence rate of 14.9%. Adjusted regression analyses show that there is a statistically significant association between visits to the website in the first 30 days and abstinence at 3-months; each additional visit to the website was associated with an approximate 2% increase in both 30-day (p=0.003) and 7-day (p=0.002) abstinence. This differed by race/ethnicity, with African-Americans showing the highest increase in 30-day abstinence (30%, p=0.04) with each additional visit to the website. Early results show that the bex website helped to promote quit behavior. Further understanding how the website engages the user and prompts quit behavior is essential in order to optimize the user-experience and maximize quit rates.

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## POS2-81

### FACTORS ASSOCIATED WITH SMOKING CESSATION MEDICATION UTILIZATION

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Objective: To identify factors associated with the use of quit smoking medications in a randomized clinical trial of telemedicine vs telephone counseling for smoking cessation in rural Kansas. Methods: All study participants received guidance in selecting pharmacotherapy; income-eligible participants were offered assistance in applying to prescription drug programs for free and reduced-cost medications. Baseline assessment

included participant's demographics, medical conditions, and insurance coverage. At 3-months post randomization, we assessed quit smoking medication use. We conducted bivariate analyses to identify factors associated with medication use, using a p-value of <0.05 to determine significance. Results: More than half (52%) of all participants (n=567) used some form of quit smoking medication. Of these, 42 (17%) obtained medications via prescription drug programs and 198 (83%) obtained medications via their drug coverage or out of pocket. Medication users were younger than non-users (47% vs 50%, p=0.0419) and were more likely to have some form of health coverage (private insurance, Medicaid or Medicare) than non-users (72% vs 56%, p=0.0002). Medication users were more likely to have prescription drug coverage for quit smoking medications compared to non-users, and drug coverage appears to be linked to medication choices. Medication users were also more likely than non-users to have home smoking restrictions (p=0.0173) and planned to quit smoking during the next 30 days (p=0.0002). Past experiences in using the nicotine patch (p=0.0011), nicotine gum (p=0.0002), nicotine lozenge (p=0.035), and bupropion (p=0.0046), appear to be important contributors to encourage utilization. Overall, medication users completed more counseling sessions than non-users (3.3 versus 2.9, p=0.0044). Conclusion: Rural smokers were receptive to receiving assistance in selecting pharmacotherapy and help identifying prescription assistance to off-set medication costs. Efforts to enhance pharmacotherapy utilization, including increasing insurance coverage for stop smoking medications, are central to supporting success in smoking cessation and increased abstinence.

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## POS2-82

### USING CASE MANAGEMENT FOR SMOKING CESSATION AMONG LATINOS

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Objective: The 2008 Clinical Practice Guidelines recommend pharmacotherapy and counseling for treatment of tobacco use; however, Latino smokers are less likely to receive advice to stop smoking and have limited access to pharmacotherapy to aid cessation. Further, while free telephone counseling quitlines are available nationwide in English and Spanish, Latinos report limited knowledge of this resource and quitlines report underutilization by Latinos. The aim of this study is to describe a protocol testing the impact of smoking cessation case management on utilization of smoking cessation quitlines and pharmacotherapy among Latino smokers. Methods: Self-identified Latino smokers, recruited from community-based interventions, were randomized to either case management or control. Participants in both arms received a kit containing educational materials and forms for free quitline and pharmacotherapy assistance programs. Participants were encouraged to set a quit date, use quit smoking medication, and call the quitline. The case management arm also included four calls to enhance utilization of pharmacotherapy and quitline. We anticipate enrolling a total of 90 smokers by December 2011. Results: Out of the 117 smokers who have been screened to date, 27 (23.1%) have been enrolled. Among those receiving case management calls, 4 (30.8%) chose to quit without using pharmacotherapy, while 4 (30.8%) selected nicotine replacement therapy, and 5 (38.5%) requested varenicline and received assistance with the pharmaceutical assistance application process. To date, 9 (75%) requested referral to the telephone counseling quitline. Conclusion: Case management facilitates access to effective smoking cessation resources among underserved Latino smokers. Implementation of case managers within clinical or social service settings may provide a bridge for connecting Latino smokers to needed smoking cessation resources.

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## POS2-83

### USE OF AN ONLINE SURVEY TO EVALUATE A TOBACCO CESSATION INTERVENTION AMONG COSTA RICAN PHARMACISTS

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Objectives: Pharmacists are trusted and accessible health care professionals. However, few pharmacists assist their customers with smoking cessation. Although some U.S. data is available, little is known regarding practices in Central and South American countries. Methods: We created a 20-item online survey using questions from prior surveys and questions tailored to pharmacy practice in Costa Rica. The survey was translated into Spanish by a native speaker. An email with a link to the survey was distributed to all Costa Rican pharmacists by the Costa Rican Pharmacist Association. A reminder email and link was sent two weeks after the initial communication. Results: Our response rate was 10.8% (245/2250). Most (220) reported having contact with patients as part of their job. Of these, almost 50% of respondents reported they had asked about smoking status and provided quit smoking advice to quit to at least one patient in the previous 30 days. However, few (18%) had referred a smoker to treatment. Most pharmacists believed cessation counseling was effective (53%), however, half (52%) only discussed smoking when patients raised the topic. Nearly all (92%) were interested in receiving smoking cessation training. Conclusion: Costa Rican pharmacists support but most do not implement smoking cessation assistance among patients. Qualitative and quantitative research would help identify the best role for Costa Rican pharmacists to fill in treating smokers. This would be facilitated by culturally adapted guidelines that take into account the treatment options and the health care system of Costa Rica.

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## POS2-84

### CALLING ALL SMOKERS: QUITLINES' REACH OVERALL AND FOR PRIORITY POPULATIONS, FY2010

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The North American Quitline Consortium has conducted a survey of publicly-funded tobacco cessation telephone quitlines annually since 2004, collecting information on quitline budgets, operations, service offerings and protocols, utilization, and outcomes (FY2010 survey only). Information on numbers of tobacco users served with counseling or medications within specific sub-populations of interest was collected for the first time in the FY2010 survey. While treatment reach (the number of tobacco users receiving counseling or medications from quitlines divided by the total number of tobacco users) was 1.10% for all populations combined, reach varied widely for African Americans (0.86%), American Indian/Alaska Natives (AIAN) (1.51%), Asians (0.46%), Hispanic/Latinos (0.63%), and those with less than a high school education (0.71%). While only 2.27% of U.S. quitline callers reported a race of American Indian/Alaska Native, AIAN smokers make up only 1.68% of the smoking population, indicating that quitlines are serving proportionally more AIAN smokers than are represented in the general population of smokers. This relationship was reversed for Black/African Americans (11.04% of quitline callers, 13.87% of the smoking population); Asians (1.02% of quitline callers, 2.34% of the smoking population); Hispanic/Latinos (7.20% of quitline callers, 11.85% of the smoking population), and those with less than a high school education (16.5% of quitline callers, 25.39% of the smoking population). These findings suggest that quitlines are not serving as many tobacco users from specific sub-populations of interest as might be expected given their prevalence nation-wide, with the exception of American Indian/Alaska Natives. Results from this study can be used to make decisions about promotional efforts for the future, and can serve as baseline measures to assess the impact of national promotions such as the implementation of FDA graphic health warnings on cigarette packs. Strategies for increasing reach of quitlines will be presented.

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## POS2-85

### IS SOCIAL ACCEPTABILITY OF SMOKING HIGHER FOR CURRENT SMOKERS THAN FOR NON-SMOKERS?

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**Background:** In the US, smoking rates are lower and intentions to quit are higher in states with lower social acceptability of smoking (SAS). SAS has been cited as the main motivation for quitting among former smokers and a positive correlate for higher cessation rates and for having a smoke-free home. While the construct of SAS is conceptually important, existing instruments for measuring SAS, such as the American Social Climate Survey, have their weaknesses and there is a need for other measuring instruments. **Purpose:** To create a SAS index and examine the link between smoking status and SAS. **Methods:** We analyzed data from the 2010 Centre for Addiction and Mental Health (CAMH) Monitor (a repeated cross-sectional RDD survey of Ontario residents aged 18+ with a region-stratified 2-stage (household, respondent) probability sample design; n=3,030). Based on results of an exploratory factor analysis, we created an index (1 factor) to proxy SAS with 8 opinion variables (e.g., own/family views on adult and teen smoking). Adjusting for complex survey design, we reported index scores by sex, age groups, marital status, education, and smoking status, and examined the correlation between smoking status and index scores. **Results:** A SAS index was created: scores range from 8 (completely acceptable) to 32 (completely unacceptable). Average SAS score for Ontarians was 24.4, 95% CI=[23.9-24.8]. There were significant differences in SAS scores across smoking status (p<0.01), sex (p<0.01), age groups (p<0.01), marital status (p=0.01), and education (p=0.01). Smoking was least socially acceptable among never smokers (25.7), followed by former (24.1) and current smokers (18.7), p<0.01. Smoking was less socially acceptable for women (25.2), those aged 65+ (26.7), married couples (25.0), and university graduates (25.4). Adjusting for sex, age, marital status, and education, the effect of smoking status remained significant (p<0.01); sex effect varied by age (p=0.01). **Conclusions:** In Ontario, young adults (especially men) and current smokers consider smoking as being more socially acceptable. Further study of SAS could aid in the development of cessation programs and policies.

*The Ontario Tobacco Survey is an initiative of the Ontario Tobacco Research Unit, which receives funding from the Ontario Ministry of Health Promotion and Sport.*

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## POS2-86

### EXAMINING THE STABILITY OF YOUNG ADULT ALCOHOL AND TOBACCO CO-USE PROFILES USING LATENT TRANSITION ANALYSIS

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Rates of tobacco and alcohol use are highest in young adults, with most smokers also reporting drinking. The current study uses longitudinal data, gathered at a six month interval, to examine cigarette and alcohol use profiles and the stability of profile structure and membership. Undergraduate student smokers' (N=264) past 30-day alcohol and cigarette use was assessed using the timeline followback procedure. Smoking (# cigs and # smoking days) and drinking (# drinks and # of binges) were entered into a latent transition analysis (LTA) to identify the latent taxonomic structure within the sample, and determine the probability of movement between groups over time. A 4-profile solution emerged at each time-point. The baseline profiles, with mean number of cigarettes (SE) and drinks (SE) reported respectively, can be summarized as B1) moderate smokers/light drinkers (n=163; 66.28 (7.63) & 15.66 (2.12)); B2) moderate smokers/heavy drinkers (n=69; 74.64 (23.97) & 63.45 (5.947)); B3) very heavy smokers/light drinkers (n=23; 369.53 (45.65) & 16.46 (4.00)); and B4) heavy smokers/very heavy drinkers (n=9; 206.89 (71.44) & 166.16 (50.04)). The 6-month profiles were substantively different from those at baseline and can be summarized as S1) light smokers/light drinkers (n=139; 8.45 (1.42) & 17.41 (2.13)); S2) light smokers/heavy drinkers (n=21; 30.57 (17.10) & 99.73 (13.92)); S3) moderately heavy smokers/moderate drinkers (n=83; 117.63 (9.63) & 28.68 (3.196)); S4) heavy smokers/light drinkers (n=21; 367.72 (39.91) & 9.60 (5.69)). The LTA probabilities highlighted both progression and reduction in the lower use groups. For example, participants in group B1 were most likely (probability=.653) to be in group S1, with the lowest alcohol and tobacco use, but were also likely (probability=.286) to be in group S3, that averaged nearly daily smoking. Overall, findings revealed notable changes in tobacco and alcohol use behaviors over the span of six months, affecting both profile structures and individual membership status. This suggests that

among young adults both tobacco and alcohol use are temporally unstable behaviors, particularly among those using at lower levels.

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## POS2-87

### TEACH: SYSTEM-LEVEL APPROACHES FOR SUSTAINED KNOWLEDGE TRANSLATION IN EVIDENCE-BASED CESSATION INTERVENTIONS

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**Background:** TEACH (Training Enhancement in Applied Cessation Counseling and Health) is a knowledge translation (KT) project offering a classroom-based university-accredited certificate program in intensive cessation counseling. Innovation champions, ongoing coaching and professional development opportunities are integral to successful dissemination and sustained practice change across the cessation treatment system in Ontario, Canada. **Objectives:** To create a system of practice supports and enablers to facilitate sustainable KT post-training. **Methods:** A menu of continuing education activities and evaluation processes have been developed to facilitate and sustain the knowledge translation process. Tobacco Cessation Practice Leaders are self-identified, TEACH-trained community leaders/champions in communities across Ontario, Canada. Tobacco Cessation Practice Leaders are supported by the Fundamentals of Tobacco Interventions Trainers' Toolkit, which guides TEACH-trained practitioners to deliver their own workshops or in-service trainings. The Community of Practice and Listserv foster information exchange; and evaluations and learning assessments are delivered pre- and post- course, and 3- and 6- months post- training. **Results:** To date we have recruited 57 Regional Practice Champions; disseminated 129 Fundamentals of Tobacco Interventions Trainers' Toolkits (with 10 workshops offered); and conducted 24 Community of Practice teleconferences /videoconferences. Follow-up evaluations indicate that over 96% of participants are disseminating the knowledge and skills obtained through TEACH. **Conclusions:** TEACH embodies the gold standard of any Continuing Medical Education program, whereby the knowledge transfer process takes place as an ongoing process. These KT initiatives are sustainable and facilitate continued contact and engagement with the growing number of practitioners trained since 2007.

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## POS2-88

### MOTIVES FOR SMOKING IN MOVIES AFFECT FUTURE SMOKING RISK IN MIDDLE SCHOOL STUDENTS

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Exposure to smoking in movies has been linked to adolescent smoking uptake. Beyond linking amount of exposure to smoking in movies with adolescent smoking, it is important to investigate whether the way that smoking is portrayed in movies matters for influencing adolescent smoking. No research has been conducted in this domain of inquiry. According to social-cognitive perspectives, movie characters who smoke convey information to adolescents about the consequences of smoking. Movies commonly portray smoking as a way to serve particular motives: Smoking to manage negative affect is the most common motive portrayed and smoking while socializing is the most common situation in which smoking is depicted. This study experimentally examined how motivation for smoking depicted in movies affects future smoking risk among early adolescents. A randomized laboratory experiment was used and 358 middle school-aged adolescents participated (M age = 13 years; 44% female; 56% Caucasian). Adolescents were exposed to movie scenes depicting one of three movie smoking motives: social smoking motive (characters smoked to facilitate social interaction); relaxation smoking motive (characters smoked to relax); or no smoking motive (characters smoked with no apparent motive). Responses to these movie scenes were contrasted (within subjects) to participants' responses to control movie scenes in which no smoking was present;

these control scenes matched to the smoking scenes with the same characters in similar situations but where no smoking was present. Future smoking risk, assessed with items tapping smoking intentions and smoking refusal self-efficacy, was the main dependent measure. Compared with adolescents exposed to movie scenes depicting characters smoking with no motive, adolescents exposed to movie scenes depicting characters smoking for social motives ( $p = .016$ ) and adolescents exposed to movie scenes depicting characters smoking for relaxation motives ( $p = .010$ ) had significantly greater chances of having increases in their future smoking risk. Exposure to movies that portray smoking motives places adolescents at particular risk for future smoking.

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## POS2-89

### MOMENTARY CHANGES IN SMOKING RISK AS A FUNCTION OF EXPOSURE TO PRO-SMOKING MEDIA

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Cognitive social learning theory suggests that exposure to pro-smoking media (e.g., point-of-sale displays, smoking in movies) affects smoking behavior through a gradually unfolding process, whereby sequential exposures to pro-smoking media incrementally strengthen individuals' risk of smoking over time. Changes in level of smoking risk over time eventually reach a "tipping point" after which initial smoking trials begin. This conceptualization suggests that it is important to measure acute changes in smoking risk as a function of pro-smoking media exposure to obtain a more complete understanding of the hypothesized sequential process for how pro-smoking media affects smoking behavior. This study used ecological momentary assessment to examine acute changes in college students' future smoking risk as a function of their exposure to pro-smoking media. A sample of 135 college students carried handheld computers for 21 days, recording their exposures to all forms of pro-smoking media during the assessment period. They also responded to three random control prompts during each day of the assessment period. After each pro-media smoking exposure and after each random control prompt they answered questions that measured their risk of future smoking. Responses between pro-smoking media encounters were compared to responses made during random control prompts. Compliance with the study protocol was high, with participants responding to over 83% of all random prompts. Participants recorded nearly three encounters with pro-smoking media each week. Results of linear mixed modeling indicated that all participants had higher future smoking risk following exposure to pro-smoking media compared with control prompts ( $p < 0.05$ ); this pattern of response did not differ between ever and never smokers ( $p = 0.77$ ). Additional modeling of the variances around participants' risk of future smoking revealed that never smokers were significantly more reactive to pro-smoking media exposures compared to ever smokers. Exposure to pro-smoking media is associated with acute changes in future smoking risk, and never smokers may be particularly reactive to such exposures.

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## POS2-90

### USING ECOLOGICAL MOMENTARY ASSESSMENT TO STUDY MIDDLE AND HIGH SCHOOL STUDENTS' EXPOSURE TO PRO-SMOKING MEDIA: A PILOT STUDY

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The studies that have examined the effect of exposure to pro-smoking media (e.g., to point of sale advertising; to magazine advertising; to smoking in movies) on smoking have been methodologically varied, ranging from experimental studies of small select samples (strong internal validity, weaker external validity) to naturalistic field studies of large representative samples (strong external validity, weaker internal validity). The trade-offs in choosing between different methods and designs make it difficult to draw precise conclusions about pro-smoking media exposure effects. This pilot study adapted ecological momentary assessment (EMA) to address these methodological issues by asking middle and high school students to monitor in vivo their exposures to cigarette ads. EMA affords the measurement precision of experiments and the external validity of naturalistic field studies; as such, it provides more precise information on how pro-smoking media affects this important population. Middle and high school students, ages 11-16 ( $n=20$ ; 50% female; 60% Caucasian), carried palmtop computers with them

for two weeks to record their exposures to all forms of pro-smoking media. Participants answered questions about their thoughts and feelings about smoking immediately after each pro-smoking media exposure event and also after responding to random prompts (two per day) during the measurement period. Compliance with the protocol was very high: participants responded to 82% of all random prompts issued. Participants reported about two pro-smoking media exposures per week. Nearly 60% of reported exposures were for Marlboro, Newport, and Camel cigarette brands; most exposures (71%) occurred at point-of sale locations with the remaining exposures from movies and television (14%), the internet (8%), magazines (4%), and other (3%). Most exposures (58%) occurred with family members present. Participants' future smoking risk was significantly higher in response to pro-smoking media compared to random times of the day ( $p < .05$ ). This study provides new information for the field about how to assess and model the effects of cigarette advertising on adolescent smoking.

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## POS2-91

### TOBACCO EXPENDITURE AND SMOKING-INDUCED DEPRIVATION: FINDINGS FROM THE INTERNATIONAL TOBACCO CONTROL (ITC) FOUR-COUNTRY SURVEY

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Objective: One of the most effective tobacco control policies in reducing smoking prevalence is increasing the price of tobacco. Price increase is shown to be more effective among smokers from lower socioeconomic backgrounds. It is argued that the lower socioeconomic smokers who are unable to quit may experience heightened deprivation as a result of having to pay more for tobacco. However, this argument has not been empirically examined. Our aim was to help fill this gap by examining the relationship between tobacco expenditure and smoking-induced deprivation (SID) among current smokers. Methods: We used data from wave 7 (2007) of the International Tobacco Control (ITC) four-country Survey conducted in Canada, the United States, the UK, and Australia. SID was measured with the following question: "In the last 6 months, have you spent money on cigarettes that you knew would be better spent on household essentials like food?" We standardized the distribution of daily tobacco expenditure in each country separately and subsequently created a unified tobacco expenditure variable. Results: After controlling for income, education, and other relevant covariates, one standard deviation increase in daily tobacco expenditure was associated with an increase of 22% in the odds of experiencing smoking-induced deprivation ( $p < .001$ ). This association did not vary by income or education. Discussion: We conclude that increase in tobacco taxation possibly results in economic deprivation among continued smokers.

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## POS2-92

### PREDICTORS OF SMOKING RELAPSE AMONG PREGNANT AND POSTPARTUM WOMEN

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Maintenance of smoking abstinence among pregnant and postpartum women is a public health priority. Previous relapse-prevention programs have been largely unsuccessful among this population. Thus, a clinical trial was conducted to test a series of self-help relapse prevention materials for pregnant and postpartum women. Women were recruited in their 4th - 8th month of pregnancy and randomized to receive either 10 relapse-prevention booklets entitled "Forever Free for Baby and Me" (FFB) or existing smoking cessation materials from the National Cancer Institute and American Cancer Society. Assessments were conducted by mail at baseline (during pregnancy) and at 1,

8, and 12-months post-partum. Women in the FFB condition reported higher abstinence rates at 8 and 12 months. These effects were most pronounced among lower-income women. The goal of the current investigation was to identify baseline variables as predictors of short-term smoking relapse at 1 month as well as 12 months postpartum. Relapse rates were 27% and 39%, respectively. Following multiple imputation (N=504), significant univariate predictors were tested in subsequent multivariate logistic regression analyses using backward stepwise regression. Smoking relapse at 1 month was predicted by intentions to resume smoking after pregnancy, low quitting confidence, presence of smokers in the household, not planning to breastfeed, and fewer years of smoking ( $p < .05$ ). Smoking relapse at 12 months was predicted by low quitting confidence and partner smoking at pre-pregnancy levels ( $p < .05$ ). Smoking trajectories will also be presented. Findings reveal important variables to target in treatment development and potential clinical applications for targeting pregnant women at-risk for smoking-relapse.

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## POS2-93

### POPULATION EFFECTS OF A TARGETED MARKETING CAMPAIGN ON THE CIGARETTE BRAND CHOICES OF GIRLS AND YOUNG WOMEN WHO RECENTLY INITIATED SMOKING: A CASE STUDY OF CAMEL NO. 9

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**BACKGROUND:** In 2007, RJR launched Camel No. 9, a cigarette brand targeted toward young women, and ran ads in 5 of the top 10 magazines popular among teenage girls at the time. After its introduction, the percent of girls reporting a favorite cigarette ad increased from 34% to 44%, an increase almost entirely due to a 65% increase in reports of Camel ads as girls' favorite cigarette ad. Previous studies have shown that youth reporting a favorite cigarette ad are more likely to experiment with cigarettes. **AIM:** This study examines the correlation between gender, age of initiation, and initiation year on the likelihood of smokers reporting Camel as their usual brand. It was hypothesized that female smokers who initiated at ages 12-17 ("girls") or 18-25("young women"), post-introduction of Camel No. 9's, were more likely to report smoking Camel compared to otherwise comparable groups that initiated prior to the campaign, were older at initiation, or were male. **METHODS:** Cross-sectional data from the nationally representative 2004-2009 NSDUHs were analyzed. Multiple logistic regressions assessed differences in cigarette brand choices across gender, initiation age, and initiation year. Camel reported as usual brand was the outcome of interest. All models controlled for race, income and menthol cigarette use. **RESULTS:** Females 26+ and male smokers showed no change in reported use of Camel cigarettes pre and post 2007. The proportion of girls reporting Camel as their usual brand increased from 2004-2006 (8.2%, CI: 7.0, 9.5) to 2007-2008 (13.4% CI: 11.3, 15.8). Young women experienced a similar increase-10.8% (9.9, 11.8) to 14.7% (13.2, 16.2). Females initiating post 2007(OR= 1.48,  $p = .001$ ) and ages 18-25 (OR=1.33,  $p = .028$ ) were more likely to report smoking Camel cigarettes compared to females initiating prior to the campaign and younger females, respectively. No differences were found among males. **DISCUSSION:** Reported use of Camel cigarettes increased among young women and girls during the Camel No. 9 campaign. The FDA may consider monitoring the marketing of cigarettes as they pertain to targeting at risk population sub-groups including females and youth.

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## POS2-94

### PERCEPTION, MARKETING & DESIGN: A COMPREHENSIVE ASSESSMENT OF THE USE OF 'LIGHT' CIGARETTES IN THE UNITED STATES, 2009

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**BACKGROUND:** Cigarettes marketed as 'low-tar' or 'light' offer no health benefits compared to their full-flavored counterparts, and implicitly mislead consumers. In response to such concerns, pack descriptors such as 'light,' 'ultra light' and 'mild,' are now banned by the FDA. However, factors beyond pack descriptors may promote

lights use. The size of the 'light' cigarette market, and characteristics of 'lights' smokers have not been recently documented. **AIM:** To understand how factors other than pack descriptors influence lights cigarette use, physical design, population use, and market share of 'light' cigarettes just prior to the 2010 ban were analyzed. **METHODS:** Cigarettes were categorized as 'light' ('light,' 'ultra-light' or 'mild') or full-flavor. Cigarette design (% ventilation) was assessed through 2009 industry disclosures to the Massachusetts Department of Public Health. Market share data were obtained via 2009 AC Nielsen ScanTrack, and population use via the 2009 National Survey on Drug Use and Health. **RESULTS:** 'Light' cigarettes were found to have a mean filter ventilation of 34.1% (95% CI: 31.5, 36.8); significantly higher than that of full-flavor cigarettes ( $p < .001$ ). 52.7% (95% CI: 51.1, 54.3) of smokers reported 'light' cigarettes as their usual type, representing 56.1% of all cigarettes sold. Significant predictors ( $p < .001$  for all) of 'light' cigarette use included: older age, white race, female sex, non-menthol cigarette use, fewer cigarettes smoked per day, and past year smoking initiation. 37.0% (95% CI: 34.6, 39.6) of menthol smokers reported smoking 'lights,' representing 40.5% of menthol cigarettes sold. **DISCUSSION:** Prior to the ban on pack descriptors, 'light' cigarettes represented approximately half of the US cigarette market, and were preferred by half of US smokers. The higher mean filter ventilation of 'lights' may lower risk perception and enhance appeal. Given differences found between menthol and nonmenthol smoker use and market share of lights, future research may investigate combined 'light' and menthol cigarette use. Further research is required to assess the influence of the descriptors ban on these measures.

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## POS2-95

### RECRUITMENT OF YOUNG ADULT SMOKERS VIA THE INTERNET: LESSONS LEARNED

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Recruiting smokers into research studies has often been challenging, as investigators try to enroll large, representative samples, or reach special populations. Internet recruitment has the potential to broaden reach, increase efficiency, and is needed for web-based interventions; however, it also presents several challenges. This paper reports on lessons learned from a national web-based recruitment and intervention trial. The design involved recruiting young adult smokers to complete an online survey with exposure to and evaluation of messages geared to mobilize smokers to seek online cessation treatment. Inclusion criteria were: ages 18 to 26, current smoker (smoking some or every day in past 7 days), and motivation to quit (>3 on a 10 point scale). Initial recruitment focused on ads posted to Craigslist.com, in the Jobs and Volunteers sections for several US cities. Ads introduced the study and directed those interested to a study web site, where a full study description and elements of consent were presented. After obtaining consent, a 7-item eligibility screener and baseline survey were presented, followed by exposure to online messages with evaluations for the non-control groups. Participants received \$10 iTunes credit immediately after survey completion. Of the 931 screened eligible, 510 (55%) unique, legitimate respondents completed the baseline survey. The final sample had a mean age of 21.9, and included: 49% female, 67% non-Hispanic white, 21% with a 4 year college degree or more education. While eligibility and duplicate checks were included, additional quality control checks were needed, due to problems encountered: "scamming," single users with multiple aliases; racing through the survey. Problems with Craigslist resulted in study accounts being placed on hold, so alternative modes were used [i.e., other online classified ad sites (e.g., backpage.com), Facebook events]; all resulted in a very low yield. Future recommendations include: delaying incentives; increasing quality control checks; understanding Craigslist terms better; using ambassadors to increase yield on Facebook.

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## POS2-98

### DOES MILITARY EXPERIENCE IMPACT SMOKERS' ABSTINENCE-RELATED EXPECTANCIES?

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**INTRODUCTION:** Some aspects of the military experience may foster resilience and optimism, and in turn deter tobacco use and promote smoking cessation. Alternatively, veterans are at higher risk of developing Post Traumatic Stress Disorder (PTSD), which is associated with higher smoking rates and greater difficulty quitting. To identify potential protective and risk factors among smokers with a history of military experience, the aim of the present study was to compare the expectancies for the process of smoking cessation (i.e., abstinence-related expectancies) of veterans to nonveterans. **METHODS:** The responses of veteran (N = 33) to nonveteran (N = 474) cigarette users were compared on the Smoking Abstinence Questionnaire (SAQ), a recently developed, 10-subscale measure of smokers' abstinence-related expectancies. **RESULTS:** Veterans were less likely to anticipate exaggerated adverse outcomes from quitting (Adverse Outcomes subscale;  $d = .46$ ) and were more likely to expect formal smoking cessation treatment to be effective (Treatment Effectiveness subscale;  $d = .40$ ). **CONCLUSIONS:** Interventions may benefit from leveraging the notion that veterans are less likely to catastrophize about quitting and are more likely to expect formal smoking cessation treatment to be effective. Despite higher rates of PTSD among veterans, some components of the military experience may cultivate resilience and optimism that are reflected by expectancies for the process of quitting.

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## POS2-99

### ADVERTISING EXPOSURE AND SUSCEPTIBILITY AMONG MIDDLE AND HIGH SCHOOL STUDENTS WHO SMOKED MENTHOL CIGARETTES—UNITED STATES, 2004-2009

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Menthol cigarettes account for 27% of all the cigarettes sold in the US. Since 1963, the market share of menthol cigarettes has ranged from 16-29%, while remaining stable at 26-27% from 2000-2005 and at 20% in 2006 (last year data available). Studies suggest that advertising menthol cigarettes make them attractive as starter products for new smokers and may impact brand preference among youth. It is important to understand the relation of advertising exposure and susceptibility to pro-tobacco influences among menthol and non-menthol smokers. We used data from 2004-2009 National Youth Tobacco Survey, a US school based survey of middle and high school students to estimate prevalence of advertising exposure (i.e. internet, supermarkets) and susceptibility to pro-tobacco influences (i.e. promotional item from tobacco industry) among current menthol and non-menthol smokers. Logistic regression will be used to analyze the relationship between current menthol and non-menthol use, exposure and susceptibility, controlling for age, sex, and race/ethnicity. Preliminary unadjusted results show that 49.5% middle and 45.0% high school students smoked menthol cigarettes. Combined data shows that <4% of non-menthol and menthol smokers in middle school saw an actor on television using tobacco, while 8.8% of non-menthol and 9.5% of menthol smokers in middle school saw advertisements for tobacco products in newspapers/magazines. Middle school menthol and non-menthol male smokers were more likely than females to wear something that has the tobacco company name or picture on it. Advertising exposure and susceptibility variables among high school menthol and non-menthol smokers mirrored middle school students; however rates were higher. Although, there are no significant differences in advertising and susceptibility measures when comparing menthol and non-menthol smokers, high school students were more likely to be exposed to various advertisements and other promotional items when compared to middle school students. Monitoring types of advertising (menthol ads) is needed to help understand advertising exposure impacts on youth smoking, initiation and brand preference.

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## POS2-100

### UNDERSTANDING TRENDS OF NON-ESTABLISHED SMOKERS BY SEX, AGE, AND RACE/ETHNICITY—NSDUH 2002-2009

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**Background:** The latest trends in current smoking ( $\geq 100$  lifetime cigarettes; smoke every day and some days) among adults in the U.S suggest that smoking has decreased over time, however the past three years rates have remained stable around 20%. The traditional adult definition of current smoking may be excluding a class of smokers who have not smoked 100 cigarettes in their lifetime but have smoked in the past year, which may be increasing among various demographic groups. In order to identify and assess the most recent trend for this smoking pattern, this study will examine trends of non-established (N-EST) smoking among adults in the US by sex, age and race/ethnicity. **Methods:** We used data from 2008-2009 National Survey on Drug Use and Health (NSDUH), an annual household survey of U.S. civilian, non-institutionalized population. We used the 100-cigarette criterion to classify adult ( $\geq 18$  years) established (EST; smoked  $\geq 100$  cigarettes and smoked  $\leq 30$  days in past month) and non-established (N-EST; smoked  $< 100$  cigarettes, smoked within past year, but may or may not smoked in past month) smokers. We assessed trends of EST and N-EST smokers by sex, age and race/ethnicity. Trends were tested for percentage differences, and statistical significance. **Results:** Preliminary results indicated that from 2002- 2009, N-EST smoking ranged from 3.2-3.6%. N-EST smoking remained stable for sex with prevalence ranging from 3.6-4.1% for males and 2.8-3.2% for females. However among 18-25 years old N-EST smoking significantly increased 2.6 percentage points (11.3%-13.9%,  $p < .01$ ). Combined data shows that among N-EST smokers in various racial/ethnic groups there are no significant differences in changes over time. **Conclusion:** Overall prevalence of N-EST smoking is less than 4% and has remained stable over the past eight years, however when looking at this pattern among 18-25 year old there has been an increase. More research is needed to determine factors that influence N-EST smoking, specifically amongst this group. Prevention and cessation strategies also need to be developed to target this age group and pattern of smoking.

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## POS2-101

### SMOKING PREVALENCE AMONG PEOPLE WITH DISABILITIES: DATA FROM THE NATIONAL COLLEGE HEALTH SURVEY, 2008-2009

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Smoking is the leading preventable cause of mortality and chronic disease; in the US, smoking prevalence among people with disabilities (PWD) is 10% higher than it is in the general population. This accentuates health disparities for PWD through co-occurring risks, such as limited health care access. Smoking rates are rising among 18-24 year olds. People who do not initiate smoking prior to this critical age are not likely to ever begin, while those who start will have a very difficult time quitting. Currently, little is known about smoking prevalence among college-aged PWD, and the association between smoking and disability. This study examined the association of disability status (physical, mental, sensory, learning, and all disabilities combined) and smoking among participants aged 18-24 (N=79,915) using data from the National College Health Assessment II 2008-2009. Current smoking was defined as smoking at least one day in the last 30 days. Prevalence was assessed using frequencies; two logistic regression models were conducted. Model 1 included all disabilities; model 2 included variables for physical, mental, sensory, and learning disabilities. Demographic variables (age, sex, race, living situation, and fraternity membership), and co-occurring risks (alcohol, marijuana and other drug use, depression, and stress) known to be associated with smoking among college students were included as controls. In this sample, 15% of persons without disabilities reported current smoking compared to 23% of PWD ( $X^2=510.1$   $p < 0.000$ ). Those reporting any disability were 1.14 times more likely to report current smoking than those reporting no disability. Those who reported mental (OR 1.39), sensory (OR 1.16), and learning disabilities (OR 1.09) were more likely to be current smokers than those who did not report these disabilities. Students who reported a physical disability were less likely to report current smoking than those without a physical disability (OR 0.85).

Identifying special populations, such as PWD, with higher smoking prevalence helps target interventions for those at greatest risk.

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## POS2-102

### NATIONAL SMOKING RATES AMONG HISPANIC/LATINO GROUPS IN THE U.S.: PROGRESS & CHALLENGES

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**Background:** Despite increasing tobacco control nationwide, limited research exists examining trends in smoking across various Hispanic/Latino groups, by gender, in the U.S. using nationally representative population data. Such analyses would complement local level data on smoking among Hispanics/Latinos, and highlight significant progress and new challenges in reducing smoking for specific Hispanic/Latino groups in the U.S. **Methods:** We examined trends in the prevalence of non-daily, light daily (<5 and 6-10 cigs/day), and heavy daily (11-19 and 20+ cigs/day) smoking among Hispanic/Latino current smokers (ever smoked 100 cigarettes in lifetime and currently smokes every day or some days) using the combined 1992-93/1995-96 (T1) and the combined 2003/2006-07 (T2) Tobacco Use Supplements to the Current Population Survey. We examined differences in the prevalence of these consumption levels between Hispanics/Latinos of Mexican, Puerto Rican, Cuban and Other origin in the U.S. **Results:** Across all Hispanic/Latino groups studied, ever smoking rates decreased by about 30% from T1 to T2 (prevalence of about 33% at T1 vs. about 23% at T2), except for those of Puerto Rican origin which decreased by only about 11% (41.2%±0.6 vs. 36.5%±0.7). Current smoking rates for both men and women decreased across all groups, except for women of Puerto Rican origin which remained at about 22%. The prevalence of heavy daily smoking decreased for all groups. Among those of Mexican origin, the proportion of current non-daily smokers increased for men (T1: 37.8%±0.9 vs. T2: 41.9%±1.0) but held steady for women at about 36%. A similar pattern was observed for those of Puerto Rican origin: men increased from T1 (16.6%±1.3) to T2 (21.9%±2.0) while women remained stable at about 23%. However, the proportion of light daily smoking increased for women of Mexican origin (T1 about 42% vs. T2 about 48%) and Cuban origin (T1 about 35% vs. T2 about 47%). **Conclusion:** These results have implications for the development of prevention and cessation strategies for various Hispanic/Latino groups, especially for women as rates of current non-daily and light daily smoking have either been flat or increased.

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## POS2-103

### RATES OF SMOKING AMONG CHRONICALLY HOMELESS ADULTS OVER TIME IN SUPPORTED HOUSING

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Although cigarette smoking is one of the leading preventable causes of death, the rates of smoking has not been adequately examined, let alone addressed, among the segment of the population that is chronically homeless. This study examined rates and correlates of smoking in this population. Data on 754 chronically homeless adults receiving mental health, primary care, and supported housing services at 11 sites in the United States were analyzed. The prevalence of current smoking, sociodemographic and clinical correlates of smoking, and change in smoking over a one year period were examined. Results show 78-80% of chronically homeless adults smoke, half of homeless smokers try to limit their smoking, and about half have discussed smoking with a healthcare professional. There was no significant overall change in smoking status over time in supported housing, but change in alcohol and drug use were associated with change in smoking status in the same direction. Having a diagnosis of posttraumatic stress disorder and reductions in alcohol use predicted quitting or limiting

smoking. A large majority of chronically homeless adults smoke, and smoking cessation interventions integrated with alcohol and drug treatment, are needed.

*The funders of the Collaborative Initiative to Help End Chronic Homelessness, representing the Departments of Housing and Urban Development, Health and Human Services, and Veterans Affairs provided essential support and guidance to this evaluation. The evaluation has been completed and the federal government is no longer involved. The views presented here are those of the authors, alone, and do not represent the position of any federal agency or of the United States Government.*

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## POS2-104

### PROMOTING TOBACCO CESSATION AMONG CANCER PATIENTS: RESULTS FROM A NATIONAL SURVEY AMONG U.S. ONCOLOGY PROVIDERS

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Tobacco use following cancer diagnosis is a serious public health concern for negative health outcomes. Despite ill-effects of tobacco among cancer patients and negative implications for treatment, many patients continue to use tobacco. Oncologists have a pivotal role in promoting tobacco cessation among cancer patients throughout treatment. This study assessed knowledge, readiness, and willingness to conduct and promote tobacco cessation counseling among a national sample of currently licensed and practicing U.S. Oncology providers. A brief survey was administered in July 2011 via e-mail (N=3,006) and U.S. postal mail (N=1,000). Samples were obtained from SK&A Information Services, Inc., which used verified addresses and broadcast e-mail surveys with one follow-up. Response rates were 0.6% for e-mail (N=19) and 9.6% for postal mail (N=96), with a 2.9% overall response rate (N=115). Results showed a majority of oncologists do the following often/almost always with patients: ask about tobacco use (96.6%); document tobacco use (93.1%); discuss tobacco use as a risk factor for cancer (87.9%); counsel patients on quitting (72.8%); and assess readiness to quit (68.7%). However, findings also reported a majority of oncologists do the following never/rarely with patients: provide information about secondhand tobacco smoke (53.5%); provide information on quitlines (59.7%); provide brochures and self-help guides (64.3%); and follow the 5A's model for treating tobacco use (68.6%). On a scale of 0 to 10, providers indicated they were generally comfortable providing cessation counseling [mean=7.0; SD=2.4]; however, providers were less willing to participate in a tobacco cessation training program for assisting patients with quitting [mean=5.2; SD=3.4]. Findings suggest oncology providers are asking, documenting use, and counseling patients who continue to use tobacco during treatment. Education targeting providers can increase knowledge and practices related to the 5A's treatment model and promote quitline and self-help information for patients. Effective strategies to increase provider willingness to attend tobacco treatment training sessions should also be encouraged.

*This study was conducted while the first author was at West Virginia University. Supported by a grant from the Agency for Healthcare Research and Quality: 1R24 HS018622-01.*

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## POS2-105

### MOTIVATION TO QUIT AND NOT ON TOBACCO (N-O-T) SMOKING CESSATION OUTCOMES AMONG YOUTH: WHAT IS THE RELATIONSHIP?

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The Not On Tobacco (N-O-T) program is an evidence-based smoking cessation program targeting teens, and has been implemented in school systems across multiple states. Motivation to quit, in addition to confidence and readiness to quit, have often been important to successful cessation outcomes, which was studied here in terms of N-O-T quitting outcomes among youth. This study included 1,940 N-O-T participants 14-19 years of age across five states (FL, NJ, NC, WI, WV) that implemented N-O-T in middle schools and/or high schools from 2000-2009. Eligible respondents smoked at least one cigarette in the last 30 days and completed the N-O-T program from baseline through 3-month follow-up. A majority of participants were: female (59.0%); 16-17 years old (55.1%); in 10th-11th grade (52.5%); White (86.3%); and planned to quit within the

next 6 months (68.3%). Binary logistic regression results included age, gender, grade, and race as confounding variables. Motivation to quit, confidence to quit, and attitude towards quitting were included as independent predictor variables, with smoking cessation as the dependent outcome variable. Findings reported motivation to quit [OR=0.720; p=0.001] and attitude towards quitting [OR=0.805; p=0.012] as significant predictors of successful smoking cessation outcomes. Youth who were more motivated to quit and who had a more positive attitude towards quitting were less likely to be smoking at 3-month follow-up and had more successful cessation outcomes in the N-O-T program. These findings suggest the importance of behavioral interventions to increase motivation and positive attitudes towards quitting before, during, and after youth participate in smoking cessation programs. Effective strategies to assess and increase youth motivation to quit should be encouraged.

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## POS2-106

### THE EFFECTS OF EXERCISE ON SMOKING BEHAVIOR: A TOPOGRAPHY STUDY

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Sessions of exercise can reduce the desire to smoke, severity of self-reported withdrawal symptoms and delay ad libitum smoking during periods of nicotine abstinence (Taylor et al., 2007). However little is known about the topographic characteristics of smoking behavior (e.g., puff volume and puff duration) following a session of exercise. The aim of this study was to assess whether smoking behavior is affected by a session of exercise during periods of nicotine withdrawal and satiation. Participants were eight overnight deprived smokers, who were on average 33.7 years old, smoked 16 cigarettes per day, and moderately nicotine dependent (FTND = 5.4). Each participant attended four laboratory sessions, which comprised a 2 (exercise/control) x 2 (nicotine/placebo cigarettes) within-subject design. Session orders were counterbalanced and randomized. Exercise consisted of walking on a treadmill at 10% below ventilatory threshold (determined by maximal exercise testing), and control sessions consisted of watching a health-related video. Before and after each condition, participants smoked either a nicotine (.60mg) or placebo (.05mg) Quest cigarette using a smoking topography device (i.e. Clinical Research Support System, Plowshare Technologies, Inc). Analyses suggest that when smoking the nicotine containing cigarette, participants display a non-significant trend towards reduced average puff volume and puff duration following exercise, relative to the control condition. This finding provides preliminary evidence that exercise may be implemented as a harm reduction strategy for smokers (i.e. they inhale less cigarette smoke), and is consistent with research suggesting that exercise may be helpful during attempts to quit smoking. Furthermore, these data may provide a behavioral mechanism underpinning findings that physically active smokers show a decreased risk in developing most cancers when compared to sedentary smokers (i.e. Alberg & Samet, 2003). Further analyses are needed to assess how reduced smoking behaviors relate to indices of craving, nicotine withdrawal, and mood. Also, a larger sample in this ongoing study will presumably strengthen these findings.

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## POS2-107

### PATIENT ATTITUDES TOWARD OUTDOOR SMOKING RESTRICTIONS IN A PSYCHIATRIC HOSPITAL SETTING

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Research and evaluation of smoke-free policy implementation in psychiatric settings has been primarily based on staff feedback and objective indicators of patient behavior, with little or no direct consultation with patients. In order to obtain feedback regarding the policy implementation process from the perspective of patients, a survey was distributed one year following implementation of a new smoke-free policy at Canada's largest mental health and addictions hospital. While the previous policy prohibited smoking anywhere indoors, patients were permitted to smoke outdoors beyond a 9-metre perimeter around each building entrance. The policy was revised in July 2010 to limit smoking on the grounds to a small number of designated areas. Patients were

recruited from a subsample of inpatient and outpatient clinics providing services for a variety of addictions and mental health issues. A total of 105 patients responded to the survey (52.5% inpatient; 77.4% male), of which 54.7% smoked daily and 8.9% smoked occasionally. Approximately half of patients supported the policy (53.5%), while the other half were either neutral (25.7%) or opposed it (20.8%). 48.5% of the sample reported no change in their smoking as result of the new smoke-free policy, the remaining reported that they had quit smoking (10.3%), made a quit attempt but relapsed (13.2%), reduced smoking (17.6%), or increased smoking (10.3%). Almost half (44.4%) of patients who smoked indicated they would be interested in receiving treatment to help quit smoking; 22.2% were unsure. Treatment methods of interest were as follows: smoking cessation medications (74.1%); support groups (40.7%); individual counseling (33.3%); and a single education session (14.8%). Approximately two-thirds (64.7%) of patients reported that they had been offered help with not smoking while at the hospital; the most common type of help offered was nicotine replacement therapy. A comparison of prescriptions filled for smoking cessation medications prior to and following implementation of the new policy will be presented. Implications of findings for other mental health hospitals undergoing similar policy changes will be discussed.

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## POS2-108

### HAZARDOUS DRINKING AND ALCOHOL DEPENDENCE IN CALLERS TO THE NEW ZEALAND QUITLINE: FINDINGS FROM A RANDOMISED TRIAL

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Background: The 2006 New Zealand (NZ) Health survey identified that 33% of people that smoke also have hazardous drinking behaviours. In 2009/10 the national, telephone-based Quitline service in NZ had over 53,000 callers per year, and provides an ideal point of contact for offering brief advice and referral for callers that may have a co-dependency with alcohol. However the Quitline does not routinely collect alcohol use data from callers. Aim: To describe the level of hazardous drinking and alcohol dependence in clinical trial participants recruited from the NZ Quitline. Method: A parallel group, single blind, randomised trial was undertaken, in which participants aged ≥18 years were identified through Quitline. A variety of baseline measures were assessed as part of the trial, including alcohol use and abuse, measured using the Alcohol Use Disorders Identification Test-consumption subscale (AUDIT-C). AUDIT-C scores of 3-7 for women and 4-7 for men indicate increased risk of hazardous drinking or dependence and this an opportunity to deliver a brief intervention. Scores of ≥8 indicate the need for referral to health services for assessment and support. Results: 1,410 smokers were randomised (705 in each arm). In women, 62% had an AUDIT-C score of ≥3, and 17% had a score of ≥8. In comparison, 68% of men had an AUDIT-C score of ≥4, and 33% had a score of ≥8. For both genders, the mean AUDIT-C score was highest in participants under 20 years of age (women: mean 7.6, SD 3.1; men: mean 9.5, SD 1.8) and decreased with age. A difference in mean scores was also observed according to ethnicity. No significant differences in AUDIT-C scores were seen by education level, nicotine dependence, type of cigarettes smoked, cigarettes smoked per day, age first started smoking, or years smoked. Conclusion: A significant proportion of trial participants recruited from the NZ Quitline were at increased risk of hazardous drinking or dependence. Quitline services should consider recording alcohol use in their clients, and look at opportunities to offer brief interventions and/or referral to services for those people identified as needing to modify their drinking behaviour.

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## POS2-109

### THE EFFECT OF HISTORY OF HAZARDOUS DRINKING AND ALCOHOL DEPENDENCE ON SMOKING CESSATION: FINDINGS FROM A RANDOMISED TRIAL

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**Background:** There is a strong relationship between smoking and alcohol consumption, with nicotine known to increase alcohol tolerance and reinforcement. Consequently, there is a need to understand how alcohol use and abuse impacts on smoking cessation. **Aim:** To determine the effect of hazardous drinking and alcohol dependence on smoking abstinence rates at 6 months. **Method:** A single blind, randomised trial was undertaken. Participants aged  $\geq 18$  years were recruited via the telephone-based, New Zealand Quitline service, and randomised to receive 1) very low nicotine content cigarettes (Quest 3) to use after their quit date, whenever they had an urge to smoke, for 6 weeks in combination with usual Quitline care or 2) usual Quitline care only. Usual Quitline care consisted of 8 weeks supply of NRT patches and/or gum or lozenges, plus behavioural support. The primary outcome was the proportion of participants who reported 7-day point prevalence abstinence at six months. Alcohol use was measured at baseline using the Alcohol Use Disorders Identification Test-consumption subscale (AUDIT-C). AUDIT-C scores (0-12) indicate the risk of hazardous drinking or dependence, with participants categorised as low risk ( $<3$  women,  $<4$  men), increased risk (3-7 women, 4-7 men) or high risk ( $\geq 8$ ). **Results:** 1,410 smokers were randomised (705 in each arm). In women, 37% had an AUDIT-C score of  $<3$ , 45% had a score of 3-7, and 17% had a score of  $\geq 8$ . In comparison, 32% of men had an AUDIT-C score of  $<4$ , 35% had a score of 4-7, and 33% had a score of  $\geq 8$ . Participants in the intervention group were more likely to have quit at six months (7-day point prevalence abstinence: 33% vs 28%, RR=1.18, 95%CI=1.10-1.39,  $p=0.04$ ), irrespective of baseline AUDIT-C score. However using continuous abstinence as a measure, smokers with low AUDIT-C scores were almost twice as likely to quit compared to those with high scores (adjusted OR=1.7, 95%CI=1.2-2.6,  $p=0.02$ ). **Conclusion:** In this trial involving a population of motivated quitters, the ability to quit smoking based on history based on alcohol use and abuse varied depending on the abstinence outcome measure used.

*This trial was supported by funding from the Health Research Council of New Zealand. This trial is registered with the Australasian Clinical Trials Network: Number ACTRN12608000410358.*

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## POS2-110

### PRACTICES, BELIEFS, AND ATTITUDES RELATED TO TOBACCO USE IN SIX ECONOMICALLY DISADVANTAGED COMMUNITIES IN THE DOMINICAN REPUBLIC

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The Dominican Republic is a tobacco-growing country that has not signed on to the FCTC nor have there been any national public campaigns targeting tobacco use. This study surveyed tobacco use and related attitudes and beliefs of residents ( $N = 1052$ ) in six economically disadvantaged communities (two small urban, two peri-urban, two rural; half tobacco growing). Over a fourth (28.1%) of the current sample reported currently using tobacco, tobacco users reported health symptoms more than non-tobacco users, were more vulnerable to advertising, less likely to notice anti-smoking messages, and less able to identify health problems related to tobacco use when compared to their non-tobacco using counterparts. Virtually all subjects acknowledged that tobacco is harmful, however knowledge regarding specific risks was low. Healthcare providers are missing opportunities to warn their patients about the adverse effects of tobacco use as only 60.8% of the participants reported receiving advice. Exposure was high with most (72.2% of all participants) reported having at least one parent who used tobacco and 60.4% reported currently being exposed to ETS sometimes or often. Seeing people smoke or use tobacco was normative in many places however, the majority of participants (74.5%) would like smoke-free public transportation and over half (55.7%) want smoke-free workplaces. Subjects reported high exposure to tobacco advertising in colmadros (small grocery stores; 80.4%) and on television (73.1%). This study begins to

identify challenges and opportunities for intervention in the Dominican Republic. There are clear needs for awareness raising regarding specific risks of tobacco use and ETS, and for interventions to change community norms and practices regarding smoke-free policies, restricting tobacco advertising, and more effectively engaging healthcare providers in interventions. Such efforts at the grass roots community level may provide a model to spur national momentum towards a more comprehensive tobacco control strategy.

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## POS2-111

### THE IMPACT OF MAJOR DEPRESSIVE DISORDER AND GENDER ON TRANSITIONS IN SMOKING: LONGITUDINAL EVALUATION IN THE U.S. POPULATION

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**Objectives:** Cross-sectional and treatment study data suggest that smokers with depression may have a tougher time quitting smoking than smokers without depression although some results disagree. Further, women exhibit a stronger relationship between depression and smoking. The main and interactive effects of depression and gender on smoking transitions have not yet been examined using longitudinal epidemiological data. The purpose of this study was to examine the impact of gender and depression (Current and Lifetime Major Depressive Disorder (MDD)) on smoking transitions (smoking cessation, smoking relapse) using two waves of data from the National Institute on Alcohol Abuse and Alcoholism's National Epidemiologic Survey on Alcohol and Related Conditions (NESARC; Wave 1, 2001-2002; Wave 2, 2004-2005). **Methods:** Analyses were conducted on 14,576 adults (50.7% female) who were classified as current or former smokers at the NESARC Wave 1 interview and completed the Wave 2 interview. Wave 1 and Wave 2 smoking status information was used to classify participants to smoking transition groups (Stable Current Smokers, Quitters, Relapsers, or Stable Former Smokers). Multinomial logistic regression analyses were conducted to test the main and interactive effects of the two independent variables (gender and MDD) on smoking transition classifications. **Results:** Smoking status remained stable for the majority of participants. Seventy-eight percent of Wave 1 Current Smokers were Current Smokers at Wave 2 while ninety-five percent of Wave 1 Former Smokers remained Former Smokers at Wave 2. Both current MDD and Lifetime MDD were significantly associated with continued smoking and relapse to smoking. Male gender was associated with quitting smoking. The depression by gender interactions were not significant. **Discussion:** Depression plays a detrimental role in the ability of both male and female smokers to quit smoking and to remain abstinent after quitting. Additional research is needed to understand the mechanisms behind the relationships of gender and depression to smoking.

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## POS2-112

### BEYOND INDOOR SMOKING BANS: ATTITUDES FROM A STATEWIDE SURVEY

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**Background:** The Healthy People 2020 goal is for all states to enact a smoke-free law that prohibits smoking in public places and worksites. All but seven states have some form of a statewide smoking restriction law, with 25 states and the District of Columbia prohibiting smoking in indoor areas of workplaces, restaurants and bars and 18 states have a partial law in place. **Purpose:** We examined the attitudes of adult smoking and non-smoking Minnesotans toward smoke-free policies in the broader community and

in particular outdoor spaces. Methods: The 2010 Minnesota Adult Tobacco Survey (MATS) is a random digit dial telephone survey of 7,057 Minnesota adults (18 years and older). Both landline and mobile telephone samples were included. Results: Almost all Minnesotans (92.3%) agree that secondhand smoke is very or somewhat harmful to health. A large majority of Minnesotans support smoke-free policies in cars when children are present (95.2% of non-smokers and 87.5% of smokers). Among both non-smokers and smokers, restrictions on smoking near building entrances and exits also had a high level of support (74.4% and 43.1% respectively). The area that had the least support among non-smokers was sidewalks, where 39.3% agree that smoking should not be allowed on sidewalks. Among smokers, only 11.6% agree that smoking should not be allowed on restaurant, cafe or bar patios. Almost half of non-smokers (49.4%) believe smoking should not be allowed anywhere in a casino compared to a minority of smokers (14.6%) who share this opinion. Discussion: Our findings add to the existing literature regarding attitudes toward additional smoke-free policies. While smokers offer less support for smoke-free policies, evolving social norms may continue to shift these beliefs. As smoke-free policies expand beyond indoor locations it will be important to track public attitudes to aid in the adoption, implementation and enforcement of additional smoke-free policies.

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## **POS2-113**

### **BODY IMAGE, ANXIETY, AND CIGARETTE EXPERIMENTATION AMONG MEXICAN ORIGIN YOUTH**

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Background: Anxiety is associated with cigarette experimentation among Mexican origin youth. Among white youth, especially girls, a desire to be thin is associated with smoking, while among immigrant youth with poor body image, low acculturation has been shown to deter substance use in general. Objective: To examine relationships between body image, anxiety, and cigarette experimentation among Mexican origin youth. Methods: In 2005-06, 1,328 youth aged 11 to 13 years enrolled in a cohort study to investigate non-genetic and genetic factors related to cigarette initiation. In 2008-09, 1,154 participants completed a follow-up and reported their smoking status, trait anxiety and body image, assessed using a ten-item scale. Height and weight were measured. Analyses: We used OLS regressions to examine the relationship between anxiety and body image and multivariate logistic regressions to examine associations between anxiety, body image and cigarette experimentation. Covariates in both models included gender, age, country of birth (a proxy for acculturation), socio-economic status (SES) and body mass index (BMI). Only participants (N=766) who answered "yes" or "no" (response option also included "not sure") to at least 9 of the body image scale items are included in the current analyses. Results: Of these 766 participants, 51% were boys, 75% were US-born, and their average age was 14.4 years (SD=1.02) at follow-up. Anxiety was associated with older age (p=0.01), being male (p=0.04), and having poor body image (p<0.01). Experimentation was associated with older age (OR=2.09; 95% CI: 1.71-2.56), being male (OR=3.33; 95% CI: 2.22-5.00) and US-born (OR=1.62; 95% CI: 1.02-2.55), poor body image (OR=1.14; 95% CI: 1.05-1.24) and anxiety (OR=1.03; 95% CI: 1.02-1.06). Neither SES nor BMI were associated with experimentation. Conclusions: Poor body image is associated with cigarette experimentation, and may contribute to the influence of anxiety on experimentation. This relationship may be stronger for boys who report higher levels of anxiety and rates of experimentation. Our results have implications for the design of gender-specific smoking prevention programs.

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Lined area for writing or notes.

## POS3-1

### RELATIONS OF PREVIOUS PSYCHIATRIC TREATMENT FOR OTHER PSYCHIATRIC DISORDERS WITH SMOKING CESSATION SUCCESS

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Smokers have a higher occurrence of psychiatric disorders than nonsmokers; in addition those with a psychiatric disorder are two times more likely to smoke (Lasser et. al. 2000) and these smokers consume over half of the nation's cigarettes. As such, helping smokers with psychiatric diagnoses represents a major public health goal. No research has been conducted on whether previous treatment for any psychiatric disorder has an effect on cessation outcomes. We used data from a randomized, double blind, smoking cessation trial (N=1504, 58% women, 83.9% white, 13.6% African American) to compare cessation rates between smokers with a previous psychiatric diagnosis who reported ever having received treatment for their psychiatric diagnosis (defined as talking to a medical doctor or other professional) vs. those who reported no psychiatric treatment. Of the 1470 smokers who completed the baseline Composite International Diagnostic Interview, 259 had ever met criteria for Major Depressive Disorder (MDD; 84.9% had previous treatment [prev. tx]), 199 had a history of Social Phobia (48.7% prev. tx), 99 had a history of Generalized Anxiety Disorder (GAD; 75.8% prev. tx), 208 had a history of panic attacks (60.1% prev. tx) and 810 had a history of alcohol or drug dependence or abuse (AODA; 26.5% prev. tx). Chi-squared tests indicated smokers with Major Depressive Disorder who had received psychiatric treatment were more likely to be women and less likely to quit at 6 months than those who had not received MDD treatment,  $\chi^2 = 7.76$ ,  $p = .021$ . Smokers with AODA history who had received psychiatric treatment were older, more likely to be African-American and less likely to be quit at 3 years than those who had not received AODA treatment,  $\chi^2 = 4.21$ ,  $p = .04$ . Although no other significant results were found, the remaining analysis showed a trend towards previous treatment negatively affecting cessation rates. Future research should focus on the possible relationship between the severity of prior mental illness in those seeking previous treatment and their cessation attempts.

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## POS3-2

### IS IT FEASIBLE TO DELIVERY ACCEPTANCE AND COMMITMENT THERAPY FOR SMOKING CESSATION AS A WEB-BASED INTERVENTION?

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Background: Acceptance and Commitment Therapy (ACT) is a promising approach to smoking cessation that, to date, has only been tested in trials as an in-person treatment. Adapting ACT into a website, a rapidly growing cessation intervention format, is challenging because this approach traditionally uses 50 minute in-person sessions with rich metaphors and extensive exercises. Responding to this challenge, we developed the first ACT intervention website: a self-paced 8-module skills program for smoking cessation. Needed now is to determine whether this adaptation yielded a feasible intervention. Objective: To determine feasibility, compare ACT participant's utilization and satisfaction with those of a standard smoking cessation intervention website. Design: Adult participants were recruited nationwide into a double-blind randomized controlled pilot trial (N = 222) comparing the web-based ACT intervention with a website utilizing current best practices (i.e., smokefree.gov). The study's web server provided three months of data on utilization (e.g., length of each logon) since randomization. Three-months post randomization, participants reported their satisfaction (e.g., satisfied overall) with their assigned website. Results: ACT participants had higher utilization in terms of length of each logon (18.98 vs. 10.72 minutes;  $p = .001$ ) and total logons (9.02 vs. 5.46 total times logged-on;  $p = .072$ ). ACT participants were also more likely to report greater overall satisfaction with their treatment program (74% vs. 42%;  $p = .002$ ), that the intervention was a 'good fit' (52% vs. 28%;  $p = .014$ ), and that they were satisfied with the utility of the quit program (53% vs. 21%;  $p = .001$ ). ACT participants also provided more positive and frequent qualitative comments than the control group participants. Conclusion: Web-based ACT is feasible to deliver as a web-based intervention. Determining ACT's effectiveness for smoking cessation is now warranted.

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## POS3-3

### REACHING POPULATIONS IN NEED: TREATING TOBACCO DEPENDENCE AMONG DIVERSE SMOKERS IN THE INPATIENT PSYCHIATRY SETTING

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Background: Smoking cessation trials rarely include persons with serious mental illness (SMI) or those who are homeless. Inpatient psychiatry settings provide opportunity to reach high-risk smokers for treatment. Purpose: In an RCT pilot, we examined feasibility and preliminary efficacy of a tobacco treatment trial for smokers recruited from inpatient psychiatry units at a large urban county hospital. Methods: Smokers (N=100) of at least 5 CPD were recruited from smoke-free psychiatric units in 2009-10 and randomized to either standard care (nicotine replacement therapy [NRT] during hospitalization plus a quit smoking pamphlet) or the addition of a computer-delivered intervention (at intake, 3, and 6 months post-hospitalization), a self-quit treatment manual, and individual counseling based on the transtheoretical model for smoking cessation with 10-weeks of NRT available post-hospitalization. Primary outcome was 7-day point prevalence abstinence confirmed using an expired breath carbon monoxide level of <10ppm assessed at 3, 6, and 12 months post-hospitalization. Results: The sample was 56% ethnic minority, 65% male, age M=39.5 years (SD=11.3), 79% unemployed, 68% had Medicare/Medicaid, and 48% had unstable housing. Diagnosed psychiatric disorders were: 54% major depression, 46% psychotic disorder, and 77% recent drug use. At baseline, subjects smoked M=19 CPD (SD=11.2), 80% smoked < 30 minutes of awakening, and 25% were preparing to quit in the next 30 days. Across groups, abstinence significantly increased over time: 9.9%, 13% and 21.5% at 3, 6, and 12 months, respectively, chi-square=5.69(1),  $p=.02$ . The difference in abstinence by group did not reach statistical significance, but suggested a notable treatment effect: 12.5%, 17.5%, 26.2%, respectively, for enhanced care and 7.3%, 8.5%, 16.7%, respectively, for standard care, (effect size  $d=.40$ ). Study retention was >80% at all follow-ups. Conclusion: Findings indicate smokers with SMI and unstable housing are able to engage in research and quit smoking at rates comparable to quit rates in the general population. A larger, fully powered trial is warranted.

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## POS3-4

### A PILOT STUDY OF A MODIFIED ACCEPTANCE AND COMMITMENT THERAPY SMOKING CESSATION TREATMENT FOR VETERANS WITH PTSD

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Veterans with posttraumatic stress disorder (PTSD) have high rates of smoking and significant difficulties with quitting. Acceptance and mindfulness-based techniques may enhance smoking cessation approaches for veterans with PTSD as they are designed to improve emotion regulation skills related to coping with elevated negative affect and withdrawal symptoms associated with quit attempts. Veterans with current PTSD and smoking  $\geq 15$  cigarettes/day (N=10) participated in an open trial of Acceptance and Commitment Therapy for Veterans with PTSD and Tobacco Use (ACT-VPT). Participants attended 9 weekly individual counseling sessions and received 8 weeks of the nicotine patch. Participants were assessed with standard measures, including the PTSD Checklist, SF-36, Minnesota Nicotine Withdrawal Scale, and Tiffany Questionnaire for Smoking Urges. Primary outcomes included expired-air carbon monoxide confirmed 7-day point prevalence abstinence and number of cigarettes/day at the end of treatment. Intent-to-treat analyses examined pre-treatment to post-treatment scores. At the end of treatment (one month after targeted quit date), 40% (4/10) of participants were abstinent from smoking. Participants reduced from 25 cigarettes/day at baseline to 1 cigarette/day ( $p=.001$ ); participants who did not quit reduced from 24 to 12 cigarettes/day,  $p=.002$ . PTSD symptoms significantly decreased from  $59.3 \pm 7.8$  at baseline to  $52.1 \pm 11.4$  at endpoint ( $p=.012$ ). Scores significantly improved on the Mental Health Functioning Scale of the SF-36 ( $p=.032$ ), but not the Physical Functioning Scale ( $p=.538$ ). Controlling for smoking status, all participants showed significant decreases in smoking urges related to positive reinforcement and anticipation of relief of negative affect ( $p=.001$  and  $p=.032$ , respectively), but not the severity of nicotine withdrawal symptoms ( $p=.780$ ). Retention rates, client satisfaction ratings and qualitative feedback from participants indicated that the treatment was acceptable. Although preliminary, these results suggest that ACT-VPT

is a promising smoking cessation treatment for veterans with PTSD. Longer follow-up and randomized controlled studies are needed.

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**POS3-5  
 HOMELESSNESS PREDICTS POORER LONG TERM TOBACCO OUTCOMES IN ALCOHOL DEPENDENT SMOKERS**

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Homelessness is associated with high smoking prevalence rates, low smoking quit rates, and high smoking related mortality rates. Recent tobacco treatment studies with sheltered homeless smokers have explored short term tobacco outcomes but not longer term outcomes in homeless vs. non-homeless groups. This current report was part of a larger trial studying enhanced cognitive behavioral (CBT) tobacco treatment concurrent with intensive outpatient substance abuse program (IOP) for alcoholic smokers. Participants were homeless (n = 40; mAge = 49.8) and non-homeless (n = 42; mAge = 49.6) alcoholic smokers enrolled in a 3-week IOP who received voluntary concurrent tobacco treatment. There were no group differences in baseline measures of number of cigarettes smoked, FTND, CES-D, STAI or Tiffany QSU. All participants in the homeless group were sheltered during IOP with 86% residing in a hospital based residence, and 14% living in community shelters; all were discharged to housing after IOP. All participants received 8 weeks nicotine patch and a cumulative 2 hours of manualized CBT tobacco treatment; half the participants also received financial incentives for tobacco abstinence during treatment. Analyses compared short and long term CO confirmed tobacco outcome rates for homeless vs non-homeless participants. For purposes of these analyses, tobacco treatment condition was covaried using logistic regression. Homeless and non-homeless groups had comparable tobacco quit rates at end of treatment (45%, 44% respectively) and 1 month follow up (32%, 36% respectively). At 6 month follow up, tobacco abstinence outcomes were significantly lower in homeless (0%) compared to non-homeless (18%) participants (n=68; B=0.17; SE=0.067; t=2.54; p=.013). Retention was high in both groups (87% and 79% respective participation) at 6 month follow up. Findings suggest that sheltered homeless alcoholic smokers who received concurrent alcohol-tobacco treatment were able to initially quit smoking at rates comparable to non-homeless alcoholic smokers; but were unable to maintain abstinence by 6 months. Future trials with homeless smokers should emphasize methods to maintain tobacco abstinence.

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**POS3-6  
 ALCOHOL TREATMENT WITH CONCURRENT VERSUS DELAYED SMOKING CESSATION: TREATMENT PARTICIPATION AND INITIAL SMOKING ABSTINENCE**

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Most alcohol treatment programs do not systematically address cigarette smoking during treatment, often with plans to address smoking at a later date. This report examines individuals enrolled in alcohol treatment, randomized to concurrent or delayed smoking cessation interventions. The aim is to determine if there are differences in smoking treatment participation and initial smoking abstinences between the concurrent and delayed treatment conditions. Participants were enrolled in intensive outpatient alcohol treatment and then randomized to Concurrent Smoking Cessation (CSC) or Deferred Smoking Cessation (DSC) groups in a 2:1 ratio. The CSC group was offered twelve 15-min smoking treatment sessions concurrent with intensive alcohol treatment. The DSC group was offered six 30-minute smoking treatment sessions beginning three months after alcohol treatment. The smoking treatment protocol for both groups was identical in

content and total time. CO confirmed cigarette abstinence following quit date through the end of treatment was contingently rewarded with voucher payments. Complete smoking abstinence during treatment would allow participants to earn vouchers worth a total of \$140. Dependent variables were percentage of smoking treatment sessions attended, attendance at a 6-week follow-up medication management session, and the amount of rewards earned by participants for smoking abstinence during treatment. Results are available for the first 88 participants. Participants in the CSC condition attended 93% of scheduled smoking treatment sessions compared with 50% session attendance for the DSC condition (chi-square (1, N = 88) = 161.86, p < .001). The 6-week follow-up medication session was attended by 80% of CSC participants and by 33% of DSC participants (chi square (1, N = 83) = 14.59, p < .001). The CSC participants earned a mean of \$95 worth of contingency management vouchers, and the DSC participants earned a mean of \$56 in vouchers (t(86) = 2.77, p < .01). Results suggest significantly better attendance, medication compliance and initial smoking abstinence when tobacco treatment is received concurrent with intensive alcohol treatment.

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**POS3-7  
 REASONS FOR SMOKING, OUTCOME EXPECTANCIES, MOTIVES AND BARRIERS TO CESSATION RELATE TO YEARS OF USE: TREATMENT IMPLICATIONS**

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Research indicates that years of smoking relates to the likelihood of seeking or being offered cessation treatment as well as intervention success. A better understanding of differences in smoking-relevant cognitions based on years of tobacco use may help target and tailor interventions for smokers across a spectrum of years of use. The current investigation is a cross-sectional analysis of differences in smoking motives, outcome expectancies, motives and barriers to cessation in relation to years of smoking. In accordance with Coombs' (2004) model of addiction, it was hypothesized that positive reinforcement cognitions would be related to less years of use, whereas negative reinforcement, addictive, and health-related cognitions would be related to more years of use. Participants (N=341, age M=36.0, SD=13.00, Range=18-65; 85% Caucasian; 55.7% male) were treatment-seeking smokers who reported smoking a M=17.2 cigarettes/day (SD=12.7). With regard to reasons for smoking, habitual (p<.01, Beta=.20) and addictive (p<.05, Beta=.19) were significantly associated with more years of use, whereas negative affect reduction (p<.01, Beta=-.24) and sensorimotor (p<.01, Beta=-.28) were associated with less years of use. With regard to smoking outcome expectancies, negative personal consequences (p<.05, Beta = .14) were significantly associated with more years of use, whereas positive reinforcement (p<.05, Beta=-.16) was significantly associated with less years of use. With regard to motives to quit, health concerns were associated with more years of use (p<.01, Beta=.23). With regard to barriers to cessation, addiction (p<.05, Beta=.15) was associated with more years of use, and external factors with less years of use (p<.01, Beta=-.18). Findings were observed above and beyond variance accounted for by sex, dependence, neuroticism, and alcohol and marijuana use. Consistent with Coombs' model of addiction, chronic smokers reported more negative reinforcement, health, and addiction concerns, while less experienced smokers identified greater positive reinforcement and external influences. Tailoring of cessation recruitment and interventions by years of use appears warranted.

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**POS3-8  
 ACUTE SMOKING ABSTINENCE IN HIGH-RISK SMOKERS**

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Subgroups of smokers who are at high risk for smoking relapse include females and those with depressive symptoms and heavy alcohol use. Retrospective studies suggest



that greater abstinence effects (i.e., nicotine withdrawal, tobacco craving, and mood disturbance) for these subgroups may contribute to relapse. However, few prospective studies have provided a detailed description of acute abstinence effects in these high-risk subgroups. Treatment-seeking smokers (N = 120) were contingently reinforced via vouchers for biochemically-confirmed smoking abstinence for 8 consecutive days. Assessments occurred prequit and daily for 8 days and included the Minnesota Nicotine Withdrawal Scale [MNWS], Wisconsin Smoking Withdrawal Scale [WSWS], Questionnaire of Smoking Urges [QSU], and Profile of Mood States [POMS]. Smokers were categorized by their gender and baseline depressive symptoms (CES-D score >10) and alcohol drinking status (>20 drinks/month). Linear mixed models examined change in abstinence effects from prequit through 8 days of abstinence. Models revealed no interaction of gender with day in predicting change in nicotine withdrawal and mood disturbance, although gender interacted with day to predict change in QSU desire score (F(8,657) = 3.05, p < .01). Depression status interacted with day to predict change in MNWS total score (F(8,630) = 2.12, p = .03) and WSWS subscale scores of anger, anxiety, concentration, and craving (ps < .01). Drinking status interacted with day to predict change in MNWS total (F(8,629) = 2.62, p < .01), WSWS anger (F(8,623) = 2.04, p = .04), and POMS total scores (F(8,629) = 2.16, p = .03). Inspection of the interactions indicated that female smokers reported greater tobacco craving after day 5; smokers with vs. without depressive symptoms reported greater withdrawal before day 5 but then did not appear to differ, and those with vs. without heavy drinking reported greater withdrawal but less mood disturbance after day 5. Treatments for high-risk smokers may be tailored to manage their unique timecourse of abstinence effects and potentially prevent smoking relapse.

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## POS3-9

### PREDICTORS OF QUIT STATUS AND MOTIVATION TO QUIT AMONG EVER SMOKERS WITH UNIPOLAR OR BIPOLAR DEPRESSION

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The prevalence of tobacco use is elevated among persons with mood disorders. To identify treatment targets, this cross-sectional study examined smoking status and quitting intentions among N=767 individuals with unipolar (23%) or bipolar (77%) depression who smoked > 100 cigarettes in their lifetime. Data were collected online through the website of the Depression and Bipolar Support Alliance, a mood disorder peer-support network. The sample was 68% female, 64% aged 26 to 50, and 89% Caucasian; 87% were current smokers; 91% of current smokers smoked daily, averaging 19 cigarettes/day (SD=11). Ex-smokers (13% of sample) were quit a median of 1 year, 9 months; 56% reported poor or fair mental health at the time they quit smoking. In a multivariate logistic regression, relative to current smokers, ex-smokers were more likely to be >50 years of age (odds ratio [OR]=4.42), hold a bachelor's (OR=2.26) or graduate (OR=2.64) degree, and report being free of mental health symptoms (OR=4.48). Among current smokers, 74% wanted to quit and 45% intended to quit in the near future. Intention to quit did not differ by gender, age, education, income, ethnicity, depression type, mental health symptom severity, cigarettes/day, or years of smoking (all p-values > 0.05). Factors significantly associated with intention to quit smoking were: recent medical provider advice to quit (OR=1.65), concerns about smoking's adverse effects on mental (OR=3.06) and physical health for self (OR= 15.48) or the physical health of others (OR=3.23), environmental restrictions on smoking (OR=1.64), and the financial costs of smoking (OR=3.52). In a multivariate logistic regression, the strongest factors associated with intention to quit were mental (OR=2.45) and physical health concerns for self (OR=13.05) and concerns for others' health (OR=1.46). Despite poor or fair mental health when quitting, ex-smokers were more likely to be symptom free than current smokers. Most current smokers wanted to quit. Provider-based interventions emphasizing the negative physical and mental health consequences of smoking to self and others may increase intention to quit among smokers with mood disorders.

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## POS3-10

### PSYCHOSOCIAL PREDICTORS OF NICOTINE WITHDRAWAL AND CESSATION AMONG TREATMENT-SEEKING AFRICAN AMERICAN SMOKERS

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African Americans tend to face poorer tobacco-related health outcomes compared to Caucasians. On average they make more quit attempts in a given year than Caucasian smokers; however African Americans have greater difficulty staying quit. Nicotine withdrawal symptoms impact cessation, but no studies have investigated this among African Americans. This prospective analysis sought to (1) examine potential predictors of nicotine withdrawal among treatment-seeking African American smokers; and (2) examine the relationships of these predictors to smoking cessation [i.e., 24-hour point prevalence abstinence (ppa) at the end of counseling (EOC), 3- and 6-month assessments]. We examined depressive symptoms, perceived stress, and transdermal nicotine patch (TNP) adherence. Data were drawn from a randomized clinical trial that examined the efficacy of group cognitive behavioral therapy for smoking cessation among African Americans. There were no significant differences between participants on the variables of interest therefore data was combined between the cognitive behavioral and health education control groups. Structural equation modeling was conducted using weighted least squares means and variances (WLSMV), adjusted for categorical outcomes. Participants were mostly female (56%), middle-aged (M = 44, SD = 9.8), single (61%), and completed high school (81%). Results indicated that baseline depressive symptoms and TNP adherence during the intervention predicted nicotine withdrawal severity, and smoking cessation outcomes (24-hour ppa at EOC and 3-month assessment) respectively. Additionally, nicotine withdrawal was predictive of short-term cessation outcomes. Perceived stress was not a significant predictor. This study highlights that depressive symptoms and TNP adherence are important factors that influence smoking. Group interventions should address depressive symptoms and TNP adherence via treatment to facilitate cessation among African Americans. Additionally, the alleviation of withdrawal symptoms should be targeted to improve success of abstinence. Future research should continue to examine factors that influence tobacco cessation among African American smokers.

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## POS3-11

### A TOBACCO CARE MANAGEMENT SYSTEM FOR PRIMARY CARE PROVIDERS: 1-CLICK REFERRAL TO A TOBACCO COORDINATOR

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BACKGROUND: The health care system is a key channel for delivering tobacco treatment to smokers. Brief interventions by primary care providers (PCPs) at office visits are effective but not done consistently. To support PCPs' efforts to intervene with smokers, we built a Tobacco Care Management System to resemble health care system models for managing other chronic diseases. This study evaluated PCPs' adoption of the system and patients' use of treatment services. METHODS: In a health care system, a "1-click" option was added to the electronic health record (EHR), allowing PCPs in an office practice to easily refer a smoker to additional care. Selecting the option generated an email to a system-wide tobacco coordinator (TC) who proactively called the smoker, did an assessment and brief counseling and connected them to the state tobacco quitline which offered free counseling and 2 weeks of free nicotine replacement. The system was adopted in 2 community health centers in Boston, MA, in February 2010. Over 18 months of follow-up, we measured use of the 1-click tool (EHR records), use of additional resources by smokers (TC records), and PCPs' satisfaction (focus groups). RESULTS: 29 (85%) of 34 clinicians used the 1-click tool a total of 466 times (26 referrals/month). The TC reached 260 (56%) smokers and connected 135 (29%) to further treatment (94 to the quitline, 41 to local programs). At 2 focus groups, 24 PCPs reported satisfaction with the system's concept and convenience but disappointment that many patients were not reached. At 1 site, the clinic leader, unprompted, sent monthly feedback to PCPs about their 1-click use relative to peers. This clinic accounted for 79% (367) of the referrals and these clinicians identified the feedback as motivating their use of the tool. CONCLUSIONS: A Tobacco Care Management System, using an EHR-based tool to refer smokers to a Tobacco Coordinator, was used by most clinicians and linked 29% of smokers referred from an office visit to further treatment, especially when PCPs

received feedback about their performance. Care management is a promising approach for improving the care of smokers in a healthcare system.

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## POS3-12

### MULTIPLE BEHAVIOR CHANGE IN THE CONTEXT OF TEEN SMOKING CESSATION

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Evidence suggests physical activity may protect against smoking initiation and increased smoking among youth. The present study explored the effect of adding a physical activity component to an evidence-based smoking intervention, Not-On-Tobacco (N-O-T), on teen smoking cessation outcomes, physical activity, and on the relationship between the two. A 3-arm randomized controlled trial randomly selected high schools in West Virginia with > 300 students, then randomly assigned schools to Brief Intervention (BI, standard of care), N-O-T, or N-O-T plus a physical activity module (N-O-T+FIT). Participants were aged 14-19 who smoked > 1 cigarette in the past 30 days. Measurement at baseline and end of treatment/3-months post-baseline included self-classified 7-day point prevalence quit rates (CO validated 3 months post-baseline), smoking intensity (cigarettes smoked per day), and physical activity outcomes. Paired t-tests, ANOVA, chi square, odd ratios, z scores, and relative risk evaluated our hypotheses. N-O-T+ FIT had significantly higher cessation rates than either N-O-T or BI alone. Overall, females quit more successfully in N-O-T compared to BI (RR<sup>>∞</sup>) at 3 months post-baseline and males responded better N-O-T+FIT than they did to BI (RR = 2-3) or to N-O-T (RR=1-2). Compared to N-O-T, the N-O-T+FIT youth had greater likelihood of cessation (RR=1.48) at 6 month-follow up. Males and females in the N-O-T+FIT condition showed significant improvement in 20-minutes, 30-minutes, and 60-minutes of physical activity N-O-T+FIT participants who increased the number of days a week they got 20-minutes of PA were significantly more likely to reduce or quit smoking, chi square (df=1, N = 80 = 20.59, p < .001, OR = 9.84). Adding physical activity to the N-O-T teen smoking intervention mediates cessation success, particularly among males. Teens who reported increased 20-, 30-, or 60-minutes of daily physical activity in the past 7 days from baseline to follow up had significantly higher odds of reducing smoking compared to those with no improvement. Teens who received targeted physical activity with the N-O-T intervention showed greatest increases in physical activity.

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## POS3-13

### A BRIEF MOTIVATIONAL INTERVIEWING INTERVENTION FOR SMOKERS WITH SERIOUS MENTAL ILLNESS

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Individuals with serious mental illnesses such as schizophrenia, schizoaffective disorder, and bipolar disorder are more likely to smoke and less likely to quit than are those without psychiatric disorders. While it is important to encourage all smokers to quit, it is especially important to encourage groups suffering a disproportionate burden of tobacco use. We randomly assigned smokers with serious mental illness – who were not interested in quitting – to receive a single, 45-minute session of 1) Motivational Interviewing (MI) with personalized feedback or 2) Psychoeducation. Both interventions were designed to encourage smokers with serious mental illness to seek tobacco dependence treatment. Participants were followed up one-month after the intervention to assess tobacco dependence treatment seeking. Among individuals with bipolar disorder (N = 44), those who received the MI intervention were significantly more likely to seek tobacco dependence treatment than were those who received the Psychoeducation intervention after one-month (OR = 5.6; 95% CI: 1.039 – 33.024; p = .045) while controlling for baseline nicotine dependence and commitment to quitting. When the full sample of participants (N = 100) including participants with schizophrenia and schizoaffective

disorder in addition to bipolar disorder were included in the analyses, we were no longer able to detect an intervention effect. It is possible that a lower functional level of smokers with schizophrenia contributed to this effect although further studies are needed. These data indicate that motivational interviewing may be a more effective approach for encouraging smokers with bipolar disorder to seek tobacco dependence treatment than more commonly used approaches such as psychoeducation. In addition, these data indicate that even brief interventions can be effective in this population. Smokers with bipolar disorder would benefit from brief motivational interviewing interventions designed to encourage them to seek tobacco dependence treatment.

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## POS3-14

### TOWARD A MORE SYSTEMATIC ASSESSMENT OF SMOKING: DEVELOPMENT OF A SMOKING MODULE FOR PROMIS

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PROMIS is the Patient-Reported Outcomes Measurement Information System, an ongoing cooperative research program that has developed, standardized, and validated item banks measuring symptoms and health status domains (e.g., anxiety, alcohol use) relevant to a range of chronic medical conditions (e.g., cancer, heart disease). The PROMIS smoking initiative has the goal of developing, evaluating, and making available a set of psychometrically sound item banks that can form the basis for standardized assessment of smoking behavior and biopsychosocial constructs related to smoking and quitting. This presentation describes the creation of an item database and qualitative item review process that was used to identify an optimal set of items that are currently being evaluated in a nationally representative field trial. Following established PROMIS procedures, the study team: (1) systematically reviewed the smoking literature to collect existing scales and items in key assessment domains; (2) selected and classified items into conceptual categories; (3) refined items within category to standardize wording tense, recall period, and response options; and (4) incorporated feedback from focus groups and cognitive interviews with smokers to further refine item wording and format. From the 1690 smoking items that underwent this item review process, 277 were ultimately retained. These items represent 11 conceptual domains: consequences of quitting; craving; dependence; health concerns; positive consequences; positive smoking experience; self as smoker; social control; social influences; temptations to smoke; and use patterns/quitting. These items are being fielded to a large national sample of smokers and will be analyzed using state-of-the-art psychometric techniques (currently ongoing with results forthcoming in future presentations and publications). Inclusion of a smoking domain in the PROMIS framework will standardize the measurement of key smoking constructs and make them widely accessible to smoking researchers and the community of PROMIS researchers who might not otherwise assess smoking in their studies.

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## POS3-15

### TARGETING TOBACCO IN A COMMUNITY-BASED ADDICTION RECOVERY COHORT: PRELIMINARY RESULTS FROM A BRIEF INTERVENTION TRIAL

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While nearly 80% of substance dependent individuals are nicotine dependent, smoking cessation is not routinely addressed during treatment for substance use disorders (SUDs). The unfortunate consequences of this "neglected epidemic" are substantive, with more alcohol-dependent persons dying from tobacco-related illnesses than from those attributed to heavy drinking. Further, empirical studies report better long-term treatment outcomes (e.g., abstinence from all drugs) when individuals receive treatment for both tobacco and other SUDs. The present study tests a computerized, brief motivational intervention (CBMI) for smoking cessation in an understudied population: a cohort recruited in peer-based recovery center. Following baseline assessment (Visit 1), participants are randomly assigned to either CBMI (30 min) or a control group. All participants receive quit smoking resources (standard care). Nicotine

replacement therapy (NRT) was also made available to minimize barriers to its use (e.g., cost). Follow-up occurred at 4 (Visit 2) and 10 (Visit 3) weeks post-randomization. In this ongoing study, 76 participants have completed Visit 1, 50 completed Visit 2 and 36 completed Visit 3. Demographically, the sample is 58% female and 46% Black. Primary SUDs include alcohol (40%) and heroin (18%), with mean of 2.3 years in recovery (range = 2 days - 21 years). Participants smoked an average of 17.3 cigarettes per day (CPD; SD = 9.3) with a mean FTND score of 4.8 (SD = 1.74) and an average CO level of 19.8 ppm (SD = 8.9). Most (71%) said they wanted to quit smoking and over half (55%) opted for NRT at Visit 1. Preliminary analyses show a main effect of visit (but not group) for CPD [ $F(1, 48) = 21.1; p < .05$ ] and FTND score [ $F(1, 46) = 10.3; p < .05$ ]; both CPD and FTND were reduced at Visit 2. Results support feasibility of CBMI in a unique and understudied population. Peer-based recovery support programs are gaining popularity and occupy a unique niche for persons with SUDs. If effective, CBMI for smoking has the potential to reduce tobacco-related morbidity and mortality, and the potential to positively influence long-term sobriety from other SUDs.

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## **POS3-16**

### **PLANNING TOBACCO GUIDELINE IMPLEMENTATION INTO HOSPITALS USING THE PRECEDE-PROCEED MODEL AND STAGE THEORY OF ORGANIZATIONAL CHANGE**

Patricia M. Smith, Ph.D.\*, Northern Ontario School of Medicine

**Background:** This article describes how the PRECEDE-PROCEED Model and Stage Theory of Organizational Change were used synergistically to plan the translation of tobacco cessation clinical practice guidelines into hospitals. **Methods:** Thirteen hospitals in Ontario, Canada, were the target for guideline implementation. Stage 1 of Organizational Change clarified that the 1st step in planning the implementation should be management awareness-raising and a problem analysis. For the problem-analysis, a '3 layer' PRECEDE planning map to include each intended intervention audience (patients, clinicians, hospitals) was created, each layer with its own 4-phase diagnosis as per the model. The diagnoses involved assessing the literature at each of the four diagnosis phases to determine the importance and feasibility of factors for measurement and amenability to change. After determining what factors to measure, how to measure the factors was determined by reviewing the literature for published instruments. Using the results of the PRECEDE diagnoses, but prior to baseline data collection, a face-to-face meeting with the senior management teams of each hospital was used as part of Stage 1 awareness-raising. **Results:** Literature summaries and measurement decisions for hospitals, clinicians, and patients were completed resulting in a comprehensive "big picture" of factors that would be important to measure and amenable to change in the implementation process. At the patient level, the factors chosen for measurement were tobacco prevalence and factors that predisposed, reinforced, and enabled smoking and cessation. At the clinician level, factors chosen were clinicians' tobacco intervention beliefs, confidence, practice, barriers, and facilitators, and hospitals' support structures. At the hospital level, factors chosen focused directly on the content of the systems- and clinician-level guidelines. **Conclusions:** Using theoretical frameworks in the planning stage provided the necessary structure and blueprint for finding a starting point for measurement and action to translate guidelines into practice and clarified how to involve stakeholders in the planning process.

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## **POS3-17**

### **EFFECTIVENESS OF NICOTINE REPLACEMENT THERAPY FOR SMOKING CESSATION IN YOUNG ADULTS, AGE 18 TO 25, COMPARED TO MIDDLE-AGED SMOKERS, AGE 40 TO 45**

Laurie A. Zawertailo, Ph.D.\*<sup>1</sup>, Michael Mielnik<sup>2</sup>, and Peter L. Selby, M.B.B.S.<sup>1</sup>, <sup>1</sup>Centre for Addiction and Mental Health and University of Toronto, Canada; <sup>2</sup>McMaster University, Hamilton, Canada

The process and predictors of smoking cessation in young adults is poorly understood. The primary objective of the study was to compare abstinence rates and differences in baseline predictors of abstinence between younger (age 18 to 25) and older (age 40 to

45) adults. We hypothesized that the young adult cohort would have significantly lower abstinence rates compared to the older adult cohort and that predictors of abstinence would differ between the two age cohorts. A secondary analysis was undertaken using data derived from two nicotine replacement giveaway programs in Ontario, Canada: one using telephone-based enrollment with a live call-taker completing the baseline assessment and calling the participant for end-of-treatment follow-up; and the other using web-based enrollment whereby the baseline assessment and follow-up was self-completed via e-mail. Nicotine replacement therapies along with self-help materials were mailed to eligible participants and end-of-treatment follow-up was attempted for all participants. The primary outcome was 7-day point prevalent abstinence. For the telephone-based and web-based studies response to follow-up was 33.0% (n = 4444) and 45.6% (n = 3045) respectively. Abstinence rates between the young and older age groups were not significantly different in either the telephone-based (41.53% vs. 44.71% respectively,  $P = 0.345$ ) or web-based studies (28.34% vs. 27.16% respectively,  $P = 0.726$ ), but quit rate was significantly lower in the web-based intervention compared to the telephone-based ( $p < 0.001$ ). Logistic regression showed that current depression ( $\{OR = 0.61 [0.40-0.94]$  for age 18-25) and (OR = 0.64 [0.48-0.86] for age 40-45); and moderate stress ( $\{OR = 0.58 [0.39-0.88]$  for age 18-25) and (OR = 0.69 [0.50-0.94] for age 40-45) decreased abstinence rates in both age cohorts. In conclusion, we did not find any difference in abstinence rates between age groups with web-based intervention resulting in poorer quit rates overall compared to telephone-based. Predictors of abstinence were also similar for both age groups suggesting that tailoring of cessation interventions for younger adult smokers may not be needed.

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## **POS3-18**

### **RELATIONSHIP BETWEEN TOBACCO CONSUMPTION AND CANNABIS USE STATUS IN SCHIZOPHRENIA**

Rachel A. Rabin, M.Sc.\*<sup>1</sup>, and Tony P. George, M.D., FRCPC

**Background:** During our on-going studies exploring effects of cannabis use on neurocognition in schizophrenia, we have had the opportunity to parse the relationship between cannabis use and tobacco consumption in schizophrenia. Therefore, we conducted a secondary analysis to explore cigarette smoking behaviors as a function of cannabis use patterns in these patients. **Methodology:** Using a cross-sectional design, cigarette smoking behaviours were assessed in schizophrenia outpatients (N=54) with current cannabis dependence (CD; n=18), historical cannabis dependence (in remission > 6 months) (FD; n=24), and those with no lifetime cannabis use (ND; n=12). **Results:** Preliminary results showed significant differences in cigarettes per day (CPD) across the three groups:  $F(2, 51) = 12.91, p < .01$ . Post hoc tests revealed that CD patients (M=11.5, SD= 6.6) smoked significantly less CPD than ND (M= 26.6, SD= 12.8;  $p < 0.01$ ) and FD patients (M=20.1, SD= 6.3;  $p < 0.01$ ). There was a trend for FD patients to smoke less CPD than ND ( $p < 0.08$ ). However, nicotine dependence scores (FTND) and expired carbon monoxide (CO) levels were similar across groups. **Conclusions:** While higher cigarette smoking rates in comorbid patients may be true of most drugs of abuse, cannabis may be an interesting exception in patients with schizophrenia. Results support a dose-dependent effect of lifetime cannabis use status (CD < FD < ND) on tobacco consumption in this sample of patients with schizophrenia. CD patients appear to smoke less CPD than patients with FD, and FD smoke less than those with ND. Given that in the absence of cannabis (i.e., lifetime or with a remission period of at least 6 months) patients appear to be more prone to increasing CPD suggests that the effects of cannabis on tobacco consumption may be best characterized as state-dependent. Future research employing prospective designs should examine the relationship between tobacco consumption and cannabis use status in schizophrenia versus control smokers in a systematic fashion.

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## POS3-19

### MODERN DETERRENCE METHODS IN PREVENTION OF ADOLESCENT SMOKING, A CLUSTER RANDOMIZED CONTROLLED TRIAL

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**Introduction:** Smoking is a leading cause of premature mortality. As regular smoking during adolescence increases the risk of tobacco dependence in later life, there is a need for adolescent smoking prevention. The objective of this study was to evaluate the preventive effect of a highly demanded, clinic-based emotionally arousing intervention on protective and risk factors of smoking and on smoking behavior. **Method:** A total of 930 students (aged 11-16) from 18 German secondary schools participated in a randomized controlled trial with two-month follow up from 2010-2011. Schools were randomized to receive either the clinic based emotionally arousing intervention or printed education material on smoking prevention. The clinic intervention consisted of a two hour workshop including a power point presentation about the risks of smoking, a live video session of a pulmonary endoscopy, and a testimonial interview with a lung cancer patient. Measures assessed following the intervention included self-reports of credibility, personal relevance, emotional arousal, and overall acceptance of the intervention. Measures assessed at follow up were in part based on Protection Motivation Theory and included self-reports of threat appraisal, coping appraisal, intention to remain non-smoker, knowledge about smoking facts, image of smoking, and smoking behavior. **Results:** The clinic intervention received significantly better ratings of credibility ( $M=3.58$  ( $SD=.80$ ) vs.  $M=3.23$  ( $SD=.95$ );  $p=.002$ ), personal relevance ( $M=2.81$  ( $SD=1.11$ ) vs.  $M=2.42$  ( $SD=1.08$ );  $p=.007$ ), emotional arousal ( $M=3.07$  ( $SD=.63$ ) vs.  $M=2.62$  ( $SD=.75$ );  $p=.001$ ), and overall acceptance ( $M=2.14$  ( $SD=.81$ ) vs.  $M=2.59$  ( $SD=1.11$ );  $p=.013$ ) than the booklet. Differences between clinic and booklet conditions failed to reach statistical significance on the assessed outcome measures at follow-up. **Conclusion:** Although the clinic intervention was rated more credible, personally relevant, and emotionally arousing than the booklet, there were no significant intervention effects at follow-up. Moreover, the clinic intervention may be of value as an access strategy for evidence-based prevention.

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## POS3-20

### TOBACCO, TOURISM, AND TENSIONS: THE LANDSCAPE OF TOBACCO USE IN A REMOTE AREA OF INDIA

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**Objective:** To understand the socio-cultural landscape of tobacco use in a remote area of India. **Background:** Ladakh is an autonomous district, situated in the trans-Himalayan range at about 12,000 feet. A national tobacco survey assessed tobacco use among a variety of ethnic/language groups, however Bodi, the native Ladakhi language, was not included. Given the massive influx of tourists, the diverse population of Buddhist and Muslim Ladakhis, Kashmiri merchants, and Nepali migrant workers, tobacco use in Ladakh merits attention. **Methods:** We used a rapid assessment process to qualitatively assess tobacco use. 72 interviews with adults were conducted with the aid of Ladakhi translators. Participant-observation was done to capture evidence of tobacco use, its economic cost, and ads/signage that promoted or discouraged tobacco use. This research was done in collaboration with the Health Department of Leh. **Results:** Lack of quitting resources is a primary theme. Many smokers would like to quit, but do not know how. Smoking is more common among men. Women are thought to secretly smoke, especially if they had attended school outside of Ladakh. Key factors influencing tobacco use are stress, smoking as a fashionable behavior as depicted in Bollywood movies, and the overt smoking of tourists. Most people are aware that tobacco use is harmful to health but could supply few details. Smoking a pack per day can cost 175 rupees/week, almost as much as 5 kg of flour at 210 rupees, potentiating considerable economic impact on households. Laws prohibit smoking in public, yet there is ample evidence of public smoking. People cite Buddhist and Islamic injunctions forbidding the use of tobacco (harmful or addictive substances) and the harm that tobacco use inflicts on non-users, thus introducing social and familial tensions. **Conclusions:** The community is primed for further efforts in tobacco control. Quit strategies and counselors are openly

desired and should be given priority. Prevention strategies that leverage the tensions between modernization and adherence to religious prohibitions could be effective in this setting.

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## POS3-21

### USING THE INTERNET TO DISTRIBUTE PRESCRIPTION SMOKING CESSATION MEDICATIONS: SIX-MONTH OUTCOMES

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The growing e-patient movement with the world wide web as its forum has patients act as drivers of their healthcare. In North America, 80% of internet users search for health-related information on the web. While web-assisted tobacco interventions are relatively common, the addition of pharmacotherapy is novel. We sought to demonstrate the effectiveness of an internet-based platform to engage smokers and their physicians in an intervention protocol providing bupropion or varenicline, free of charge, combined with physician counseling and motivational e-mails. Participants visited the study website, provided consent and completed an on-line assessment. Eligible participants (daily smokers who wished to quit smoking) received a personalized script with instructions to the physician to use their clinical judgment to prescribe varenicline or bupropion for 12 weeks, or neither. Signed scripts were faxed to an online pharmacy that couriered the medication to the participant. Participants completed follow-up questionnaires online at 4, 8, 12 and 26 weeks after start of treatment. Participants ( $n=912$ ) enrolled over a combined 2 month period, of whom 524 (57%) visited their physician to have the script signed and faxed (265 varenicline, 259 bupropion). 419 different physicians were engaged in the process. All medication packages were delivered, with only 1.0% ( $n=5$ ) requiring address clarification or reshipment. Participants were 42 (+/-13) years old, 56% female; 50% of them had high school education or less, and 66% smoked 20 or more cigarettes daily. At 6-month follow-up, the 7-day point prevalence of abstinence was higher in the varenicline group than bupropion, but was not statistically significant (30.7% vs. 24.2%,  $p>.01$ ; OR (95%CI): 1.5 (0.9-2.2)). This internet-based paradigm resulted in 6-month cessation outcomes for varenicline and bupropion that are comparable to those seen in randomized clinical trials. Implementation of this strategy at the state- or national-level is warranted as the method can be applied over larger geographic jurisdictions to enhance smoking cessation rates at a population level.

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## POS3-22

### MOOD MANAGEMENT PHONE COUNSELING FOR SMOKERS WITH RECURRENT DEPRESSION

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Carefully conducted clinical trials have supported the efficacy of cognitive-behavioral mood management treatment for depression in improving smoking cessation outcomes for smokers with recurrent MDD. Although efficacious, these intensive group treatments require significant resources and thus may have limited impact outside of specialized cessation clinics. Proactive phone counseling for smoking cessation, has received strong recommendations from the US DHHS as a primary mechanism for increasing access to smoking cessation interventions. With support from NIDA (R01DA01794701) we have completed Stage1 activities including qualitative evaluations of consumer and provider perceptions of a phone counseling intervention with cognitive-behavioral mood management skills training for depression (MM) and conducted iterative refinement of treatment protocols. In a pilot trial, we compared an 8-session proactive phone counseling intervention for smoking cessation that integrated MM to an 8-session standard proactive phone counseling (ST) comparison condition that has established efficacy. The

sample (N=53) was comprised of smokers with recurrent MDD who were not currently depressed. We have promising evidence for the mechanisms of MM including impacts on decreased depressive symptoms (B(SE)=4.59(2.13);  $p = 0.04$ ) and depressogenic cognitions (B(SE) =0.25(0.12);  $p=0.04$ ), and increased biochemically verified point-prevalence abstinence 6-months after quitting (OR=2.64, 95%CI= 0.93-7.45). We have translated an efficacious treatment into a format that has the potential to dramatically increase access to a well-specified phone counseling intervention for smokers with a history of recurrent MDD. Given the estimated 8-10 million adult smokers with recurrent MDD, we expect that this program of research will have important clinical and public health significance in decreasing the overall prevalence of cigarette smoking.

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## POS3-23

### RECRUITMENT OF ADOLESCENT SMOKERS INTO A SMOKING CESSATION PROGRAM – DO WE REACH THOSE IN NEED OF PROFESSIONAL HELP?

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Even though adolescent smokers clearly state that they want to quit, successful recruitment into cessation interventions is still a difficult endeavor. In addition, professional treatment approaches should show that they reach those in need of professional support rather than smokers who will probably quit successfully by themselves. In this study we compare participants of a cessation program and adolescent smokers who decided not to participate with regard to predictors of self-initiated quitting. Method: Within a non-randomized controlled intervention study, 1195 smokers (age 11-21) from 48 German secondary schools were assessed at baseline. Of these smokers, 247 were successfully recruited into 41 courses of a motivation-enhancing, cognitive-behavioral cessation program. In-class cessation information session, individually addressing potential participants, and media vouchers were used to improve recruitment success. Predictors of attendance were analyzed using logistic regression analyses adjusted for the clustered structure of the data. Results: Significant univariate predictors of program participation included higher smoking intensity, more smoking peers, more smoking siblings, higher motivation and intention to stop, less desire to smoke in the future, and more problematic perception of life circumstances. After controlling for covariation, smoking intensity (adjusted odds ratio (OR)=1.07, 95% confidence interval (CI) 1.03-1.10,  $p<.001$ ), smoking peers (adj. OR=1.69, 95% CI 1.09-2.62,  $p=.02$ ), quit motivation (adj. OR=1.40, 95% CI 1.04-1.89,  $p=.03$ ), and quit intention (adj. OR=1.56, 95% CI 1.22-2.01,  $p<.001$ ) remained significant predictors of program participation. Conclusion: We were able to recruit stronger smoking adolescents living in a social context with more smoking peers. Participation was also associated with stronger motivation and intention to quit. Results will be discussed in relation to previously published predictors of program participation and self-initiated quitting in adolescents.

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## POS3-24

### INCREASING NURSES' REFERRAL TO TELEPHONE QUITLINES FOR SMOKING CESSATION USING A WEB-BASED EDUCATIONAL PROGRAM

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Smokers who make a quit attempt during hospitalization have improved long-term abstinence if they receive follow-up support; this support can be provided by telephone quitlines, a free resource for smokers in the U.S. Few studies have evaluated the long-term impact of smoking cessation education for healthcare professionals on their delivery of interventions. Objective: To evaluate the impact of a web-based educational intervention (Helping Smokers Quit, HSQ) on increasing nurses' referral of smokers to a quitline and performance of the 5As as compared to the nurses who received a minimal intervention (control group) at 6-months using a web-based survey. Methods: Nurses from 30 (n = 15 controls and n = 15 HSQ) randomly selected and assigned hospitals from California, Indiana and West Virginia received a toolkit of materials, including a state

quitline card, tailored, state-specific facts sheets and the Guideline-based pocket guide. They also had access to the Tobacco Free Nurses website. Nurses in the HSQ group had access to a project-specific webpage with additional resources and the opportunity to attend/view a webinar. 333 nurses (n = 209 in the HSQ group; n = 124 in the control arm) completed the baseline and 6-month surveys. Differences in the frequency of referral to the quitline and performance of the 5As at 6-months by group were analyzed; a logistic regression was used to determine differences in quitline referral. Results: Nurses in both groups increased their frequency of intervention. Referral of smokers to quitlines was more likely among nurses in the HSQ group compared to controls (OR= 1.74, 95% CI 1.11, 2.72), but performance on the 5As, although improved in both groups, was not significantly different. Those who viewed the webinar were twice as likely to refer smokers to a quitline as compared to those who did not (OR = 2.34, 95% CI 1.03, 4.25). Discussion: Access to printed materials alone improved nurses' smoking cessation interventions. The web-based HSQ program, especially the webinar, resulted in improvement in referrals of smokers to the quitline and frequency of cessation interventions compared to printed materials alone.

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## POS3-25

### RACE AND GENDER DIFFERENCES IN MECHANISMS OF TOBACCO DEPENDENCE

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INTRODUCTION: African Americans (AAs), American Indians (AIs), and women may be less likely to quit smoking and may be at greater risk of smoking-related disease than Whites (Ws) and men, respectively. While these special populations may well benefit from targeted interventions, the mechanisms driving health disparities are poorly understood and thus there is little data to inform the targeting process. The objective of the present study was to compare mechanisms of tobacco dependence among Ws, AAs, and AIs, and men and women using the Nicotine Dependence Syndrome Scale (NDSS) and the Wisconsin Inventory of Smoking Dependence Motives (WISDM). METHODS: Subsets of participants from a study designed to develop a measure of smokers' abstinence-related expectancies were compared: Ws (N = 185), AAs (N = 151), and AIs (N = 87); and men (N = 270) and women (N = 231). Participants who met inclusion criteria completed a set of measures that included the NDSS and WISDM. RESULTS: On the NDSS, whereas Ws reported greater Total (d = .40) and Drive (d = .76) scores than AAs, AAs reported greater Priority (d = .32) scores than Ws. There were no differences between Ws and AIs on the NDSS. On the WISDM, Ws reported greater scores than AAs on 12 of the 14 subscales, including the Primary Dependence Motives subscales: Automaticity (d = .37), Craving (d = .49), Loss of Control (d = .38), and Tolerance (d = .30). AIs reported greater scores than Ws on one subscale: Social/Environmental Goals (d = .33). With regard to gender, whereas men reported greater NDSS Stereotypy scores (d = .26), women reported greater WISDM Cue Exposure (d = .18), Negative Reinforcement (d = .31), and Weight Control (d = .27) scores. CONCLUSIONS: Despite being lower on many dimensions of dependence, AAs' tendency to favor smoking over other reinforcers may contribute to poorer smoking outcomes. AIs may be less likely to quit due, in part, to social contexts that promote cigarette use. Withdrawal processes, smoking cues, and weight-related issues may be significant barriers to quitting among women. Ways in which tobacco dependence interventions might be targeted to AAs, AIs, and women will be discussed.

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## POS3-26

### TEACH: AN INTERACTIVE, DISTRIBUTED LEARNING CURRICULUM FOR BUSY PRACTITIONERS IN PRIMARY CARE

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Primary care providers play an important role in motivating health behaviour change and providing evidence based treatment to smokers; however, CME offerings can be a challenge due to resource limitations, large geographic areas, and time constraints. Objectives: A monthly, interactive webinar series was developed to enhance knowledge and skills in evidence-based cessation interventions among primary care providers in Ontario, Canada. Methods: A Mainpro-C/M1 accredited webinar series, Lunch and Learn Seminar Series for Physicians, Family Health Teams and other Health/Allied Health Practitioners offered monthly for 1 hour from April 2011 - August 2012. Sessions were accessed via desktop computers and/or teleconference. All sessions contain at least 50% interactivity through cases, Q&A, quizzes and online chat. Content included: brief screening & assessment; pharmacotherapy; brief motivational interventions; specific populations; and working with medically complex patients. Sessions are also archived for self-study. Summative evaluations and pre-post Learning Assessments are carried out for each session. Results: Webinars reached a diverse group of practitioners in a cost-effective way without compromising quality of the learning experience or learning outcomes. 677 practitioners from 7 provinces attended 5 live webinars (April - August 2011): 92.8% Ontario, n=628; 1.48% British Columbia, n=10; 0.89% Alberta, n=6; 2.66% Manitoba, n=18; 1.03% Nova Scotia, n=7; 0.74% New Brunswick, n=5; 0.15% Saskatchewan, n=2. The most represented discipline was nursing (38.35%). Practitioner ratings of confidence in implementing knowledge and skills increased significantly post training (p<.05). Overall course evaluations were 4.28/5 (5=highest/best). These data are comparable to those achieved from TEACH classroom-based courses covering similar content. Conclusion: These findings provide preliminary support for the feasibility of reaching large numbers of practitioners at low cost and across great distances with a series of brief interactive webinars.

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## POS3-27

### EFFECTS OF ABSTINENCE IN ADOLESCENT TOBACCO SMOKERS: WITHDRAWAL SYMPTOMS, REACTIVE IRRITABILITY, AND CUE REACTIVITY

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Introduction: The aim of the current study was to expand upon prior studies of acute abstinence effects in adolescent daily smokers by examining the effects of experimentally-manipulated acute smoking abstinence on a broader array of measures including: 1) withdrawal symptoms (Minnesota Nicotine Withdrawal Scale (MNWS)); 2) reactive irritability (Acri & Grunberg, 1992) and 3) affect and urge responses to smoking cues. Methods: Adolescents (ages 13-19, 74 daily smokers and 22 nonsmokers) participated. Participants completed baseline questionnaires and laboratory assessments (Session 1) and returned to the laboratory 1-4 days later to repeat the laboratory assessments (Session 2); half of the smokers were randomly assigned to overnight tobacco abstinence preceding Session 2. Results: During session 2, abstaining smokers reported significantly greater increases in withdrawal symptoms [ $F(2, 92) = 23.31, p < .0001, \text{partial } \eta^2 = .19$ ] and showed significantly greater smoking urges to both neutral and smoking cues [ $F(2, 93) = 13.78, p < .0001, \text{partial } \eta^2 = .23$ ] when compared with smokers who did not abstain and compared with nonsmokers. There was no effect of abstinence on reactive irritability or affect in the presence of neutral or smoking cues. Discussion: Our findings suggest that adolescents experience increases in withdrawal symptoms and smoking urges following acute smoking abstinence. Overall findings are supportive of the withdrawal relief and negative reinforcement of smoking maintenance and progression in adolescents and may help elucidate the motivational underpinnings of smoking maintenance among adolescent smokers.

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## POS3-28

### BRIEF INDIVIDUAL AND FAMILY-BASED MOTIVATIONAL INTERVENTIONS FOR ALCOHOL-POSITIVE ADOLESCENTS: ARE THERE EFFECTS ON SMOKING OUTCOMES?

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Smoking and drinking commonly co-occur during adolescence (Orlando et al. 2005). Adolescent smokers are more likely to drink and adolescent drinkers are more likely to smoke (Johnson et al. 2000). Motivational enhancement is one of the most widely used approaches for adolescent smoking cessation (Curry, et al., 2009), as well as for reducing alcohol and other substance use among adolescents (Spirito et al. 2004; Monti et al. 1999). In addition to individual Motivational Interviewing (MI) approaches, MI interventions incorporating parents, such as the Family Check-up (FCU; Dishion & Kavanagh, 2003), have demonstrated success in reducing alcohol as well as other substance use among adolescents (Spirito et al. 2011, Dishion et al. 2003). The FCU seeks to improve parental monitoring of adolescents behavior which in turn has been associated with reductions in a range of substance use, including tobacco. The current study examines three smoking outcomes in a randomized clinical trial of 111 alcohol-positive adolescents (Mean Age=15.59 SD=1.21; 55% female) presenting to an emergency department. Participants were randomized to either individual MI(IMI) or the IMI plus FCU condition (IMI+FCU). Three continuous smoking outcomes (days smoked in past 30, days smoked and drank together in past 30, number of cigarettes per day) were analyzed using multivariate analysis of variance(MANOVA) to examine mean differences from baseline to 3- and 6-month follow-ups for the two treatment conditions. Results found a significant time by condition effect for days smoked and drank together in the past 30 ( $F(1, 109)=5.21, p=.02$ ). Adolescents receiving IMI demonstrated a significant increase in days smoked while drinking over the 6 months of the study while adolescents in the IMI+FCU condition did not show a significant increase over this time, and had significantly lower mean numbers of days smoked while drinking compared to IMI at 6-month follow-up. There were no significant effect of treatment condition on number of days smoked or number of cigarettes smoked per day. The results highlight the enhanced benefit of family interventions in influencing concurrent smoking and drinking.

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## POS3-29

### RACE AND GENDER DIFFERENCES IN THE CHARACTERISTICS OF SMOKERS UNDER COMMUNITY CORRECTIONS?

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In the general population a number of race and gender difference in tobacco use have been identified, including differences in: age of onset (Moon-Howard, 2003) number of cigarettes smoked (Kabat et al., 1991), beliefs about the dangers of smoking (Brownson et al., 1992), and quit attempts (Okuyemi et al., 2004). The criminal justice population often shows a different pattern of substance use than the normal population when race and gender are examined (Langan & Pelissier, 2001). This study was conducted to examine the smoking characteristics of members of the criminal justice system as a function of race and gender. Individuals under community corrections supervision in Jefferson County Alabama were recruited to take part in a smoking cessation study examining the effectiveness of Bupropion and counseling in this population (R01CA141663). Baseline data (N=346), including basic demographics and smoking characteristics, were extracted from this ongoing clinical trial. Black men (149), White men (54), Black woman (73), and White women (60) were compared across a variety of smoking characteristics via univariate Chi-Square and ANOVA analyses. The White participants tended to smoke more both currently and during the highest point in their life. They were more likely to have used nicotine replacement to aid in quitting in the past, less likely to smoke menthol cigarettes. The Black participants reported more confidence in their ability to quit, and more motivation to quit. The only gender difference that emerged was that women were more likely to have used medication to aid in quitting in the past. Of the four groups, the White women began smoking when they were youngest, and they were more likely to live with someone who currently smokes. The White men showed the most variance in use of nicotine products, they were the most likely to have used a pipe, have smoked cigars, or used chew/snuff. No variables were identified which specifically differentiated the Black women from the Black men.

R01CA141663 (PI: Cropsey).

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## POS3-30

### CIGARETTE USE AND ADHD SYMPTOMS AMONG COLLEGE STUDENTS

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Research has shown an association between attention-deficit/hyperactivity disorder (ADHD) symptoms and cigarette smoking among older adolescents, a population at high risk for smoking initiation. While ADHD has been linked to earlier onset of smoking, greater nicotine dependence, and more difficulty quitting, the specific symptoms underlying this relationship remain unclear. The present study examined relationships between inattention and impulsivity, two primary ADHD symptoms, and smoking status among college students. We compared these symptoms among smokers (smoked at least 100 lifetime cigarettes and currently smoke at least some days) with non-smokers. We hypothesized that college student smokers would report greater inattention and impulsivity compared to non-smokers. College students (N=386; 287=nonsmokers; 99=smokers) completed the Cognitive Failures Questionnaire, a measure of inattention, and the Zuckerman Kuhlman Personality Questionnaire, a measure of impulsivity. Participants were predominantly freshmen (35.8%), female (53.9%), Caucasian (51.4%), and older adolescents (Mage= 19.7, SD = 1.69). Two one-way analyses of covariance (ANCOVAs) were conducted revealed the expected associations. Smokers reported greater inattention (M=23.42, SE=1.05,  $p<.05$ ) and impulsivity (M=11.79, SE=.44,  $p<.001$ ) compared to nonsmokers. Findings were consistent with previous research on the relationship between ADHD and smoking. Given that these hallmark symptoms are related to smoking status, more research investigating the link between ADHD and smoking among college students is warranted. Moreover, our findings have implication for interventions designed to prevent smoking, and cessation efforts in this population.

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## POS3-31

### MOTIVATION TO QUIT SMOKING WHILE UNDER COMMUNITY CORRECTIONS SUPERVISION

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Several factors have been linked to motivation to quit smoking in the past such as previous abstinence (Martin et al., 2006) concern over health risks (McCaul et al., 2006) and cost (Riedel et al., 2002). However, much less research has been done to examine the motivational factors related to quitting in the criminal justice population. The goal of this study was to examine the characteristics associated with motivation to quit in that population. Data from this study was extracted from an ongoing randomized clinical trial (R01CA141663). At baseline, the participants (N=346) were asked a number of questions about their demographics, and smoking characteristics. They were also asked to rate their motivation, interest, and confidence in quitting on a seven-point Likert scale. This study dichotomized the Likert responses and compared individuals who were high on a variable to those who were low on that variable with Chi-square and ANOVA analyses to examine differences in motivation, interest, and confidence in quitting. The results indicated that perception of family support increased all three aspects of motivation. Additionally the belief that such things as medication, nicotine replacement, individual therapy, and group therapy would aid in ones cessation effort, produced the largest effect-sizes found. Several variables demonstrated an increase on one of the motivational factors, but not the others. Individuals who rated their last quit attempt as being more difficult were more interested in quitting. Also having someone in the family who suffered from a medical problem linked to smoking and having a health professional discuss the dangers of smoking both doubled one's interest in quitting. Individuals who smoked more cigarettes and individuals who were White had less confidence in their ability to quit. Finally, individuals who smoked light tar cigarettes were less motivated to quit. Several variables influenced the aspects of motivation studied. However, the belief that medication, nicotine replacement and or therapy could help with smoking cessation seemed to be the most influential.

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## POS3-32

### AN ANALYSIS OF TREATMENT IMPLEMENTATION FIDELITY AS A POSSIBLE EXPLANATION FOR NULL FINDINGS IN A SMOKING CESSATION TRIAL

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Monitoring treatment fidelity helps to ensure that a clinical intervention trial produces reliable and valid results. Treatment fidelity evaluation strategies should address treatment delivery, receipt, and enactment as well as study design and provider training. Clinical trials that employ these strategies are more readily able to achieve internal validity, a necessary requirement for accurate interpretation of study findings. We conducted a smoking cessation trial among cancer patients (n = 180) in which the enhanced intervention (behavioral tapering administered by a handheld computer (HHC)) was compared to best practices and did not improve cessation outcomes. We hypothesized that observed equivalence in treatment fidelity would support the interpretation of our null trial findings as true-negative. To confirm that treatments were delivered as intended, three treatment components were assessed: nicotine replacement therapy (NRT), behavioral counseling, and training in HHC use. There were no significant differences in delivery, receipt, or enactment between arms for either NRT or behavioral counseling treatment components. NRT was offered to 99.4% and given/accepted by 81.5% of patients. Of these, 82.1% actually used NRT during the trial. Patient refusal was the most common reason for non-use of NRT. Of the five counseling sessions scheduled, 98% were attempted and, on average, patients completed 4.1 sessions of 16.7 minutes each. HHC data were assessed by determining whether HHC training had been administered for patients in the enhanced (experimental) intervention arm. Data showed that 96.7% of patients received HHC training. The observed high percentage of treatment delivery, receipt, and enactment provide supporting evidence that the interventions were implemented as planned. Therefore, the results from the treatment fidelity analysis indicate that the observed absence of significant trial results is not due to improper treatment implementation. Ways to improve measurement of implementation fidelity in future tobacco cessation research are discussed.

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## POS3-33

### GENDER DIFFERENCES IN THE EFFECTS OF TOPIRAMATE ON CIGARETTE SMOKING IN ADOLESCENTS WITH BIPOLAR DISORDER AND CANNABIS USE DISORDERS

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Background: Topiramate, an anticonvulsant medication, has shown some promise as a treatment for substance use disorders, including nicotine dependence. However, prior work by our group suggested that the efficacy of topiramate for smoking cessation may be gender-specific, with greater evidence of utility in men. In this secondary analysis of a larger study of topiramate as a treatment for bipolar disorder and cannabis use disorders in adolescents, we examined whether topiramate reduced smoking relative to placebo, and whether the effects differed by gender. Method: Participants were 33 adolescents (55% female) with bipolar I disorder, currently in a manic or mixed episode, and co-occurring cannabis abuse or dependence. Topiramate (150 mg bid, or maximal tolerated dose) (n=16) or matching placebo (n=17) was administered over 16 weeks in a double-blind fashion as an adjunct to open-label quetiapine, provided as a standardized treatment for bipolar disorder. We examined main effects of treatment and gender, and their interaction, on average cigarette consumption per day using linear mixed models. Results: There was no overall effect of topiramate ( $p=0.09$ ) or gender ( $p=0.55$ ) on smoking. However, there was a significant gender x treatment group effect ( $p=0.03$ ): topiramate-treated girls (M=10.4 cig/day decrease) showed significant reductions in smoking compared with placebo-treated girls ( $p=0.009$ ; M=0.1 cig/day increase), but the topiramate-treated boys (M=2.6 cig/day decrease) did not differ from their placebo-treated counterparts ( $p=0.47$ ; M=5.1 cig/day decrease). Conclusions: Our findings provide preliminary evidence that topiramate reduces smoking in female adolescents with bipolar and cannabis use disorders. Because of its potential to treat multiple comorbidities in adolescents with bipolar disorder (e.g., alcohol, cannabis, and tobacco

use disorders), further investigation of topiramate's effects in young female smokers with bipolar disorder is warranted.

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## POS3-34

### THE RELATIONSHIPS OF EARLY SMOKING WITHDRAWAL SYMPTOMS TO SMOKING CESSATION TREATMENT OUTCOMES AND THE RATE OF NICOTINE METABOLISM: PRELIMINARY RESULTS FROM A PILOT STUDY

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**INTRODUCTION:** Although prior research has demarcated the time course of early smoking withdrawal symptoms (ESWS), it is unknown if such symptoms are related to smoking cessation treatment outcomes. Moreover, the association between ESWS and the rate of nicotine metabolism has yet to be determined. **METHODS:** 20 smokers were randomly assigned to abstain without or with using a 21 mg nicotine patch for 4 hours. After baseline assessment, ESWS were assessed every 30 minutes. At the end of the 4-hour session, participants were provided with brief smoking cessation treatment and returned at 1 week and 12 weeks posttreatment for assessment of their smoking status, cigarettes smoked in the past 24 hours, withdrawal symptoms, motivation to quit, and abstinence self-efficacy. The rate of nicotine metabolism was assessed via saliva at baseline using the nicotine metabolite ratio 3'hydroxycotinine/cotinine. **RESULTS:** In the abstinent condition without patch, greater ESWS were significantly associated with an increased probability of smoking, more cigarettes smoked in the past 24 hours, greater long-term withdrawal symptoms, less motivation to quit, and less abstinence self-efficacy. Conversely, in the patch condition, greater ESWS were significantly associated with a decreased probability of smoking, fewer cigarettes smoked in the past 24 hours, greater motivation to quit, and greater abstinence self-efficacy. Data suggest that whereas faster nicotine metabolism predicted more severe ESWS among abstinent without patch participants, it predicted less severe ESWS among patch participants. **CONCLUSIONS:** The first few hours of abstinence may be meaningful to the treatment of tobacco dependence. While greater ESWS in the absence of nicotine replacement may portend treatment failure, greater ESWS in the context of nicotine replacement use may indicate a higher likelihood of success. The role of nicotine metabolism, nicotine replacement therapy, and ESWS and the interaction of these variables with respect to cigarette abstinence is worthy of further exploration in the development of personalized treatments for tobacco dependence.

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## POS3-35

### GREATER NUMBERS OF PAST YEAR LIFE EVENTS IN ADOLESCENTS PREDICT SMOKING CESSATION SUCCESS

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Stress is linked to smoking, but aspects of this relationship remain unclear. While smoking cessation attempts in adults are adversely impacted by recent major life events, it is unclear whether such stressors impede smoking cessation in adolescents. It is also unknown whether particular coping strategies interact with life events to prevent abstinence in adolescents. We examined the interaction of life events and coping strategies in a cohort of 72 adolescents (mean age: 16.5±1.41; 52.8% female) enrolled in a 4-week contingency management/cognitive behavioral therapy (CM/CBT)-based smoking cessation trial. Analyses that examined past year life events (Life Events Questionnaire [LEQ]; Masten et al., 1994) used logistic regression to predict self-reported abstinence, verified by cotinine, at 4 weeks (end of treatment) and 8 weeks (4 weeks post-treatment). Hierarchical logistic regression was used to examine the interaction of life events and coping strategies (Response-based Coping Inventory

[RCBI]; Wills, 1986) on abstinence. Age, gender, race/ethnicity, treatment group and modified Fagerström Tolerance Questionnaire (Prokhorov et al., 2000) were entered as control variables. Contrary to expectations, higher scores on the LEQ predicted cessation success at 4 weeks (chi-square=5.08, p=.024, odds ratio [OR]=.91). At 8 weeks, no association was found (p=.67). The effect at 4 weeks was driven largely by chronic, negative, independent [CNI] events (chi-square=7.10, p=.008, OR=.58), or long-standing stressors from others (e.g., parental work instability). Only helpless coping interacted with LEQ score (chi-square =6.15, p=.013). Abstinent participants at 4 weeks with low LEQ scores had much lower levels of helpless coping, while abstinent participants at 4 weeks with high LEQ scores had much higher levels; non-abstinent smokers at 4 weeks were intermediate, regardless of LEQ score. These results need replication and may indicate important developmental differences in cessation attempts. *Supported by NIH grant P50DA09421.*

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## POS3-36

### THE ASSOCIATION BETWEEN ACTIVE AND PASSIVE RECRUITMENT METHODS AND STUDY ENROLLMENT AND RETENTION AMONG PARTICIPANTS IN A NOVEL SMOKING CESSATION PROGRAM FOR YOUNG ADULTS

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Presently, more than 20% of young adults aged 18-24 are current cigarette smokers. Enrolling young adults in smoking cessation clinical trials can be challenging and has led to creative recruitment methods like intercept sampling young adults in the environment who are observed smoking. Few studies have assessed the relationship between recruitment methods and incentives, and their impact on study enrollment and retention of young adults into tobacco cessation programs. The present study assessed differences between the method of contact, use of baseline incentives, baseline enrollment, participants' stage of readiness to quit smoking, and attrition during the study of a novel integrated intervention for cigarette smoking and binge drinking. Participants were recruited through both Active (Intercept Sampled in Community) and Passive (Responded to Study Announcement) methods of contact. Both actively and passively recruited participants completed a phone screen to determine basic study eligibility. After passing the phone screen, participants were invited to complete an in-person baseline assessment. Results indicated that among individuals eligible to participate after the phone screen (N=84), completing the baseline assessment was significantly associated with being offered a baseline incentive (\$20.00) for those who were actively recruited (N=50) (p = 0.007), but not for those who were passively recruited (N=34) (p = 0.261). Individuals enrolled after completing the baseline were found to have no significant association between their stage of readiness to quit smoking (Pre-Contemplation, Contemplation, or Preparation) and their method of recruitment (Active vs. Passive) (p=0.601). For enrolled participants who were offered the baseline incentive, their smoking Stage of Change was found to be significantly associated with their attrition in the study (p=0.02). Results suggest that baseline incentives can significantly impact participant enrollment and attrition in clinical trials when actively recruited through means such as intercept sampling.

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## POS3-37

### A RANDOMIZED CLINICAL TRIAL OF PRESCRIBED SMOKELESS TOBACCO USE AMONG UNMOTIVATED CIGARETTE SMOKERS: A PILOT STUDY

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Oral, non-combustible smokeless tobacco (SLT)—the most recent generation of potentially reduced exposure products (PREPs)—is implicitly and explicitly marketed to smokers with the purpose of reducing smoking and/or coping with smoking restrictions. However, there are limited empirical studies of the behavioral and motivational effects of SLT use, particularly as a function of how these products are used. This pilot study aimed to explore the impact of prescribed use of SLT (Camel Snus) on intentions to



quit smoking and all tobacco use among adult smokers, all with no prior PREP use and all unmotivated to quit in next month (N=57; 61% Female, 68% White). Smokers were randomized to one of 3 groups: (1) Reduce cigarette use as much as possible and switch to Camel Snus (REDUCE, n=23), (2) Cope with smoking restrictions using Camel Snus, with or without changes in smoking (COPE, n=23), or (3) Maintain conventional cigarette use (no provision of Camel Snus or other SLT; MAINTAIN, n=11). Using self-report data obtained following 1 week of prescribed SLT use, ANOVAs and planned simple contrasts were used to identify significant ( $p < .05$ ) group differences (REDUCE/COPE vs MAINTAIN participants) in intentions to quit (0=very definitely no and 10=very definitely yes). For intentions to quit smoking in 1 month, REDUCE (M=3.1, SD=2.9) but not COPE (M=1.6, SD=2.4) participants had higher quit intentions than MAINTAIN (M=0.3, SD=0.7) participants. Similarly, for intentions to quit all tobacco use in 1 month, REDUCE (M=2.4, SD=3.0) but not COPE (M=1.2, SD=1.8) participants had higher quit intentions than MAINTAIN (M=0.3, SD=0.5) participants. The exact same pattern of results was found for intentions to quit smoking and all tobacco use in 6 months. Use of SLT for the purpose of smoking reduction is associated with stronger quit intentions. Use of SLT to circumvent smoking restrictions did not alter motivation. For smokers who use SLT, changes in smoking behavior are likely a function of how the product is used. Future research will need to clarify any direct relationship between use of SLT and smoking behavior.

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## POS3-38

### GROUP EFFECT ON REPORTING OF VARENICLINE ADVERSE EVENTS IN A SMOKING CESSATION TRIAL WITH GROUP COUNSELING

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Studies have shown that group counseling is effective in helping people quit smoking especially when paired with pharmacotherapy. The effect of group counseling on reporting of adverse events in clinical research studies is unknown. Due to the increased communication among study participants, we hypothesized that group assignment would have a significant effect on the reporting of adverse events. Specifically, we aimed to determine if group assignment is associated with the frequency and likelihood of reporting of adverse events. Postmenopausal women over the age of 45 who smoked at least 10 cigarettes/day for at least the past year and were in stable mental/physical health were recruited for an ongoing smoking cessation study. Varenicline was provided for 12 weeks and adverse events were assessed via one open-ended question during weekly one-on-one interviews. Group counseling occurred once or twice a week during the 12 week treatment period. Statistical analysis was conducted using SAS 9.2 and included descriptive statistics and mixed regression models. The participants (n=84) had a mean age of 56.3 (Standard Deviation [S.D.]:  $\pm 5.4$ ) and had been smoking an average of 36.5 (SD:  $\pm 8.6$ ) years. The average cigarettes/day was 18.6 (SD:  $\pm 7.7$ ). There were a total of 14 groups with 5 to 10 participants per group. The average number of adverse events reported per participant during the treatment period ranged from 1.8-9.0 by group. Group assignment was a significant predictor of the number of adverse events reported ( $t=2.77$ ,  $p=0.007$ ) and the likelihood of reporting of gastrointestinal adverse events ( $t=2.02$ ,  $p=0.047$ ). Two other trends were noted between group assignment and nausea ( $t=1.70$ ,  $p=0.093$ ) and dizziness ( $t=1.96$ ,  $p=0.055$ ). No other significant associations were observed. These results indicate there may be a group effect on both the frequency and likelihood of reporting adverse events. Additional research should confirm these results and investigate if the method of assessing adverse events (i.e. open-ended vs. structured questions) may play a role on reporting adverse events within a group counseling setting.

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## POS3-39

### INVESTIGATING CORRELATES OF USING LEGAL ALTERNATIVES TO MARIJUANA IN A SAMPLE OF LIGHT AND INTERMITTENT SMOKERS

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Legal alternatives to marijuana (e.g., Salvia, Spice, and related "incense" blends) are increasingly being recognized as a public health concern. Few studies examine potential correlates related to use of these products. This study investigated whether demographic, smoking-related, and motivational variables were related to having ever used Salvia, Spice, and related products. One-hundred eighty-five participants (50 % female; 83% Hispanic; Mage = 32 years; SD = 13.68) were recruited from a local health clinic and a university on the U.S. / México border for a smoking cessation study. At baseline, participants completed measures assessing demographics, tobacco use and history, stage of change, and perceived competence. Bivariate correlations assessed the univariate relationships between having ever used Salvia, Spice, or related products and age, gender, stage of change, average cigarettes per day, the Fagerstrom Test for Nicotine Dependence (FTND), drinking frequency, use of other tobacco products (e.g., cigars), and being a menthol smoker. Correlations with a p value less than 0.1 were retained for logistic regression analyses. Model predictors included: age, gender, age of first use of tobacco, and use of other tobacco products. Ten percent of the sample indicated they had ever used Salvia, Spice, or related products, and 24% indicated that they were familiar with these products. Gender (OR 6.9,  $p = .017$ ) and use of other tobacco products (OR 2.8,  $p = .013$ ) were significantly associated with ever use of legal alternatives to marijuana. Thus, men were far more likely than women to use these products, and those who used other tobacco products in addition to cigarettes were almost three times more likely to ever use marijuana alternatives. These findings suggest that the assessment of legal marijuana alternative use is warranted in studies of other addictive behaviors. Marijuana alternative intervention and prevention efforts should target men and include components that attend to co-morbid cigarette and other tobacco use.

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## POS3-40

### A DESCRIPTIVE STUDY OF URBAN AND RURAL ACUTE CARE NURSES' TOBACCO BELIEFS AND PRACTICE

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Background: This study with acute care nurses was designed as a needs assessment to inform implementation of tobacco cessation clinical practice guidelines into acute care hospitals. Methods: This was a cross-sectional survey with nurses (N=269) in 1 urban and 11 rural hospitals that measured systems strategies, nurses' intervention beliefs, confidence, and practice based on the 5A protocol (ask, advise, assess, assist, and arrange), and inhibitors and facilitators to intervening with tobacco. Urban vs. rural outcomes were analyzed using frequency counts, chi square analyses, and t-tests depending on variable type. Results: The majority of nurses agreed that intervening with tobacco was part of their role, were at least somewhat confident, and had intervened using the 5A's in the last year, even if only seldom—91% asked, 96% advised, 89% assessed, 88% assisted, and 61% arranged post-discharge follow-up, but few performed these steps frequently. Rural nurses had significantly higher confidence, more positive beliefs, and assisted and arranged follow-up more often than urban nurses ( $p < .01$ ). The intervention activities performed most frequently tended to be easier to do; activities involving prescription pharmacotherapy or that were more complex were seldom performed. Factors that encouraged nurses included knowledge of patient benefits, cost-effectiveness, patient motivation, reasonable workloads, and resource supports. Barriers included heavy workloads and lack of counselling skills, time, and patient motivation. Discussion: The survey was instrumental in elucidating nurses' beliefs and confidence about providing tobacco interventions and the frequency level and type of activities that nurses currently engage in relating to tobacco use among inpatients. The findings can be interpreted as a promising professional climate amenable to translating guidelines into practice and were used to inform decision-making about the development of what might be an acceptable brief inpatient intervention consistent with the guidelines and the training needed to institutionalize tobacco intervention guidelines into practice.

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## POS3-41

### SMOKING TOPOGRAPHY AND SMOKING-RELATED OUTCOME EXPECTANCIES IN SMOKERS WITH SCHIZOTYPY

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Individuals with schizophrenia have extremely high smoking rates (70-88%). Compared to smokers in the general population, smokers with schizophrenia smoke more cigarettes per day, smoke stronger cigarettes, and have higher nicotine dependence, carbon monoxide (CO) levels and boosts, and cotinine and nicotine levels. They also have more intense smoking topography (e.g., shorter interpuff intervals, longer puff duration) and greater positive smoking outcome expectancies. Studies exploring the relationship between smoking and schizophrenia symptomatology have yielded inconsistent findings. As most individuals with schizophrenia start smoking prior to the onset of schizophrenia, research suggests a shared vulnerability between smoking and schizophrenia. By studying the relationship between smoking and schizotypy (the putative genetic vulnerability to developing schizophrenia), researchers can avoid many confounds (e.g., medication side effects) associated with schizophrenia. This study assessed schizotypy symptoms, smoking characteristics and behaviors, and smoking outcome expectancies in undergraduate students with psychometrically-defined schizotypy and demographically-matched controls without schizotypy. Results revealed no significant differences in schizotypy traits between smokers with schizotypy and nonsmokers with schizotypy. Smokers with schizotypy had significantly higher nicotine dependence than control smokers without schizotypy. There was also a non-significant trend in which smokers with schizotypy smoked more cigarettes per week. Further, smokers with schizotypy were more likely than control smokers to endorse more positive consequences (i.e., improved state enhancement, stimulation, social facilitation, taste/sensorimotor manipulation, reduced negative affect and boredom) than negative consequences of smoking. There were no significant differences between smokers with schizotypy and control smokers on measures of smoking behaviors such as smoking topography or CO. These preliminary findings offer insight into mechanisms underlying smoking in individuals with schizotypy and underscore the importance of continued research within this population.

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## POS3-42

### BUILDING CAPACITY FOR SMOKING CESSATION TREATMENT WITHIN PRIMARY HEALTHCARE TEAMS

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Primary care practitioners are ideally positioned to deliver smoking cessation interventions since they have more frequent and more personal patient interactions than other health professionals. However the literature suggests that they have limited training or capacity to provide comprehensive cessation treatment. A new program by the provincial government in Ontario, Canada to make free nicotine replacement therapy (NRT) available to patients of multi-disciplinary community-based primary care organizations (called Family Health Teams or FHTs) provided an opportunity to assess the current capacity of FHTs to deliver evidence-based smoking cessation programming. A survey to assess current practice and interest in incorporating the provision of free NRT within a smoking cessation model was distributed by mail and email to all 170 FHTs across the province. The results of the survey were used to categorize the current level of readiness of each FHT to adopt the program model and to encourage the uptake of resources developed to build capacity and mediate practice change. Of the 170 FHTs, 122 (72%) responded to the survey of which 46% had minimal staff (0 or 1) formally trained in smoking cessation. Approximately half of all respondents reported actively tracking smokers' progress (54%) and assessing readiness to quit smoking at every visit (46%). Smoking cessation activities were described as an organized program by 57% of respondents but only 30% collected patient quit rates. The strategies used to enhance capacity and mediate knowledge exchange to improve the adoption and implementation of smoking cessation best practices will be presented. The capacity survey indicated that the majority of FHTs were interested in accessing free nicotine replacement therapy for their patients and additional training around smoking cessation interventions for their clinical staff. While there was only moderate adoption of best practice guidelines overall

at baseline, the opportunity to provide patients with more comprehensive treatment may lead to greater utilization and implementation of evidence-based tools and resources.

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## POS3-43

### DESIGN AND IMPLEMENTATION OF A UNIVERSAL MANDATORY ELECTRONIC MEDICAL RECORD (EMR) BASED STRUCTURED TOBACCO USE ASSESSMENT AND INTERVENTION PROGRAM IN CANCER PATIENTS

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Background: National clinical oncology guidelines stipulate that cancer patients should be routinely screened for tobacco use, advised to quit, and offered assistance to quit. Unfortunately, these guidelines have not received widespread implementation in cancer populations in part due to a failure to develop and implement clinically efficient standardized tobacco assessment and cessation procedures in cancer treatment populations. Methods: A standard set of tobacco assessment questions was developed using evidence-based medicine and annotated using fixed-response variables (FRV). A logic based electronic medical record (EMR) referral system was developed to determine patient eligibility for referral to a dedicated tobacco Cessation Service. A clinical program was developed to provide standardized assessments for patients at initial presentation to a comprehensive cancer center and during at follow-up for cancer treatment. Results: At Roswell Park Cancer Institute, a screening and referral algorithm was developed to: 1) maintain efficient clinical workflow, 2) capture cancer patients at diagnosis, during treatment, and at follow-up, 3) achieve real time EMR based data acquisition with FRV and automated cessation service referral logic, and 4) design and implement a dedicated cessation service. The standardized assessment instrument, FRV, referral decision algorithm, and cessation service clinical management structure are presented. Of the initial 443 patients referred, 315 have been reached. First call outcomes demonstrate that 84% (246 of 294) of eligible patients are receptive to intervention comprised of 33% actively quitting (action phase) and 67% thinking about quitting (contemplation phase). In 48 patients not interested in the program at first call, 85% are receptive to discussion at a later date (pre-contemplation phase). Only 2% of patients (7 of 294 patients) refused any intervention assistance. Conclusions: Design of an EMR based structured tobacco assessment with automatic referral logic is feasible. Data suggest that a large proportion of newly diagnosed cancer patients who use tobacco are receptive to intervention.

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## POS3-44

### PHYSICIANS' PERCEPTIONS VS. ACTUAL EVIDENCE REGARDING EFFECTIVENESS OF TOBACCO CESSATION MEDICATIONS

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Physicians play an integral role in delivering tobacco dependence treatment, particularly prescribing medications. Prescribing can be influenced by many factors including the perceptions of these medications' effectiveness. This study evaluates the perceived effectiveness of cessation medications by primary care physicians. Data from 1408 direct patient-care physicians in New Jersey in 2008 through an anonymous, mail survey were analyzed. Bivariate associations of perceived effectiveness of pharmaceutical options by select physician characteristics were examined by contingency tables and chi-square test of independence. The large majority of respondents perceived varenicline (93%), bupropion/nicotine replacement therapy (NRT) combinations (80%), and bupropion alone (78%) to be effective. More than half perceived NRT combinations (62%) and nicotine patch (61%) to be effective, and fewer perceived nicotine gum (42%), inhaler (39%), lozenge (35%) and nasal spray (33%) to be effective. Family practitioners, female, and younger physicians tended to have higher perceived medication effectiveness. Physicians who utilize the Clinical Practice Guidelines tended to have higher perceived effectiveness and those who smoked at

least 100 cigarettes in their lifetime tended to have lower perceived effectiveness. These data illustrate gaps between providers' perception of pharmacologic efficacy and actual efficacy rates for tobacco treatment medications. Given that pharmacologic support is a critical component of comprehensive tobacco treatment, further research is needed to determine the factors that influence the full implementation of Clinical Practice Guidelines. Educational interventions for physicians at all levels of training should be employed to ensure that clinical decision-making for tobacco treatment remains evidence-based.

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## POS3-45

### ACTIVE PARENTAL CONSENT IN ADOLESCENT SMOKING CESSATION: A NECESSITY OR HURDLE?

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In intervention research, minors must provide a signed parental consent to be eligible for participation. It is a federally regulated institutional review board (IRB) requirement and standard practice. We unconditionally agree that studies using invasive procedures and/or highly sensitive survey tools must alert the parents of potential physical and/or emotional harms for their child. In theory, these protections potentially allow parents to understand risks and benefits of research participation. We ask about whether adolescents are truly protected when a signed parental consent is not received prior to participation? One survey of parents who did not return the informed consents indicated that 96% did not disapprove of the research. Lack of motivation on the parents' part to complete the form was cited. We may be missing those adolescents at highest risk since parents who are not as involved in their children's activities may well be a greatest risk of tobacco use. We conducted two group-randomized trials involving prevention and cessation of tobacco use among high-school students and required active parental consent. The first project, ASPIRE, yielded 1,574 participants from 16 Houston-area high schools out of which only 111 (7.1%) reported cigarette smoking. Another trial, Project CURBING, was conducted in rural and suburban high schools aimed at both cigarette and smokeless tobacco (ST) use. From 16 schools, we were able to recruit 1,148 participants with only 77 (6.7%) being smokers and 23 (2%) being ST users. Given the tobacco use statistics, it is clear that in both projects tobacco users were grossly underrecruited. Since in neither study a single signed form with parental objection has been received, we assumed that many forms were never seen by the parents. The well-known stigma attached to underage tobacco use was a likely reason for this. We urge the policymakers to relax the counterproductive IRB rules for research projects aimed at tobacco use cessation. Such revisions will enable adolescent tobacco users to benefit from participation in cessation studies and, ultimately, be protected from the real harms of tobacco use.

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## POS3-46

### CHANGE IN DAYS OF ALCOHOL AND MARIJUANA USE AMONG ADOLESCENTS IN A SMOKING CESSATION PROGRAM

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Cigarette smoking is strongly linked to alcohol and marijuana use. Evidence indicates that alcohol use impedes smoking cessation in adults, with preliminary evidence supporting this in an adolescent sample. That said, little is known about how alcohol use changes in adolescents attempting cessation. Less is known about marijuana use during cessation attempts. This study examined data from 62 adolescents participating in a contingency management/cognitive behavioral therapy (CM/CBT)-based smoking cessation program to evaluate the course of alcohol and marijuana use in the first

4 weeks of treatment. Linear mixed model analysis was used to evaluate change in days of alcohol and marijuana use from pre-quit day through the first four weeks of the cessation program. In addition, abstinence status was entered in an interaction with week to evaluate whether change in days of alcohol or marijuana use varied by cessation outcome. Analyses controlled for gender, age, treatment group and baseline modified Fagerström Tolerance Questionnaire score (Prokhorov et al., 2000). Days of marijuana use did not significantly change over the four weeks post-quit day, but use of days of alcohol did ( $F(4, 57.89)=2.90, p=.029$ ). Bonferroni-corrected post hoc analyses indicated a small increase from pre-cessation to week 1 (mean difference of .36 days per week;  $p=.013$ ). Days of alcohol use on weeks 2 through 4 did not differ from pre-treatment levels. No interaction was found between week and cessation outcome for either days of alcohol ( $p=.25$ ) or marijuana use ( $p=.45$ ); similarly non-significant results were found when comparing those abstinent through all 28 days of treatment and those who had a lapse. Thus, changes in alcohol and marijuana use in early cessation did not impact either end-of-treatment abstinence or sustained 28-day abstinence among adolescents.

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## POS3-47

### SATISFACTION WITH VIDEO VERSUS PHONE COUNSELING IN A RURAL SMOKING CESSATION TRIAL

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Significance Connect2Quit is an RCT (N=566) that tests real-time video counseling for smoking cessation in the patient's physician office (ITM) versus in-home telephone counseling (QL). Methods Across both groups, all participants received the same counseling content as well as extensive assistance in selecting/obtaining quit smoking medications. Counseling consisted of 4 sessions of combined motivational interviewing and cognitive behavior therapy. We report patient satisfaction at end of treatment (3 months post-baseline; satisfaction with medication assistance) and 6-months post baseline (satisfaction with counseling; overall satisfaction). Results Satisfaction with medication assistance was measured on a 1-7 scale (1=very unsatisfied; 7=very satisfied). Participants reported high satisfaction with deciding if they wanted quit smoking medication (6.5); determining which medication was right for them (mean 6.5); how to pay for medication (mean 6.0) and trouble-shooting difficulties with medications (mean 6.1). There were no significant differences across study arms. At 6-months, most (79%) reported the length of sessions was about right. When asked to choose from educational materials, counseling, medication assistance, or support from doctor, most (62%) participants reported the most helpful part of the program was counseling. Overall, participants were somewhat satisfied (24.8%) or very satisfied (67.7%) with the program. The vast majority of participants reported they would recommend Connect2Quit to their friends or family, with slightly more in the telephone arm reporting they would not do so (video: no - 6, yes - 149, have already recommended - 45; phone: no - 16, yes - 156, have already recommended - 26;  $p$ -value=0.0075). Conclusion Satisfaction with medication assistance and with counseling was uniformly high among participants. Video counseling participants were slightly more likely to recommend the program to others. Should one study arm outperform another, it will not be due to participant dissatisfaction.

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## POS3-48

### IS IT TIME TO INVEST IN SILVER? REINVESTIGATING SILVER ACETATE AS A SMOKING DETERRENT

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Smoking is a complex behavior which has pharmacological, somatosensory, and behavioral components. Smokers relapse for multiple reasons, and although NRT can modify pharmacological craving, it has no effect on the somatosensory and behavioral aspects of smoking. Therapy with silver acetate can lessen the pleasurable effect of smoking by imparting an unpleasant taste to inhaled cigarette smoke, but clinical trials

of silver acetate alone have shown it to be of low efficacy, due in part to the lack of any effect on nicotine withdrawal. This investigation evaluated the effectiveness of a lozenge containing a combination of silver acetate and powdered tobacco (SAT) in reducing the urge to smoke by imparting an aversive taste to cigarettes and replacing the desired psychoactive constituent nicotine. Three randomized, double-blind, crossover studies were conducted. In Studies 1 and 2, subjects (n=43 and n=37, respectively) received SAT or a placebo or oral tobacco (OT) lozenge followed by smoking their own cigarette; subjects then completed questionnaires to rate cigarette taste and satisfaction. Results from Studies 1 and 2 showed that following silver exposure, significantly (p<0.05) more subjects rated their cigarette as having an unfavorable, abnormal, and unsatisfactory taste or aftertaste relative to placebo and OT, and over 80% rated the taste of their cigarette as worse than normal. In Study 3, subjects (n=111) received SAT or a silver acetate (SA) lozenge and craving for a cigarette was assessed by the Questionnaire of Smoking Urges (QSU). SAT resulted in significant reductions in mean QSU scores from pre- to post-administration (p<0.0001), and mean score reductions with SAT were significantly greater than those observed with SA (p=0.003). Overall, these results provide evidence that an oral product containing silver acetate in combination with a nicotine source could be an effective deterrent to smoking, and possibly prevent early relapse in those trying to quit. Although tobacco cessation is always an ultimate goal, a product such as this may be useful as an aid to discourage smoking if the risk of argyria due to overuse of the product can be overcome.

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## POS3-49

### TOBACCO USE IN ECONOMICALLY DISADVANTAGED DOMINICAN REPUBLIC COMMUNITIES: WHO ARE THE EX-SMOKERS?

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**Objective:** To examine factors associated with being an ex-tobacco user in 8 economically disadvantaged Dominican Republic (DR) communities. **Background:** Tobacco use is increasing globally with greatest increases in low and middle income countries where cessation rates are low, providing few role models for quitting. **Methods:** Data were drawn from Proyecto Doble T, a joint US/DR trial of cessation and secondhand smoke reduction interventions in the DR. Communities included 2 remote rural, 4 peri-urban (2 remote, 2 central), and 2 small urban communities, with one tobacco producing member in each pair. Baseline household surveillance surveys were conducted in approximately 175 randomly selected homes/community (total 1399 homes) by local teams trained by project staff. Data collectors surveyed the first available adult in each home who could provide information for all household members, representing a total of 3278 adults (ages 18+). Overall, 15.1% were tobacco users (8.6-20.2% across communities) and 10.3% were ex-users (1.0-18.1%), with a total of 834 ever users (25.5%). Among ever users, 40.5% were ex-users (10.8-52.0%). Factors associated with ex-user status among ever users in a full model logistic regression were being literate vs. illiterate (42.5% vs. 35.9%, OR 1.6, 95% CI 1.1, 2.2), female vs. male (52.1% vs. 32.7%, OR 1.9, 95% CI 1.4, 2.6), having a health condition vs. not (50.8% vs. 33.8%, OR 1.4, 95% CI 1.02, 2.0), and using smoked tobacco vs. smokeless (43.7% vs. 13.9%, OR 3.3, 95% CI 1.5, 7.3). No differences were found by age, religion, marital status, individual health conditions, community location, or tobacco growing status. **Conclusions:** Overall prevalence of ex-users was low, and among ever users, fewer than half had quit, with considerable cross-community variability. Tobacco use was likely underestimated, as there was anecdotal evidence of hidden use. Nevertheless, results suggest that illiterate, male, healthy, and smokeless tobacco-using groups are particular targets for interventions in these DR communities. Identifying factors associated with quitting can help shape interventions in this underserved and vulnerable region.

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## POS3-50

### A REVIEW OF CULTURALLY TARGETED/TAILORED TOBACCO PREVENTION AND CESSATION INTERVENTIONS FOR MINORITY ADOLESCENTS

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Tobacco use among minority adolescents continues to be serious concern. Thus, identifying effective prevention and cessation interventions for minority youth is critical. To address this need, we conducted a systematic literature review of smoking prevention and cessation intervention studies that were targeted and tailored to racial/ethnic minority adolescents and published in English, peer-reviewed journals between 1990 and 2011. The inclusion criteria were: (1) at least 50% of intervention focused on tobacco use, (2) intervention had more than one session, (3) treatment outcome was defined as initiation or reduction/abstinence of smoking behaviors, (4) at least 50% of the sample was minority. A total of 11 studies met the inclusion criteria; of these, 4 (36%) focused on prevention, 4 (36%) on cessation, and 3 (27%) combined prevention and cessation. The majority (n = 9, 82%) was school-based and 2 were community-based. Diverse racial/ethnic groups were represented (Asian American, American Indian, Arab American, African American) with Hispanics being the most commonly targeted group (n = 6, 55%). The most common theoretical construct used was the Social Influence Model (n = 5, 46%), followed by Social Cognitive Theory, Cognitive Behavioral Theory, and Transtheoretical Model of Change. Six (55%) studies tailored the intervention to include culture-specific components, and these included, 1) surface changes, such as using bicultural/bilingual staff, providing the intervention in the language of the target population, including culturally relevant print materials, and using recruitment settings with more diversity, and 2) deep structural changes that incorporated group-specific cultural core values in the intervention. The overall findings indicated that culturally tailoring tobacco cessation intervention did not improve tobacco quit rates among minority groups, but culturally tailoring tobacco prevention resulted in less tobacco initiation rates among minority groups. This review suggests the need to improve tobacco cessation interventions that targets or is tailored to minority adolescents.

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## POS3-51

### ABUSE AND SMOKING CESSATION IN CLINICAL PRACTICE

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**Background:** This paper explores issues of abuse during smoking cessation counseling that surfaced during a nurse case-managed smoking cessation pilot study in primary care. Tobacco best practice guidelines recommend that nurses integrate smoking cessation interventions into daily practice. Issues of abuse, however, might surface during cessation counseling that can hinder a person's ability to quit smoking and there is little written about to deal with abuse during cessation counseling. **Method:** A literature review and synthesis of abuse and smoking cessation was undertaken to arrive at suggestions for practice. **Results:** This paper clarifies a relationship between smoking and abuse and the subsequent implications for smoking cessation interventions, and highlights the importance of addressing abuse and smoking cessation separately in clinical practice, even though they are inter-related problems that may require overlapping interventions. Best practice guidelines for abuse can be applied to cases of abuse that surface during smoking cessation counseling. Guidelines recommend: 1) validate the woman's experience; 2) affirm that she is being abused; 3) ensure that she is safe from her abuser; 4) refer her to specialized healthcare providers to cope with the abuse; and 5) provide support. If the woman wishes to continue with smoking cessation counseling, stress-reducing strategies which may help her cope with abuse and cessation can be integrated into the cessation intervention. **Conclusion:** Guidelines for abuse provide clinicians with appropriate initial responses when abuse is disclosed during an unexpected encounter, such as during a smoking cessation intervention. Guidelines address not only care planning but the ethical and legal issues associated with the disclosure of abuse, and provide clinicians with a generalized practical tool for addressing abuse rather than a menu of different ways to work with abuse within a smoking cessation intervention.

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## POS3-52

### USE OF AN ONLINE TOBACCO CESSATION EDUCATION PROGRAM FOR DENTAL STUDENTS

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**Introduction:** To address barriers associated with implementing tobacco cessation education into the dental curricula, a web-based, self-paced, interactive module on tobacco cessation was developed and evaluated for effectiveness. The course consists of 3 sections: Pre-exam, Post-exam, and Helping Your Patient Quit. These are designed to align with typical dental practice and help students assimilate tobacco cessation counseling into their clinic experience. The educational content in the program is presented as text and video, brief interactive knowledge and skills assessments, and a final virtual patient exercise. Students also have a course guide and pharmacotherapy reference guide that can be printed for easy reference. **Methods:** The module was fully incorporated into the curriculum after two phases of usability testing and revision. Prior to viewing or taking the tobacco course, students were administered a survey to assess pre-program tobacco related knowledge, attitudes, and behaviors. Follow-up surveys will be administered at yearly intervals until graduation. **Results:** Results from the pre-survey are presented for 72 sophomore dental students. Nearly all students (88.7%) think a dentist should be responsible for tobacco use cessation activities; 4.2% thought it should be the responsibility of the dental hygienist and 4.2% thought it should be the dental assistant's job. Students also believed that tobacco cessation was an important component of a preventive dentistry program (75.6%). At baseline, many students were not confident in their ability to perform tobacco cessation counseling; 19.4% reported poor knowledge, 44.4% reported that their knowledge about tobacco cessation counseling was fair, compared to 29.1% who reported good or very good knowledge, with only 1.4% reporting excellent knowledge. Only 3% of students reported current smoking behavior. **Conclusions:** The course is designed to provide knowledge and skills on how to incorporate tobacco cessation into clinical practice, and to encourage dentist participation in tobacco cessation counseling. We will assess how successful the program is in achieving these goals at 12-month intervals.

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## POS3-53

### MENTHOL SMOKERS AND QUILINES: ARE WE PREPARED?

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Menthol cigarettes account for one quarter of the market in the U.S. The Food and Drug Administration (FDA) is currently considering future regulatory action on tobacco products, including a ban on menthol cigarettes. With 39% of menthol smokers reporting that they would quit smoking if menthol cigarettes were banned, there is a need to better understand whether existing cessation programs such as quitlines are reaching menthol smokers. The purpose of this study was to explore the demographic and tobacco use characteristics of menthol smokers in a population-based sample and to contrast these with uninitiated and underinsured menthol smokers that were seeking treatment through a quitline. Statewide cross-sectional data were obtained from the 2010 Minnesota Adult Tobacco Survey (MATS) (n=7057). In addition, data from the QUITPLAN Helpline were obtained for the study period: September 2009 – July 2011 (n=6079). A sample of eligible participants who enrolled in the QUITPLAN Helpline were contacted for a follow-up survey seven months post enrollment (n=616). In 2010, of 1136 smokers identified in MATS, 22.2% smoked menthol cigarettes. Helpline data revealed that of 6257 callers in the study period, 18.7% smoked menthol cigarettes. In the statewide sample, 55.8% of menthol smokers were female, 23.4% were African American, and 60.2% were low income. Similarly, menthol smokers who called the quitline were more likely to be female, African American, and have less than a high school education. 92% of menthol callers enrolled in services and 83% of those that enrolled requested NRT. Preliminary analyses of outcome data reveal no differences in self-reported 24-hour and 30-day abstinence rates between menthol and non-menthol smokers who enrolled in the quitline. The quitline appears to be reaching a population of menthol smokers and the outcomes for menthol smokers are comparable to non-menthol smokers seeking telephone based treatment. If an FDA menthol ban is implemented, quitlines should be

well equipped to treat menthol smokers. However, quitlines have functioned for many years with modest numbers of smokers so a menthol ban may present an increased demand for services.

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## POS3-54

### VARENICLINE TOLERABILITY AND ADHERENCE AMONG DRUG USERS

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Varenicline has demonstrated efficacy for smoking cessation, but early clinical trials excluded patients with substance use disorders. We assessed incident psychiatric symptoms, cardiovascular events, adverse effects prompting treatment discontinuation, and treatment adherence among current and former drug users prescribed varenicline during routine clinical care. All patient charts in two urban methadone clinics with on site primary care were reviewed, and data abstracted. Fisher's Exact tests assessed the association of prescription course and tobacco abstinence. 719 patient charts were reviewed. 582 (82.1%) patients were smokers. 74 (12.7% of smokers) were prescribed varenicline. Patients prescribed varenicline had a median age of 50 years, 45% were female, and 65% had preexisting depression, anxiety, bipolar or psychotic disorders. Among those prescribed varenicline, 10 (13.5%) discontinued treatment due to adverse effects (including 2 GI effects, 2 depressive symptoms, 1 insomnia). Two initiated new outpatient psychiatric treatment; none reported suicidal ideation, had agitation prompting clinical intervention, or required psychiatric hospitalization within 6 months of varenicline prescription. There were no incident cardiac or vascular events within 6 months of varenicline prescription. Among the 42 prescribed varenicline with treatment course documented, 26 received a prescription for a 4 week course; of those, only two (7.7%) received additional varenicline prescriptions. Those prescribed 12 weeks of treatment were significantly more likely to report tobacco abstinence at follow up than those who prematurely discontinued treatment or prescribed a less than 12 week course (33.3% v 3.7%, p=0.016). Among drug users with significant psychiatric comorbidity, treatment emergent adverse effects with varenicline were comparable to those seen in the general population. Assessment of adverse effects is limited by low rates of varenicline adherence. Interventions are needed to optimize use of smoking cessation treatment among current and former drug users.

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## POS3-55

### INFLUENCE OF FLAVORING AND pH ON CARDIOVASCULAR AND SUBJECTIVE EFFECTS OF SMOKELESS TOBACCO

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Previous research demonstrated that the pH of smokeless tobacco products (SLT) influences the rate of nicotine absorption by regulating the amount of nicotine present in the nonionized, readily absorbed free-base form. Other evidence suggests that mint flavorings may influence nicotine absorption by increasing local blood flow, increasing saliva production and by decreasing membrane barriers to absorption. In the present study, we parametrically varied pH and levels of wintergreen flavoring in a within-subject design. An unflavored SLT (pH 7.7) was amended by adding wintergreen (methyl salicylate) to a concentration of 2.0 mg/g or 20.0 mg/g; pH was increased to 8.3 by the addition of sodium bicarbonate or decreased to 5.4 by addition of citric acid. Five products were tested experimentally: 1) low pH, low flavor; 2) low pH, high flavor; 3) high pH, low flavor; 4) high pH, high flavor; and 5) the non-flavored referent SLT. Seven male SLT users participated in five sessions (double blind) of about 90 min. Baseline heart rate (HR) values were collected; HR and visual analog scales (VAS) of subjective effects and product liking were collected while the SLT was in the mouth (30 min) and for 30 min after. We found small HR increases from 69 to 71 bpm in the low pH conditions and larger changes from 72 to 78 bpm in the high pH conditions. Subjective reports were not robustly related to pH. For example, VAS scales of strength averaged 52 in the low pH and 57 in the high pH; liking averaged 57 in the low pH and 54 in the high pH; and head rush averaged 40 in the low pH and 45 in the high pH. In addition, the concentration of

flavor did not systematically change HR response or subjective measures. The overall perception of product qualities (at 20 min) indicated higher ratings of overall strength, burning and tingling sensations for the high pH products whereas no differences existed between products on questions of swallowing, salivation, packing or nausea. These data tentatively suggest that the pH of the product (and the amount of free nicotine) moderates a physiologic measure (HR) but has fewer effects on subjective estimates of product characteristics.

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## POS3-56

### PALATABILITY OF NEW EXPERIMENTAL CIGARETTES VARYING IN NICOTINE CONTENT

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Limited availability of very low nicotine content (VLNC) cigarettes has constrained research. Consequently, NIDA contracted with Research Triangle Institute to obtain cigarettes for experimental use. Both menthol and non-menthol cigarettes were produced by 22nd Century using tobacco varying in nicotine content. Six of these cigarettes corresponding to menthol and non-menthol versions of very low (~0.01 mg), low (~0.25 mg) and moderate (~0.50 mg) nicotine yields (ISO method) were assessed in a single laboratory session. Participants recruited from three sites smoked 1 preferred brand cigarette followed by 3 experimental cigarettes matched to their menthol preference and presented in random order (30 min inter-cigarette interval). Participants smoked 4 puffs from each cigarette with an inter-puff interval of 30 sec. The Cigarette Evaluation Scale was used as the primary measure of palatability. Five subscales were analyzed including: Satisfaction, Psychological Reward, Aversion, Enjoyment in the Respiratory Tract Sensations and Craving Reduction. For all subscales except Aversion, the low and moderate nicotine yield cigarettes resulted in significantly higher ratings than the VLNC cigarettes (all  $p$ 's < 0.01), but did not differ from each other. Cigarettes with moderate nicotine were also rated significantly higher on strength and nicotine content compared to VLNC cigarettes ( $p$ 's < 0.01). Non-menthol smokers reported more positive effects related to the experimental cigarettes than menthol smokers (e.g., satisfaction:  $p$  < 0.01) which may have been related to differences in preferred brand nicotine yields. Critically, 65% of participants (45% menthol; 88% non-menthol) said they would either 'agree or somewhat agree' or 'neither agree or disagree' to using the <0.01 mg cigarettes for several weeks during a research study. Overall, smokers were able to differentiate between cigarettes based on nicotine content and preferred higher nicotine yields. However, the majority of participants would be willing to smoke even the VLNC cigarette in an experimental setting with overall positive ratings similar to other recent research tools (e.g., Quest 3).

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## POS3-57

### TESTING A PDA-BASED CLINICAL DECISION SUPPORT SYSTEM FOR TREATING TOBACCO USE IN DENTAL CLINICS

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Dental public health clinics provide an important but relatively untapped venue for delivering evidence-based tobacco use treatment to high risk populations. The purpose of this pilot study was to develop and test the feasibility of a PDA-based clinical decision support system (CDSS) to promote guideline recommended tobacco use treatment in dental clinics. We employed a three-phase development process of definition, usability testing, and clinical testing. To develop the CDSS we used semi-structured interviews, iterative usability testing with providers and consultation with an expert panel. We then pilot tested the system by implementing it in one dental clinic at the New York University College of Dentistry. In the final phase we evaluated the impact of the CDSS using

post-intervention qualitative interviews and reviewed a random sample of 400 charts pre and post intervention in four sites (study site and three comparison sites) to compare adherence to tobacco use treatment guidelines in the study site with sites that did not have access to the CDSS. Dental providers reported that utilizing the CDSS was easy, and saved them time while providing a better quality evidence to inform clinical treatment decisions. All commented favorably on the ability to personalize the counseling and check for medication cautions and contraindications. However, a few reported intermittent problems with internet connectivity and having to log onto a website to access the system. Based on chart reviews we found that dental providers were significantly more likely to screen patients for tobacco use (<.001), and tobacco users were more likely to be advised (<.001), referred to the state's Quit Line (<.001), and prescribed Nicotine Replacement Therapy (.035) in the study site compared to other clinics that did not have access to CDSS. This study demonstrated the feasibility and general acceptability of this approach to enhance Dentists' adherence to Treating Tobacco Use and Dependence Clinical Practice Guidelines and shows promise as a strategy for improving the quality of tobacco use treatment in dental settings.

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## POS3-58

### IMPULSIVITY, EXPERIENTIAL AVOIDANCE, AND STAGES OF SMOKING BEHAVIOR

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Impulsivity, broadly defined, is associated with smoking initiation, maintenance, and relapse. Factor analysis has identified four distinct dimensions of impulsivity, which are assessed via the UPPS Impulsive Behavior Scale: Urgency (tendency to act impulsively when experiencing negative affect), lack of Premeditation, lack of Perseverance, and Sensation Seeking. Research has suggested that these dimensions may contribute uniquely to different aspects of smoking. Experiential avoidance, the tendency to avoid or try to eliminate uncomfortable thoughts and feelings, has also been implicated in maintaining smoking and may be conceptually related to Urgency. The goal of the current study was to evaluate relationships among UPPS, a smoking-specific measure of experiential avoidance (AIS), and past and current smoking behavior, including age at initiation, a single-item measure (0-100) of current craving, nicotine dependence (FTND), and quit attempts. Participants included 162 adult daily smokers who were participating in a larger study and intended to make a quit attempt within the next 6 months. Results indicated a significant positive correlation between Urgency and AIS scores ( $r = .21$ ,  $p = .009$ ). Only Urgency ( $rs = -.27$ ,  $p < .001$ ) and Sensation Seeking ( $rs = -.25$ ,  $p = .001$ ) were significantly associated with younger age at first cigarette. Only Urgency and AIS were significantly correlated with craving and dependence ( $p$ 's < .01). Linear regression results indicated that after accounting for dependence, only AIS contributed unique variance in predicting craving ( $p < .001$ ). Finally, only Urgency was associated with duration of longest previous abstinence, such that participants higher in Urgency were able to quit for a shorter duration in the past ( $r = -.18$ ,  $p = .03$ ). However, Urgency did not predict abstinence duration after controlling for dependence. Results suggest that among dimensions of impulsivity, Urgency may play the strongest role in smoking maintenance, and the relationship between Urgency and experiential avoidance is worthy of further study. Limitations of these findings (e.g., reliance on retrospective self-report) are discussed.

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## POS3-59

### MODAFINIL DOES NOT ALTER CIGARETTE USE OR CRAVINGS IN COCAINE-DEPENDENT VOLUNTEERS

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Modafinil is a CNS stimulant and currently among the most promising pharmacological agents for treating cocaine dependence. Given the high percentage of cocaine-dependent individuals who are also cigarette smokers (>70%), it is important to know how modafinil treatment may affect this behavior. This is especially relevant since a study in

non-cocaine-dependent smokers revealed that modafinil (200 mg, bid) increased rates of smoking and withdrawal as compared to placebo (Schnoll et al., 2008). In the current study, we examined the effects of modafinil (0 and 200 mg/day for 5 days) on cigarette smoking utilizing a randomized, double-blind, between-subjects design. Participants (N=7-13/group) consisted of non-treatment seeking, cocaine-dependent, daily cigarette smokers. Participants were predominately male (88.9%) and African-American (77.8%). In regards to cocaine, average years of use and days used in the last 30 were 18.7±7.1 (mean±S.D.) years and 11.0±7.9 days, respectively. In regards to cigarette use, average years smoking and daily smoking were 24.2±7.7 years and 10.6±6.0 cigs/day, respectively. In comparison to placebo, modafinil administration produced no changes for breath carbon monoxide (CO) levels, daily cigarettes, cigarette cravings, and FTND scores. The lack of effects on smoking behavior are interesting given that by day 5, modafinil had produced significant improvements in cognitive performance as well as significant decreases in the rewarding effects produced by cocaine (data presented elsewhere).

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## POS3-60

### THE ROLE OF HEALTH RISK PERCEPTION VARIABLES ON SMOKING-RELATED OUTCOMES IN A MOTIVATIONAL INTERVIEWING-BASED INTERVENTION FOR COLLEGE STUDENTS

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Smoking among college students is of significant concern because many students initiate or increase their level of smoking during college. While existing research indicates college students tend to minimize the health risks associated with smoking, no studies have evaluated whether health risk perceptions relate prospectively to changes in smoking behavior. In this study we examined the extent to which risk perceptions were predictive of quit attempts and cessation (independent of treatment) among college students enrolled in a group randomized smoking intervention trial. Participants were 303 smokers (57.4% male, mean age=19.5) recruited, regardless of interest in quitting, from sororities and fraternities at a large Midwestern university. Perceived vulnerability, optimistic bias, and precaution effectiveness were assessed at baseline while quit attempts (yes/no) and smoking cessation (yes/no) were assessed at follow-up. Logistic regression analyses which controlled for baseline level of smoking and treatment group revealed that optimistic bias was negatively related to quit attempts (OR = .85, 95% CI = .75-.97), while perceived vulnerability and future precaution effectiveness were positively related to quit attempts (OR = 1.54, 95%, CI = 1.26-1.88 and OR = 1.12, 95% CI = 1.01-1.25, respectively). Future precaution effectiveness was also positively related to abstinence (OR = 1.14, 95%, CI = 1.01-1.28), but perceived vulnerability was negatively related to abstinence (OR = .79, 95% = .64-.97). Results indicate that health risk perceptions are significant predictors of quit attempts and cessation and suggest that they may be helpful targets of interventions for motivating college students to quit.

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## POS3-62

### A CONTROLLED PROSPECTIVE EXAMINATION OF POST-CESSATION WEIGHT GAIN IN FEMALE SMOKERS

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Numerous studies in human smokers and recent animal models highlight the problem of post-smoking cessation weight gain. However, a focus on the developmental process in which these effects unfold has been lacking. For example, young women report fear of weight gain as reason for continued smoking, assuming these effects are universal. However, the majority of studies involving human smokers attempting to quit capture an older age range (average age ~ >40), there is bias in samples followed in terms of drop-out, and they lack a continuing to smoke control group for comparison. This investigation was part of a larger effort that enrolled 96 female smokers, representing an age range of 18-46, with 67 randomized to quit smoking ("quitters") and 29 randomized to continue smoking for the 31-days that the immediate group remained abstinent

("persisters"). Large financial incentives controlled against relapse and minimized drop-out leaving N=54 quitters and N=25 persisters with complete data. We examined post-cessation weight gain across time, by quit group and age group (younger <30 < older). Significant increases in weight gain were noted (p < .001), weight by quit group differences (p < .01), and weight by age group differences (p < .05). For those age 30 and above in the quit group, we observed a linear increase in weight across the course of a month that was greater than quitters younger than age 30; with an average weight gain of 7.3 pound in quitters age 30 and above in just 1-month post-cessation, compared to only 1.1 pounds in the younger quitters. All quitters age 30 and above gained some weight over the course of cessation, compared to only 56% of quitters younger than age 30. In the continuing to smoke control group (persisters), no age-related differences in weight change were noted over the course of 1-month. While self-reported change in appetite or mood did not account for these differential effects on post-cessation weight gain here, these results suggest the need for mechanistic studies of the differential (or additive) effects of changes in eating behavior and metabolism in younger vs. older smokers in a well controlled study of smoking cessation.

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## POS3-63

### SEQUENCE AND PATTERNS OF SMOKING, ALCOHOL, AND MARIJUANA INITIATION IN A STATEWIDE SURVEY OF ADOLESCENTS

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There is not a single trajectory for initiation of substance use. This study examined various patterns of initiation using data from the 2010 Maryland Youth Tobacco Survey (MYTS), a classroom-based survey of 86,098 public middle (MS) and high (HS) school youth. A subsample of youth (N=4,381) who reported using all 3 substances (cigarettes, alcohol and marijuana) in the past month with valid age of initiation data were included in the analyses. We examined initiation of the 3 substances by sequencing the youth's self-reported age at time of initiation, resulting in 12 distinct patterns of initiation. Overall, significantly more boys (56%) reported past month use of all 3 substances (i.e., cigarettes, alcohol and marijuana) than girls (44%), p < .001. Only 4% of the youth reported a typical 'gateway pattern', i.e., cigarettes first, followed by alcohol and then marijuana. We also examined a subsample of these youth (N=3,043) who had 4 clear patterns of initiation: 1) initiated cigarettes first (i.e., at an earlier age than alcohol and marijuana); 2) initiated alcohol first (i.e., at an earlier age than cigarettes and marijuana); 3) initiated marijuana first (i.e., at an earlier age than cigarettes and alcohol); and 4) initiated all 3 substances at the same age. Half (51%) of these polysubstance using youth began with alcohol first; almost one-quarter initiated with tobacco (12.7%) or marijuana (10.1%); while 26.1% initiated all 3 substances within the same year. Cross-tabulations were used to explore group differences on demographic characteristics. There were no demographic differences among the youth who initiated cigarette smoking first. Among the youth who initiated alcohol first, they were more likely to be female and White. Among the youth who initiated marijuana first, they were more likely to be male, African American and in HS. Among the youth who initiated all 3 substances at the same age, they were more likely to be in MS and either Hispanic or from an 'other' minority group. These patterns of initiation among MS and HS youth suggest the need for multiple risk prevention efforts based upon demographic characteristics.

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## POS3-64

### EVALUATION OF THE IMPACT OF CIGARETTE SMOKING ON THE "HIGH" AND "DESIRE" PRODUCED BY METHAMPHETAMINE (METH) AMONG METH-DEPENDENT VOLUNTEERS

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Aims: The primary aim was to evaluate whether cigarette smoking alters the "High" or "Desire" produced by METH among METH-dependent volunteers. Methods: Participants completed a series of questionnaires, including the Fagerstrom Test for Nicotine Dependence (FTND), Tiffany's Craving Questionnaire (TCQ), and Multiple Drug Use

Questionnaire (MDUQ). To be included, participants must have self-reported smoking  $\geq 10$  cigarettes per day (CPD) and  $\geq 5$  days of METH use within the past 30 days. Results: As expected, the majority of METH users were also nicotine-dependent ( $N = 165/193$  of the full sample: 85%). Participants who met inclusion criteria ( $N=124$ ) were primarily Caucasian (75%) and male (67%),  $35.0 \pm 8.4$  (mean  $\pm$  S.D.) years of age, who reported using METH for  $11.3 \pm 7.4$  years and  $19.9 \pm 7.6$  days out of the past 30. Among eligible participants, they had smoked cigarettes for  $18.1 \pm 8.2$  years, currently used  $17.4 \pm 7.5$  CPD, and had an FTND score of  $4.3 \pm 2.4$ . The two questions on the MDUQ (-5: reduces, 0: no change, +5: increases) included "Does nicotine affect the high that you experience from METH?" and "Does nicotine affect your desire for METH?" The scores were  $0.4 \pm 1.8$  and  $0.3 \pm 1.3$ , respectively. Eleven questions on the TCQ evaluated interactive effects of nicotine and METH on a scale of 0 to 100 (0: not at all, 100: most ever). In response to "When using METH, I crave cigarettes more than usual" and "When using, I smoke out of habit", participants rated these as  $56.5 \pm 39.9$  and  $68.7 \pm 34.2$ , respectively. Conclusions: Given the increased rates of nicotine-dependence among METH users, it is possible that these addictive drugs target common neural substrates and that there are synergistic effects when these drugs are used simultaneously. For example, nicotine and METH both cause dopamine (DA) release. However, these results unexpectedly suggest that nicotine use does not substantially increase the "High" or "Desire" produced by METH, but these individuals apparently smoke cigarettes due to nicotine craving and out of habit. It may be possible that METH-induced DA release may stimulate nicotine craving and/or habitual activity centers in the brain.

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## POS3-65

### PRETREATMENT PREDICTORS OF ATTRITION IN SUBJECTS WITH SEVERE MENTAL ILLNESS ENROLLED IN A SMOKING CESSATION STUDY

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Introduction: Nicotine dependence is the most common form of addiction in the world and causes more deaths each year than human immunodeficiency virus (HIV), illegal drug use, alcohol use, motor vehicle injuries, suicides, and murders combined. One in five Americans smokes tobacco regularly and those with severe mental illness (SMI) smoke 2-3 times more than the general population. Only 30-60% of people quit on a given cessation attempt and rates of attrition from cessation treatment approach 40%. Determining characteristics that predict drop out will permit smoking cessation interventions to be customized to retain smokers in treatment, which will contribute to treatment effectiveness. Objective: To identify significant predictors of attrition in a subject population with SMI from a 12-week multi-site open treatment study for smoking cessation. Methods: We enrolled adults with nicotine dependence and SMI (schizophrenia spectrum disorder and bipolar disorder) into a 12-week treatment regimen of standard dose varenicline and weekly group CBT. Baseline demographic, smoking and clinical data were included in this analysis. The primary outcome of interest was completion of the 12-week regimen. Results: In order to control for the possibility that attrition may simply be a proxy variable for failure to quit smoking, we analyzed the participants who were smoking at drop out or end of study ( $n=80$ ). Univariate predictors included female gender, self-reported history of anxiety and depression, insomnia as a result of past quit attempts and higher scores on the disorganization subscale of the Brief Psychiatric Rating Scale and the Barrett Impulsiveness Scale. In the multivariable model, only self-report history of anxiety (OR 0.19, 0.07-0.50,  $p<.001$ ) remained a significant independent predictor of drop out. Conclusion: Baseline self-reported history of anxiety predicted early termination of treatment, suggesting that SMI individuals with history of perceived anxiety may benefit from intensified psychological and psychopharmacological approaches to address this issue, which may increase retention in addiction treatment programs.

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## POS3-66

### SELF-REPORTED VERSUS BEHAVIORAL EFFECTS OF PERCEIVED DRUG-CONDITION ASSIGNMENT: INFERRING EXPECTANCY EFFECTS OF VARENICLINE

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Placebo effects have long been recognized to occur, but the extent to which they influence the efficacy of pharmacotherapies is only beginning to be understood (Kirsch, 2010). Within the nicotine dependence literature, balanced-placebo designs have enhanced our understanding of expectancies about the nicotine content of cigarettes (e.g., Juliano & Brandon, 2002; Perkins et al., 2008). However, little research has focused on the influence of expectancies related to pharmacotherapies for smoking cessation. Further, it is unclear how this influence differentially affects modalities of assessment (self-report vs. behavioral observations). To explore this question we conducted secondary analyses from a placebo-controlled, double-blind study on the effects of varenicline on craving and smoking reward (Brandon et al., 2011). Specifically, we investigated how participants' expectancies about what medication they were receiving would affect responses on self-report (e.g., craving, smoking satisfaction) and behavioral measures (e.g., smoking topography) of smoking motivation. We examined this when participants had reached full medication dosage (3rd of 3 experimental sessions). Regression analyses indicated that participants' guesses regarding the medication they had received (varenicline vs. placebo) predicted responses on self-report measures of smoking satisfaction and craving, even after controlling for baseline responses (from the 1st experimental session), perceived side effects, and actual treatment condition. This pattern was not observed for any smoking behavior variable, such as number of puffs, latency to first cigarette, and total time smoking. These results suggest that expectancies regarding medication may exert greater influence upon self-report compared to behavior, and have implications for evaluating the efficacy of pharmacotherapies for smoking cessation. Study limitations and future directions will be discussed.

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## POS3-67

### BEHAVIORAL AND TRAIT IMPULSIVITY AMONG YOUNG ADULT INTERMITTENT AND DAILY CIGARETTE SMOKERS

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BACKGROUND: Young adults are at risk for initiating tobacco use and progression to tobacco dependence, and previous studies have indicated that those who are more impulsive tend to initiate tobacco use and escalate to tobacco dependence at higher rates. Impulsivity is a multi-faceted construct that is assessed using both subject-rated trait assessments and performance on tasks of behavioral inhibition. Further research is needed in order to determine how the facets of impulsivity inform vulnerability to tobacco dependence. The aim of this study was to compare young adults who varied in smoking status on different measures of behavioral and trait impulsivity in order to determine which facets of impulsivity were most closely associated with tobacco use and dependence. METHOD: Young adult first-year college students between the ages of 18-24 ( $N=512$ ) were assigned to one of three groups based upon smoking status as determined by a life history calendar (non-smokers, intermittent smokers, or daily smokers). Participants completed several measures of impulsivity including self-report trait (e.g. UPPS-P) and behavioral measures (e.g. delay-discounting, Cued Go/No-Go & Balloon Analog Risk Task), along with assessments of substance use. Group differences were analyzed using ANOVA. RESULTS: Scores on all facets of the UPPS-P (i.e. positive and negative urgency, premeditation, perseverance, sensation seeking) were greater in both smoking groups compared to the non-smoking group, and both negative and positive urgency were greater in daily smokers than intermittent smokers. In addition, inflations per balloon on the BART were greater in intermittent smokers than non-smokers, though performance did not differ between non-smokers and daily smokers. There were no group differences in delay-discounting or Cued go/no go task performance. SUMMARY: These results are consistent with prior studies indicating that smokers are more impulsive than non-smokers on trait and behavioral measures of impulsivity, and suggest that urgency might be a risk factor for transitioning from intermittent to daily tobacco use patterns among young adults.

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## POS3-68

### THE ABSTINENCE-RELATED MOTIVATIONAL ENGAGEMENT SCALE AS A PREDICTOR OF SMOKING CESSATION OUTCOME

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Little research has focused on changes in post-cessation motivation to remain smoke-free. The abstinence-related motivational engagement (ARME) scale is a recently developed and validated measure that assesses the ex-smokers' motivation as evidenced by his/her level of involvement in the quitting process following an attempt to quit smoking (Simmons et al., 2010). The aim of the current study was to test the ARME scale as a predictor of smoking cessation outcome in a treatment-seeking sample of smokers. The current analyses were based on 1495 participants recruited from the New York State Smokers Quitline who made a recent quit attempt and were smoke-free at the time of enrollment into the study. Participants completed baseline and 6-month follow-up questionnaires that assessed smoking status, nicotine dependence, confidence to remain smoke-free, and the ARME scale. At six-month follow-up, 61.6% of responders reported being smoke-free. Univariate logistic regression indicated that baseline ARME scores significantly predicted abstinence 6 months later such that participants with higher ARME scores were more likely to be abstinent, OR = .985; 95% CI: .977 - .993,  $p < .001$ . ARME scores were also associated with pre-cessation nicotine dependence level ( $r = .12$ ,  $p < .001$ ) and baseline confidence to remain smoke-free ( $r = .26$ ,  $p < .001$ ). Similar to the initial validation results, the 16-item ARME scale showed high internal consistency reliability ( $\alpha = .84$ ) and demonstrated the predicted correlation with a traditional measure of global cessation motivation ( $r = .36$ ,  $p < .001$ ). As predicted by the ARME model, ARME scores showed a decline from baseline  $M = 92.3$  ( $SD = 13.1$ ) to 6-month follow-up  $M = 84.2$  ( $SD = 16.7$ ),  $p < .001$ . The current study found that motivational engagement, as measured by the ARME scale is a significant predictor of 6-month cessation outcome in a treatment-seeking sample. This research extends findings from the initial validation of the ARME scale.

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## POS3-69

### CIGARETTE SMOKING PATTERNS AS AN ASSOCIATED RISK FACTOR FOR HIGH RISK SEXUAL BEHAVIOR IN ADOLESCENTS

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A strong relationship between engaging in various high risk behaviors during adolescence has been demonstrated (Biglan et al., 1988). Two prominent behaviors that have been linked to one another include cigarette smoking and sexual intercourse. For example, smoking has been found to be one of the highest predictors of sexual onset, above and beyond race and gender (Robinson et al., 1999). For the current study, we examined the relationship between adolescent cigarette smoking patterns as related to adolescent reported sexual activity. It was hypothesized that high risk smoking patterns (i.e., early age of initiation, number of days smoked per month, number of cigarettes smoked per day and daily cigarette consumption) would be associated with adolescents endorsing high risk sexual behavior (ever having sex, an earlier age of sexual onset, and greater number of sexual partners). The study utilized the data obtained by the Center for Disease Control (CDC) 2009 Youth Risk Behavior Surveillance System (YRBSS), sampling 196 schools, 9th-12th grades ( $N = 16,410$ ). Regression analyses revealed, as hypothesized, that ever having smoked a cigarette significantly predicted ever having sexual intercourse ( $B = 1.819$ ,  $p < .001$ , Odds Ratio = 6.168). Further analyses revealed that age of sexual onset and number of partners was significantly predicted ( $p < .001$ ) by age of first cigarette use ( $B = 0.541$ ,  $-0.452$ ), days smoked per month ( $B = -0.450$ ,  $0.440$ ), number of cigarettes smoked per day ( $B = -0.645$ ,  $0.623$ ), and daily cigarette use ( $B = -2.079$ ,  $2.020$ ), respectively. These findings indicate a startling and concerning relationship between cigarette use and sexual behavior during adolescence, which suggests that adolescents who have not only tried smoking but engage in risky smoking are also likely to be involved in high risk sexual activity as well. Future research efforts targeting not only the prevention and cessation of smoking, but delayed sexual intercourse may be more effective in addressing high risk behaviors in adolescents, as well as decreasing the risk that these adolescents experience.

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## POS3-70

### CORRELATES OF REASONS FOR RELAPSE TO SMOKING IN A STATEWIDE SURVEY OF ADULT SMOKERS

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Relapse is a common outcome among smokers who have tried to quit. Understanding reasons for relapse may provide useful information for future quit attempts. This study examines four distinct categories of reasons for relapse among a sample of adult smokers in Maryland using data derived from the 2008 Maryland Adult Tobacco Survey (MATS), a telephone-based survey of 22,806 persons aged 18 or older. We examined a subsample of current smokers ( $N=909$ ) who reported one of four reasons (weight concerns, negative affect, pleasure of smoking, or addiction/craving) as the most important factor in their relapse to smoking. Nearly half (46.9%) of this sample reported negative affect as their most important reason for relapse, followed by almost one-third (31.1%) who cited addiction/craving, 11.6% who cited pleasure/enjoyment of smoking and 10.5% who cited weight concerns. Women (77.9%) were significantly more likely than men (22.1%) to report weight concerns as their most important reason for relapse. Men and women did not differ on endorsement of negative affect, addiction/craving or pleasure. No racial differences were found among the reasons. Those who endorsed pleasure as their most important reason for relapse were significantly less likely to be in the preparation stage of change (i.e., planning to make a quit attempt in the next 30 days) and to have reported a quit attempt in the past year, relative to those who endorsed the other reasons,  $p$ 's  $< .05$ . Those who endorsed weight concerns as the most important reason for relapse reported smoking significantly more cigarettes per day ( $M=16.7$ ,  $SD=13.6$ ) during the past month relative to those who endorsed past relapse due to pleasure of smoking ( $M=12.6$ ,  $SD=10.8$ ). No group differences were found on nicotine dependence (measured by time to first cigarette), or use of cessation aids (e.g., NRT and/or medications). These data suggest that weight concerns remain a significant barrier to women trying to maintain abstinence and that smokers who endorse pleasure of smoking as a reason for relapse are a distinct group. Overall, understanding reasons for past relapse may prove useful in working with smokers on future quit attempts.

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## POS3-71

### ABSTINENCE GOAL IN TREATMENT SEEKERS OVER A TWO-YEAR PERIOD

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A goal of enduring and complete abstinence (total abstinence) has been a robust predictor of abstinence from cigarettes in multiple studies in treatment seeking and non-treatment seeking samples of smokers. The present study examined the effect of abstinence goal on abstinence status, changes in goal, and correlates of those changes over a two year period in two clinical trials (Trial 1  $N=403$ ; Trial 2  $N=406$ ). In both studies, the treatment period lasted for one year, with follow-up at the end of year two. As in previous studies, abstinence goal at baseline was a robust predictor of abstinence status at weeks 12, 24, 52, and 104 ( $p < .0001$ ). Of greater importance, abstinence goal at one assessment predicted abstinence status at the next, even when abstinence status at the earlier assessment was entered into the statistical model ( $p < .0001$  at weeks 24 and 52;  $p < .0025$  at week 104). Approximately 30% of the sample changed their goals during the treatment period (weeks 12 to 52), and similar percentage changed their goal during the follow-up period (weeks 52 to 104.) A series of GEE analyses were computed to determine those variables that correlated with changes in goal. These analyses suggested that baseline desire to quit, expectations of success, perceived difficulty, tolerance, as measured by the Fagerstrom Test for Nicotine Dependence, cigarettes smoked per day, and social support, as measured by Social Participation Index, were related to changes in goal over time. The greater the baseline desire to quit, expectation of success, social support, tolerance and cigarettes per day, the greater the probability of a goal of total abstinence; the greater the perceived difficulty of quitting, the less the probability of a goal of total abstinence. We concluded that abstinence goal changes over time for many smokers, and these changes are correlated with motivation and smoking behavior. Abstinence goal predicts subsequent abstinence, even when current abstinence status is taken into account.

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## POS3-72

### PREVALENCE AND CORRELATES OF NICOTINE DEPENDENCE IN ADOLESCENTS WITH BIPOLAR DISORDER AND CANNABIS USE DISORDERS

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**Background:** Adolescents with both bipolar and cannabis use disorders may be at particularly high risk of initiating and maintaining cigarette smoking, yet prior studies have not examined the phenomenology of nicotine dependence in this group. The purpose of this study was to examine the prevalence and correlates of a DSM-IV diagnosis of nicotine dependence in adolescents with bipolar disorder and cannabis use disorders. **Methods:** Participants were 90 adolescents (51% male) between 12 and 22 years of age with bipolar I disorder, currently in a mixed or manic episode, and co-occurring cannabis abuse or dependence. The Kiddie Schedule for Affective Disorders and Schizophrenia-Present and Lifetime Version (K-SADS-PL) and the adolescent version of the Child Semi-Structured Assessment for the Genetics of Alcoholism (C-SSAGA-A) were used to assess DSM-IV diagnoses of bipolar disorder and substance use disorders, respectively. **Results:** Fifty-eight participants (64%) met DSM-IV criteria for nicotine dependence. Nicotine dependent adolescents reported earlier onset of non-nicotine substance use disorders (M=13.71, SD=1.98) than adolescents who were not nicotine dependent (M=14.66, SD=1.95) ( $p=.031$ ). White adolescents (73%) were also more likely to meet criteria for nicotine dependence than racial/ethnic minority adolescents (20%) ( $p<.001$ ). Nicotine dependence was not correlated with age, gender, psychiatric co-morbidity, or clinical presentation of bipolar I disorder. **Conclusions:** Nicotine dependence was highly prevalent among these adolescents with co-occurring bipolar disorder and cannabis use disorders and was associated with both race/ethnicity and age at onset of non-nicotine substance use disorders. Future research should explore mechanisms to curb nicotine usage and dependence in this population.

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## POS3-73

### PRODUCT EVALUATION AND PERCEIVED RISK OF HARM FOR POTENTIAL MODIFIED RISK PRODUCTS

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Potential modified risk tobacco products include smokeless tobacco (ST) and very low nicotine content cigarettes. We completed two studies utilizing these products as smoking cessation aids, then utilized the data from these studies to assess how consumers perceive these products, and if their perceptions affect amount of use. In Study 1, subjects were randomized to 4 weeks of either Taboka Snus (low nicotine product), Camel Snus (higher nicotine product), or medicinal nicotine lozenge. In Study 2, subjects were randomized in a semi-blinded design and completed 6 weeks of either 0.05 mg or 0.3 mg nicotine yield cigarettes, or 4 mg nicotine lozenge. Perceived health risk and product evaluation scale (PES) assessments were administered throughout the study period for both studies. In Study 1, significant reductions in perceived health risks were observed at week 4 for all treatment groups compared to usual brand cigarettes. In Study 2, significant decreases in perceived health risks in all disease categories were found for the nicotine lozenge group compared to the low nicotine cigarette groups. Subjects in the Taboka group of Study 1 reported significantly lower scores on the PES for reduction of craving. Subjects in Study 2 reported significantly lower scores for satisfaction, psychological reward, enjoyment of mouth sensation and reduction of craving with the low nicotine study cigarettes compared to their usual cigarettes, and some of these measures were significantly lower for the 0.05 mg nicotine cigarette group compared to the 0.3 mg nicotine group. Significant associations were found between low satisfaction scores on the PES and amount of study product used for both studies. Although smokers perceive the use of combusted tobacco products as higher risk for disease than oral tobacco products, we did not find a correlation between perceived risk and amount of study products used. PES scores, however, were a better predictor of product use since smokers rated low nicotine products lower on the PES and our

studies found significant correlations between these low satisfaction and reward scores and product use.

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## POS3-74

### WHAT ASPECT OF DEPENDENCE DOES THE FAGERSTRÖM TEST FOR NICOTINE DEPENDENCE MEASURE?

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**Introduction:** Despite its widespread use over two decades, the literature reflects uncertainty regarding what aspects of nicotine dependence are tapped by the FTND. Our purpose was to administer the FTND along with a battery of other measures to obtain insight into this issue. We hypothesized that the behaviors described by the items in the FTND are indicative of smokers who have difficulty maintaining abstinence because of withdrawal symptoms. **Methods:** Adult current smokers ( $n = 422$ , mean age 33.3 years (SD 13.7), 61.9% female) completed a web-based survey containing items related to (a) demographics, (b) smoking behavior, (c) the Autonomy over Tobacco Scale (AUTOS), and (d) how they prepare to cope with periods of abstinence. We also asked three standardized questions tapping smokers' experiences in response to withdrawal: wanting (a mild desire to smoke that can be ignored fairly easily), craving (an intrusive, persistent desire to smoke that is difficult to ignore), or needing (the sense that one must smoke to feel and function normally), and about the length of time smokers can go before experiencing each reaction (i.e., the latency to each experience). **Results:** Correlations between the FTND and AUTOS subscales were moderate, but better with Withdrawal ( $\rho = .72$ ) than with Psychological Reliance ( $\rho = .64$ ,  $z = 3.06$ ,  $p = .002$ ) or Cue-Induced Urges ( $\rho = .63$ ,  $z = 3.40$ ,  $p = .001$ ). The FTND correlated more strongly with the latency to wanting ( $\rho = -.66$ ) than with the latency to craving ( $\rho = -.59$ ,  $z = 2.66$ ,  $p = .006$ ) or the latency to needing ( $\rho = -.37$ ,  $z = 5.77$ ,  $p < .001$ ). Each FTND factor and the individual FTND items correlated most strongly with various withdrawal-related measures. **Conclusion:** We examined correlations between the FTND and 19 items assessing different aspects of dependence. In accordance with our hypothesis and with the initial intention of the scale, the FTND, its two factors and the six items consistently showed the strongest correlations with nicotine withdrawal.

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## POS3-75

### PREDICTORS OF SUSCEPTIBILITY TO SMOKING FOR DIFFERENT ETHNIC GROUPS IN A STATEWIDE SURVEY OF ADOLESCENTS

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Susceptibility to smoking, defined as the absence of a firm decision not to smoke, has been found to be a strong predictor of experimentation and smoking initiation in adolescents. Considering that adolescent experimentation with smoking significantly raises the risk for smoking in adulthood, understanding of what makes certain youth more susceptible to experiment with smoking is an important area of research. We examined youth susceptibility to smoking across ethnic groups as predicted by social and media influences. We defined susceptibility to smoking in two ways: 1) youth who endorsed any likelihood of smoking a cigarette in the next year (SusceptYear) and 2) youth who endorsed any likelihood of smoking a cigarette if a best friend offered one (SusceptFriend). Data derived from the 2010 Maryland Youth Tobacco Survey (MYTS), a classroom-based survey of 86,098 youth conducted in public middle and high schools, were used to conduct binary logistic regression analyses to explore if youth attitudes, household smoking, peer smoking, and anti-smoking media were predictors of susceptibility to smoking among a subsample of adolescents who have never smoked ( $n=61,084$ , 14.0% SusceptYear, 16.8% SusceptFriend). The current study explored whether social and media influences predicted susceptibility to smoke by each of the following ethnicities: African American, Hispanic, Asian/Pacific Islander, Native American/Alaskan Native, and Caucasian. For all ethnic groups, having at least one

close friend who smokes and thinking people who smoke look cool were associated with increased odds of being susceptible to smoking for both outcomes. Household smoking was a predictor of both susceptibility outcomes for White and Hispanic youth. Media was a predictor for Native Americans/Alaskan Natives only. All comparisons were  $p < .01$ . The implications for this study suggest that the effectiveness of adolescent smoking prevention programs could be strengthened by including ethnic-specific strategies.

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## POS3-76

### DEPRESSIVE SYMPTOMS IN HEAVY CIGARETTE SMOKERS: THE INFLUENCE OF RACE AND GENDER

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Considerable research has documented that cigarette smokers report higher levels of depressive symptoms and greater frequency of depressive disorders than non-smokers. This study examined the possible roles of gender and race in the expression of depressive symptoms. Differential gender-related liabilities for affective disorders have been well established; the role of nicotine in affect regulation and known racial differences in nicotine uptake and metabolism suggest the potential role of race. Participants were drawn from two large genetic studies of nicotine dependence. For the entire sample (N=4758), 46% were male, 68.2% African-American (AA) with the remainder European-American (EA), mean age=42.8, 68.3% were employed, most were high school educated or higher, 56% earned \$30K or less annually, and 46% were married. Average CES-D (depression) score was 6.5. Amongst smokers, mean cigarettes per day was 27.4, and FTND score was 7.4. Smokers presented with higher CES-D scores than non-smokers (8.7 vs. 4.9,  $p < 0.001$ ). When examined based on categorical score ranges, fewer smokers scored 0 (38.7% vs. 46.5%), while more smokers scored 16 or above, indicative of possible clinical depression (16.1% vs. 6.3%,  $p < 0.001$ ). Logistic regression controlling for standard demographic variables (chi-square=61.8,  $p < 0.001$ ; OR=2.32, 95% CI: 1.88-2.85), as well as demographics plus social context smoking variables (chi-square=6.8,  $p < 0.01$ ; OR=1.37, 95% CI: 1.08-1.72) supported these findings. Separate logistic models for Race x Gender subgroups including all covariates revealed borderline effects for both AA men and women, but strong effects for EA men (chi-square=7.7,  $p < 0.01$ ; OR=2.46, 95% CI: 1.31-4.65) and women (chi-square=7.4,  $p < 0.01$ ; OR=2.14, 95% CI: 1.24-3.69). Finally, post hoc comparisons based on the entire sample revealed significant differences for EA men and women when comparing smokers to non-smokers, but not AA men or women. Thus, heavy smokers do report higher levels of depressive symptoms than non-smokers. Importantly, EA heavy smokers appear to be at elevated risk, which may require greater attention during the course of treatment.

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## POS3-77

### EFFECT OF SHORT ACTING VS LONG ACTING NICOTINE REPLACEMENT THERAPY AMONG A LOW SES POPULATION OF LIGHT SMOKERS

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Even as smoking rates decline, the proportion of light smokers in the US is growing. For example, since 2003, average daily cigarette consumption for New York smokers has decreased from approximately 15 to 11 cigarettes per day, and in NYC, 63% of current smokers smoke <10 cigs/day. The percentage of light smokers is even higher among racial ethnic minorities (>70%). Yet, there is little data on effective approaches to treating this group. In particular, there is little data to guide the use of cessation pharmacotherapy in this population. In this pilot study, 40 patients who met eligibility criteria were randomly assigned to receive six weeks of long-acting NRT (patch) versus short-acting NRT (lozenge or gum). Patients were recruited at the New York University College of Dentistry clinics, a safety net provider of dental services to low income minority patients. The primary outcome was 3 month smoking abstinence (7 day point prevalence abstinence). We also examined side effects and withdrawal symptoms. Among the 1229 consecutive patients screened, 21.3% were current smokers and 80% of those smokers reported smoking <10 cigarettes per day. Among these light smokers, lack of interest in

quitting in the next 30 days was the most common reason for study ineligibility (56.82%). Forty two percent of those enrolled were female and of those randomized to short acting NRT, 65% chose to use the lozenge. The end of treatment (6 weeks) abstinence rate is 16% with no differences between the two groups. We will present 3 month outcome data as well as data on secondary and feasibility outcomes. In a state with one of the highest cigarettes taxes and other aggressive tobacco control policies, a large majority of current smokers smoke <10 cigarettes a day. There is a critical need for further research on the effectiveness of specific counseling and medication interventions in this population of smokers.

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## POS3-78

### PERCEIVED HEALTH EFFECTS AND RELATIVE SAFETY OF SMOKELESS TOBACCO PRODUCTS AMONG ADOLESCENTS AND ADULTS IN APPALACHIA, OHIO

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**Introduction:** Smokeless tobacco (ST) products have typically consisted of chewing tobacco and snuff. Recently, novel ST products such as snus and dissolvable tobacco have been introduced. This qualitative research study examined the perceived health effects and relative safety of ST products among adolescents and adults in Appalachia, Ohio. **Methods:** Thirteen focus groups with 70 participants and 31 qualitative interviews with residents of Appalachian Ohio counties were conducted to investigate adolescent and adult perceptions of ST as a potential harm reduction product. Separate focus groups were held for males and females and ST users and non-users. ST use was defined as self-reported "daily" or "most days" use. Transcriptions were coded independently for common themes by two individuals. Inter-rater agreement was 89.6%. Discrepancies were resolved by a third coder. **Results:** Participants were knowledgeable about health problems associated with ST use (i.e., oral and pharyngeal cancers, periodontal disease, mouth sores). While nearly all participants believed that ST use was not safe, their beliefs about the relative safety of ST were mixed. Perceptions included ST is safer than cigarettes because health effects are localized to the mouth and are less severe; ST is safer than cigarettes because there is no secondhand smoke; and ST is not safer than cigarettes because users are still at risk for adverse health effects. **Discussion:** Educating adolescents and adults about ST health risks and safety may not be an effective strategy to prevent ST initiation and promote cessation. Since there is some confusion about the relative safety of ST, tobacco control efforts should focus on clarifying messages to the public about the relative safety of ST compared to cigarettes.

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## POS3-79

### RELATIONSHIP BETWEEN WEIGHT STATUS AND RISKY SMOKING BEHAVIORS IN A NATIONAL SAMPLE OF ADOLESCENT FEMALES

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The need for smoking cessation intervention efforts within childhood obesity treatment programs have been strongly recommended by the Expert Committee on Childhood Obesity (Barlow et al., 1998). Moreover, while adolescent females have reported increased use of smoking cigarettes when attempting to lose weight, adolescent males have reported decreased use of cigarettes (Ryan et al., 1998; Strauss & Mir, 2001). However, little research has examined the effect of female weight status on smoking patterns during adolescence. For the current study, the relationship between female adolescents' weight status to cigarette smoking was examined. It was hypothesized that higher weight perceptions (ie. overweight, obese), greater BMI, and the desire to lose weight would be associated with the endorsement of risky smoking patterns (i.e., early age of initiation, number of days smoked per month, and number of cigarettes smoked per day). The study utilized the data obtained by the Center for Disease Control (CDC) 2009 Youth Risk Behavior Surveillance System (YRBSS), sampling 196 schools, 9th-12th grades (N = 16,410). However, the present study only examined females (N = 7,816). Regression analyses revealed, as hypothesized, that higher perceptions of weight (B = .161,  $p < .001$ ) and greater BMI (B = .008,  $p < .001$ ) predicted ever having smoked a cigarette. Moreover, compared to adolescent females unconcerned with their

weight status, those attempting to lose weight were twice as likely to report smoking cigarettes ( $B = .608, p < .001, Odds Ratio = 1.837$ ). As hypothesized, higher perceived weight, greater BMI, and desire to lose weight significantly predicted ( $p < 0.01$ ) age of first cigarette ( $B = -.115, -.006, -.325$ ), days smoked per month ( $B = .086, .004, .221$ ), and number of cigarettes smoked per day ( $B = .069, 0.003, .194$ ), respectively. These findings indicate a concerning relationship between weight status and cigarette smoking patterns in adolescent females. It is vital for future research efforts targeting the prevention and intervention efforts towards smoking cessation to account for both gender and weight status when working with adolescents.

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## **POS3-80**

### **EVALUATION OF A TRANSCREATED VERSION OF THE FOREVER FREE BOOKLETS: CULTURAL ACCEPTABILITY OF SMOKING CESSATION SELF-HELP MATERIALS AMONG SMOKERS LIVING IN PUERTO RICO**

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Despite the lower incidence of smoking in Puerto Rico, cigarette smoking remains associated with a range of cancers and is associated with five of the seven leading causes of death in Puerto Rico. Minimal self-help interventions have shown promising results in reaching participants and preventing relapse from smoking. Clinical trials have shown the Forever Free booklets to reduced relapse (Brandon et al., 2000; 2004). Recently, we transcreated the booklets into Spanish, with efforts to make them culturally appropriate across a range of Hispanic cultures. We conducted a pilot study in Ponce, Puerto Rico, to evaluate the Spanish edition of our smoking relapse-prevention booklets. We evaluated the cultural acceptability of the booklets; views regarding the optimal means to promote and disseminate the LPS booklets; and perceived availability and relevance of existing smoking cessation programs in Puerto Rico. Qualitative, semi-structured interviews were conducted with 20 current and former smokers. Participants were sent 3 out of the 8 booklets. One week later, interviews were conducted to elicit feedback regarding the booklet's content, cultural appropriateness, dissemination, and perceived availability of smoking cessation resources in Puerto Rico. Interviews were audio-taped and transcribed verbatim. Transcripts were coded using content analysis, with a priori codes based on the interview guide. Emergent themes were examined. Overall, participants liked the booklet's content, perceived them to be culturally appropriate, easy to read and understand. Regarding dissemination, it was recommended that the booklets be disseminated by physicians and advertised through television. Most importantly, participants reported the best way to distribute and complement the booklets would be through support groups. Participants also reported having limited knowledge about resources provided in the community to aid smoking cessation. Overall, this pilot study was able to show the cultural acceptability of the booklets and highlights the need for the dissemination of these materials among current and former smokers in Puerto Rico.

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## **POS3-81**

### **FACTORS DETERMINING SUCCESSFUL SMOKING CESSATION IN BIPOLAR DISORDER: INTERIM LOOK**

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**Background:** Persons with Bipolar I have a 44.4% lifetime prevalence of nicotine dependence but it is not known if the topographic style of their smoking is related to mood state. They are also thought to be "impulsive," particularly when manic, but how impulsivity measures might relate to their smoking topography has not been investigated. In this study we are looking at mood state, impulsivity, and smoking topography and how those factors might affect smoking and smoking cessation. **Methods:** We are in the process of enrolling 30 euthymic and 30 depressed male US Veterans with bipolar I. All participants complete a baseline visit: measures of mood (YMARS, MADRAS, MINI), impulsivity (Delay discounting, Stop Task), personality measures (BIS, TPQ, &

EIS), smoking questionnaires, and a smoking topography session. The subjects are then counseled on smoking cessation and return for a second visit after their quit date to repeat measures of mood and impulsivity. **Results:** At this time, 28 patients have enrolled in this study (9 depressed ; 19 euthymic). Of these, 1 subject did not complete the smoking cessation and 14 subjects have completed visit #2. There were no differences in delay discounting, perceived risks and benefits of smoking cessation, smoking topography between the depressed and euthymic groups. However, there were significant differences in some of the subscales of the personality measures. The depressed group had a higher score on the BIS attention scale, motor impulsiveness, and cognitive instability scale, and the TPQ the harm-avoidance scale at the first visit. Preliminary analyses also indicate relationships between impulsivity measures and smoking topography. **Discussion:** Initial results do not demonstrate a difference between mood state groups, except for the personality measures. It has been shown before for persons with unipolar depression that TPQ harm avoidance scores are higher than population norms and this study seems to suggest that they are also elevated in bipolar depression compared to a euthymic bipolar state. Interpretation of the BIS is limited due to the interim nature of the data.

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## **POS3-82**

### **PREDICTORS OF LAPSE AFTER INITIAL ABSTINENCE WITH NICOTINE REPLACEMENT THERAPY IN FEMALE SMOKERS**

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**Objective:** Tobacco smoking is projected to cause 1 billion deaths worldwide in this century. Effective smoking cessation treatments are available, but relapse rates are high with currently available therapies. Many smokers lapse to smoking after initial abstinence, and in many cases such lapses lead to full relapse within one year. Identifying factors that predict such early lapses is critical to developing effective strategies to improve long-term abstinence outcomes. **Method:** 264 female, adult, nicotine-dependent smokers entered a 6-week, open label smoking cessation intervention with nicotine replacement therapy (NRT) combined with cognitive behavioral therapy (CBT). 143 attained at least 24 hours abstinence within 4 weeks of the quit date. Of the 124 who attained initial abstinence and completed baseline measures, 65 maintained abstinence and 59 experienced a lapse. A logistic regression analysis was conducted to determine predictors of lapse to smoking versus continuous abstinence during the six-week treatment intervention. **Results:** The overall model was significant. Scores on the Difficulty Concentrating Subscale Factor of the Wisconsin Smoking Withdrawal Scale (WSWS) and the Guilt Subscale of the Positive and Negative Affect Scale (PANAS) were predictive of lapse ( $\chi^2 = 22.449, df = 12, p = .033$ ) such that baseline difficulty concentrating was associated with lapse and baseline guilt was associated with continuous abstinence during the trial. Overall, the predictive success of the model was 69.4%. **Conclusion:** Difficulty concentrating at baseline was associated with lapse after initial abstinence and baseline guilt was associated with continuous abstinence in this sample of nicotine dependent female smokers treated with NRT and CBT. Baseline difficulty concentrating may be further exacerbated by abstinence associated cognitive impairment. Additionally, disturbances in concentration may result in increased smoking-cue sensitivity seen in deprived smokers. Behavioral and pharmacologic therapies that improve concentration may be effective as relapse-prevention treatments. These findings also suggest that guilt may be protective against relapse.

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### POS3-83

#### RATES AND PREDICTORS OF RECYCLING FOLLOWING A FAILED SMOKING CESSATION ATTEMPT AMONG PRIMARY CARE PATIENTS

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Smoking cessation can be understood as a cyclical process in which smokers alternate between smoking and abstinence until achieving stable abstinence. This study examined the rates and predictors of recycling to abstinence after relapsing among smokers enrolled in a smoking cessation treatment study. Twenty-two percent of those who initially failed recycled, significantly lower than the population quit attempt rate. Health concerns seemed to diminish in salience from the index quit attempt to recycling attempts. Thirty-four percent of recyclers achieved 7-day point-prevalence abstinence one year after the initial quit attempt, compared with a 19% initial success rate. Information about recycling predictors may suggest targets for future interventions promoting recycling among relapsers.

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### POS3-84

#### THE RELATIONSHIP BETWEEN SEXUAL ABUSE, RELATIONSHIP VIOLENCE, AND USE OF CIGARETTES IN YOUTH

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Individuals who endorse childhood sexual/physical assault have a much higher likelihood of endorsing current tobacco smoking (Acierno et al., 2000; Anda et al., 1999). There is also evidence that experiencing multiple forms of abuse may have an additive influence on likelihood of smoking uptake (Jun et al. 2008), however there is very little data regarding interrelations between sexual abuse, dating violence, and cigarette smoking. For the current study, we examined the extent to which childhood sexual abuse (CSA) and physical dating violence may be synergistic in their influence on smoking. Specifically, we hypothesized that experiencing both partner violence and CSA would increase the likelihood of trying smoking and daily smoking. The study utilized the data obtained by the Center for Disease Control (CDC) 2009 Youth Risk Behavior Surveillance System (YRBSS), sampling 196 schools, 9th-12th grades (N = 16,410). Regression analyses revealed, as hypothesized, that relative to youth who have never experienced sexual assault or partner violence those who have experienced partner violence (B = .824, p < .001, Odds Ratio = 2.279) and those that only experienced CSA (B = 1.325, p < .001, OR = 3.762) were more likely to have ever smoked. In addition, compared to youth who have experienced neither types of violence, those who have experienced partner violence (B = 1.106, p < .001, OR = 3.021) and those who have experienced CSA (B = 1.146, p < .001, OR = 3.960) were also more likely to endorse smoking daily. Youth that endorsed being victims of both partner violence and CSA were significantly more likely to endorse having ever smoked (B = 1.671, p < .001, OR = 5.319) and exponentially more likely to endorse smoking daily (B = 2.122, p < .001, OR = 8344), compared to those who have never experienced either CSA or partner violence. Given these findings, and the knowledge that the vast majority of tobacco smokers initiate smoking during adolescence, and that up to 70% percent of sexual abuse occurs during adolescence, it is crucial to examine the temporal onset of cigarette smoking in samples of sexually abused youth.

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### POS3-85

#### LACK OF GENDER DIFFERENCES IN NICOTINE USE AMONG NON-TREATMENT SEEKING METHAMPHETAMINE AND COCAINE USERS

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**Aims:** The goal of this project was to determine if there are gender differences in nicotine use among non-treatment seeking methamphetamine (METH) and cocaine users. **Methods:** Data were obtained from screens conducted between 2008-2011. The Fagerstrom Test for Nicotine Dependence (FTND) was used to assess nicotine dependence. The Beck Depression Inventory (BDI) were used to measure depressive symptoms. Other drug use and frequency were assessed using the Multiple Drug Use Questionnaire. **Results:** METH-dependent participants (N=124) were mostly male (N=83), but also included several females (N=41). These individuals were similar with regards to age, and years of METH use, but females were more likely than males to use METH more frequently during the last 30 days (21.8±7.0 vs. 18.9±7.7 days, respectively) and used more METH in grams per day (1.4±1.3 vs. 0.9±0.7). Males and females exhibited similar years of nicotine use, cigarettes smoked per day, and FTND scores. METH-dependent females also had higher BDI scores than males (14.1± 8.9 vs. 11.3±8.4), though this did not reach statistical significance. In a separate cohort, cocaine-dependent participants (N=138) were mostly male (N=104), but also included several females (N=34). These individuals were similar with regards to age, years of cocaine use, and use of cocaine during the last 30 days. Females and males were also statistically similar for years of nicotine use, cigarettes smoked per day, and FTND scores. As above, cocaine-dependent females had higher BDI scores than males (16.7± 10.9 vs. 13.9±10.5), though this did not reach statistical significance. **Conclusions:** The results indicate that there were no differences in nicotine use between genders among methamphetamine and cocaine users. This result is surprising given that the 2010 NSDUH report indicated higher rates of cigarette smoking was significantly higher in males than females (38% vs. 30%, respectively). While nicotine use patterns were not distinct, recent evidence from our lab indicates that females may differ from males in their response to specific smoking cessation therapies.

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### POS3-86

#### CUES, COGNITION, AND ADDICTION: ALCOHOL-NICOTINE INTERACTIONS

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Alcohol and nicotine dependence are highly comorbid. Although this comorbidity is likely driven by multiple processes, associative conditioning may play a role in the development and maintenance of comorbid dependence via the development of cross-cue reactivity through contemporaneous substance use. Unfortunately, research on cross-cue reactivity has been limited. Furthermore, the little work that has been done in this area has not examined the role of cognition in drug-cue processing, which may play an important role in modulating behavioral responses to drug cues. The present investigation reports preliminary results on a modified addiction Stroop task that examines the impact of smoking, drinking, and neutral picture primes on the processing of smoking, drinking and neutral words. Thirty-three dual-substance users with a range of alcohol and tobacco use patterns completed this task as part of a larger study examining the effects of alcohol and nicotine consumption on cross-cue reactivity and behavioral outcomes. A previous report on an early version of this task did not note any cross-drug priming effects. However, in the modified version we report here, participants had slower responses to smoking and drinking-related words following both same-drug and other-drug primes (ps < .01), with no effect of primes on neutral words (p > .5). This indicates that cross-cue reactivity effects may extend beyond craving, and adds to a body of literature suggesting a role for cognition in drug use and addiction, with a potentially interactive role for smoking and drinking cues. Data collection is ongoing and additional analyses will be conducted to determine the extent to which individual differences in cigarette and alcohol use modulate these effects.

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## POS3-87

### MENTHOL CIGARETTE SMOKING AND BRAIN NICOTINIC ACETYLCHOLINE RECEPTOR DENSITY

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**Background:** A third of smokers use predominantly menthol cigarettes, and these cigarettes lead to elevated serum nicotine levels and more difficulty quitting in standard treatment programs. Previous brain imaging studies of humans smokers demonstrate that smoking (without regard to cigarette type) leads to up-regulation of nicotinic acetylcholine receptors (nAChRs). We sought to verify up-regulation of nAChRs in smokers (in general) and to determine if menthol cigarette usage results in greater nAChR up-regulation than non-menthol cigarette usage. **Methods:** 114 participants (n = 63 smokers and n = 51 non-smokers) underwent positron emission tomography (PET) scanning with the radiotracer 2-[<sup>18</sup>F]fluoro-A-85380 (2-FA). 2-FA specific binding volume of distribution (VS/fP) was determined, as a measure of  $\alpha 4\beta 2^*$  nAChR density. **Results:** An overall test of VS/fP values across brain regions revealed a significant between-group (smoker versus non-smoker) difference (MANCOVA, df = 5, 107; F = 20.4; P < 0.0005), resulting from smokers having significantly higher levels of  $\alpha 4\beta 2^*$  nAChRs in all regions studied (36 to 42%) other than thalamus (3%). In comparing menthol to non-menthol cigarette smokers, the overall test revealed a significant between-group difference (MANCOVA; df = 5, 56; F = 2.9; P < 0.05), resulting from menthol smokers having 9 to 28% higher  $\alpha 4\beta 2^*$  nAChR densities across regions. The subgroups of menthol and non-menthol smokers both had significant up-regulation of nAChRs compared to non-smokers (MANCOVAs, F = 24.8; df = 5, 65; P < 0.0005 for the menthol smoker group and F = 18.6; df = 5, 84; P < 0.0005 for the non-menthol smoker group). Exploratory tests also revealed a significant decrease in  $\alpha 4\beta 2^*$  nAChR density with increasing age. **Conclusion:** Nicotine exposure appears to be a primary determinant of nAChR density, with menthol smokers having more severe up-regulation of nAChRs than non-menthol smokers (presumably related to higher plasma and brain nicotine levels). Study results provide additional information about the severity of menthol cigarette use, and may explain why these smokers have more trouble quitting in standard treatment programs.

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## POS3-88

### ISOLATING CUE-PROVOKED CRAVING FROM BACKGROUND CRAVING ENHANCES PREDICTION OF SMOKING BEHAVIOR

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Within clinical trials, there is evidence suggesting that background (abstinence-related) cravings are predictive of smoking cessation outcomes. Cue-provoked cravings, on the other hand, have not been as consistent in predicting these outcomes, calling into question the utility of the cue-reactivity paradigm (Perkins, 2009). However, Waters et al. (2004) found that cue-provoked cravings predicted relapse among participants assigned NRT, but not among those administered placebo. Shiffman (2009) proposed that this finding may be due to an increased signal-to-noise ratio produced by the NRT-based suppression of background cravings. That is, the predictive utility of cue-provoked cravings may only become apparent under conditions when background cravings are reduced. We tested this hypothesis via secondary analyses from a controlled, double-blind study that found varenicline to reduce background and cue-provoked cravings (Brandon et al., 2011). We hypothesized that cue-provoked cravings would predict smoking behavior among smokers randomized to take varenicline, but not for those in the placebo condition. Following overnight abstinence, nicotine dependent smokers completed three laboratory sessions that included questionnaires on smoking motivation, a cue-reactivity paradigm, and ad lib smoking. At baseline, background cravings, but not cue-provoked cravings, were found to predict number of puffs taken from a preferred brand cigarette smoked after cue-exposure (for both conditions). In contrast, once participants reached full medication dosage (session 3), cue-provoked cravings emerged as a predictor of number per puffs for those receiving varenicline, but not placebo (moderation  $p = .02$ )—even when controlling for background craving. These results support Shiffman's suggestion that cue-provoked cravings may predict smoking behavior only when background cravings are reduced. Thus, this study provided evidence for a context (i.e., on varenicline) that may moderate the relationship between cue-provoked cravings and smoking behavior. As this relationship becomes

further elucidated, the clinical relevance of the cue-reactivity paradigm will be clarified (Perkins, 2009).

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## POS3-89

### EFFECT OF B-ADRENERGIC BLOCKADE ON PHYSIOLOGIC AND AFFECTIVE REACTIVITY TO SMOKING CUES

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**Introduction:** Pre-clinical studies have shown that salient drug memories are sensitive to propranolol-induced reconsolidation blockade when reactivated. In clinical samples, memory reconsolidation blockade (MRB) with propranolol reduces physiologic response to mental imagery of a traumatic event. **Objective:** To test the effect of propranolol, administered immediately following smoking memory reactivation on emotional and physiologic reactivity to personalized script-driven imagery smoking cues 1 week later. **Methods:** In a double-blind, randomized, parallel group, placebo-controlled trial in 54 smokers, a single dose of propranolol or identical placebo was given in the clinic followed by description of two situations that most trigger craving to smoke. This description was used to develop and audio-record two personalized smoking scripts for each subject. One week later, craving, emotion, and physiologic activation (Skin Conductance (SC), heart rate (HR), corrugator electromyogram (EMG)) were assessed while previously recorded smoking scripts (SS) and standard neutral scripts (NS) were played. **Results:** SC, HR, and EMG reactivity and negative affect were higher and positive affect was lower following SS vs NS (main effect). There was a treatment by stimulus type interaction such that there was less anger (F(1,52)=4.89,p=0.03) and guilt(F(1,52)=4.39,p=0.041), and more self control (F(1,52)=6.77, p=0.01), and happiness (F(1,52)=7.06,p=0.01) in response to SS in those assigned to propranolol. There was no Script Type x Medication interaction for any physiology measure. **Conclusion:** In adult, treatment-seeking smokers, personalized smoking-related script-driven imagery stimulated physiologic reactivity, craving, and negative emotions and reduced positive emotions and may be a useful experimental tool. A single dose of propranolol did not affect physiologic responses to smoking cues or craving 1 week later. Because subjects actively smoked between MRB with propranolol and outcome measurement, it is possible that propranolol may have reduced the salience of the memory through MRB, but that this process was reversed by continued exposure to smoking.

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## POS3-90

### BRAIN RESPONSES TO PLEASANT STIMULI PREDICT SMOKING ABSTINENCE

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Current theories of drug addiction hypothesize that drugs of abuse and drug-related stimuli acquire motivational relevance at the expense of non-drug-related, intrinsically pleasant stimuli. Based on these theoretical models, we hypothesized that smokers with blunted brain responses to pleasant stimuli would have more difficulty quitting smoking. Prior to their enrollment in a smoking-cessation trial, we recorded whole-brain blood-oxygenation-level-dependent functional magnetic resonance imaging (BOLD fMRI) data from 35 smokers during the presentation of pleasant (erotica and romance), unpleasant (mutilations and sad), neutral, and cigarette-related pictures. Random-effects analyses were conducted to identify areas of the extended visual system that showed greater BOLD signal increase during presentation of emotional pictures (pleasant and unpleasant) relative to neutral ones. From these areas, brain responses elicited by each picture category were entered into a k-means cluster analysis that allowed us to divide smokers into two groups (with 18 and 17 smokers, respectively). The two groups differed significantly in their brain responses to highly arousing emotional pictures ( $p < 0.05$  for both pleasant and unpleasant stimuli), but they did not differ in their brain

responses evoked by cigarette-related cues. As hypothesized, smokers in the group with blunted brain responses to pleasant stimuli were significantly ( $p < 0.05$ ) less likely to be abstinent 10 weeks after their scheduled quit date. These findings suggest that reduced sensitivity to natural rewards might be a significant factor preventing smokers from achieving a smoke-free life. This experimental paradigm will allow researchers to identify brain circuits underlying low reactivity to pleasant stimuli in smokers, which may facilitate the development of new smoking cessation interventions that specifically target these circuits.

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## POS3-91

### REMOTE PHYSIOLOGICAL MONITORING OF CIGARETTE SMOKING

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The ability to detect in vivo drug use has gained increased attention with the introduction of devices such as the SCRAMx, which can track alcohol use. In the current study, we are investigating a remote physiological monitoring (RPM) device to assess cigarette smoking. Bioharness is a RPM device that can record a variety of measures (heart rate (HR), respiration, motor activity, and temperature) in real time. The device is unobtrusive and can be worn under an individual's clothing using a discrete chest strap. Participants include non-treatment seeking, cocaine-dependent cigarette smokers enrolled in an inpatient medication trial. The current sample size is  $N=4$ , though we expect an  $N=25$  by March, 2012. The study design consists of two conditions. In one, participants sit down in a designated smoking area and have 10 minutes to either smoke their own cigarette (smoking condition) or simply sit without smoking (non-smoking/control condition). Following each session, participants are allowed to freely roam around the Research Commons and engage in normal, daily activities, except for smoking. Each session is conducted at least twice for each participant. Preliminary data from the current cohort reveal no significant effects on respiration during smoking versus non-smoking conditions. In contrast, for HR, repeated measures ANOVA reveal a significant CONDITION X TIME interaction ( $F_{1,9}=2.59, p=.01$ ). These promising data suggest that Bioharness can detect acute bouts of cigarette smoking. In the final presentation, we will show changes in HR, respiration, and other variables in smokers after short-term (2 hrs) vs. longer-term (10 hrs) smoking deprivation, following recent exposure to cocaine, and after acute bouts of exercise (walking and running). The ultimate goal will be to identify a physiological profile consistent with recent smoking relapse, so that Bioharness can be used track individuals trying to quit smoking in real world settings.

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## POS3-92

### COGNITIVE CONTROL AND SMOKING: THE RELATIONSHIP BETWEEN INDICES OF EXECUTIVE FUNCTION AND SMOKING CHARACTERISTICS, MOTIVATION, AND CONFIDENCE TO QUIT

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Emerging research in cognitive neuroscience suggests executive functions may influence self-regulation in health behavior change. For example, among smokers trying to quit, executive functions may aid in stress regulation and the inhibition of urges to smoke. In this study we examined whether indices of executive processing were related to smoking characteristics and motivation, confidence, and self-efficacy to quit smoking. Daily smokers recruited from the community for a clinical trial ( $N=231$ ; mean age =

45.58; 55.4% men; 68.4% African American) completed established baseline measures of demographics, smoking characteristics, motivation and confidence to quit (single-item 10 point scales), self-efficacy (the Situational Temptation Scale), and a battery of cognitive tests designed to tap executive functions [The Oral Trail Making Test (OTMT A and B); Symbol Digit Modalities Test (SDMT: W-129); the Controlled Oral Word Association Test (COWAT-FAS); and the Stroop Test]. The FAS was significantly positively associated with life-time quit attempts ( $r(218) = .16, p < .05$ ) and motivation to quit ( $r(219) = .14, p < .05$ ), while the OTMT-B was significantly positively correlated with self-efficacy ( $r(204) = .28, p < .001$ ). A significant negative correlation was found between OTMT-A and confidence to quit ( $r(220) = -.14, p < .05$ ). Though the strength of associations are modest, results mostly indicate that individuals with lower motivation and confidence to quit may perform worse on executive processing tasks, which is consistent with a greater likelihood of relapse. More work is needed to understand why self-efficacy was the only measure to be negatively related to cognitive performance, and to understand how executive functions may be used to predict and enhance smoking cessation.

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## POS3-93

### ABSTINENCE-RELATED EXPECTANCIES AMONG SMOKERS WITH AND WITHOUT CONCERN OF HIV/AIDS EXPOSURE

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Over half of individuals living with HIV/AIDS are current smokers. With improved treatments leading to longer life expectancy, individuals with HIV/AIDS are at increased risk for tobacco-related health harms. These include those common to the general population but also unique risks to smokers with HIV/AIDS. Thus, it is critical to identify factors that promote or deter cessation within this population. Such factors may include abstinence-related expectancies, i.e., the anticipated outcomes associated with the process of quitting. Based within an ongoing parent clinical trial for smoking cessation among 151 smokers under community corrections supervision, in whom engagement in HIV/AIDS risk behaviors is high, we compared abstinence-related expectancies in smokers who expressed any concern of HIV/AIDS exposure ( $n = 105$ ) to those who expressed none ( $n = 45$ ) via the Smoking Abstinence Questionnaire. Expectancies for the effectiveness of pharmacologic and professional intervention were greater among smokers who expressed concern of HIV/AIDS exposure ( $d = .41$ ). Furthermore, trends suggested that those who expressed concern reported greater expectancies that treatment would be difficult to obtain ( $d = .35$ ) as well as stronger endorsement of positive health expectancies from quitting ( $d = .35$ ). This is the first attempt to examine abstinence-related expectancies among at-risk individuals concerned that they have been exposed to HIV or AIDS virus. While not a direct examination of abstinence-related expectancies specifically among HIV/AIDS smokers, we believe our sample is an appropriate and more feasible proxy of it. As study recruitment continues (target  $N = 530$ ), additional data will be available for conference presentation. Infectious disease clinics should capitalize upon the perceived effectiveness of formal smoking cessation intervention while addressing potential barriers to care such as prohibitive costs (e.g., refer smokers to interventions that deliver free services, including quitlines). Smokers with HIV/AIDS may be especially receptive to messages concerning the benefits of cessation, which may prove useful in augmenting motivation to quit.

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## POS3-94

### NEURAL CHANGES IN RESISTING THE URGE TO SMOKE AND CUE-ELICITED CRAVING DURING SUCCESSFUL SMOKING CESSATION WITH VARENICLINE

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OBJECTIVE: Varenicline reduces the reinforcing effects of nicotine. This study characterizes changes in brain activation patterns during cue-elicited craving and

attempts to resist the urge to smoke following varenicline therapy in treatment-seeking, nicotine-dependent smokers. **METHODS:** Eleven subjects underwent a BOLD fMRI scan with presentation of visual smoking cues, neutral cues, and rest periods in a block design under two conditions: allowing craving and attempting to resist craving at two time points, baseline and following 5 weeks of standard varenicline therapy during a successful smoking quit attempt. Data were analyzed with FSL 4.1.7 utilizing mixed effects by FLAME1+2, focused on the smoking vs. neutral cues contrast. **RESULTS:** The 7-day point prevalence abstinence rate at week 5 was confirmed with urinary cotinine. One participant was excluded from the resist analysis due to excessive movement. Subjective ratings of ambient craving and following cue exposure were significantly reduced between the sessions ( $p < .0001$ ). Analysis of the resist condition showed greater activation in the superior frontal gyrus and paracingulate gyrus at baseline compared to the 2nd scanning session ( $Z > 2.3$ , corrected clusters threshold of  $p = .05$ ). No increased activation was seen comparing the 2nd session to baseline. In contrast, analysis of the crave condition demonstrated greater activation at baseline compared to the 2nd session in the bilateral anterior cingulate cortex, orbital frontal cortex, inferior temporal gyrus, and occipital cortex (uncorrected,  $p = .05$ ). Increased activation was found in the right prefrontal cortex (RPFC) during the 2nd session compared to baseline. **CONCLUSIONS:** Following successful smoking cessation with varenicline decreased craving and increased ability to resist the desire to smoke was reported. Prior to smoking cessation, there was greater activity in the PFC during attempts to resist smoking urges. Reduced activation in response to cues was found following smoking cessation, with the exception of activity in the RPFC. Varenicline may have dual actions in making it easier to resist the urge to smoke and decreasing cue-elicited craving.

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## POS3-95

### ACUTE PAIN-INHIBITORY EFFECTS OF NICOTINE AND TOBACCO SMOKING IN HUMANS: A META-ANALYSIS

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Nicotine addiction and chronic pain are two highly prevalent and comorbid conditions that engender substantial burdens upon individuals and systems. The interaction of smoking and pain can be conceptualized as a prototypical example of the biopsychosocial model, demonstrating a complex interplay between biomedical, behavioral, cognitive, affective, socio-cultural, neurobiological, and physiological phenomena (Ditte et al., in press, Psychological Bulletin). Smoking has been associated with the onset of chronic pain, and the prevalence of smoking among persons with painful conditions may be greater than twice that of the general population. Whereas direct pain-inhibitory effects of nicotine and tobacco smoke have consistently been demonstrated in animal studies, human results have been far less convergent. We have also observed great variability in how researchers interpret and characterize these findings. The main goal of the current study was to estimate the magnitude of purported analgesic effects of nicotine/tobacco among humans. Separate random effects meta-analyses were conducted for continuous measures of pain threshold (Study N = 22) and pain tolerance (Study N = 16). Mixed effects analyses were conducted to examine categorical moderators. Summary effect sizes are reported in Hedge's  $g$ , which may be interpreted as small (.20), medium (.50), and large (.80), respectively. Antinociceptive effects of nicotine/tobacco were observed to be "small" for both pain threshold ( $g = .27$ ; CI: .11-.44;  $p = .001$ ) and tolerance (.26; CI: .13-.38,  $p < .001$ ). Although effect sizes were considerably heterogeneous for pain threshold ( $Q = 40.17$ ;  $p < .01$ ), observed tolerance effects were less variable ( $Q = 20.77$ ;  $p = .14$ ). Thus, analgesic effects of nicotine/tobacco appear most stable for measures of pain tolerance. Smoking status was found to be a significant moderator of pain tolerance effects, and there was evidence to suggest that pain threshold effects may be influenced by smoking status, gender, method of pain induction, and timing of nicotine administration. Discussion will address hypothesized mechanisms, clinical implications, and directions for future research.

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## POS3-96

### ODOR CUE-ELICITED CRAVING IN NICOTINE-DEPENDENT SMOKERS

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**INTRODUCTION:** Previous research has shown that the smell of cigarette smoke increases the urge to smoke during a quit attempt. The goal of this ongoing study is to identify other crave-inducing scents that might trigger smoking behavior. **METHODS:** During four focus groups, healthy adult nicotine-dependent smokers ( $n = 18$ ) were asked to identify odors commonly associated with smoking among an assortment of 15 odors. In addition to the odors of tobacco and cigarette smoke, the focus groups identified the odors of coffee and freshly mowed grass as eliciting the urge to smoke. In a follow-up study, ten healthy, normosmic, nicotine-dependent adult smokers were exposed to these odors (and a control odor) in a laboratory session following 12 hours of CO confirmed abstinence. **RESULTS:** The mean craving rating on an 11-point analog scale following exposure to an odorless control, propylene glycol (PG), was 6.3 (SD=2.98). Compared to PG, the tobacco and cigarette smoke scents elicited statistically significantly higher mean craving ratings, (mean= 8.4, SD=1.35,  $p < 0.05$ ; mean=8.10, SD=1.20,  $p < 0.05$ , respectively). In this preliminary analysis, the scent of freshly mowed grass significantly increased craving (mean= 7.4, SD=2.5,  $p = 0.05$ ) compared to PG; while coffee demonstrated only a marginal increase (mean=7.1, SD=2.55,  $p = .137$ ). **CONCLUSIONS:** Not surprisingly, smoking-related odors such as fresh tobacco and cigarette smoke elicit craving. However, other scents less commonly recognized as triggers to smoke such as freshly mowed grass, also induce craving. Ongoing data collection and analyses will include objective measures of smoking cue reactivity, such as skin conductance and heart rate.

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## POS3-97

### SMOKERS WITH HEIGHTENED LEVELS OF CUE-INDUCED CRAVING EXHIBIT ELEVATED ATTENTIONAL BIASES TOWARD SMOKING-RELATED STIMULI

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Situational factors, such as exposure to smoking cues in the environment (e.g., the sight of a cigarette) have long been recognized as important triggers for cigarette cravings in smokers. In addition, research has demonstrated that smokers exhibit attentional biases toward smoking-related stimuli in the environment. Little is known, however, regarding the potential interplay between these two processes. The present study investigated the possibility that smokers with heightened levels of cue-reactivity will also exhibit elevated attentional biases toward smoking-related stimuli. A synergy in these two processes may be particularly important for the genesis and maintenance of cigarette craving. Indeed, if smokers are both: 1) exhibiting high levels craving following exposure to smoking cues, and 2) selectively attentive to smoking cues in their environment, then the possibility for repeated instances of cue-induced craving throughout the day may dramatically increase. To test our hypothesis, nicotine dependent smokers ( $N = 56$ , Mean age=41.4, 62.5% male, 45% African American, 16% Caucasian, 20% Hispanic, 16 cigarettes/day, FTND=5.3) were exposed to smoking cues (an unlit cigarette) and neutral cues (a stapler), and reported their cravings (0-100) immediately before and after each exposure. They also completed a color-word Stroop task containing both smoking and neutral words. Consistent with the hypothesis, findings revealed that higher levels of cue-induced craving were related to an increased number of errors on the smoking Stroop task, relative to the neutral Stroop task ( $F = 4.6$ ,  $p < 0.038$ ). The synergy between heightened processing of stimuli (i.e., attentional bias) and elevated reactions to those stimuli (i.e., cue-induced craving) may serve to increase the risk of smoking cessation failure among smokers trying to quit.

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## POS3-98

### MIXED EMOTIONS AND CUE-INDUCED CIGARETTE CRAVING

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Craving is an important component of nicotine addiction, and extant research has demonstrated a clear link between craving and affect. Although craving is a state associated with the word desire, which typically has positive connotations, research has more often indicated an association with negative affect. The current study was designed to investigate if cue-elicited craving might be associated with a mixed emotional state (i.e., simultaneous positive and negative affect), consistent with a recent model of craving, the elaborated intrusion model of desire (Kavanaugh, Andrade, & May, 2005). One hundred adult smokers completed the laboratory study, 50 regular smokers who smoked 15 or more cigarettes per day, and 50 tobacco chippers who smoked at least 4 days per week, 1-5 cigarettes per smoking day. Participants viewed positive, negative, neutral and cigarette picture cues while providing continuous self-reports of positive and negative affect, as well as repeated craving measurements. Mixed emotion scores were calculated for each cue category using multiple calculation strategies to capture the degree to which participants experienced simultaneous positive and negative affect during cue presentation. Results revealed no differences between regular smokers and tobacco chippers on measures of emotional reactivity to smoking cues. Across all indices of mixed emotion, cigarette cues were associated with more mixed emotion than positive, negative, and neutral. To assess the relationship between craving and mixed emotion, visual analogue scale craving reports given after each cue presentation were correlated with mixed emotional responses. Stronger mixed emotional responses were associated with higher craving ratings. Moreover, when predicting post-cue-reactivity craving using hierarchical multiple regression, mixed emotional responses to cigarette cues predicted higher craving, after controlling for smoker type (regular smoker versus tobacco chipper), gender, and baseline craving score. Results suggest that strong mixed emotional responses contribute to self-reported craving.

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## POS3-99

### DISTRESS TOLERANCE AND SMOKING REINFORCEMENT IN MEN AND WOMEN DURING NEGATIVE MOOD INDUCTION

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Negative mood situations can increase smoking persistence and reward, perhaps especially among smokers low in distress tolerance (i.e. inability to tolerate frustration). After a screening session to assess self-reported distress tolerance (Distress Tolerance Scale; Simons & Gaher, 2005), 164 dependent smokers (86 men, 78 women) participated in two counter-balanced laboratory sessions, involving induction of negative mood or neutral mood (control) via pictorial slides and mood congruent music. Subjective negative affect (Diener & Emmons Mood Form, 1984) was assessed before and during mood induction, and then subjects smoked and rated the reward level of a fixed number of puffs before smoking their preferred brand ad libitum during the last 14 mins of both mood induction sessions. All smoking was done via the CRess device for topography assessment. Our aim was to examine responses on negative affect, smoking reward ("liking"), and smoking reinforcement (puff volume) as a function of distress tolerance level. Among all participants, negative mood induction increased negative affect,  $F(1,161) = 136.68, p < .001$ , as planned, and increased mean smoking reward,  $F(1,162) = 11.99, p < .001$ , and smoking reinforcement,  $F(1,162) = 9.83, p < .01$ . Distress tolerance did not influence smoking reward due to mood induction but interacted with sex to influence smoking behavior. Lower distress tolerance increased smoking reinforcement among men during negative mood induction but among women during neutral mood,  $F(1,160) = 11.30, p < .001$  for the interaction of mood x sex x distress tolerance. Our results confirm that an acute negative mood situation increases smoking reward and smoking reinforcement, along with reported negative affect. However, distress tolerance may enhance smoking reinforcement due to negative versus neutral mood differentially between women and men. These results may have implications for future research into mood influences on smoking persistence, particularly in those differing in level of distress tolerance.

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## POS3-100

### ANXIETY SENSITIVITY AS A PREDICTOR OF ACUTE SUBJECTIVE EFFECTS OF SMOKING

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Anxiety Sensitivity (i.e., AS; the degree to which one believes that anxiety and its related sensations are harmful) is a stable trait that is associated with habitual smoking. One hypothesis that may explain the AS-smoking link posits that individuals with high AS are more sensitive to the acute subjective effects of smoking and are therefore more prone to nicotine dependence. This study examined trait AS as a predictor of several subjective effects of cigarette smoking in non-abstinent smokers. Adult non-treatment seeking smokers (N = 87; 10+cig/day) participating in a study of tobacco deprivation effects each completed a measure of AS during a baseline session. Prior to a subsequent session, participants were asked to smoke normally before their appointment. At the outset of that visit, participants smoked a cigarette of their preferred brand in the lab. Self report measures of affect and cigarette craving were completed before and after smoking. Following smoking, post-cigarette ratings of various subjective smoking effects were provided. AS predicted greater increases in positive affect pre to post cigarette (Beta = .30, p = .006). For post-cigarette subjective ratings, AS predicted greater satisfaction, pleasant taste, calming effects, concentration enhancement, alertness, and irritability reduction (Betas = 23 to 48, ps < .03). Each of these effects remained statistically significant after adjusting for anxiety symptom severity, nicotine dependence severity, demographics, and depressive symptom severity. AS did not predict changes in negative affect and craving or post-cigarette hunger reduction, dizziness, nausea, or enjoyment of inhalation sensations. Adult smokers with higher AS appear to be more sensitive to several subjective positive reinforcing effects of smoking as well as smoking's influence on irritability. In contrast, AS was not associated with craving reduction, aversive subjective effects, or several negative reinforcing effects. These findings shed light on the mechanisms linking AS and smoking, and may be relevant for tailored interventions targeting high-AS smokers.

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## POS3-101

### SECONDHAND SMOKE EXPOSURE DURING PREGNANCY: THE ROLE OF INTIMATE PARTNER VIOLENCE

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Background: Secondhand smoke exposure (SHS) has significant health effects, and exposure during pregnancy is linked to adverse birth outcomes and health and developmental consequences for children exposed in utero. Many pregnant women are unable to prevent SHS exposure, especially from partners, and relationship issues may play a role. Objective: The aim was to examine the role of intimate partner violence (IPV) in SHS exposure during pregnancy. Women who experienced IPV were hypothesized to be less likely to eliminate SHS from their partners during pregnancy, and to be exposed to greater amounts of partner SHS, than those who did not. Methods: Participants were 220 pregnant women living with smoking partners. Women were recruited at entry to prenatal care and completed various research tools, including the HITS and the WAST to screen for IPV. SHS exposure status and average number of cigarettes exposed to per day was assessed at time of conception (asked retrospectively at first prenatal visit), at entry to prenatal care (typically near the end of the first trimester), at the beginning of the third trimester, and at delivery. Results: Of the 220 women, 28% had never let their partner smoke around them or eliminated exposure by entry into prenatal care. Another 42% had initial exposure from their partner but eliminated this by the time of delivery, while 30% still had exposure at delivery. Compared with those who never had/eliminated exposure, those with continued SHS exposure from their partner were significantly more likely to report IPV. Aspects of IPV that differed among the groups included elements of both emotional and physical abuse. In addition, those who reported either emotional or physical abuse were exposed to significantly more cigarettes/day than those who did not report abuse. Significant associations remained after control for potentially confounding background factors. Conclusions: IPV is a significant risk factor for continued SHS exposure during pregnancy. Prenatal care providers should screen patients with SHS

exposure for IPV and relationship issues, and should address this potential barrier when working with women to eliminate exposure.

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## POS3-102

### PREDICTING ATTRITION IN A SECONDHAND SMOKE INTERVENTION STUDY WITH FAMILIES IN A NEONATAL INTENSIVE CARE UNIT

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The neonatal intensive care unit (NICU) presents a unique opportunity for intervention research with an underserved population on potentially harmful health practices, such as smoking and household secondhand smoke exposure (SHSe). Attrition in the intervention as well as the follow-up period of the study, however, can affect the accuracy of conclusions drawn from such research. This study investigated predictors of SHSe intervention attendance and follow-up assessment participation with NICU parents. 83 mothers who reported at least one household smoker, were randomized to usual care (UC) or motivational interviewing (MI) targeting SHSe. MI participants (N = 67) received two hospital-based counseling sessions. Baseline measures, completed by all participants, included smoking, psychological (e.g., depression measures), and demographic variables. Using multiple ordinal regression, we investigated associations between these baseline variables and intervention attendance (MI group only) as well as follow-up participation (MI & UC groups). Follow-up assessments were scheduled at 1 month, 3 months, and 6 months. More cigarette packs smoked monthly by other household smokers (OR = 1.06; 95% CI: 1.00-1.11,  $p < .05$ ) and fewer children in the home (OR = 0.58; 95% CI: 0.36-0.92,  $p < .05$ ) predicted higher MI attendance. Maternal non-smoking status (lifetime; OR = 3.45; 95% CI: 1.43-8.32,  $p < .01$ ), more cigarette packs smoked monthly by other household smokers (OR = 1.03; 95% CI: 1.00-1.07,  $p < .05$ ), and higher household income (OR = 0.12; 95% CI: 0.02-0.70,  $p < .05$ ) predicted higher follow-up attendance. Both study-related (i.e., smoking) and more general characteristics related to intervention and follow-up assessment were associated with attrition and deserve consideration when planning health behavior change interventions, particularly SHSe interventions, with NICU families.

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## POS3-103

### CHANGES IN CALORIE INTAKE & BODY MASS INDEX IN POSTMENOPAUSAL WOMEN DURING SMOKING CESSATION

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Fear of weight gain is a common barrier to smoking cessation. Nicotine replacement therapy may limit post-cessation weight gain by limiting calorie intake. This theory has not yet been tested in older women, who are at increased risk for weight gain. Therefore, we assessed differential changes in calorie intake and body weight during attempted smoking cessation in a sample of postmenopausal women randomized to receive active or placebo nicotine patch. Postmenopausal women who smoked  $\geq 10$  cigarettes/day and were in stable physical/mental health were enrolled in this double-blind study. Participants were randomized to active or placebo patch and followed for 12 weeks. Total calorie intake (via four-day food diaries), body mass index (BMI; kg/m<sup>2</sup>) and smoking status (self-report verified by carbon monoxide) were assessed at three time points: 2 weeks prior and 6 and 12 weeks after quit date. Analysis included descriptive statistics and random coefficient mixed model regression using SAS 9.2. Participants (n=121) were, mostly white (89%) and, on average, 55.6 $\pm$ 7.0 years old with a baseline BMI of 27.0 $\pm$ 5.2 and average cigarettes/day was 21.5 $\pm$ 8.2. The interaction between smoking status and randomization was a significant predictor of both change in BMI and calorie intake. All participants experienced an increase in BMI: abstinent-placebo (n=26; 2.4 $\pm$ 0.8), followed by abstinent-active participants (n=16; 2.3 $\pm$ 2.3), smoking-active (n=31; 1.0 $\pm$ 0.8), and smoking-placebo (n=48; 0.7 $\pm$ 1.6;  $p=0.02$ ). The abstinent-active

participants also had the greatest increase in calorie intake (+139.2 $\pm$ 502.6) whereas the smoking-placebo participants decreased (-278.3 $\pm$ 638.7) calorie intake ( $p=0.02$ ). The change in calorie intake was not significantly associated with the change in BMI, even after controlling for smoking status and baseline smoking rate ( $p=0.89$ ). The results of this study indicate that nicotine patch may not prevent post-cessation weight gain in postmenopausal smokers. Additional research is needed to test the potential of different forms of nicotine replacement therapy to prevent post-cessation weight gain.

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## POS3-104

### BITTER TASTE PHENOTYPE AS A RISK FACTOR FOR ORAL NICOTINE REPLACEMENT NON-ADHERENCE

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Smoking cessation pharmacotherapy yields 2 to 3-fold improvement in quitting success. Differential adherence with nicotine replacement therapy (NRT) products occurs. The study purpose was to examine the effect of bitter taste phenotype (BTP), as determined by 6-n-propylthiouracil (PROP) taste methodology, on participants' use of two oral NRT products (nicotine inhaler and lozenge for 1 week each) in cigarette smokers during smoking abstinence. A crossover repeated measures experimental design with each subject receiving NRT lozenge and NRT inhaler product for one week each with random assignment to order was used. The sample was stratified on bitter and non-bitter taster status. 120 participants completed the 2-week study. 48.3% of the sample were non-tasters of bitter, average age was 32.1  $\pm$  10.3, and 47.5% were women. Smoking history was 15.4 cpd  $\pm$  5.7, 14 yrs of regular smoking  $\pm$  9.9, and FTND score of 5.3  $\pm$  1.7. Results: Participants used an average 4.7 lozenges/day and 4.1 inhalers/day (below recommended dosage). Data were analyzed using a mixed effects linear model. The response variable was frequency of usage (average number of lozenges or cartridges/day). Independent fixed effects were BTP, NRT type, addiction level, ratio of cotinine at end of week to baseline, and a variable indicating subject relapse during the week. Significant findings after adjusting for other factors: Subjects used 0.463 more lozenges/day than cartridges/day on average ( $p = 0.044$ ) and 0.486 more lozenges and cartridges/day during the first week than they did in the second week on average ( $p = 0.034$ ). Higher cotinine ratios were linked to greater number of lozenges and cartridges used/day ( $p = 0.001$ ). BTP and addiction level were not found to impact the average number of cartridges or lozenges used per day on average. A second model included an interaction between product and BTP. Among non-tasters, the average number of lozenges used/day was 0.654 higher than the average number of cartridges used/day after adjusting for other factors ( $p = 0.045$ ). Sensory data and taste receptor gene (TAS2R38) haplotypes were assessed. Strategies to enhance NRT adherence are needed.

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## POS3-105

### BEHAVIORAL ECONOMICS OF TOBACCO TREATMENT DECISIONS IN THE MEDICAL CLINIC

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The PhillyCOPD Initiative is an effort to support clinicians' tobacco treatment (TT) decisions in Philadelphia. Previous work identified a significant treatment paradox; reported value of TT is suspiciously higher than corresponding observed treatment rates (Evers-Casey 2004). Lichtenstein (1971) used a Standard Gamble Model (SGM) to demonstrate that value setting, or utility, may differ from choice making (i.e. preference reversal, PR). In preparation for PhillyCOPD, we adapted SGM methods to investigate the treatment paradox and to identify potential corrections. Four clinician cohorts were polled to estimate the magnitude of PR operant in TT decision making, and compared to diabetes (DM) and hypertension (HTN). Cohort 1 (N=42, primary care) was presented with a case scenario and asked to rate both the utility and likelihood of success of TT on a 5-point Likert scale. Utility scores averaged 4.95 (range 4-5) while success scores averaged 2.07 (range 1-5) ( $p=0.03$ ). Cohort 2 (N=63, Internal Medicine) was asked to assign dollar values to both utility and choice scenarios for TT, DM and HTN. When normalized against DM, utility values for TT (1.14) exceeded HTN (0.71), but reversed

for choice (0.44 vs 1.21,  $p < 0.001$ ). In cohort 3 (N=12, Pulmonary Medicine), TT utility scores (1.66) again exceeded HTN (0.88), and reversed for choice (0.86 vs 1.58). Cohort 3 was then reassessed 2 weeks after an intervention designed to influence preference construction. TT utility continued to exceed HTN (1.99 vs 1.11), however choice scores no longer suggested PR (1.35 vs 1.59,  $p = 0.66$ ). PR was identified in cohort 4 (N=100, various practice settings), with TT utility (3.23) dramatically exceeding HTN (0.97) while choice scores reversed (0.99 vs 2.54,  $p < 0.001$ ), but was not associated with practice type or reported tobacco prevalence. Conclusions: 1) TT utility scores exceed utility scores for both DM and HTN, 2) TT preference reversal appears to persist across specialty type and geography, potentially explaining the observed treatment paradox, and 3) TT preference reversal may be modifiable through interventions designed to undermine biases responsible for the phenomenon.

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## POS3-106

### FAST NICOTINE METABOLISM IS ASSOCIATED WITH GREATER REWARD AND HEART RATE INCREASES FROM INTRAVENOUS NICOTINE

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The ratio of two nicotine metabolites, 3- hydroxycotinine (3HC) to cotinine, reflects the rate of nicotine metabolism. In previous studies high nicotine metabolite ratio (NMR) predicted poor outcomes for smoking cessation treatment. The underlying mechanisms by which NMR moderates treatment outcomes have not been fully elucidated. A total of 100 smokers were divided into four quartiles based on their plasma baseline NMR at the time of study intake. Following overnight abstinence, smokers received saline followed by escalating doses of nicotine (0.5, and 1.0 mg/70 kg), given intravenously in 30 minute intervals. Nicotine's effects were assessed through subjective, plasma cortisol, heart rate, and systolic and diastolic blood pressure measurements. Smokers in the first quartile for NMR (slower metabolizers) had lower FTND scores suggesting lower levels of dependence. In contrast, smokers who were in the fourth quartile for the NMR (faster metabolizers) reported greater craving for cigarettes following overnight abstinence from smoking. Further smokers who were in the fourth quartile had greater ratings of nicotine-induced good drug effects, drug liking, and wanting more drug. Higher NMR was also associated with greater heart rate increases in response to nicotine. These findings suggest that enhanced nicotine reward and cigarette craving may contribute to the poor treatment response in smokers with high NMR. Pharmacological interventions to reduce the rate of nicotine metabolism, as has been suggested, should be further examined as potential treatments for smoking cessation.

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## POS3-107

### E-CIGARETTE ABUSE LIABILITY: SUBJECTIVE, BEHAVIORAL, AND EXPOSURE EFFECTS OF SWITCHING

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BACKGROUND: Electronic cigarettes have been promoted as a safer alternative for delivering nicotine to smokers. However, the appeal of the e-cigarette (e-cig) may be limited compared with a conventional cigarette. Abuse liability of e-cig was assessed among daily smokers using a switching study design. METHODS: Participants (N=43; 35.4 yrs of age; 70% male) were regular smokers not contemplating quitting, and were naive to e-cig use. After a 72 hour baseline of usual brand of conventional cigarette use, subjects were switched for a further 11 days to a commercial e-cig product. Behavior was monitored throughout the study (smoking diary, phone interview) and follow-up lab sessions were conducted at Days 11 and 14. Puffing topography, smoking urges, nicotine withdrawal, sensory perceptions, and drug effect and liking were measured pre- and post-switching. Exposure to nicotine was assessed via urinary cotinine pre- and post-switching. RESULTS: After 14 days, mean cigarettes smoked per day significantly decreased a relative 40.3% from 14.7 at baseline to 8.8 at Day 14 (paired t-test,  $p < 0.001$ ). Subjects took larger ( $p = 0.045$ ) and longer ( $p = 0.008$ ) puffs

with the e-cig compared with conventional. Cotinine geometric mean did not differ significantly from baseline to Day 14 (1535.9 ng/ml vs. 1391.7 ng/ml;  $p < .001$ ). E-cig use reduced urges to smoke ( $p = .046$ ) and withdrawal ( $p = .046$ ). However, e-cig nicotine effect ( $p = .006$ ) and liking ( $p < .001$ ) were rated significantly lower than the conventional cigarette. CONCLUSIONS: E-cigarette use reduced smoking urges and withdrawal, but nicotine effect and liking measures suggested a less optimal e-cig nicotine reward. While conventional cigarette consumption decreased, complete switching did not occur, further suggesting limited consumer appeal. These data suggest that e-cigs have lower abuse liability compared with conventional cigarettes and are likely to be used dually with conventional cigarettes. The failure to lower exposure to tobacco toxicants, while maintaining nicotine dependence, suggests that e-cigs may provide no public health benefit. These findings support FDA regulation of e-cigarettes as Modified Risk Tobacco Products.

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## POS3-108

### EFFECT OF PAROXETINE ON PHYSIOLOGICAL RESPONSE TO STRESS AND SMOKING

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Studies suggest that stressful events undermine smoking abstinence. Blood pressure (BP) and heart rate (HR) increase in response to stress and to smoking with an additive increase observed when stress and smoking are combined. Exaggerated cardiovascular responses to stress have been associated with greater cardiovascular disease risk and in some studies with enhanced risk of smoking relapse. This study examined paroxetine's effect on the physiological response to combining stress and smoking. Sixty-two subjects completed this randomized, double blind, cross-over study in which systolic BP (SBP), diastolic BP (DBP), HR, plasma epinephrine and plasma norepinephrine (NE) concentrations were measured at rest, during a 5 minute smoking period, during speech and math stress tasks (occurring immediately following smoking) and during a final rest period. One laboratory session occurred after 1 month of paroxetine (10 mg daily for 1 week followed by 20 mg daily) and the other session after 1 month of placebo. For all five measures, a significant time effect was observed (all  $p < 0.001$ ) with increases occurring during the smoking period and additional increases occurring during the speech task. Significant treatment effects were found for NE and HR with lower values observed after a month of paroxetine (relative to placebo) (both  $p < 0.001$ ). Significant treatment x time effects were observed for SBP and DBP ( $p < 0.001$  and  $p = 0.002$ , respectively). For SBP and DBP, a smaller increase (when comparing baseline values to those during the speech) was observed in subjects when treated with paroxetine compared to treatment with placebo (F(1,60)=27.4,  $p < 0.0001$ ; F(1,60)=8.04,  $p < 0.006$ , respectively). In both measures, the increase observed in response to smoking was similar for both treatments, however the further increase during the speech was smaller when taking paroxetine (vs. placebo). This study suggests that paroxetine affects physiological response to stress in smokers. Further research is needed to determine the impact of these results on development of cardiovascular disease and on smoking cessation efficacy in high stress responder groups.

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## POS3-109

### TRAJECTORIES AND PREDICTORS OF RELAPSE IN LUNG AND HEAD AND NECK CANCER PATIENTS FOLLOWING SURGICAL TREATMENT

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Cancer patients who continue to smoke are at increased risk for adverse outcomes including reduced treatment efficacy and poorer survival rates. Many patients spontaneously quit smoking after diagnosis, offering a unique opportunity to provide a relapse-prevention intervention. However, little information is available regarding

relapse in this population, and no relapse interventions tailored to cancer patients have been developed. The goal of the current study was to examine smoking-related (dependence), emotional (depressive and intrusion/avoidance symptoms), cognitive (fear of cancer recurrence, perception of risk, cancer locus of control, thoughts about abstinence), and physical (pain, fatigue) predictors of smoking relapse in lung and head/neck cancer patients following surgical treatment. Potential predictors were chosen based on theory and our previous qualitative work. Eligible patients either (1) had quit smoking since their diagnosis and were abstinent at the time of surgery or (2) were smoking prior to surgery but made a quit attempt immediately post-surgery. Participants completed baseline assessments at a pre-operative appointment (head/neck) or during their post-operative hospital stay (lung). Smoking behavior was assessed via telephone follow-up at 2, 4, 6, and 12 months post-surgery. Relapse rates were 29.8%, 33.9%, 31.8%, 34.6%, respectively. 114 patients (49 women) provided data for analyses of relapse across the 4 follow-up periods using GEE and backward stepwise regression to assess the importance of hypothesized predictors. With gender and follow-up period included in all models, significant predictors of relapse included: lower quitting confidence ( $p < .0001$ ), higher ratings of quitting difficulty ( $p = .021$ ), prior treatment for depression ( $p = .032$ ), and greater fear of cancer recurrence ( $p = .017$ ). Follow-up was also a significant predictor with more patients having relapsed at later time points ( $p = .017$ ). These findings guided the creation of a relapse intervention tailored for this population to be evaluated in a future clinical trial. Reducing relapse in this population could have significant public health implications.

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## POS3-110

### TIME AND REASON OF SMOKING RELAPSE IN OUTPATIENTS SMOKING CESSATION SERVICE IN A CARDIOLOGY HOSPITAL

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Relapse is a great challenge during the smoking cessation treatment. The rates of relapse are near to 40-50% in several trials. Understanding the reasons for relapse according to the time after smoking cessation is one of the main strategic points to improve the success rates. The goal of this study is to verify the reasons for relapse during the first 52 weeks of follow up in an outpatient smoking cessation service. Methods: It is a retrospective study which analyzed the database of Programa de Assistência ao Fumante (PAF) in the period of 2008 to 2009. Most of the patients have heart disease or risk profile for cardiovascular diseases. The statistical program used was SPSS v13. We evaluated 820 patients, 54% (446) female, 46% (374) male, average age 50.9 years old, average Fagerström score 6.52. Among the patients evaluated, the continuous abstinence rate was 33.7% (276), the relapse rate was 31.3% (257), the treatment failure was 21.2% (174) and 13.8% (113) missed the follow up. In the relapsing group, 95.7% were able to report the reason and the time of relapse. They were divided into 4 groups according to the time of relapse: 57.5% in the first 3 months, 19.4% between 3 and 6 months, 17.1% between 6 and 12 months and 1.5% after 12 months. Results: The three major causes of relapse were acute stress (31%), intense anxiety (15%) and carelessness (13%). In all the groups acute stress was the most important cause of relapse. For relapses during the first 3 months, the most important causes were acute stress (28.3%), intense anxiety (14.1%) and lack of motivation (13.5%). Between 3 and 6 months, more evident causes were acute stress (34%) and carelessness (22%), followed by lack of motivation (10%) and intense anxiety (10%). Between 6 and 12 months, acute stress (36.3%), intense anxiety (22.7%) and carelessness (18%) were predominant, followed by depression (11.3%). Conclusion: Acute stress is the main reason of relapse during all the time of follow up. We believe this condition should be discussed between the physician and the patient to create strategies to prevent relapses.

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## POS3-111

### MONITORING OF EXHALED CARBON MONOXIDE TO PROMOTE PRE-OPERATIVE SMOKING ABSTINENCE

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Even temporary abstinence from smoking may reduce risk for perioperative complications. However, most smokers continue to smoke cigarettes up to and including the morning before surgery. Knowledge that smoking will be checked prior to surgery may motivate compliance with recommendations to not smoke the morning of surgery. The goal of this study is to determine the potential role of exhaled carbon monoxide (CO) monitoring as a means to decrease preoperative cigarette consumption immediately prior to surgery. We hypothesized that exhaled CO levels in the preoperative holding area would be lower in smokers who are informed at a preoperative visit that their smoking status will be checked using a CO monitor at the time of hospital admission for surgery. 169 cigarette smokers scheduled for elective non-cardiac surgery were recruited from the preoperative evaluation clinic at Mayo Clinic Rochester. Participants were randomized to one of two groups. Participants in both groups received a brief intervention that recommended abstinence from smoking the morning of surgery. One group was also informed that their smoking status would be checked before surgery using exhaled CO monitoring, and the other group was not. The primary endpoint was the exhaled CO level measured in the preoperative holding area on the morning of surgery. Baseline characteristics of the two groups were comparable. CO levels in the preoperative holding area were  $9.7 \pm 8.0$  ppm (mean  $\pm$  SD) for the group that was informed that smoking status would be checked ( $n = 82$ ) and  $9.3 \pm 6.6$  ppm for the group that was not informed ( $n = 87$ ), a difference that was not significant ( $p = 0.672$ , t-test). The self-reported time from last cigarette to hospital admission was  $29.1 \pm 71.1$  hours and  $18.4 \pm 36.8$  hours in the two groups, respectively,  $p = 0.218$ . CO monitoring before surgery is feasible in clinical practice and provides valid information on patient's smoking behavior prior to surgery. However, informing patients that their smoking behavior will be checked by CO monitoring does not increase the efficacy of an intervention that recommending "fasting" from cigarettes beginning the night before surgery.

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## POS3-112

### PREDICTORS OF IN-PERSON FOLLOW-UP AMONG PATIENTS IN AN EMERGENCY DEPARTMENT-BASED TRIAL OF SMOKING CESSATION

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Background: Losses to follow-up are common in clinical trials enrolling patients in the emergency department (ED). Requiring in-person follow-up (IPFU) may pose a particular threat to internal validity, if substantial numbers of or particular categories of subjects fail to return. Methods: Secondary analysis of a clinical trial of an ED-based smoking cessation intervention, conducted in a busy urban ED from 1/06-9/07. We identified subjects who returned for IPFU at three months, and performed a multivariate logistic regression analysis to identify factors associated with returning to the ED. Covariates included in the model were age, sex, race/ethnicity, insurance, use of alcohol or illicit drugs, depression, group assignment, having a tobacco-related ICD9 code, level of nicotine dependence, subject belief that the ED visit was tobacco-related, and subject belief that s/he has an ED-related illness. Analyses were performed with SPSS 17.0. Results: Of 340 enrolled subjects, 337 were available for IPFU (2 died, and 1 was a protocol violation). Of these, 145 (43.0%) returned for IPFU. Factors associated with IPFU were having Medicaid (OR 2.71 relative to third-party insurance), self-reported use of alcohol or illicit drugs (OR 1.82 relative to abstainers), and subject belief that s/he has a tobacco-related illness (OR 2.38). Depression was associated with decreased odds of IPFU (OR 0.48). Conclusion: Subject factors associated with IPFU can be identified. Substance use and Medicaid are not deterrents to IPFU. Patients screening positive for depression are less likely to return, but to exclude them from future trials raises ethical concerns. These findings need confirmation from additional studies.

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## POS3-113

### A CELL PHONE-DELIVERED INTERVENTION FOR HIV-POSITIVE SMOKERS: PROJECT REACH OUT

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Smoking represents an important health threat to persons living with HIV/AIDS (PLWHA), yet few efforts to develop, deliver and evaluate cessation interventions appear in the literature. To address this gap, we conducted an RCT to compare a cell phone-based intervention (CPI) to usual care (UC). UC participants received brief provider advice to quit, self-help materials and access to NRT. CPI participants received all UC components plus a cell phone, by which proactive counseling was delivered. Smoking status, biochemically verified by expired CO, was determined at 3-, 6-, and 12-month follow-ups. Four-hundred-seventy-four participants were enrolled and randomized (236 in CPI and 238 in UC). The treatment groups were well-balanced in terms of socio-demographic and behavioral characteristics. Using an intent-to-treat approach, multiple logistic regression modeling was used to estimate the effect of treatment group on abstinence at the time of each follow-up. At 3-months, ORs (95% CI) were 4.2 (2.1, 8.4) for 24-hour abstinence; 4.3 (1.9, 9.8) for 7-day; 3.6 (1.5, 8.6) for 30-day; and 5.2 (1.9, 14.2) for continuous abstinence. At 6-months, ORs (95% CI) were 1.4 (0.7, 2.9) for 24 hour abstinence; 1.2 (0.5, 2.9) for 7-day; 1.5 (0.6, 4.1) for 30-day and 1.9 (0.5, 6.5) for continuous abstinence. At 12-months, ORs (95% CI) were 0.7 (0.4, 1.5) for 24 hour abstinence; 0.6 (0.2, 1.4) for 7-day; 0.5 (0.2, 1.4) for 30-day and 0.5 (0.2, 1.4) for continuous abstinence. Preliminary generalized linear mixed models were generated to estimate the treatment group effect on abstinence outcomes over all follow-ups. Results indicated participants who received the CPI were significantly more likely to have achieved 24 hour abstinence ( $p=0.01$ ) and continuous abstinence ( $p=0.048$ ). However, the effects of CPI on 7-day abstinence ( $p=0.06$ ) and 30-day abstinence ( $p=0.10$ ) were marginally non-significant. While the 3-month findings are positive and indicate that PLWHA can achieve significantly higher abstinence rates with a CPI treatment approach, findings from the 6- and 12-month follow-ups suggest that treatment refinements are needed to achieve longer term abstinence.

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## POS3-114

### SMOKERS WITH CHRONIC PAIN ARE MORE LIKELY TO UTILIZE PHARMACOTHERAPY FOR SMOKING CESSATION: RESULTS FROM A NATIONALLY REPRESENTATIVE SURVEY

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Greater than 100 million adults experience chronic pain, and the prevalence of smoking among persons in pain may be greater than twice that of the general population. There is also reason to believe that chronic pain may serve as a significant barrier to smoking cessation. Initial evidence indicates that smokers who endorse some pain (relative to no pain) tend to report less confidence, and greater difficulty in quitting. Smokers in pain have also been shown to rate their desire to quit at a level commensurate with that of pain-free smokers. However, these findings are derived from relatively small samples of smokers who did not necessarily have chronic pain. We are also not aware of any studies that tested how comorbid chronic pain may influence the likelihood of either attempting to quit, or using pharmacotherapy for smoking cessation. We examined smokers' responses (N = 1948) to the National Comorbidity Survey-Replication (2003). Separate linear and logistic regressions were conducted with chronic pain status as the fixed factor, and either number of past quit attempts, or past use of pharmacotherapy as the respective dependent variables. After adjusting for sociodemographic factors and lifetime substance misuse, we observed no association between pain status and previous quit attempts ( $p = .13$ ), suggesting that smokers with and without chronic pain are equally likely to engage a quit attempt. Results of a similar analysis, further controlling for number of past quit attempts, indicated that smokers with chronic pain were more likely to utilize pharmacotherapy for smoking cessation (OR = 1.57,  $p < .001$ ). Follow up analyses revealed that smokers were more likely to endorse past use of NRT if they also endorsed a history of chronic back or neck pain (OR = 1.54,  $p < .001$ ), medically unexplained chronic pain (OR = 1.73,  $p < .01$ ), or arthritis (OR = 1.60,  $p < .001$ ). Smokers with a history of medically unexplained chronic pain were also more

likely (OR = 1.80,  $p = .02$ ) to have utilized prescription cessation medications. Potential mechanisms, clinical implications, and directions for future research are discussed.

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## POS3-115

### SAFETY OF VARENICLINE AMONG HIV-INFECTED SMOKERS

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In the era of increasingly effective treatments for HIV, persons with HIV have the potential to live longer, productive lives. This, and the fact that smoking continues to be a problem among HIV-infected individuals, suggests that smoking-related conditions could become more prevalent in this population. There are few studies that have examined tobacco dependence treatment in the HIV population. This paper reports the side effects of varenicline compared to nicotine replacement therapy (NRT) experienced by HIV-infected smokers who completed a tobacco dependence treatment program as part of a larger study. We also report preliminary information on the effectiveness of counseling plus either varenicline or NRT. Participants completed 12 weeks of telephone counseling and either varenicline or NRT. Varenicline was encouraged as the preferred intervention; NRT was used for those unable/unwilling to take varenicline, inverse probability of treatment weighted logistic regression models were fit to remove selection bias. Adverse events (AEs) related to pharmacotherapy were monitored. Cotinine-confirmed abstinence at 3 months was examined. Among participants on varenicline ( $n=118$ ), the most common AEs were nausea, abnormal dreams, sleep problems, and mood disturbances. Among participants on NRT ( $n=110$ ), the most common AEs were rash, nausea, vivid dreams, and insomnia. Approximately 15% of participants on varenicline stopped or switched to NRT because of AEs. At 12 weeks, the percentages of confirmed abstainers were 11.8% in the NRT group and 25.6% in the varenicline group. The odds of being abstinent were 2.54 times as great in the varenicline group compared to the NRT group in the propensity weighted model (95% CI 1.43 – 4.49). When participants with depressive symptoms were removed, the odds ratio for abstinence among the varenicline group was even higher (2.84). In this preliminary study, varenicline was more effective than NRT at promoting abstinence among HIV-infected smokers. Its safety profile resembles findings among smokers without HIV. Future rigorous randomized clinical trials testing the efficacy of varenicline in this population are warranted.

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## POS3-116

### CORRELATES OF CONTINUED SMOKING VERSUS CESSATION AMONG SURVIVORS OF SMOKING-RELATED CANCERS

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Smoking cessation is critical among cancer survivors, given the link of smoking to developing second malignancies, reduced treatment effectiveness, and increased mortality. We examined correlates of continued smoking among survivors of smoking-related cancers. We recruited participants identified in the electronic medical record with a smoking-related cancer diagnosis (i.e., lung, oral cavity, pharynx, larynx, esophagus, bladder, stomach, cervix, kidney, pancreas, acute myeloid leukemia) within the past year and a history of smoking to complete a mail-based survey. A total of 139 completed the survey (19.4% response rate;  $n=139/716$ ). Our current analyses focus on the 105 participants meeting the criteria of smoking at diagnosis and either having quit since diagnosis (48.6%;  $n=51$ ) or having continued to smoke (51.4%;  $n=54$ ). We assessed sociodemographics, type of cancer diagnosis and treatments, depressive symptoms (Centers for Epidemiological Studies Depression Scale – 10 item), perceived social

support (Multidimensional Scale of Perceived Social Support), and quality of life (Functional Assessment of Cancer Therapy – General). Bivariate results indicated continued smokers were more likely to have significant depressive symptoms, to have been diagnosed with other smoking-related cancers vs. lung or head and neck cancer, and to have lower quality of life in terms of physical well-being and emotional well-being and lower perceived social support from a significant other ( $p < .05$ ). Multivariate analyses controlling for sociodemographics indicated that being diagnosed with lung or head and neck cancer vs. other smoking-related cancers ( $OR = 11.21$ ,  $CI 2.85, 44.02$ ) and screening positive for significant depression symptoms ( $OR = 1.25$ ,  $CI 1.08, 1.45$ ). The rate of depressive symptoms among continued smokers was 63.8% vs. 26.7% among quitters. The prevalence of continued smoking was 27.1% among lung and head and neck cancer survivors vs. 72.9% among survivors of other smoking-related cancers. This highlights the need to address depression among cancer survivors and to explore the messages cancer survivors are given regarding the connection of smoking to their cancer diagnosis.

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## **POS3-117**

### **HEALTH LOCUS OF CONTROL PREDICTS SMOKING RELAPSE DURING A SPECIFIC QUIT ATTEMPT**

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Health locus of control (LOC), or the extent to which people believe they can control health-related outcomes, has been associated with the likelihood of being a smoker and the number of cigarettes smoked per day among smokers. A few studies have examined associations between health LOC and smoking relapse, but methodological limitations preclude definitive results. The current study was designed to examine this relationship among smokers undergoing a specific quit attempt. We addressed the limitations of previous research by incorporating a longitudinal design, using biochemically verified abstinence, and including a range of sociodemographic and tobacco-related covariates. Participants were 200 adult smokers (43% male, 49% Non-White) from Houston, Texas. Generalized linear mixed model regressions were used to examine the effects of the Multidimensional Health LOC Scale on biochemically verified, 7-day point prevalence abstinence across Weeks 1, 2, and 3 post-quit. This scale consists of three causal attributions for health outcomes that are orthogonal to one another: internal causes, external causes determined by powerful others, and chance. Analyses controlled for time, age, gender, income, education, employment status, partner status, race, the average number of pre-quit cigarettes smoked per day, and time to the first cigarette of the day before quitting. Internal LOC and powerful others LOC were not significant predictors of smoking relapse; however, higher chance LOC attributions were significantly associated with greater odds of smoking relapse [ $OR = 1.07$  (95%  $CI: 1.01 - 1.15$ );  $p = .05$ ]. Results suggest that stronger beliefs that chance underlies health outcomes (i.e., higher scores on chance LOC) can help to identify smokers at greater risk of smoking relapse, for whom specialized cessation services may be necessary. Because chance LOC attributions have been linked with unrealistic expectations of smoking harm, and lower motivation, self-efficacy and hopefulness for behavior change, cessation interventions may need to specifically address these issues to reduce relapse rates among at-risk smokers.

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## **POS3-118**

### **SMOKERS IN THE GENERAL POPULATION ARE MORE LIKELY TO MISUSE OPIOID PAIN MEDICATIONS THAN NONSMOKERS**

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Tobacco smoking has been implicated in the onset of chronic pain, and the prevalence of smoking among persons with comorbid pain disorders may be greater than twice that of the general population. The misuse of prescription pain relievers has increased in the United States, and health professionals are becoming increasingly reluctant to prescribe opioid medications. Smokers are more likely to misuse a variety of substances, and there is evidence that smoking is a risk factor for aberrant prescription opioid use among clinical pain samples (e.g. patients undergoing treatment for pain). However, we are not aware of any studies that examined whether smokers in the general population (relative to nonsmokers) are at increased risk for misusing prescription pain medications. We examined smokers' responses ( $N = 38,067$ ) to the National Survey on Drug Use and Health (2009). Separate logistic regressions were conducted with smoking status as the fixed factor, and either (1) past-year prescription pain medication abuse/dependence, (2) lifetime nonmedical use of prescription opioids, or (3) past-year treatment for pain medication misuse, as the dependent variables. Results indicated that current smokers (relative to nonsmokers) were more likely to meet DSM-IV criteria for past-year prescription pain medication abuse ( $OR = 1.43$ ,  $p < .001$ ) and dependence ( $OR = 2.99$ ,  $p < .001$ ). Smokers were also more likely to endorse lifetime nonmedical use of prescription opioids ( $OR = 1.92$ ,  $p < .001$ ), including morphine ( $OR = 3.02$ ,  $p < .001$ ), oxycontin ( $OR = 2.41$ ,  $p < .001$ ), hydrocodone ( $OR = 1.84$ ,  $p < .001$ ) and codeine ( $OR = 1.95$ ,  $p < .001$ ). Finally, smokers were found to be greater than three times more likely to have undergone treatment for pain medication misuse in the past year ( $OR = 3.19$ ,  $p < .001$ ). This study provides the first evidence that smokers in the general population may be at increased risk for misuse of prescription pain medications, including opioids. Findings are discussed with regard to clinical implications and directions for future research.

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## **POS3-119**

### **ACCURACY OF SELF-REPORTED TOBACCO USE IN A COHORT OF NEWLY DIAGNOSED CANCER PATIENTS**

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**Background:** Biochemical validation of self-reported tobacco use provides more accurate assessment of smoking behavior, but few studies have examined the accuracy of self-reported tobacco use in newly diagnosed cancer patients. This study compares smoking status in newly diagnosed cancer patients obtained by self-report and by cotinine assay. **Methods:** Structured tobacco use questionnaires and serum samples were prospectively collected from 240 newly diagnosed cancer patients seen at Roswell Park Cancer Institute between January 2004 and October 2010. The sample included 80 lung, 80 breast, and 80 prostate cancer patients. Serum samples were assayed for cotinine levels using a commercially available enzyme linked immunosorbent assay (ELISA). Cotinine exceeding 10 ng/mL were categorized as current smokers. Smoking status based on cotinine levels was contrasted with self-reported current, never, recent quit (< 1 year since quit), and non-recent quit (> 1 year since quit) smoking status. The characteristics of patients with concordant and discordant smoking status measured by self-report and cotinine were compared using the chi-square statistic. **Results:** Cotinine confirmed 100% accuracy in self-reporting of current and never smoking status. Discordance in cotinine and smoking status was observed in 29 (16%) patients reporting former tobacco use. Discordance in self-reported smoking was 12-time higher in recent quitters (36%) compared to non-recent quitters (3%). Among recent quitters, discordance with self-reported smoking was also more common in lung cancer patients (53%) compared to those with breast cancer (33.3%) or prostate cancer (0%). **Discussion:** Self-reported tobacco use may not accurately assess smoking status in newly diagnosed cancer patients. Patients who report quitting tobacco use within the past year are at particular risk for inaccurate self-reporting.

*American Cancer Society.*

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## POS3-120

### INFLUENCE OF ANTI-TOBACCO DRUGS IN BLOOD PRESSURE AND HEART RATE IN PATIENTS WITH HIGH RISK FOR CARDIOVASCULAR DISEASE

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Smoking is the main reversible cardiovascular risk factor and is well established that quitting smoking reduces coronary events. However, on several occasions, the cardiovascular safety of some anti-tobacco drugs was questioned. Some studies assessed the effects of first-line drugs for smoking cessation (nicotine replacement therapy, bupropion and varenicline) on blood pressure and heart rate, but without strong evidence or definitive association regarding the cardiovascular risks. Our goal is to evaluate the effects of anti-tobacco drugs in blood pressure and heart rate, in outpatients of a smoking cessation service in a cardiology hospital. Methods: It is a retrospective cohort study that examined database from PAF - Programa de Assistência ao Fumante between 2008 and 2009. PAF is specific software to treat smoking and database. Only data from patients who have given informed consent were analyzed. We evaluated 371 patients, 168 (45%) were male, average of age was 49,6 +10 and the most frequent clinical diagnoses were coronary arterial disease (15%), arterial hypertension (30,4%), dyslipidemia (20,3%), Diabetes (8,8%) and Depression (25,2%). Blood pressure, heart rate and carbon monoxide concentration in exhaled air were considered in three consecutive visits, during the first 45 days of treatment. Analysis of repeated measure was used for the statistical analysis ( $p < 0,05$ ). Results: There were analyzed 103 patients treated with nicotine replacement (patch + gum), 49 patients treated with Bupropion, 91 patients that used Bupropion plus nicotine patch, 41 patients that used Bupropion plus nicotine gum, 45 patients treated with Varenicline, and 42 patients that used Varenicline plus Bupropion. For all anti-tobacco drugs there was no increase in the average value of the Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), and Heart Rate (HR). There were significant reduction of CO concentrations in all anti-tobacco drugs group. Conclusion: The anti-tobacco drugs used in monotherapy or in combined regimen in this group of patient did not SBP, DBP and HR during the observation period of use.

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## POS3-121

### MOTIVATIONAL INTERVIEWING FOR ADOLESCENT SMOKING CESSATION: LESSONS LEARNED AND IMPLICATIONS FOR DEVELOPING NATIONAL GUIDELINES

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Motivational interviewing (MI) is one of the most widely used approaches for adolescent smoking cessation yet the empirical support for this approach to date is equivocal. Numerous randomized controlled trials provide evidence for the efficacy of MI to reduce smoking rates (i.e., cigarettes per day) among adolescents. Support for MI's efficacy to promote smoking abstinence has been quite limited in individual trials, though more recent meta-analysis and pooled data analysis approaches have found MI to approximately double abstinence at follow up compared with control conditions. The discrepancy between findings from individual trials versus meta- or pooled-analyses is attributed to small effect sizes and often underpowered trials. This presentation will provide a critical review of the relevant MI literature to date, with a particular emphasis on how this literature could inform national guidelines to promote adolescent smoking cessation. Specific considerations will include: Who participates in MI trials for adolescent smoking cessation? What are their clinical characteristics? What strategies could be used to increase the reach of MI? How might MI be integrated with other approaches to maximize impact? How do randomized clinical trials differ from real-world applications and what are the implications for translating research trials to national guidelines for healthcare?

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## POS3-122

### ADOLESCENT OCCASIONAL VS DAILY SMOKERS: EVIDENCE FOR GREATER CUE REACTIVITY

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The mechanism of onset of nicotine dependence among early-stage adolescent smokers is unclear. Using the cue-reactivity paradigm, this study examined cue-elicited craving among occasional (n=52) vs. daily (n=55) adolescent smokers, ages 16-20 (N=107). Prior to the cue reactivity assessment, all participants smoked one cigarette to equate for time since last cigarette and to minimize the effects of withdrawal, which varies between groups. In-vivo cues, each lasting 120s and presented in counterbalanced order, consisted of 1) smoking (opening cigarette pack, removing and lighting cigarette; 1 puff only), 2) alcohol (opening, smelling, and pouring of preferred beverage; no ingestion allowed), and 3) neutral cues (pencils, paper). Pre/post cue measures of craving included: QSU total, QSU Factor 1 (hedonic craving), QSU Factor 2 (craving to relieve withdrawal), and two 0-10 VAS scales to measure craving, and desire to smoke. For both groups, exposure to active cues (smoking, alcohol) produced significant increases in craving, while exposure to the neutral cue did not. For the smoking cue, occasional smokers reported a greater percentage increase in QSU Factor 1 craving than did daily smokers (66% vs. 43%;  $p=.05$ ). For the alcohol cue, occasional smokers reported greater percentage increases in QSU Factor 1 craving (26% vs. 10%;  $p=.04$ ) and VAS craving (112% vs. 23%;  $p=.04$ ), with a trend for greater percentage increases in VAS desire (75% vs. 32%;  $p=.06$ ). There was no evidence for a greater percentage increase in craving among daily vs. occasional smokers, for any cue, for any measure. We conclude: 1) the cue reactivity paradigm is an effective method to test cue-elicited craving among adolescent occasional and daily smokers, 2) daily smokers report higher levels of absolute craving than do occasional smokers, but 3) the increase in craving (relative to baseline) is greater among occasional smokers than daily smokers, particularly for positively-valenced (i.e., hedonic) craving. Adolescent occasional smokers may be under greater stimulus control than their daily smoking counterparts.

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## POS3-123

### EVALUATION OF MEDIATORS OF AN INTENSIVE DEPRESSION-FOCUSED INTERVENTION FOR PREGNANT SMOKERS USING MEDIATED MODERATION ANALYSIS

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There is a high prevalence of major depressive disorder and depressive symptoms in pregnant smokers. However, little is known about the impact of depressive symptoms on smoking cessation outcomes in this population. We previously evaluated the efficacy of a 10-session depression-focused smoking cessation intervention (cognitive behavioral analysis system of psychotherapy; CBASP) in pregnant smokers (N = 257), comparing it to a time and therapist contact control focused on health and wellness (HW). At 6 months post treatment, women with higher levels of baseline depressive symptoms treated with CBASP were significantly more likely to be abstinent and to have experienced greater reductions in depressive symptoms than those treated with HW. In the current study, we conducted a secondary data analysis to evaluate whether depressive symptoms during treatment and the follow-up period mediated the baseline depression-moderated treatment effect on abstinence. We also explored self efficacy and social support during treatment and follow-up as potential mediators of the moderated treatment effect. Depressive symptoms, self efficacy and social support failed to mediate the moderating effect of baseline depressive symptoms on treatment outcome. Results suggest that the CBASP treatment effect on depression in the most depressed women was independent of the treatment's effect on abstinence at 6 months.

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## POS4-1

### SMOKING CESSATION INTEREST AMONG SUBSTANCE ABUSE TREATMENT PATIENTS

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The majority of individuals seeking treatment for substance use disorders are cigarette smokers and more likely to die from smoking-related illnesses than from problems related to substance abuse. Nevertheless, smoking cessation is rarely addressed during treatment. It is important to characterize the attitudes of substance abusers towards smoking cessation in order to facilitate development of effective treatment strategies. This study administered questionnaires to characterize behavior and interest in quitting among outpatient, psychosocial substance abuse treatment attendees. Participants (N=91) enrolled in substance abuse treatment completed a survey study that assessed smoking status, knowledge, attitudes, and access to cessation services (Delucchi et al, 2009), as well as interest in quitting smoking and in receiving various smoking cessation resources. 75% of participants reported being current smokers. Mean (SD) cigarettes per day were 10 (5.7), and 18% reported smoking more cigarettes per day after beginning treatment. 60% of participants made at least one quit attempt in the past year, in which they didn't smoke for at least 24 hours, and 95% of those attempts were unassisted. About one-third (37%) of respondents indicated serious interest in a future quit attempt. Interest in receiving the nicotine patch or gum was endorsed by 58% and 38%, respectively, while only 6% endorsed interest in medications, such as bupropion or varenicline. There is interest in smoking cessation among patients enrolled in substance abuse treatment. However, their history of unaided quit attempts and low endorsement of interest in non-nicotine medications suggest that these patients may be unaware of and/or lacking in access to evidence-based treatment options. Therefore, an educational intervention may be a first-step in encouraging successful cessation attempts. Such barriers will need to be overcome in order to provide evidence-based smoking cessation treatment to smokers in treatment for substance use disorders.

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## POS4-2

### INDIVIDUAL AND AREA-BASED MEASURES OF SOCIO-ECONOMIC DEPRIVATION ARE NOT STRONG INDEPENDENT PREDICTORS OF SMOKING CESSATION OUTCOMES: FINDINGS FROM THE INTERNATIONAL TOBACCO CONTROL AUSTRALIAN COHORT STUDY

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**INTRODUCTION:** Area-level indicators of socio-economic variation are frequently included in models of individual health outcomes. Area disadvantage is linearly related to smoking prevalence, but its relation to cessation outcomes is less well understood. **AIMS:** To explore the relationship between area-level disadvantage and prospective data on smoking cessation. **DESIGN AND METHODS:** The Australian cohort of the International Tobacco Control 4-Country survey (N = 3503) was used to prospectively examine the contribution of area-level socio-economic disadvantage to predicting three important smoking-cessation outcomes: making a quit attempt, achieving 1 month abstinence, and achieving 6 months abstinence from smoking, while controlling for individual-level socio-economic indicators and other individual-level covariates related to smoking cessation. **RESULTS:** Only two independent associations were observed between socio-economic disadvantage and cessation outcomes. Area-level disadvantage was related to 1-month abstinence in a non-linear fashion, and the individual experience of smoking-induced deprivation was associated with a lower likelihood of making quit attempts. **DISCUSSION:** Despite the documented higher prevalence of smoking among the more disadvantaged and in more disadvantaged areas, socio-economic disadvantage was not consistently related to making quit attempts, nor to medium-term success. Nevertheless, indirect effects of disadvantage, like its impact on psychological distress, cannot be ruled out, and considering smokers' individual psychosocial circumstances is likely to aid cessation efforts. **CONCLUSION:** Socioeconomic disadvantage, particularly at the area-level poses few direct barriers to smoking cessation.

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## POS4-3

### INDOOR AIR QUALITY IN VIRGINIA WATERPIPE CAFÉS

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A revised indoor air quality law has been implemented in Virginia to protect the public from the harmful effects of secondhand smoke (SHS) exposure. This legislation contains exemptions that include allowing smoking in a room that is structurally separated and separately ventilated. The objective of the current study was to examine the impact of these laws on air quality in waterpipe cafés, as well as compare the air quality in these cafés to restaurants that allow cigarette smoking and those where no smoking is permitted. Indoor air quality in 28 venues (17 waterpipe cafés, 5 cigarette restaurants, 6 smoke-free restaurants [5 with valid data]) in Virginia was assessed during March-June of 2011. Real-time measurements of particulate matter (PM) with 2.5 micron ( $\mu\text{m}$ ) aerodynamic diameter or smaller (PM<sub>2.5</sub>) were obtained and occupant behavior/venue characteristics were assessed. The highest mean PM<sub>2.5</sub> concentration was observed for waterpipe café smoking rooms (374  $\mu\text{g}/\text{m}^3$ ; n=17) followed by waterpipe café non-smoking rooms (123  $\mu\text{g}/\text{m}^3$ ; n=11), cigarette restaurant smoking rooms (119  $\mu\text{g}/\text{m}^3$ ; n=5), cigarette restaurant non-smoking rooms (26  $\mu\text{g}/\text{m}^3$ ; n=5), and smoke-free restaurants (9  $\mu\text{g}/\text{m}^3$ ; n=5). Smoking density was positively correlated with PM<sub>2.5</sub> across smoking rooms and the smoke-free restaurants. In addition, PM<sub>2.5</sub> was positively correlated between smoking and non-smoking rooms of venues. The PM<sub>2.5</sub> concentrations observed here indicate air quality in waterpipe cafés is worse than restaurant rooms in which cigarette smoking is permitted, and state-required non-smoking rooms in waterpipe cafés may expose patrons and employees to PM<sub>2.5</sub> concentrations above national and international air quality standards. Reducing the health risks of SHS may require completely smoke-free establishments in which tobacco smoking sources such as waterpipes are, like cigarettes, forbidden.

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## POS4-4

### NATIONAL AND STATE ESTIMATES OF SECONDHAND SMOKE EXPOSURE AMONG U.S. MULTIUNIT HOUSING RESIDENTS

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Secondhand smoke (SHS) exposure causes disease and premature death among nonsmokers. As the number of states and communities with laws prohibiting smoking in indoor areas of all worksites and public places increases, private settings such as homes are becoming relatively larger sources of SHS exposure. Individuals who reside in close proximity to one another in multiunit housing (MUH) are particularly susceptible to SHS, which can infiltrate smoke-free living units from neighboring units and shared areas where smoking is permitted. This study used data from the 2009 American Community Survey to assess the extent of MUH residency and SHS exposure in MUH in all 50 U.S. States and the District of Columbia (D.C.). A MUH resident was defined as any respondent who reported living in a one-family attached house or a building with two or more apartments. The number of MUH residents exposed to SHS in the home was determined by multiplying the estimated number of MUH residents with smoke-free home rules by the range of self-reported SHS infiltration in MUH (46%-53%) from the published literature. The findings indicate that 25.8% of U.S. residents (79.2 million) live in MUH, with the proportion ranging from 10.1% in West Virginia to 83.5% in D.C. Among U.S. MUH residents, 47.6% are male and 24.4% live below the federal poverty level. The greatest proportion of U.S. MUH residents are 25-64 years old (53.3%), followed by 18-24 (12.8%),  $\geq 65$  (11.2%),  $\leq 4$  (8.4%), 5-11 (8.3%), and 12-17 (6.1%) years old. Most

U.S. MUH residents are non-Hispanic white (48.0%), followed by Hispanic (23.0%), non-Hispanic black (19.2%), non-Hispanic Asian (6.8%), and some other non-Hispanic race (3.0%). Among the approximately 62.7 million U.S. MUH residents with smoke-free home rules, an estimated 28.8-33.2 million have SHS infiltrating their homes. By state, SHS infiltration estimates ranged from 27,000-31,000 million individuals in Wyoming to 3.6-4.1 million individuals in New York. These findings suggest that policies prohibiting smoking in all living units and indoor shared areas are needed in MUH to protect all residents and visitors from the adverse effects of SHS.

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## POS4-5

### **THE COMBINED EFFECT OF GRAPHIC CIGARETTE WARNING LABELS AND TAX INCREASES ON SMOKING BEHAVIOR: EVIDENCE FROM THE CANADIAN EXPERIENCE**

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**Introduction:** The implementation of Canadian graphic warnings in 2001 coincided with a substantial increase in tobacco taxes at the federal and provincial levels. We examine the combined effect of these two key tobacco control measures on smoking prevalence and quit attempts in Canada. **Methods:** A nationally representative sample of individuals aged 15 years and older from the Canadian National Population Health Survey (1998-2008) is used. The sample consists of 4,706 individuals for the smoking prevalence regression, and 1,223 smokers for quit attempts. Multivariate analyses are conducted using logistic regression. Two approaches are used to capture the combined effect of the two tobacco control measures. In the first approach, we use a dichotomous indicator to represent the pre- and post policy periods, and in the second approach we use survey year dummies. **Results:** Using the first approach, the combination of graphic warnings and tax increases reduced smoking prevalence (OR = 0.915, CI = 0.844-0.992) and increased quit attempts (OR = 1.336, CI = 1.118-1.596). Results from the second approach (survey year dummies) show statistically significant reduction in smoking participation only in the immediate post-policy period (year 2002) (OR = 0.918, CI = 0.796-0.996). A statistically significant increase in quit attempts was also found, with the exception of year 2008. **Conclusion:** The results of this study suggest that the combination of graphic warnings and higher cigarette taxes in Canada have a more positive impact on quit attempts, a pathway to smoking cessation.

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## POS4-6

### **CIGARETTE PRICE MINIMIZATION STRATEGIES USED BY ADULTS**

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**Background:** To examine the prevalence of cigarette price minimization strategies in a national sample. **Methods:** The 2006-2007 Tobacco Use Supplement of the Current Population Survey (TUS-CPS) consists of 30,397 current smokers. We used the supplement to examine current smokers' uses of price minimization strategies. Price minimization strategies explored in this national sample of adults (≥ 18 years) include purchasing cartons of cigarettes, purchasing lower after-tax price cigarettes in another state, and practicing some other method of tax avoidance, which could include Internet purchases or purchases made in another country. **Results:** Current smokers used at least 1 of the 3 explored price minimization strategies 28.8% of the time. **Conclusion:** By using multivariate analysis, we found that adults younger than 25 years of age, black non-Hispanics, those with family household incomes less than \$75,000, and those smoking less than 6 cigarettes per smoking day were less likely than reference groups to purchase cheaper cigarettes out of state (P < 0.05). Women, adults younger than 25 years of age, black non-Hispanics, Hispanics, unemployed individuals, those with family incomes less than \$25,000, some day smokers, and those smoking less than 6 cigarettes per day were less likely to purchase cigarettes by the carton than reference groups (P < 0.05). **Conclusion:** Price minimization strategies are used approximately 28.8% of the time by current smokers. The most frequent price minimization found in the TUS-CPS was purchasing cartons of cigarettes. Potential policy responses to reduce

price minimization cigarette purchases include implementing a uniform cigarette tax to prevent cross-border shopping and implementing minimum per pack price laws to discourage carton purchasing.

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## POS4-7

### **WATERPIPE TOBACCO AND CIGARETTE SMOKING IN JORDAN**

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The objective of this study is to characterize the relative prevalence of waterpipe tobacco and cigarette smoking among university students in Jordan and to compare and contrast the demographic and environmental factors associated with each form of tobacco use in this population. We surveyed 1845 students randomly recruited from four universities in Jordan regarding smoking of waterpipe tobacco and cigarettes and demographic and environmental covariates. We used multivariable logistic regression controlling for clustering of individuals within universities to determine independent associations between covariates and each type of tobacco use. Waterpipe tobacco smoking rates were 30% in the past 30 days and 56% ever, and cigarette smoking rates were 29% in the past 30 days and 57% ever. While smoking of both substances was higher at private universities compared with public ones, differences had greater magnitude for cigarettes. Compared with males, females had substantially lower odds of being current waterpipe (OR=0.12, 95% CI=0.10-0.15) or cigarette (OR=0.08, 95% CI=0.05-0.14) smokers. Current cigarette smoking was significantly associated with all markers of high socioeconomic status (increased income, smaller households, and a larger number of rooms in the house), while waterpipe tobacco smoking was only weakly associated with the highest level of monthly household income. In conclusion, waterpipe tobacco smoking is as common as cigarette smoking among Jordanian university students. Both waterpipe and cigarette smoking are most common among older, male individuals. Cigarette smoking is consistently associated with markers of high socioeconomic status, while waterpipe tobacco smoking is more evenly distributed across various sociodemographic and environmental characteristics.

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## POS4-8

### **DAY-TO-DAY VARIABILITY IN NUMBER OF CIGARETTES SMOKED PER DAY: INTERPERSONAL STRESS MATTERS**

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Acute lab-based stressors increase cigarette smoking (e.g., Buchman et al 2010; Perkins & Grobe 1992; Pomerleau & Pomerleau 1987), yet few studies have examined the role that daily stressors play in the day-to-day variation in cigarette smoking (e.g., Aronson et al 2008). We examined daily variation in cigarette smoking and the influence of daily stressors on this variation in a naturalistic setting using data from the second wave of the National Study of Daily Experiences (NSDE). A total of 2,022 individuals (57% women, mean age=56.2 +/-12.2 yrs) completed 8 daily diary telephone interviews about their life experiences, including number of cigarettes smoked per day (CPD) and daily stressors encountered. Of these participants, 346 individuals (56% women) reported smoking cigarettes on at least 1 of the 8 days, for a total of 2,409 smoking days. Multi-level modeling was used to examine within- and between-person differences in CPD across the 8 days, and the influence of daily stress on these within- and between-person differences. Overall, there was more between-person than within-person variability in CPD (87% vs 13%) across the 8-day period. Gender and age were not

significantly associated with CPD. However, smokers were more likely to smoke on days when they encountered interpersonal stressors (e.g., fight with partner) ( $\beta=0.33$ ,  $p<0.05$ ) compared to days when no interpersonal stressors occurred. This effect remained statistically significant when controlling for gender, average CPD, average number of stressors, age and education. Importantly, smokers and non-smokers did not differ in the number of stressor days they experienced nor in the numbers of stressors they experienced per day. Results regarding day-to-day variation in CPD are new and suggest that daily cigarette use is fairly consistent within individual smokers. However, individual smokers smoke more on days when they experience interpersonal, but not "other" (e.g., home- or work-related), stressors. This finding highlights the importance of incorporating daily experience with daily tobacco use measures to better understand the association between daily stressor exposure and tobacco use.

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## POS4-9

### TIME TO FIRST CIGARETTE PREDICTS CESSATION OUTCOMES IN ADOLESCENT SMOKERS

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Given the difficulty of assessing nicotine dependence in adolescent populations of smokers with traditional questionnaire measures (Shadel et al. 2000), identifying behavioral measures of nicotine dependence may help to capture dependence more accurately in adolescents. One such behavioral measure, time to first cigarette (TTFC) in the morning, has been linked to important health outcomes in adult smokers, such as ability to quit smoking and risk of relapse (Baker et al. 2007). Additionally, TTFC predicts nicotine exposure, even when controlling for cigarettes/day (Muscat et al. 2009) and has been credited as accounting for the majority of the predictive value of the Fagerstrom questionnaires. Among adolescents, the time to cigarette craving in the morning is correlated with several measures of nicotine dependence, including cotinine. The present study sought to examine the relation between TTFC and cessation outcomes among adolescent smokers. Participants (N = 1363) were treatment-seeking adolescent smokers (57.3% female) aged 14-20 (M = 16.2, SD = 1.1) enrolled in the Not On Tobacco (N-O-T) cessation program who smoked >1 cigarette/day in the past 30 days (M = 15.1, SD = 9.0). Smoking behaviors were assessed at program initiation and 3 months post baseline. Linear and logistic regression analyses explored the relation between TTFC and self-reported cessation and changes in the number of cigarettes smoked over the program period. Results demonstrate that TTFC predicted self-reported 7-day cessation, even controlling for cigarettes per day,  $p<.001$ . Additionally, among those who did not quit, earlier TTFC predicted increases in the number of cigarettes per day over the program period,  $p<.001$ . Research suggests TTFC is an important indicator of nicotine uptake and dependence. The present study suggests that TTFC predicts both cessation outcome and increases in smoking frequency over time among an adolescent population, even controlling for baseline cigarettes per day. Identifying an adolescent smoker's TTFC prior to a quit attempt may help to identify individuals who may have a particularly difficult time during quit attempts or are at high risk of relapsing.

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## POS4-10

### CIGARETTE SMOKING BEHAVIORS AMONG A US SAMPLE OF OPIATE-DEPENDENT ADULTS

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Cigarette smoking increases the risk of ill health effects such as coronary heart disease, stroke, lung cancer, and other lung diseases (CDC, 2011). It is known that a relationship exists between opiate dependence and nicotine dependence; however, the smoking behaviors and subsequent health issues have not been thoroughly studied in populations of opiate dependent adults. Traditionally, opiate dependence treatment

programs have been reluctant to address nicotine dependence, with some suggesting smoking cessation may interfere with the treatment of opiate addiction. Nevertheless, opiate dependent adults who smoke cigarettes, like all smokers, remain at risk for the negative sequelae of tobacco use. Unfortunately, very little is known about the smoking behaviors of opiate dependent adults. Understanding the smoking behaviors of opiate dependent adults is important in accurately assessing health risks and developing interventions that may target both opiate and nicotine dependence concurrently. The present study sought to identify the smoking characteristics of 381 (122 female) treatment-seeking opiate dependent adults aged 18-70 (M = 38.4, SD = 10.9). Of the 381 participants, 326 (106 female) identified themselves as current smokers with a smoking history of 19.1 years (SD = 11.3). The average FTND score was 4.8 (SD = 2.2), indicating moderate dependence. The majority of the smokers (62%) smoked less than a pack-a-day. Well over a third of the smokers (43.1%) reported smoking the first cigarette of the day within 5 minutes of waking, and nearly 80% of the total participants smoked within 30 minutes of waking. There was a significant positive relation between the amount of opiates used and the number of CPD. Results suggest a population of smokers with moderate dependence and a lower-than-average smoking frequency (62% vs. 52% in the general population smoking less than a pack a day). Presentation will include additional analyses by gender, ethnicity and opiate addiction severity. Future research may further examine the relation between nicotine and opiate addiction and will inform the concurrent treatment of both addictions.

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## POS4-11

### CHARACTERISTICS OF ALCOHOLIC SMOKERS AND NON-SMOKERS: ALCOHOL INVOLVEMENT, AFFECT, PERSONALITY, AND TREATMENT PARTICIPATION

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The prevalence of smoking is as high as 80% for treatment-seeking alcohol-dependent individuals (see Kalman et al., 2010). Among treatment-seeking alcoholics, smoking and alcohol outcome appear to be related. For example, being a non-smoker at treatment entry is associated with abstinence from alcohol 7 years later (Hintz & Mann, 2007) and current nicotine use has a negative impact on alcohol treatment outcome (Mason & Leher, 2009). Although previous research has demonstrated that smoking is correlated with negative affect in the general population (e.g., Bisol et al., 2010), less is known about the correlates of smoking in alcoholics. The present research examines pre-treatment characteristics and treatment involvement as a function of smoking status in treatment-seeking alcoholics. The sample was drawn from a study on facilitating Alcoholics Anonymous involvement in outpatient alcoholics (Walitzer, Dermen & Barrick, 2009). Of 169 alcoholics, 72 were non-smokers (42.6%; 21 women) and 76 were daily smokers (45.0%; 29 women). At pre-treatment, we assessed alcohol consumption and consequences, negative affect, and personality. We also assessed treatment participation. Smokers and non-smokers had similar levels of pre-treatment alcohol consumption; however smokers reported greater levels of alcohol problems ( $ps < .05$ ) and physical dependence ( $p < .01$ ). Smokers reported greater negative affect and psychiatric symptoms on 5 of 8 subscales of the Brief Symptom Inventory (Derogatis, 1993). No personality differences were noted on the NEO Five-Factor Inventory (Costa & McCrae, 1992). Finally, smokers attended fewer treatment sessions ( $p < .001$ ) and were less likely to complete treatment ( $p < .01$ ). Our results suggest that, although similar for alcohol consumption and personality, smoking alcoholics have more negative alcohol consequences, greater negative affect and psychiatric symptoms, and, importantly, participate less in treatment. Although addressing smoking in the context of alcoholism treatment is being discussed (see Kalman et al., 2010), further research should examine whether smoking alcoholics are at higher risk for treatment dropout.

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## POS4-12

### CHARACTERISTICS OF SMOKERS WITH DEPRESSION IN AUSTRALIAN PRIMARY CARE

Nicole Clancy, Nicholas Zwar\*, and Robyn Richmond, School of Public Health and Community Medicine, University of New South Wales, Sydney, Australia

**Aims:** This study described recently completed comparison of characteristics of depressed and non depressed participants in a smoking cessation study in Australian primary care. **Methods:** The data is from the baseline assessment of a randomized controlled trial currently in progress. 2393 patients participated and supplied baseline data of whom 709 (30%) reported current depression. **Results:** Depressed smokers were slightly older (mean 44.3 versus 41.1), were more often female (60% versus 51%) and were less often in employment. Smokers with depression had more medical co-morbidities, were smoking more cigarettes per day (mean 19 versus 16) and had higher nicotine dependence score. Depressed smokers were more likely to think that quitting would be very difficult or extremely difficult and to think that assistance would be needed to help them quit. **Conclusions:** Depression is common in this cohort of primary care patients and there were significant barriers to quitting reported.

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## POS4-13

### PREDICTORS OF PERIOPERATIVE SMOKING BEHAVIOR OF SURGICAL PATIENTS IN CHINA

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Surveys suggest that, consistent with a high smoking prevalence, Chinese smokers in the general population report little interest in quitting. In other cultures, surgery is a powerful teachable moment for smoking cessation. This study determined the perioperative tobacco-use behavior of Chinese patients scheduled for elective surgery who smoke cigarettes and determined factors associated with both intent to abstain and self-reported smoking behavior at 30 days postoperatively. Patients  $\geq 18$  year of age scheduled for elective non-cardiovascular surgery were assessed preoperatively and up to 30 days postoperatively for factors associated with smoking behavior, including indices measuring knowledge of smoking-related health risks. Of the 227 surgical patients surveyed at baseline, most (164, 72%) intended to remain abstinent after hospital discharge. For the 205 patient contacted at 30 days postoperatively, 126 (62%) self-reported abstinence. In multivariate analysis, factors associated with both intent and abstinence included older age, preoperative intent to maintain abstinence, higher self-efficacy, and undergoing major (vs. minor) surgery. Knowledge of health risks caused by smoking predicted neither intent nor abstinence. However, higher perception of benefits from quitting was associated with intent, but not abstinence. Both intent to quit and self-efficacy for maintaining abstinence appear to be much higher in surgical patients than in prior surveys of the overall Chinese population, and a high proportion of surgical patients maintained abstinence for at least 30 days. Even among the patients who have had a previous quit attempt, surgery was significantly associated with continued abstinence at 30 days. These findings suggest that surgery can serve as a powerful teachable moment for smoking cessation in China.

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## POS4-14

### DEVELOPMENT OF A SCALE TO MEASURE SOCIAL CONTEXT OF HOOKAH USE AMONG COLLEGE STUDENTS

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**Background:** Social context is defined as the immediate situational, temporal, and motivational factors that influence the behavior. The aim of this study was to develop an instrument that measures social context of hookah use among college students. **Method:** An initial pool of 50 items were administered to a convenient sample of college students (n=190), who were regular and occasional hookah users. Items were developed based on 44 in-depth interviews with regular hookah smokers. **Results:** Principle components analysis was used with varimax rotation. Five factors emerged with eigenvalues greater than 1 and accounted for cumulative variance of 53.4%. Two factors did not meet the minimum internal consistency criterion of .70, and therefore were not retained. A final solution that retained 3 factors explaining 45% of the variance was preferred. Internal consistency for each of the three sub-scales was examined using Cronbach's alpha. The alphas were adequate for all three subscales-- .83 for Social facilitation (7 items), .82 for Family/cultural influence (5 items), and .86 for Alternatives to cigarettes (3 items). The results showed that the first factor explained 27% of the variance, the second factor 9% of the variance, and a third factor 7.7% of the variance. The summed scores for the three social context subscales were examined across frequency of hookah use categorized as "at least once a year", "at least once a month" and "at least once a week". Results indicated significant differences between the groups for social facilitation [F (2, 185) =29.85, p<.001]. Those who reported smoking hookah on a weekly basis reported significantly higher scores on social facilitation than the other two groups. Similar effects were observed for family/cultural influence [F (2, 184) =7.4, p<.01]; weekly smokers scored high on family/cultural influence than occasional smokers. **Conclusion:** Findings of this study confirm multidimensionality of social context of hookah use among college students. An identification of situation specific contexts among college students could facilitate in designing interventions targeted towards preventing tobacco use in this population.

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## POS4-15

### CONTEXTUAL AND COMMUNITY FACTORS ASSOCIATED WITH YOUTH ACCESS TO CIGARETTES THROUGH COMMERCIAL SOURCES: A MULTILEVEL APPROACH

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This study examines contextual and community level characteristics associated with (a) retailer compliance with underage tobacco sales laws and (b) cigarette prices in 50 mid-sized California communities. The study used data from access surveys conducted in 997 tobacco outlets by 4 confederate buyers (2 males and 2 females), who were over age 18 years, but judged to look younger by an independent panel. Contextual characteristics were documented by the confederate buyers. City characteristics were obtained from 2010 GeoLytics data. Adult smoking prevalence was based on a survey of 8,918 adults in these communities and was aggregated to the city level. Measures of tobacco outlet density, local tobacco retailer licensing and cigarette tax were also included in the analyses. Using multilevel logistic and linear regression analyses, results showed that in the presence of community characteristics, only being a male clerk and asking buyers about their age were related to successful cigarette purchases. Also, displaying visible minimum age signs increase the likelihood that clerks will request proof of age. At the community level, higher percentage of minors, higher education, higher percentage of African Americans, lower percentage of Hispanics, and higher taxes were positively associated with increased likelihood of a successful purchase. Lower percentage of minors, lower education, lower percentage of African Americans, lower tobacco outlet density, and having a local tobacco retailer licensing were associated with retailers being more likely to ask for ID. Cigarette prices were related to community characteristics and outlet type. Larger supermarkets were more likely to charge more for a pack of cigarettes than small markets. Smoke/tobacco shops and drug/pharmacy stores were more likely to charge less. Higher cigarette prices were also associated with higher median household income, a higher percentage of unemployed individuals, and a greater percentage of Hispanics in the community. Findings about community

characteristics, however, differed by brand. This study enhances our understanding of factors related to youth access to tobacco through commercial sources.

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## POS4-16

### MU-OPIOID RECEPTOR BINDING POTENTIAL IN THE AMYGDALA IS ASSOCIATED WITH SELF-REPORTED SMOKING FOR NEGATIVE AFFECT RELIEF

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The perception that smoking relieves negative affect has long been considered a key motive for continued smoking as well as a risk factor for relapse. Endogenous opioid neurotransmission, and the mu-opioid receptor (MOR) in particular, plays a role in affective regulation and is modulated by nicotine. We examined the relationship of mu-opioid receptor binding availability in the amygdala to the motivation to smoke for negative affect relief and to the acute effects of smoking on affective responses. Twenty-two smokers were scanned using [<sup>11</sup>C]carfentanil positron emission tomography imaging after overnight abstinence on two separate occasions: once after smoking a nicotine-containing cigarette and once after smoking a denicotinized cigarette. Self-reports of smoking motives were collected at baseline, and measures of positive and negative affect were collected pre- and post- cigarette smoking. Higher MOR availability in the amygdala was associated with motivation to smoke to relieve negative affect. However, MOR availability was unrelated to changes in affect. Increased MOR availability in amygdala may underlie the motivation to smoke for negative affective relief. These results are consistent with prior literature demonstrating the role of mu-opioid system neurotransmission in smoking behavior.

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## POS4-17

### INTEGRATING TOBACCO CESSATION WITH TOBACCO-FREE INPATIENT DUAL DIAGNOSIS TREATMENT IMPROVES OUTCOMES

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Background: Although the prevalence of tobacco use in those in addiction treatment is known to be quite high, most treatment programs do not address tobacco. An outcome study of an innovative, fully integrated, tobacco-free, 90-day inpatient, dual diagnosis treatment program was undertaken to determine treatment success. Men and women, ages 18-65, having failed multiple other treatment programs are referred to this program; 88% with nicotine dependence. Methods: Between January 2009 and December 2010 178 patients were treated in the program. All patients completing the program were invited to enroll in a yearlong follow-up study consisting of monthly phone contact with the patients and their probation officer or case manager to assess recovery from substance abuse and mental illness. Results: 142 patients (80%) successfully completed the 90-day program. There was no difference between gender, race, age, primary drug dependence diagnosis, or primary psychiatric diagnosis and program completion. Tobacco use and plans to use tobacco after treatment were variables that were significantly associated with program non completion ( $p < .01$ ). Of the 137 eligible for the study, 119 (87%) enrolled. By December 2011, 105 patients had completed the year follow-up. At the beginning of treatment 88% were using tobacco daily. At the end of the year this decreased to 74%. Patients who were not using tobacco were more likely to not relapse to other drugs or alcohol ( $p = .01$ ). Patients who made the decision to stay quit from tobacco after treatment were significantly more likely to remain continuously

abstinent throughout the year than even those who were not using tobacco at the time of admission ( $p = .03$ ). Conclusions: This study demonstrates that tobacco use is highly correlated with relapse and addressing tobacco in treatment as seriously as and in the same fashion as all other drugs, improves outcomes and moves people in their stage of change regarding tobacco use. When provided with completely drug free treatment for 90 days, patients with severe addictions and mental illness can and do make the decision to quit tobacco and stay quit, aiding their ability to remain sober.

*State of Colorado.*

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## POS4-18

### EFFECTS OF SMOKE-FREE LAWS ON ALCOHOL-RELATED CAR CRASHES IN CALIFORNIA AND NEW YORK: TIME SERIES ANALYSES FROM 1982 TO 2008

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Introduction: We examined effects of New York and California's statewide smoke-free restaurant and bar polices on alcohol-related car crash fatalities. Method: New York and California were the first two large states to pass 100% statewide smoke-free restaurant and bar laws. An interrupted time series design from 1982-2008, with 312 monthly observations, was used to examine the effect of each state's law on single-vehicle-nighttime car crashes and crashes involving a driver with a blood alcohol concentration of 0.08 g/dl or above. Additionally, we examined possible cross-border effects by analyzing effects of New York's smoke-free policy on alcohol-related car crashes in communities along the Pennsylvania-New York border. Results: Implementation of New York and California's 100% statewide smoke-free restaurant and bar policies were not associated with alcohol-related car crash fatalities. Additionally, analyses showed no effect of New York's smoke-free policy on alcohol-related car crash fatalities in communities along the Pennsylvania-New York border. Conclusion: Strong statewide smoke-free restaurant and bar laws do not appear to affect rates of alcohol-related car crashes.

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## POS4-19

### EFFECTS OF BLOCKADE OF NICOTINIC ACETYLCHOLINE RECEPTORS ON CONDITIONED REINFORCEMENT ASSOCIATED WITH NICOTINE IN RATS

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Nicotine exerts its reinforcing actions by activating nicotinic acetylcholine receptors (nAChRs). The  $\alpha 4\beta 2$  and the  $\alpha 7$  nAChRs are the two major subtypes in the brain while an increasing number of the nAChR subtypes continues to be identified. However, it is yet to be determined whether these nAChRs are involved in nicotine-associated conditioned reinforcement. This study examined effects of pharmacological antagonism of the  $\alpha 4\beta 2$  and the  $\alpha 7$  nAChRs on cued nicotine-seeking behavior using the abstinence-only and the extinction procedures. Male Sprague-Dawley rats were trained in 20 daily 1-h sessions to intravenously self-administer nicotine (0.03 mg/kg/infusion, free base) on a FR5 schedule. A nicotine-conditioned cue was established via association of a sensory stimulus (5-s tone/20-s lever light on) with each nicotine infusion. For the abstinence-only procedure, rats remained in their home cages for two weeks. For the extinction procedure, lever responding was extinguished in ten daily sessions over a two-week period. Then, lever responses in the presence of the nicotine cue without availability of nicotine were examined after pretreatment with antagonists at the nAChRs. In the abstinence-only rats, neither dihydro- $\beta$ -erythroidine (DH $\beta$ E,  $\alpha 4\beta 2$ -selective antagonist) nor methyllycaconitine (MLA,  $\alpha 7$ -selective antagonist) altered the cue-maintained lever responses. In the extinction rats, however, MLA but not DH $\beta$ E significantly suppressed the cue-reinstated lever responses. These results demonstrated the conditioned incentive properties of nicotine cues independent of testing procedures. Interestingly, the extinction-reinstatement paradigm showed a critical involvement of activation of the  $\alpha 7$  nAChRs in the expression of conditioned reinforcement by nicotine cues whereas the abstinence-only paradigm did not detect an effect of blockade of the  $\alpha 4\beta 2$  and

$\alpha 7$  nAChRs. Further characterizing the roles of the nAChRs in mediating conditioned incentive properties of nicotine cues and examining procedural differences (abstinence-only versus extinction) are warranted.

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## POS4-20

### DESIRE TO SMOKE WHILE PREPARING MAKE YOUR OWN (MYO) CIGARETTES

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Handling a drug product, with or without anticipation of imminent use, is among the most evocative stimuli to increase desire for a drug. As part of a study to characterize the production and smoking characteristics of self-made cigarettes, we investigated changes in cigarette desire before and after participants prepared cigarettes. The cigarettes were made by rolling shredded tobacco in paper leaves (Roll Your Own, RYO) or by means of a machine that injected tobacco into a preformed cigarette paper tube (Personal Machine Made, PMM). Only exclusive RYO and PMM cigarette smokers participated. Ninety-eight participants (RYO (n=56) and PMM (n=42); Caucasian (n=74); Men (n=85); Non-menthol (n=53)) enrolled. Among Caucasian participants, 18.4% (n=7) of the PMM group smoked menthol whereas 58.3% (n=21) of the RYO group smoked menthol (p<0.001). Participants prepared 10 cigarettes, rested for 15 min, and then prepared 15 more cigarettes. Time to produce the cigarettes differed by group such that the total time to produce 25 cigarettes was significantly shorter (18.5±8.1 min) for the PMM group than for the RYO group (23.8±8.4 min) (p<0.002). Cigarette desire was assessed before and after making the 25 cigarettes by a single question that asked "How much do you want a cigarette right now" (scale 1-11). There was a significant difference in self-reported baseline desire by group: 5.7±3.2 PMM; 7.1±3.1 RYO (p<0.05). Desire increased similarly in both the PMM and RYO groups. The percent increase in desire to smoke was significantly larger for participants who chose to smoke MYO cigarettes because of taste compared to participants who did not report taste as a factor (p<0.05). These results show that handling tobacco in preparation of cigarettes increases desire to smoke but the increase is not related to the length of time handling the product or the type of cigarette produced; however it may be related to the perceived taste of the product. Our findings are consistent with other research that desire increases after exposure to relevant stimuli (product handling), however our results suggest that sustained handling does not further increase desire.

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## POS4-21

### ROLE OF ALPHA2-CONTAINING NICOTINIC ACETYLCHOLINE RECEPTORS IN NICOTINE-FACILITATED CONTEXTUAL AND CUED FEAR CONDITIONING, REINFORCEMENT AND WITHDRAWAL IN THE MOUSE

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The current study used Chrna2 null mutant mice to examine the role of  $\alpha 2^*$ -containing nicotinic acetylcholine receptors (nAChRs) in nicotine-facilitated contextual and cued fear conditioning, reinforcement and withdrawal behaviors. For nicotine-facilitated contextual and cued fear conditioning, our results demonstrated that nicotine significantly enhanced 'cue' but not 'context' fear conditioning in female  $\alpha 2$  null mutant mice, suggesting an amygdala-mediated mechanism. For nicotine reinforcement experiments, there was no significant difference between wild type and Chrna2 null mutant mice during either food or nicotine self-administration. For nicotine withdrawal experiments, when scoring somatic behaviors (paw tremors, head-shakes, backing and curls), both wild type and Chrna2 null mutant mice exhibited significantly enhanced (versus saline) mecamylamine-precipitated withdrawal scores. When we quantified other somatic behaviors (grooming, scratching, chewing, cage scratching, head nodding, and jumping),

we observed suppression of behavior in wild type mice, which failed to reach statistical significance in Chrna2 null mutant mice. Given the high level of  $\alpha 2$  nAChR transcripts in the interpeduncular nucleus (IPN), we tested whether altered neurotransmitter levels (dopamine, norepinephrine, serotonin) in the IPN could explain the subtle genotype-dependent differences in nicotine withdrawal. While no genotype-specific effects were observed, mecamylamine-precipitated nicotine withdrawal (versus saline treatment) abolished the relationship between IPN tissue levels of dopamine, norepinephrine, and serotonin in predicting somatic measures (paw tremors, head-shakes, backing, and curls). Taken together, our data suggest that  $\alpha 2^*$ -containing nAChRs (i) play a sex dependent role in 'cue' associated fear conditioning, (ii) play no discernable role in nicotine reinforcement, (iii) and are subtly involved in somatic withdrawal, depending on how the assay is performed and data are analyzed. Future studies need to assess the role of amygdala  $\alpha 2^*$ -containing nAChRs in fear conditioning during nicotine withdrawal.

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## POS4-22

### AN EXAMINATION OF THE ROLES OF NICOTINE AND NON-NICOTINE SENSORY STIMULI ON ATTENTIONAL BIAS AND THE SUBJECTIVE EFFECTS OF SMOKING

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Prior studies comparing smokers' reactions to nicotine and denicotinized (DN) cigarettes have shown that DN cigarettes produce rewarding effects, sometimes comparable to nicotine cigarettes. The present study was designed to build upon prior research by including a non-smoking control condition, which controls for the passage of time and elucidates the effects of DN cigarettes relative to not smoking at all; such as may be the case if DN cigarettes are used as a means to quit smoking. Furthermore, the present study assessed smokers' attentional bias (AB) to smoking-related stimuli in addition to subjective outcomes. It is believed that smoking-related stimuli are highly effective at automatically capturing the attention of smokers, thereby increasing smoking motivation and possibly impeding smoking quit attempts (Waters et al., 2003). Prior studies using the smoking Stroop task as a measure of AB have demonstrated that smokers respond more slowly and/or make more errors when naming the color of smoking-related words relative to neutral words, especially when smoking deprived. One prior study found that, on the first day of a quit attempt, smokers wearing a placebo patch showed greater AB to smoking-related words than those wearing a nicotine patch (Water et al., 2003). In the present study, 63 smokers abstained from nicotine for 12 hours and were then randomly assigned to smoke a nicotine cigarette, DN cigarette, or complete a non-smoking control task. Self-reported urge, mood, withdrawal, cigarette ratings, and AB (via the smoking Stroop task) were assessed before and after the experimental manipulation. Participants who smoked nicotine or DN cigarettes reported greater decreases in smoking urge, withdrawal, and mood disturbances relative to those in the non-smoking control condition, but no differences between nicotine and DN cigarettes were observed. Although smokers took longer to respond to smoking-related words than neutral words on the Stroop task, preliminary analyses revealed no effect of the experimental manipulation on AB. Implications of the findings and directions for future research are discussed.

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## POS4-23

### THE EFFECT OF AN INCREASE IN CIGARETTE TAX ON SMOKING-INDUCED DEPRIVATION: INTERNATIONAL TOBACCO CONTROL (ITC) MEXICO SURVEY

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Background and aim: Increasing the price of tobacco is regarded as one of the most effective tobacco control policies for reducing smoking prevalence. However, it has been argued that higher tobacco prices can result in material deprivation especially

among lower income smokers. In 2011, there was a substantial increase in cigarette tax in Mexico. The aim of this study was to examine the effect of this tax increase on smoking-induced deprivation (SID). Methods: We used data from five waves (2006, 2007, 2008, 2010, and 2011) of the International Tobacco Control Mexico Survey, which is a longitudinal study of smokers. Smoking-induced deprivation (SID) was measured with the question: "In the last 6 months, have you spent money on cigarettes what you should have spent on household essentials like food? [yes/no]" We employed generalized estimating equations (GEE) to examine the effect of tax increase on the risk of SID. Results: Data revealed no indication that the risk of SID increased after the taxation policy. Before the introduction of the policy, the percentage of smokers who experienced SID in waves 1, 2, 3, and 4 of the survey were 28, 21, 17, and 24, respectively. After the policy, i.e. in wave 5 of the survey, the percentage was 22. Multivariate analyses also showed no support for an association between SID and the policy of increasing cigarette taxes. We found no interaction between income and policy in their effect on SID. Conclusion: We found no support for the argument that increasing cigarette taxes can result in material deprivation.

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## POS4-24

### ASSESSMENT OF IPTAKALIM IN PRECLINICAL MODELS OF NICOTINE ABUSE LIABILITY

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Smoking and its associated nicotine dependence remains a significant health problem worldwide. Although advancements in treatment have been made in recent years, the high relapse rate indicates a need for continued research into potential therapeutics. Iptakalim, originally developed in China to treat hypertension, is an ATP sensitive potassium channel opener and an antagonist for alpha4-beta2 containing nAChRs. Further, pretreatment with iptakalim diminishes dopamine and glutamate release induced by nicotine, and decreases nicotine-induced hyperactivity. This profile suggests that iptakalim may be used to treat smoking. To this end, in one study, we assessed whether iptakalim would block the stimulus effects of nicotine. Rats first received discrimination training with intermixed nicotine (0.4 mg/kg, SC) and saline sessions. Sucrose was intermittently presented in a response-independent manner only on nicotine sessions. Upon stable discrimination performance, greater anticipatory dipper entries (goal-tracking) on nicotine than saline sessions, rats were tested for whether pretreatment with iptakalim (10, 30, 60 mg/kg, IP) blocked nicotine-evoked responding. Iptakalim blocked responding in a dose-dependent manner. Further, simultaneous collection of chamber activity found that iptakalim also blocked the locomotor stimulant effects of nicotine. When iptakalim was given alone, baseline chamber activity and goal-tracking was not affected, decreasing the feasibility of an account based on a non-specific effect of iptakalim. In a separate study, rats were prepared with IV catheters and then trained to self-administer nicotine (0.03 mg/kg/infusion) on a VR3 schedule of reinforcement. Pretreatment with iptakalim (1, 3, 6 mg/kg, IV) decreased the intake of nicotine (i.e., less active lever responding). Inactive lever presses and chamber activity were not affected by iptakalim, again, suggesting that antagonism was not due to a non-specific effect. In sum, iptakalim blocked the stimulus, the reinforcing, and the stimulant effects of nicotine. Together, these findings support the notion that iptakalim may be an effective pharmacotherapy for increasing smoking cessation.

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## POS4-25

### THE ROLE OF ALPHA5\* NICOTINIC ACETYLCHOLINE RECEPTORS IN THE EFFECTS OF ALCOHOL IN MICE

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The high co-morbidity between alcohol (ethanol) and nicotine abuse suggests that nicotinic acetylcholine receptors (nAChRs), thought to underlie nicotine dependence, may also be involved in alcohol dependence. Genetic studies in humans suggest an association between the Alpha5\* nAChR-coding gene (\* denotes additional subunits) and phenotypes related to alcohol dependence. There is currently a lack of in vivo behavioral evidence that would be useful in supporting human genetic findings. We assessed the involvement of Alpha5\* nAChRs in acute ethanol responsive behaviors and chronic drinking behavior in ethanol preferring C57BL/6J mice lacking Alpha5\* gene expression (Alpha5\* KO mice). We tested acute ethanol responsive behaviors including initial sensitivity and functional tolerance, anxiolysis, and hypothermia in the loss of righting reflex, elevated plus maze, and hypothermia paradigms, respectively. We also assessed ethanol drinking behavior and reward-like behavior using the two-bottle choice and conditioned place preference (CPP) paradigms, respectively. Results showed that Alpha5\* KO mice displayed an enhanced response to acute ethanol anxiolysis and hypothermia compared to wild type mice, but showed similar response in loss of righting reflex. Conversely, Alpha5\* KO mice displayed significantly reduced ethanol CPP compared to wild type, while showing no difference in drinking behavior in the two-bottle choice test. These data provide some of the first in vivo observations of a possible involvement of the Alpha5\*-coding gene in some ethanol responsive behavioral phenotypes, corroborating some associations found in human genetic studies. Thus, this receptor subtype may represent a potential target for determining some underlying causes, and possible treatment, of excessive drinking.

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## POS4-26

### THE INVOLVEMENT OF PREGNANT SMOKERS AND THEIR HEALTH CARE PROVIDERS IN THE DESIGN OF AN INTERVENTIONAL VIDEO AND A PRENATAL SMOKING STATUS ASSESSMENT TOOL: COMPARATIVE QUALITATIVE ANALYSIS

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Purpose: To compare information generated from two separate studies of pregnant smokers and their health care providers. The purposes of the original studies were to seek consumer input in the 1) development of a smoking status assessment tool and 2) design of a prenatal educational video. Methods: Seven focus groups (four for video development and three for tool development) were held in five communities of which four were rural. The total sample (n=57) included 36 providers and 21 pregnant smokers. Focus group transcripts were analyzed individually then collectively for repeated words, phrases and themes until saturation was achieved. Results: Several overarching themes emerged between and among both studies and both target populations of pregnant smokers and their health care providers. Identified themes included motivation to quit, present and anticipated stress levels, mutual trust versus mistrust and absence of supportive relationships. Participants felt these issues needed to be addressed and incorporated in both the development of the smoking status assessment tool and the design of the video. Conclusions/Implications: The results highlight common concerns and frustrations with the current strategies regarding smoking cessation and pregnancy. Tailoring a comprehensive assessment and educational program for pregnant smokers that utilizes consumer input and is integrated into prenatal care is essential.

*This research was conducted at the following clinical sites: Arnot Ogden Medical Center (Elmira, NY); Demarillac Clinic (Binghamton, NY); Geisinger (Tunkhannock, PA); Guthrie (Corning, NY); St. James Mercy Hospital (Hornell, NY). It was supported by grants from: the Binghamton University Academic and Faculty Development Fund; the March of Dimes Taylor Bequest Grant.*

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## POS4-27

### PROFILE OF PROBLEMS AND RISK FACTORS ASSOCIATED WITH TOBACCO CONSUMPTION AMONG PROFESSIONAL DRIVERS IN NIGERIA

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**Introduction:** Commercial drivers in Nigeria use tobacco while driving thereby making them vulnerable to developing nicotine dependence. **Objective:** The objective of this study was to describe the profile of problems and identify risk factors associated with tobacco dependence among these drivers. **Methodology:** The study design utilized a multistage sampling method to interview 851 consenting subjects using the drug section of the Composite International Diagnostic Interview (CIDI). Profile of problems associated with tobacco dependence was determined using certain indices as contained in the CIDI. CIDI auto, computer software was used to determine lifetime and current prevalence of any tobacco use and tobacco dependence. Risk factors for tobacco dependence were determined using variables that had significant association with tobacco dependence during bivariate analysis. Analysis was by SPSS 15.0 **Results:** Mean age of smoking initiation was 15.4 ± 2.4 years. Current prevalence rate of using a tobacco product was 354 (41.6%). Health problems was the commonest profile of problems (39.6%) associated with nicotine dependence,  $p < 0.001$ . Risk factors associated with nicotine dependence included: age of driver < 25 years, with OR 5.3, 95% CI (3.1-11.4),  $p = 0.01$ ; age of initiation < 15 years, OR = 9.2, 95% CI (4.5– 19.1)  $p < 0.01$ ; introduction to tobacco by parents OR = 3.1 95% CI (2.1 – 8.3),  $p < 0.01$ ; never married OR = 2.4, 95% CI (1.5 – 6.5)  $p = 0.03$ ; cigarette smoking OR = 5.5, 95% CI (3.3-10.2) and cigarette/snuff combination OR = 5.8, 95% CI (3.4 – 12.9),  $p = 0.01$ . **Conclusion:** Commercial drivers require health educational awareness program about harmful consequences of tobacco and the government needs to enforce no-use tobacco policies within vehicles. The implementation of tobacco cessation programs for those with tobacco related disorders will also be helpful.

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## POS4-28

### SCALOGRAM ANALYSIS OF SMOKE-FREE SPACES IN CASINOS: UNDERLYING PATTERNS IN POLICY PROGRESS

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Collecting baseline data for a study of changes in smoke-free policies in tribally-owned casinos, the authors assessed smoke-free policies in tribally-owned casinos in Northern California including how much and which spaces were deemed smoke-free under these policies. Because of the tribes' sovereign status, they are not subject to state smoke-free workplace laws, but may develop their own laws. **Methods:** Management in all 37 tribally owned casinos in Northern California (with Monterey, Kings, Tulare and Inyo Counties forming the lower boundary) were contacted by phone or in person and asked to describe which areas, if any (including hotels, restaurants, bingo halls and slots floors) were currently covered by smoke-free policies. The policies were categorized by type of smoke-free space, tallied and mapped, using Guttman Scaling to analyze patterning in escalating levels of smoke-free space protection. **Findings:** To date, only one casino in the study area features a comprehensive smoke-free policy. The most common smoke-free spaces within the casinos were restaurants. Other casinos also had dedicated smoke-free slot areas, although protection is limited when there is no barrier between these areas and those where smoking is permitted. Nine casinos had no smoke-free policies whatsoever. **Conclusions:** There is substantial variation between establishments in the degree to which casinos have demarcated smoke-free spaces. However, scalogram analysis using Guttman Scaling indicates an underlying pattern of policy progression in this sample. Smoke-free policies most often begin with smoke-free restaurants. This pattern may mirror a generalized norm shift to smoke-free dining in California. Our finding of a scale or continuum of policy coverage suggests that creating additional smoke-free spaces within tribally-owned casinos is not only entirely feasible but has already begun.

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## POS4-29

### NICOTINE ENHANCES LONG-TERM MEMORY THROUGH A PKA AND PROTEIN SYNTHESIS-DEPENDENT MECHANISM

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Nicotine modulates various types of hippocampus-dependent learning and memory. Acute nicotine enhances contextual conditioning through nicotine binding to dorsal hippocampal  $\beta 2$ -containing nicotinic acetylcholine receptors (nAChRs), but it is unknown if nicotine targets processes involved in short-term memory (STM) leading to a strong long-term memory (LTM) or if nicotine directly targets LTM. In addition, the molecular mechanisms involved in the enhancing effect of acute nicotine are unknown. Previous research indicates that protein kinase A (PKA) and protein synthesis are critically involved in LTM. Therefore, the present study examined the effects of nicotine on STM and LTM and the involvement of PKA and protein synthesis in nicotine enhanced contextual conditioning. The protein synthesis inhibitor anisomycin impaired contextual conditioning at 4 hours but not 2 hours post-training delineating time points for examining STM (2 hours) and LTM (4 hours and beyond). Nicotine enhanced contextual conditioning at 4, 8, and 24 hours but not 2 hours post-training indicating nicotine specifically targets processes involved in LTM. Furthermore, nicotine did not rescue deficits in contextual conditioning produced by anisomycin, suggesting that nicotine enhanced contextual conditioning through a protein synthesis-dependent mechanism. In addition, inhibition of dorsal hippocampal PKA activity blocked the enhancing effect of acute nicotine and nicotine shifted the timing of learning-related PKA activity in the dorsal and ventral hippocampus as measured with a PKA kinase activity assay. Thus, the present results indicate that nicotine specifically enhances LTM in a PKA and protein synthesis-dependent mechanism and that the dorsal and ventral hippocampus show different patterns of PKA-related activity during learning and nicotine altered learning.

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## POS4-30

### SEXUAL MINORITY FEMALES' ATTITUDES TOWARDS TARGETED SMOKING CESSATION PROGRAMS

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**Purpose:** Sexual minority females (SMFs) smoke cigarettes at higher rates than their heterosexual counterparts. Recent reports by the Institute of Medicine and Centers for Disease Control and Prevention identify smoking among lesbian, gay, and bisexual (LGB) youth as a priority research area. We sought to better understand young SMFs' (ages 18-24) smoking-related attitudes and experiences, as well as their smoking cessation needs and interest in LGB-specific quit programs. These data are vital to develop culturally-sensitive prevention and cessation programs for SMF youth. **Methods:** We conducted 30 qualitative interviews with SMFs living in Michigan. Participants were recruited via the Internet using LGB listservs and Facebook™ advertisements. Eligible individuals were female, ages 18-24, currently residing in Michigan, and identified as a sexual minority (i.e. not heterosexual). In order to compare SMF's attitudes toward and experiences with tobacco, we purposely interviewed current smokers, non-smokers, and former smokers. Interviews were telephone-based and lasted approximately one hour. **Results:** Participants (mean age: 22) self-identified as lesbian (15), bisexual (13) or other (2). Half of the sample reported being current smokers. Participants suggested a number of topics for inclusion in quit smoking programs including generalized stress, sexual minority stress, weight gain, and coping with peer influences. When asked about the elements and formats of quit smoking programs they believed would most influence SMF quit rates, some participants stated that offering in-person quit smoking programs would be effective, while many suggested that online approaches are preferable. In addition, while some participants believe that quit smoking programs should target LGB smokers exclusively, others felt LGB-specific programming was unnecessary. **Conclusion:** We discuss participants' attitudes towards LGB-specific programming,



highlighting components where the delivery and content may require cultural adaptation based on participants' sexual orientation.

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## **POS4-31**

### **EFFECTS OF SMOKING ABSTINENCE ON ATTENTIONAL BIAS FOR EMOTIONAL CUES**

Sally Adams, Ph.D.\*, Sophie Parker, Angela S. Attwood, Ph.D., and Marcus R. Munafò, Ph.D., University of Bristol

Nicotine has been shown to non-contingently enhance the positive value of other stimuli. In relation to affective stimuli, nicotine is suggested to modulate attentional bias to emotional stimuli. Here we investigated the effects of smoking abstinence on attentional bias to positive and negative stimuli. We hypothesised that non-abstinence would increase attention towards positive stimuli while reducing attention to negative stimuli. Weekly smokers ( $n = 39$ ) were randomised to either abstain for smoking for 12 hours or asked to smoke just before coming to the lab. Participants completed a visual probe task, including positively (happy) and negatively (sad) valenced facial expressions, paired with neutral facial expressions. Participants identified characteristics of a probe that replaced the emotional stimulus on 50% of trials (valid condition) and neutral stimulus on 50% of trials (invalid condition). Data were analysed within a  $2 \times 2 \times 2$  design, with abstinence state (abstinent, non-abstinent) as a between-subjects factor, and stimulus type (positive, negative), and validity (valid, invalid) as within-subject factors. A significant interaction between validity  $\times$  abstinence state was observed ( $F [1, 37] = 4.12, p = 0.050, \eta^2 = 0.10$ ). Participants in the non-abstinent condition were faster to respond to probes replacing (valid) emotional stimuli ( $M = 627, SD = 126$ ) compared to those replacing (invalid) neutral stimuli ( $M = 641, SD = 133$ ). Whereas participants in the abstinent condition were faster to respond to probes replacing neutral stimuli ( $M = 636, SD = 80$ ) compared to those replacing emotional stimuli ( $M = 644, SD = 93$ ). Our data did not support our hypothesis that non-abstinence would increase attention towards positive affective stimuli while reducing attention to negative affective stimuli. However, our results indicated an attentional bias for emotional cues in non-abstinent smokers that was not observed in abstinent smokers. These data suggest that smoking abstinence may disrupt attention towards emotional stimuli. Reduced value of affective cues during nicotine abstinence may therefore be a potential mechanism for novel smoking cessation interventions.

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## **POS4-32**

### **COMMUNITY-BASED RECRUITMENT STRATEGIES TO REACH AND ENGAGE LATINO SMOKERS IN CESSATION INTERVENTION STUDIES**

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While Latinos represent the fastest growing minority group in the U.S. they have been under-represented in smoking cessation research. Only a handful of studies have focused on treatment for Latino smokers. Community-based participatory research may be an important strategy for reaching, recruiting and enrolling Latinos that have traditionally been difficult to engage in research studies. Methodology. We compared two community-based recruitment strategies: an active on-site recruitment at a large community health fair and a reactive opt-out approach within three community-based databases. The opt-out recruitment approach consisted of two steps: opt-out letters were mailed, and one week after research staff contacted smokers by phone to complete consent form, eligibility and baseline survey. Latino smokers identified at health fair completed consent form, eligibility and baseline survey on-site. Results. At on-site health fair recruitment, we enrolled 14 Latino smokers; 100% participation rate. Using

multiple databases, we mailed opt-out letters to 273 Latino smokers. After one week, we began calling participants: 120 (44%) had a wrong/disconnected phone numbers, 61 (22%) were never reached, 35 (13%) were no longer smokers. Out of 273 smokers, we reached 57 (21%) smokers. Of smokers reached, 67% consented to participate (52% female; 48% recent immigrants; 69% born in Mexico). Highest participation rate were identified 1st) using on-site recruitment at a binational health fair, 2nd) a database from a community-based cancer coalition and 3rd) promotoras de salud recruitment database. Conclusion. Latino smokers are interested in participating in smoking cessation research intervention. While on-site recruitment yielded higher participation rates and were conducted in one day, an opt-out approach using community-based databases should also be considered as feasible for screening a large number of minority smokers. Clinical researchers working to eliminate tobacco-related disparities should maintain an active community based infrastructure to improve recruitment of ethnic and racial minority smokers in clinical research studies.

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## **POS4-33**

### **THE ROLE OF FUNDING IN THE ADOPTION AND USE OF APPROVED TOBACCO CESSATION PROGRAMS IN CALIFORNIA SCHOOLS**

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In contrast to previous years of decline, the prevalence of tobacco use among adolescents in California is increasing. School-based tobacco cessation programming is an integral part of reversing these trends, however at present, little is known about how and why schools adopt and implement tobacco cessation programs. The purpose of this research is to explore the impact of dedicated tobacco funding on the adoption and implementation of approved tobacco cessation programs in schools. Data used for this study comes from a cross-sectional survey of 235 California school district administrators and county office of education Tobacco Use Prevention Education (TUPE) coordinators surveyed during 2011 via a web-based survey. In the current study, we limited the sample to those organizations that reported using a tobacco cessation program ( $N=116, 49%$ ) in their schools. We conducted chi-squared and t-tests to assess differences related to the adoption and implementation of approved tobacco cessation programs between organizations that currently had TUPE funding ( $N=69$ ) and those that did not ( $N=47$ ). Funded organizations were significantly more likely to use approved tobacco cessation programs compared to organizations that were not funded ( $p < .05$ ). Additionally, funded organizations were significantly more likely to report: using a pre-packaged approved tobacco cessation curriculum; that the primary reason for deciding to offer a youth cessation program was the availability of competitive grant funds; and that school counselors, community agencies, and tobacco specialists implement their tobacco cessation programming ( $p < .05$ ). There were no significant differences with regard to the reasons for adopting the cessation program or in the percentage of students mandated to attend. Findings suggest that funding is an integral part of getting approved cessation programs used in schools. These results should be used to inform policies that affect school districts' use of tobacco cessation programming, which will ultimately lead to reductions in negative health outcomes among adolescents.

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## **POS4-34**

### **EXPLORING THE EXPERIENCES OF SMOKING AND SMOKING CESSATION IN PRIMARY CARE PATIENTS WITH DEPRESSION**

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**Aim:** To explore the experiences of primary care patients with depression of smoking and smoking cessation. **Methods:** This qualitative study was conducted with a sample of patients who reported current depression at entry into a randomized trial of smoking cessation support in primary care. Smokers with depression were invited to participate in a semi-structured telephone interview of approximately 30 minutes duration. The interviews were recorded, transcribed and analyzed thematically. **Results:** 16 interviews (5 men and 11 women, age range 24 to 85) were conducted between May and September

2011. Participants were long term smokers with a range of depressive mood disorders and other mental health, physical health and social problems. All wanted to quit smoking. They described their smoking and mental health problems as strongly inter-connected. Mood, lack of meaningful activities and, in a few, a urge to self harm were triggers for smoking. Motivation, confidence and psychological support were seen as important to quitting. Conclusions: This study provided insights into the experiences of depressed smokers in primary care and will help guide the development of cessation interventions.

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## POS4-35

### TIME TO FIRST CIGARETTE PREDICTS TOBACCO SPECIFIC CARCINOGENS

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It is estimated that in 2011 there will be nearly a quarter of a million new cases of lung cancer and over 150,000 deaths attributable to the disease. The vast majority of these cases are related directly to cigarette smoking. Among the numerous carcinogens found in tobacco smoke, 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK) is thought to play a significant role in the development of lung tumors. The main metabolite of NNK, 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol (NNAL), can be readily detected in urine and has been independently related to lung cancer among smokers (Yuan et al., 2011). Given there are meaningful differences in NNAL levels between individuals, understanding factors that may contribute to an increase in NNAL – and therefore to an increased lung cancer risk – are essential. The time to the first cigarette of the day (TTFC) has emerged as a strong indicator of nicotine tolerance, relapse and increased nicotine uptake. The present study sought to examine how TTFC may predict NNAL levels controlling for cigarettes per day (CPD) and other factors. The present study utilized the 2007-2008 and 2009-2010 National Health and Nutrition and Examination Survey (NHANES) data from 1,048 regular smokers (54% male) with an average age of 45 years. Participants provided urine samples from which NNAL levels were determined and responded to questionnaires relating to demographics and tobacco use. Step One of multiple hierarchical regression models predicting NNAL added current age, the age at which participant started smoking regularly, gender, presence of smokers in the home, whether participant used menthol or non-menthol cigarettes, and CPD. Step 2 of the model added the time to the first cigarette of the day. Adding TTFC in Step Two resulted in significant R square change. In the final step, menthol, CPD and TTFC were predictors of NNAL. Results suggest that a behavioral indicator, TTFC, adds significantly to the explanation of NNAL levels over and above other relevant factors, including CPD. Implications for interventions and identification of disease risk, as well as future directions will be discussed.

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## POS4-36

### LITTLE CIGAR USE AMONG CURRENT CIGARETTE SMOKING ADOLESCENTS

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Little cigar use has increased among adolescents, with mounting evidence that there may be unique health risks associated with little cigar use that are not found with cigarette use. However, there is limited research on the prevalence of little cigar use and on the unique correlates of its use. To better understand the phenomenon of little cigar use in adolescents, we examined the demographic, tobacco use, substance use and mental health correlates of little cigar use among adolescent current cigarette smokers, both independently and above and beyond cigarette use. Data came from a 24-month assessment of a longitudinal study of adolescent smoking. Analyses included only participants who reported smoking cigarettes in the past 30 days (n=486/1263 total participants, 45.3% male; mean age=17.6; 62.3% white). We compared past 30-day little cigar users (n=198) to non-users (n=288). None of the adolescents who did not smoke cigarettes in the past 30 days smoked little cigars. Past 30-day users were more likely to be male and have a lower GPA than non-users. Additionally, past 30-day users reported a greater amount and higher frequency of past 30-day cigarette use, concurrent use of smokeless tobacco, Bidis, Kreteks and hookah, higher levels of

nicotine dependence, more frequent alcohol and marijuana use in the past 90 days, more alcohol problems, and higher levels depression, anxiety and antisocial behavior (all p's<.04) than non-users. With the exception of level of nicotine dependence, all of the associations between 30-day little cigar use and correlates of interest remained after controlling for frequency of past 30-day cigarette use (all p's<.01). Results suggest that the prevalence of little cigar use is high among current adolescent cigarette users and its use is associated with a variety of deleterious tobacco, substance use and mental health variables that is not solely accounted for by the individual's level of cigarette use. Future research is needed to better understand the phenomenon of joint cigarette and little cigar use and to develop more targeted and tailored interventions.

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## POS4-37

### TOBACCO DEPENDENCE AMONG INTERMITTENT SMOKERS

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Intermittent smokers (ITS) are an increasingly prevalent segment of smokers, yet it is unknown whether or how dependence severity may vary across ITS. Here we sought to test whether ITS would be less dependent than daily smokers (DS) on multiple dependence measures, and whether variations in dependence among ITS was associated with behaviors such as smoking rate and longest duration of abstinence. 217 ITS (who smoked 4-27 days per month) and 197 DS (who reported smoking every day) were recruited for a study on smoking patterns. Among the ITS smokers, 70 were never daily ITS (NITS) and 138 were converted ITS (CITS; ITS who reported previously being DS); 9 were unknown. Participants completed questionnaires on dependence (time to first cigarette after waking, Fagerstrom Test of Nicotine Dependence [FTND], Nicotine Dependence Syndrome Scale [NDSS], Wisconsin Inventory of Smoking Dependence Motives [WISDM], and Hooked on Nicotine Checklist [HONC]). As we wanted to also evaluate whether the variability in assessed dependence was meaningfully related to smoking behaviors, participants also recorded each cigarette smoked in real time over 3 weeks using Ecological Momentary Assessment. Logistic regression assessed differences in dependence between groups (DS vs. ITS; CITS vs. NITS), and least squares regression examined associations between dependence and smoking behavior (mean, max cigarettes per day; proportion of days smoked; longest period of abstinence) within ITS. As expected, DS were significantly more dependent than ITS: FTND, NDSS & WISDM discriminated between ITS and DS with > 90% accuracy. Similarly, among ITS, NITS demonstrated lower dependence than CITS. Within ITS, dependence measures correlated with observed mean and maximum smoking rates and duration of abstinence, even after accounting for NITS-CITS differences. The study demonstrated that some ITS exhibit features of dependence, suggesting that some aspects of dependence may appear with very infrequent smoking. Future work should examine implications for ITS' potential progression to daily smoking and cessation outcome.

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## POS4-38

### SOCIOECONOMIC, DEMOGRAPHIC, AND SMOKING-RELATED CORRELATES OF THE USE OF POTENTIALLY REDUCED EXPOSURE TOBACCO PRODUCTS IN A NATIONAL SAMPLE

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Background and Aim: In recent years, new non-traditional, potentially reduced exposure products (PREPs), claiming to contain fewer harmful chemicals than the traditional products, have been introduced in the market. Little is known about socioeconomic, demographic & smoking related determinants of the likelihood of using these products among smokers. The aim of this study was to examine these determinants. Methods: Data from the 2006-2007 Tobacco Use Supplement to the Current Population Survey

was used. We limited the analysis to current smokers (n=40,724). Multivariate logistic regression analyses were conducted to estimate the association between covariates and the probability of the use of PREPs. Results: We found that younger age, lower education, higher nicotine addiction, and having an intention to quit are associated with higher likelihood of the use of PREPs. The likelihood of using these products was found to be higher among respondents who are unemployed or have a service, production, sales or farming occupation than those with a professional occupation. Smokers living in the Midwest, South or West, were found to have a greater likelihood of the use of PREPs than those living in the Northeast. Conclusion: Because there is little evidence to suggest that PREPs are less harmful than other tobacco products, their marketing as harm-minimizing products should be regulated. Smokers, in particular those who are younger, have a lower socioeconomic status, and are more nicotine-dependent, should be the target of educational programs that reveal the actual harm of PREPs.

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## POS4-39

### THE IMPACT OF OUT-OF-POCKET COSTS ON VARENICLINE UTILIZATION AND PERSISTENCE

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This study explores the relationship between patient out-of-pocket(OOP)costs and the utilization of, and persistence with varenicline treatment regimens. De-identified claims data in the Thomson Reuters MarketScan Databases were analyzed retrospectively. The study sample (N=884,995) included all adults age 18-64 continuously enrolled in plans 1/2008 to 12/2009, and plans had at least 100 varenicline users in 2009. Varenicline utilization was assessed from 2009 retail and mail-order pharmacy claims. To control for access restrictions, plans were categorized, based on 2009 data as prior authorization, smoking cessation program requirement, and no restrictions for varenicline. Utilization was defined as likelihood of drug claim within plan members, and persistence as likelihood of regimen completion (90 days supply within 113 days of initiation) in plan members filling varenicline prescriptions. Bivariate and logistic regression analyses were used. After screening, there were 142,251 individuals in the low OOP cohort (varenicline OOP≤\$11.99),458,966 individuals in the medium OOP cohort(OOP=\$12-\$24.99), and 222,241 individuals in the high OOP cohort (>\$25). Overall, higher cost-sharing for varenicline resulted in lower utilization of treatment. Whereas 2.8% of the Low OOP group had at least one varenicline fill, only 1.85% of the Medium OOP group and .43% of the Low OOP group had a varenicline fill (p < .0001 for both comparisons with High OOP group). In a logistic regression analysis, higher OOP cost consistently showed lower likelihood of varenicline initiation within each of the access restriction groups. For persistence, within the no access restrictions group, high OOP cost subjects were half as likely to complete a varenicline regimen as low OOP cost (OR=0.47; p<.002). Findings within other access restrictions groups were directionally consistent, although not statistically significant due to sample size limitations. High OOP costs for varenicline were associated with reduced use and persistence. These findings have implications for coverage policies in health plans and employers seeking to encourage smoking cessation.

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## POS4-40

### IMPACT OF VARENICLINE ACCESS RESTRICTIONS ON SMOKING CESSATION TREATMENT UTILIZATION

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This retrospective, observational cohort study was conducted to assess the impact of health plan access restrictions on varenicline on the utilization of varenicline and prescription nicotine replacement therapy (NRT) De-identified claims data from employer-sponsored health plans in the Thomson Reuters MarketScan Databases were analyzed retrospectively. Plans were categorized as having either prior authorization, smoking cessation program requirement, or no restrictions for varenicline based on

2009 data. The study sample (N=884,995) included all adults age 18-64 continuously enrolled in plans 1/2008 to 12/2009. Varenicline and prescription Nicotine Replacement Therapy (NRT) utilization (likelihood of drug claims within plan members) were assessed from 2009 retail and mail-order pharmacy claims. Information on over-the-counter (OTC) use of NRT could not be obtained through this data set. Pre-index clinical characteristics were based on 2008 data. The odds of varenicline use were computed using logistic regression to control for demographic and clinical differences between cohorts. Compared to adults enrolled in plans with no access restrictions, the odds of varenicline use were significantly lower for adults enrolled in plans with a varenicline prior authorization requirement (OR=0.20, 95% CI 0.19-0.22, p<.001) and plans requiring members to participate in a smoking cessation program to obtain varenicline coverage (OR=0.29, 95% CI 0.26-0.31, p<.001). The odds of prescription nicotine replacement (NRT) therapy use also were significantly lower for adults in plans with prior authorization (OR 0.01, 95% CI 0.01-0.02) and smoking cessation program (OR 0.02, 95% CI 0.01-0.04, p<.001) requirements even though the restrictions pertained to varenicline. These results suggest access restrictions on varenicline decrease use of varenicline and of prescription nicotine replacement therapy as well (although the unavailability of data on OTC NRT use must be considered when interpreting the results). Health plans should consider the potential impact of access restrictions when considering coverage policies for smoking cessation interventions.

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## POS4-41

### A CLINICAL TOOLKIT FOR TREATING TOBACCO DEPENDENCE: AN EVALUATION OF HEALTHCARE PROVIDER SURVEY RESULTS

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Health care providers play a pivotal role in helping their patients quit smoking. Clinical interventions lasting fewer than 3 minutes increase overall tobacco abstinence rates. Research shows that Hispanics receive counseling and are screened for smoking status at a lower rate than White patients. This study evaluated attitudes, behaviors, and intentions toward smoking cessation services among health care providers in a predominantly Hispanic community. Health care providers (n = 105) who attended a brief presentation promoting A Clinical Toolkit for Treating Tobacco Dependence completed a post-presentation survey which included questions regarding smoking status assessment, appropriateness on the provision of cessation advice, likelihood of referral, and barriers to cessation advice and promotion. Analyses included descriptives and Spearman correlations. Smoking status was assessed in 54% of patients, and 45% of providers promoted information to patients about quitting smoking. The reported percentage of patients assessed for smoking was positively associated with providing patients cessation information (r = .45, p < .05). The appropriateness to advise patients to quit smoking was positively associated with the likelihood of a referral to QuitLine/QuitNet (r = .41, p < .05), satisfaction with the presentation (r = .47, p < .05), as well as providers' perceived value of the presentation's content (r = .27, p < .05). Lack of skills was cited as the primary barrier to incorporating tobacco cessation into routine care. These findings suggest the need to work with health care providers to promote the assessment of all patients' smoking status. In addition, health care providers should receive training on tobacco cessation counseling (problem-solving skills training) and providing support and encouragement as part of routine care. Future directions include continuing the dissemination and education of the Toolkit, following up with health care providers on their use of and satisfaction with the Toolkit, and assessing their referral patterns to the QuitLine/QuitNet.

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## POS4-42

### REALTIME WATERPIPE TOBACCO SMOKE SAMPLING: EFFECTS OF SAMPLER PLACEMENT

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Waterpipe tobacco smoking (WTS) is increasingly common in the U.S. especially among young adults. One factor contributing to WTS prevalence is the perception that waterpipe smoke is less lethal than cigarette smoke. While analytical laboratory results using a smoking machine protocol demonstrate that many toxicants found in cigarette smoke are abundant in waterpipe smoke, critics contend that a more natural setting would produce different outcomes. Waterpipe smoke toxicant content can be assessed in natural settings with the use of a new device that allows real-time, in-situ smoke sampling ("REALTIME"). REALTIME incorporates a sampler into the waterpipe hose that collects a small fraction of smoke during each puff. The placement of the sampler is critical: placement close to the mouthpiece allows sampling of smoke that is most representative of that which is inhaled, but that location may influence device acceptability and/or smoker behavior. This study aimed to address this issue by examining if a mouthpiece-mounted REALTIME sampler was acceptable and/or altered behavior. Twenty participants (12 men; mean age=21.7 years) reporting monthly WTS (mean=13.3 uses/month) completed three randomly ordered 45-minute conditions in which they smoked ad libitum. Conditions differed by REALTIME sampler placement: at the mouthpiece, at the waterbowl, or not at all (control). Outcomes included subjective measures and smoking topography. Among subjective measures, a significant main effect of time was observed for items associated with nicotine administration (increases in "Lightheaded", "Dizzy") and suppression of tobacco abstinence symptoms (reductions in Factors 1 and 2 of the Tiffany-Drobes QSU Brief) but no measures differed by condition. Regarding puff topography, no significant differences were observed for the mouthpiece condition relative to the control condition. For the waterbowl condition, average puff volume was significantly larger than in the control condition; no other topography variables differed significantly. These results suggest the location of the sampler may not influence subjective responses to WTS and only slightly alter smoking behavior.

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## POS4-43

### THYROID RECEPTOR BETA IS CRITICALLY INVOLVED IN THE COGNITIVE ENHANCING EFFECTS OF NICOTINE

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Cigarette smoking is common despite its adverse effects on health, including cardiovascular disease and stroke. Nicotine, the main psychoactive component of cigarette smoke, may contribute to the development of addiction by enhancing maladaptive drug-context associations. Nicotine may also have long-lasting detrimental effects on the endocrine system. Specifically, nicotine may increase thyroid hormone secretion, metabolism, and receptor activation. Low thyroid hormone levels in adulthood can confer memory deficits. Animal models of disrupted thyroid function suggest nicotine reverses the memory deficits associated with low hormone levels. Initial examination with Protein/DNA arrays (Panomics) identified hippocampal thyroid receptor activation during nicotine enhancement of hippocampus-dependent learning. The present work evaluates the contribution of thyroid hormone receptor  $\beta$  (TR $\beta$ ) in the effect of nicotine on hippocampus-dependent memory using a contextual fear conditioning paradigm. It was hypothesized that TR $\beta$  would be important for the acute effects of nicotine on contextual fear conditioning. To determine the role of TR $\beta$  in the effects of nicotine on memory, mice lacking the TR $\beta$  gene (KOs) and their wildtype littermates (WTs) were administered acute nicotine (0 or 0.09mg/kg, IP) prior to training and testing on contextual fear conditioning. Twenty-four hours after training, mice were returned to the training context and evaluated for freezing, a species-typical fear response, for 5 minutes and this was used as a measure of contextual fear memory. WTs receiving nicotine froze significantly more than WTs receiving vehicle alone, while KOs receiving nicotine did not freeze more than those receiving saline. This demonstrates a critical role for TR $\beta$  in the acute effect of nicotine on hippocampus-dependent memory. The present study may inform novel treatment approaches to smoking cessation therapies. Future directions include the evaluation of the role for thyroid receptor alpha (TR $\alpha$ ) in the acute effect of nicotine

on contextual fear conditioning and the role of TR $\alpha$  and TR $\beta$  on the cognitive deficit associated with nicotine withdrawal.

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## POS4-44

### USE OF HOOKAH TO SMOKE CANNABIS AMONG COLLEGE STUDENTS

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Background: Despite the increasing popularity of smoking hookah among college students, studies focused on understanding reasons why it is gaining popularity are scarce. Even though, high prevalence of cannabis use among college students has been documented in several studies, the connection between using a hookah as a "bong" to smoke cannabis has never been established. Methods: In-depth qualitative interviews were conducted to gain better understanding of the psychosocial and environmental influences on hookah smoking behavior. Data were collected from a sample of college students (n=59) who were regular hookah smokers. We used MAXQDA to code emergent themes and organize the data for analysis. Results: Majority of the hookah smokers were male (79.7%), 45.8% were of Asian origin and 42.4% owned their own hookahs. Only 15% of the smokers were dual users of cigarettes. Mixing of marijuana with maassel (flavored tobacco used in hookahs) while smoking a hookah was reported by several students. Some of the students practiced it frequently while others had friends or roommates who did it on a regular basis. Those who mixed tobacco and marijuana reported experiencing enhanced effects, which they often termed as "buzz". Others who had tried it said it was a "waste of weed". Some students solely used a hookah to smoke marijuana. We also found that there is a lack of knowledge regarding the health effects associated with smoking hookah and cannabis. Students considered hookah smoking safer than using other tobacco products. It was a common belief that water in the hookah absorbed all the "impurities" in the tobacco making it safe. Some of the main reasons for mixing hookah with cannabis were social and legal acceptance of hookah compared to cannabis, peer pressure, relaxation, socializing with friends, and physiological enhancement. Conclusion: The ability to smoke cannabis out of a hookah might be one of the main reasons why hookah smoking is rapidly gaining popularity among college students. These findings highlight the need for improved interventions for drug and tobacco related problems among college students.

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## POS4-45

### VOLUNTARY HOME SMOKING RESTRICTIONS AND SUPPORT FOR SMOKE-FREE POLICIES AMONG SUBSIDIZED HOUSING TENANTS

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Background: Mandatory smoke-free policies in subsidized, multi-unit housing (MUH) may decrease secondhand smoke exposure in households with the highest rates of exposure. However, to promote tenant compliance, policies must be based on a strong understanding of factors affecting in-home smoking behaviors in the target population. Methods: A stratified random sample was selected from 1,000 private, project-based Section 8 housing units in Columbus, Ohio without existing smoke-free policies. Face-to-face surveys were conducted with the primary leaseholder (n=301, 64% response rate) from August-October 2011. Respondents were asked to report individual (e.g., knowledge of health effects), social (e.g., number of friends who smoke), and environmental (e.g., safety) factors hypothesized to be related to voluntary home smoking restrictions (HSRs) and support for smoke-free policies. Multivariable logistic regression models were used to identify independent predictors. Results: Almost half (47.5%) of respondents were current smokers and only 29.2% reported having complete HSRs. Slightly more than half (54.5%) supported a smoke-free policy in their unit but only one-third (36.3%) supported a ban on porches or steps outside. Complete HSRs and support for smoke-free policies inside and outside were more common among non-smokers than smokers (50.0% vs. 6.3%, p<0.0001; 71.5% vs. 35.7%, p<0.0001, and 46.2% vs. 25.4%, p=0.0002,

respectively). Several demographic, individual, and social factors were independently associated with HSRs and policy support; no environmental factors were significant. Conclusion: The smoking rate among subsidized housing tenants was more than twice the national rate while the prevalence of complete HSRs was less than half of national estimates. Support for smoke-free policies was similar to that among non-subsidized MUH tenants. However, low support among smokers combined with a lack of social norms for restricting in-home smoking may limit compliance with mandatory policies. Implications for policy-based initiatives to decrease in-home smoking in subsidized housing populations will be discussed.

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## POS4-46

### RELIABILITY OF SELF-REPORTED TOBACCO USE AGAINST URINARY COTININE IN EUTHYMIC PATIENTS WITH BIPOLAR DISORDER

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Background: Patients with bipolar disorder (BD) have a high prevalence of tobacco use and predisposition to tobacco-related health risks compared to general population. However, the validity of self-reported tobacco use in this patient population remains undetermined. Aim: The study aims to compare the self-report for tobacco use in euthymic BD patients with urinary cotinine. Methods: Male patients, aged 18 years or above, seeking treatment at Psychiatry OPD of AIIMS and diagnosed as BD type-I as per DSM-IV criteria were included. All were euthymic (HAM-D<7 and YMRS<4). The tobacco use status over previous 72 hours was recorded and 5ml of urine sample was obtained after informed consent. Each sample was subjected to a quantitative cotinine estimation by direct enzyme-linked immunosorbent assay. Results: Of the 100 screened patients, 79 were included. Mean age of sample was 35.23±12.29 years. Of the total sample, 44.3% patients were from middle socioeconomic status, 36.7% were from lower and 6.3% from upper socio-economic status. Mean duration of bipolar illness was 8.44±6.84 years and mean number of episodes were 5.44±4.42. All patients were on maintenance medications for bipolar disorder. Mean age of onset of tobacco use was 19.85±5.65 years and nearly half (50.6%) reported tobacco use in previous 72 hours. Sixty percent patients were oral tobacco users and 40% were smokers. The self-reported recent tobacco use showed a moderate concordance with urinary cotinine (k=0.518) as well as cotinine-creatinine ratio (k=0.492). The median cotinine level was 1575.00 ng/ml and mean cotinine to creatinine ratio (CCR) was 418.05 ng/mg. Overall, the self-report of 24% patients was discordant with the urinary cotinine results. Conclusion: The findings from this study has important clinical and research implications. The detection and management of tobacco use should be an integral part of management of BD in euthymia. There is also a need to incorporate the objective measures of tobacco use in a mental health setting.

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## POS4-47

### PRELIMINARY RESULTS COMPARING TWO BRIEF CESSATION INTERVENTIONS FOR OLDER SMOKERS SEEKING LOW-DOSE CT SCAN OF THE CHEST

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The overall goal was to compare the efficacy of two brief cessation interventions delivered to older smokers seeking low-dose CT scan of the chest. Current smokers aged 50 or older were randomized to one of two smoking cessation interventions: Referral to the national Quitline and receipt of the American Legacy Foundation's manual, Become an EX, a 145 page self-help cessation guide (Group A, n = 275) or the same material as Group A plus a 15-minute motivational counseling session provided by the study coordinator and written personalized risk feedback depicting avoidable risk associated with quitting (Group B, n = 261). Three months and one year after the

CT scan, each participant was asked via a telephone interview whether they had quit smoking (7 day point abstinence), number of quit attempts, and if still smoking, number of cigarettes smoked daily (cpd). Comparing Groups A and B, there were no significant baseline differences in gender, pack-years, Charleston comorbidity index, perceived lung cancer risk, readiness to quit, and proportion with positive CT test result. The self-reported quit rate for Groups A and B was 19% (n = 51) and 20% (n = 53), respectively (p=0.61). Among those with a positive CT test result, the quit rates were higher, but still lower in Group A than Group B (22% vs. 28%, P = 0.59). Among those who did not quit, the number of quit attempts was also similar (2 vs. 3, p = 0.53). Although there was a significant reduction in the median number of cigarettes smoked per day, (from 15 to 10 cpd; p = 0.003), no significant treatment difference was found p = 0.58). Given the brief nature of the cessation interventions, the quit rate was high in both groups and there was a significant reduction in the number of cigarettes smoked daily. There were no significant differences between the two cessation treatment groups. Future work is needed to further boost cessation rates among current smokers seeking low-dose CT scanning for screening for lung cancer.

American Legacy Foundation.

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## POS4-48

### DELAYING A QUIT ATTEMPT IS ASSOCIATED WITH LESS SUCCESS

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Previously, we found that delaying a quit attempt was associated with less success. Here we report a replication test using data from a double-blind, placebo-controlled, randomized trial of varenicline in which smokers were given flexibility in when they could start their quit attempt. Smokers (n=651) received varenicline or placebo (randomization 3:1) for 12 weeks and, after the initial dose titration week, were recommended to quit during the following 4 week window. Among the 562 smokers who reported a quit attempt during the quit window, 24% had their first quit attempt during the intended pre-cessation week, 27% had the initial quit attempt in the first week of the recommended period, 19% in the second, 18% in the third, and 12% in the fourth week. Baseline predictors of a later first quit attempt were being a woman, North American study site, shorter time-to-first-cigarette in the morning, higher Fagerström Test for Nicotine Dependence score, and never abstinent for a day in the past. In a logistic regression predicting continuous abstinence (CA) 9 to 24 weeks after study entry (with propensity score analysis), later quit attempts were associated with smaller quit rates (p<.001). This effect was mainly driven by smokers who first attempted to quit in the last 1-2 weeks of the window (p<.0001). CA was 37% among those who first attempted to quit during medication dosing prior to the recommended quit period and was 36%, 34%, 28%, and 20% during the subsequent 4 weeks. Similar results occurred within varenicline and placebo conditions, and at different time points. Week 9-12 CA for varenicline was 52%, 52%, 53%, 49%, and 41% for those with their first quit attempt at weeks 1-5. Whether delaying a quit attempt actually causes less success or is a marker for other variables (eg, low motivation) is unclear. Given that several smoking cessation treatments require a delay in the quit date (eg, self-monitoring prior to quitting, gradual reduction, nicotine replacement therapy pretreatment, and vaccines), trials randomizing smokers to quit sooner vs. later should be considered.

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## POS4-49

### EFFECTS OF EXTENDED-DURATION COUNSELING VS. SHORTER-DURATION COUNSELING AFTER 1.5 YEARS OF FOLLOW-UP

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Long-term success rates after an initial period of abstinence among smokers trying to quit are disappointing, with typically only 10-20% abstinent after 1 year of follow-up. Relapse is very common after short-duration counseling programs end. Our study is testing the efficacy of extending the counseling period from 3 months duration to 12

months duration among those trying to quit. Smokers were randomized at baseline to one of three cognitive/behavioral counseling-treatment groups: 3-months duration, 6-months duration, or 12-months duration. All subjects received the same weekly in-office treatment for the first 3 months of counseling. Those assigned to 6-months and 12-months of counseling received a combination of in-office and phone-counseling sessions after the initial 3-month period. All subjects also received standard nicotine patch treatment for 3 months. We performed a series of proportional hazards analyses using the National Heart, Lung and Blood Institute definition of relapse (relapse defined as smoking on 7 or more consecutive days or on 7 or more consecutive occasions) to test the efficacy of extended-duration counseling. Subjects were followed for 1.5 years, and we combined the shorter-duration counseling groups (3- and 6-months) so as to have greater statistical power to detect a difference between these groups and our counseling group of prime interest, those receiving 12 months of counseling. Those who received 12 months of counseling had the higher likelihood of maintaining abstinence at 1.5 years post-quit ( $p = 0.012$ ). Approximately 33% of participants were abstinent in the extended-duration group after 1.5 years of follow-up vs. 10% in the shorter-duration counseling conditions. We conclude that extended-duration counseling schedules can significantly increase the likelihood of long-term smoking cessation.

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## POS4-50

### AN INVESTIGATION OF THE EXPRESSION OF BRAIN CYP2D6 IN A MONKEY MODEL OF NICOTINE AND ETHANOL EXPOSURE

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CYP2D6 is an enzyme expressed in the liver and in the brain that metabolizes a range of centrally acting drugs (eg. opiates, amphetamines, antidepressants), neurotoxins (eg. MPTP) and endogenous neurochemicals (eg. dopamine, serotonin). CYP2D6 is essentially uninducible in the liver, however, we have identified higher levels of CYP2D6 in certain brain regions of human smokers and alcoholics; in rats, nicotine or ethanol treatment induces CYP2D in brain but not in the liver. Together, this suggests that nicotine and ethanol may be responsible for the elevated levels of brain CYP2D6 in smokers and alcoholics. Forty male African green monkeys that self-administered >1g ethanol/kg/4 hours were identified and randomized into 4 groups of 10/ group (Control, Nicotine, Ethanol, and Nicotine+Ethanol). Two groups received 2 daily injections of 0.5mg/kg nicotine s.c., while the other two were injected with saline on the same schedule. Two groups were allowed to self-administer 10% ethanol in sucrose solution for 4 hours/day, while the other two consumed sucrose solution on the same schedule. Following 5 weeks of treatment, animals were sacrificed, membrane proteins were isolated from liver and brain tissue and CYP2D6 protein levels were assessed by immunoblotting. Nicotine and ethanol induced CYP2D6 in brain, but not in the liver. For example, both monkeys that were given nicotine alone or self-administered ethanol had a >50% increase in CYP2D6 protein levels in the brainstem ( $p < 0.05$ ). CYP2D6 levels were further increased by ~90% with combined nicotine treatment and ethanol self-administration ( $P_{trend} = 0.003$ ). Moreover, nicotine and ethanol induced CYP2D6 in other brain regions such as the putamen. Immunoblotting is ongoing for additional brain regions. This study demonstrates that nicotine and ethanol can increase brain CYP2D6 levels, as seen in human smokers and alcoholics, which may contribute to differences in CNS drug response, neurodegeneration and personality among smokers and/or alcoholics. Due to the large number of people who either smoke or consume alcohol, or both, further study of the effects of brain enzyme induction by alcohol and nicotine are warranted.

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## POS4-51

### INHIBITION OF BRAIN CYP2B-MEDIATED NICOTINE METABOLISM CAN ALTER SPONTANEOUS ACQUISITION OF NICOTINE SELF-ADMINISTRATION

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Nicotine is metabolized by CYP2A6 and CYP2B6; both enzymes are highly polymorphic in humans. CYP2B6 genetic variation can influence smoking behaviour and acquisition of smoking in adolescents. This variation does not affect hepatic nicotine metabolism, therefore the impact on smoking behaviour may be due to its effect in the brain. CYP2B is expressed in human and rat brain, and has been shown metabolically active *in vivo* in rat brain. A mechanism-based (suicide) inhibitor selective for CYP2B, C8-xanthate (C8X), was used to investigate the role of brain CYP2B-mediated nicotine metabolism in the acquisition of nicotine self-administration (NSA). C8X, or vehicle control artificial cerebrospinal fluid (ACSF), was given daily via ICV injection 20 hr before rats underwent spontaneous acquisition of NSA (where no prior training was given). We hypothesized that inhibiting brain CYP2B would increase nicotine levels and result in an increased proportion of rats that acquire NSA. Acquisition of intravenous (i.v.) NSA was tested using 3.75, 7.5, and 15 microg/kg infusion doses. A higher percentage ( $p < 0.05$ ) of rats treated with C8X (100%) met acquisition criterion for NSA compared to 40% for those treated with ACSF (40%) at 7.5 microg/kg. This observation was replicated in a second cohort (100% for C8X vs 50% for ACSF). There was no difference in acquisition at 3.75 and 15 microg/kg nicotine doses. C8X also appeared to increase nicotine's reinforcing properties. Rats were split into two groups, one at FR2 and one at FR5 and NSA at 3.75, 7.5, 15, and 30 microg/kg were evaluated. Under FR2, C8X treatment resulted in higher mean lever responses and reinforcements at all doses tested, which reached significance ( $p < 0.05$ ) at 7.5 (where a higher percentage of rats acquired NSA) and 30 microg/kg, while there was little difference at FR5. Assessment of nicotine levels resulting from 7.5 microg/kg i.v. dosing following C8X and ACSF ICV pretreatment are underway. These results suggest that inhibiting brain CYP2B, and thus decreasing nicotine metabolism in the CNS, can increase acquisition of NSA behaviour which is similar to observations in human genetic CYP2B6 slow metabolizers.

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## POS4-52

### IMPACT OF CIGARILLO SALES BAN ON USE: A PRE-POST STUDY IN TWO URBAN CENTRES

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Cigarillo use continues to account for the largest share of non-cigarette tobacco use among youth and young adults in Canada. Legislation banning the sale of flavoured and single cigarillos came into force in 2010. Our study aimed to assess the effects of the new legislation on cigarillo use and co-use with cigarettes. A total of 72 participants from the Greater Toronto Area, Ontario and Edmonton, Alberta completed a pre- and post-legislation survey. In addition, 17 in-depth telephone interviews were conducted post-legislation. Eligible participants were 19–29 years of age, had smoked cigarillos in the past 30 days, and resided in either survey site. Participants completed a 30 minute online survey pre- and post-legislation that included questions on cigarillo and cigarette use, social influence, beliefs about cigarillo use and the impact of the cigarillo sales ban. Overall, cigarillo users who completed the post-legislation survey were aged 24.8 years on average, primarily male (71%), and more likely to be blue-collar workers (58%). Cigarillo use in the past 30 days dropped by almost half at follow-up (100% to 54%). Co-use with cigarettes also significantly dropped at follow-up (86% to 42%). Of the respondents who did not report smoking cigarillos in the 30 days prior to the follow-up survey, 27% smoked only cigarettes and 17% did not smoke either cigarettes, or cigarillos. One-third (33%) of respondents had tried smoking the new unfiltered cigarillos post-legislation and the majority (63%) did not like the taste. Many of respondents reported that they were still able to purchase flavoured cigarillos (53%) and some were still able to purchase single cigarillos (27%) despite the sales ban on both of these products. Because the legislated bans have been circumvented by marketing of new filtered and heavier (>1.4 grams) flavoured cigarillos it is difficult to discern if the legislation has had a true impact on cigarillo use. Knowledge gained from this study will assist policymakers and decision makers in developing relevant policy and tobacco

control programs aimed at decreasing the prevalence of cigarillo use and associated use of other tobacco products.

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## **POS4-53**

### **NICOTINIC AGONIST MODULATES PERFORMANCE MONITORING ON THE STOP SIGNAL TASK IN ADULTS WITH ADHD**

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People with Attention-Deficit/Hyperactivity Disorder (ADHD) have deficits in areas of executive function. These include response inhibition and performance monitoring processes. Behavioral adjustments in response to environmental cues and performance are critical to daily life. Deficits in response inhibition, as measured by the Stop Signal Task (SST) can be modified through nicotinic receptor stimulation by both nicotine and nicotinic agonists. Performance monitoring relies on attentional orienting and signal detection, also known to be modulated by the nicotinic cholinergic system. Therefore, we hypothesized that AZD3480, an alpha 4 beta 2 nicotinic agonist, would improve performance monitoring during the SST in adults with ADHD. This was a secondary analysis of a study (NCT00683462) to determine the safety and efficacy of AZD3480 in adult ADHD. 24 non-smoking adults (18-65 years) with ADHD participated in a 3-way cross-over double blind trial including three randomized 2-week periods of dosing (AZD3480 5 mg, 50 mg, and placebo), separated by washout. Performance monitoring during the SST was measured by changes in reaction time after stop versus go trials. Mixed model ANOVAs were used to analyze the difference in slowing of post-stop trials across the three drug conditions. Treatment with AZD3480 significantly slowed the reaction time of post-stop trials. Specifically, trials following failed inhibition, post-error trials, showed significant slowing while those following successful inhibition did not. Further analysis showed a treatment effect, with the greatest slowing at the 50 mg dose. This study is the first to suggest that performance monitoring, specifically through post-error adjustments, may be modulated by nicotinic stimulation in ADHD. Slowing was not associated with the mere presence of the stop signal, but rather was associated specifically with failed inhibition. These results demonstrate that performance monitoring can be studied using the stop signal paradigm in ADHD, and that performance is modulated by nicotinic cholinergic system function.

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## **POS4-54**

### **ROLE OF GENETICALLY VARIABLE CYP2A6 IN SMOKING CESSATION IN ADOLESCENTS**

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Adolescence is a critical period for the acquisition of cigarette smoking behaviors and nicotine dependence, and is an opportunity for cessation before long-term smoking is established. Genetic factors play a major role in smoking behaviors. However, few genetic studies have been conducted in adolescents. Studies in adult smokers indicate variation in the gene encoding the principal nicotine inactivating enzyme, CYP2A6, influences multiple smoking behaviours including cessation. Specifically, clinical and epidemiological data in adults suggests CYP2A6 slow metabolizers (SM) have higher quit rates consistent with a lower prevalence of SM among adult smokers. However, we previously showed that adolescent SM are at increased risk of acquiring nicotine dependence. Together this suggests SMs are quitting before, and during adulthood, more than NM. Here we hypothesized that CYP2A6 slow metabolism is associated with increased quitting in adolescence. The sample comprised 341 Caucasian adolescent smokers (ever puffed on a cigarette) from the Nicotine Dependence in Teens (NDIT) study. Participants were followed from the age of 12 until 17, were 38.4% male, 7.0% SM ( $\leq 50\%$  CYP2A6 activity), 13.5% intermediate metabolizers (IM; 75% CYP2A6 activity), and 79.5% normal metabolizers (NM; 100% CYP2A6 activity). In all, 158 of 341 ever-smokers stopped smoking for at least 12 months. Using multivariable logistic regression analysis within a GEE framework on multiply imputed datasets, the odds

ratio (OR) for quitting was 2.35 (95% confidence interval (CI) 1.11-4.95,  $p=0.025$ ) for SM relative to NM. There was also a linear trend toward increased quitting with decreasing CYP2A6 activity (OR 1.47, 95% CI 1.06-2.04,  $p=0.022$ ), consistent with a non-significant increase in quitting among IM relative to NM (OR 1.27, 95% CI 0.73-2.20,  $p=0.391$ ). Thus, the higher quit rates for SM in adolescence may contribute to the lower prevalence of SM among adult smokers. A greater understanding of the mechanisms governing cessation in adolescence may improve quit rates early in the course of onset, and curtail subsequent long-term illnesses that result from cigarette smoking initiated during this stage.

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## **POS4-55**

### **A STUDY OF NICOTINE METABOLITE RATIO IN WHOLE BLOOD, PLASMA, SALIVA, AND URINE AND STABILITY IN WHOLE BLOOD AT 4°C**

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Nicotine is primarily metabolized by CYP2A6 to cotinine (COT) and further to trans 3'-hydroxycotinine (3-HC); 3-HC/ COT is called the nicotine metabolite ratio (NMR). NMR is an indicator of CYP2A6 enzymatic activity, is highly correlated with the rate of total nicotine clearance, and is used to assess the effect of variation in nicotine metabolism on smoking behaviors and cessation. Our objectives were to establish relationships between whole blood, plasma, saliva and urine NMRs. As whole blood is collected for different purposes (e.g. DNA) and is often refrigerated prior to freezing we also investigated the stability of NMR at 4°C. Whole blood, plasma, saliva and urine were collected from 36 smokers and concentrations of COT and 3-HC were analyzed by LCMS and regression analyses. Urinary NMR was analyzed using both free (non-glucuronidated) and total (deconjugated) metabolite ratios. For the stability analysis, whole blood obtained from 10 smokers was stored at 4°C. Aliquots were taken at 5 time-points between 0 and 72 hours, transferred to -30°C and analyzed in duplicate. Within-subject coefficient of variation (CV) and repeated-measures ANOVA were conducted. We observed strong correlations ( $p<0.0001$ ) for log normalized NMRs between whole blood to plasma  $R^2 = 0.87$ , slope = 0.89 and blood to saliva  $R^2 = 0.70$ , slope = 0.86. There were also good correlations ( $p<0.0001$ ) between whole blood and different urinary NMRs: total 3-HC/ total COT  $R^2 = 0.75$ , slope = 0.93, total-3-HC/free COT  $R^2 = 0.58$ , slope 0.94 and free 3HC/free COT  $R^2 = 0.47$ , slope = 0.81. Whole blood NMR showed good stability at 4°C over the 72 hours with no significant change and an average CV of 9.2% (range: 1.6 – 19.4 %). Our findings show a near-to 1:1 relationships and strong correlations between whole blood, plasma, saliva and urinary log NMRs. The NMR from whole blood showed little variation over 72h kept at 4°C, indicating the samples can be stored short term until frozen to prevent possible degradation of COT and 3-HC. Taken together, this supports the use of whole blood, plasma, saliva, and urine (total 3-HC/total COT) log-normalized NMR as a tool for assessing rates of nicotine metabolism.

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## POS4-56

### RELATIONSHIPS OF ABSTINENCE-RELATED EXPECTANCIES TO SMOKING CESSATION TREATMENT OUTCOME AMONG SMOKERS IN THE CRIMINAL JUSTICE SYSTEM: INITIAL RESULTS FROM AN ONGOING CLINICAL TRIAL

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**INTRODUCTION:** Individuals in the criminal justice system have high rates of smoking and multiple comorbidities that make cessation difficult yet few opportunities for smoking cessation treatment. The objective of the current study was to evaluate the relationships between expectancies for the process of cessation (i.e., abstinence-related expectancies) and smoking cessation treatment outcome among smokers in community corrections enrolled in an ongoing clinical trial. **METHOD:** Participants were recruited onsite at community corrections offices, provided with 12 weeks of bupropion, and randomized to receive either 4 sessions of counseling or brief physician advice. 286 participants completed the Smoking Abstinence Questionnaire, which assessed smokers' abstinence-related expectancies, at pretreatment baseline. Smoking status was assessed at multiple time points with the latest assessment occurring at 12 months after the initiation of treatment. **RESULTS:** To test the unique predictive validity of abstinence-related expectancies, generalized estimating equations analyses were conducted while controlling for the effects of treatment condition, gender, race, age, education, tobacco dependence, motivation to quit, and abstinence self-efficacy. Results suggest that those who expected greater withdrawal symptoms (OR = .91, 95% CI [.84, .99]) and greater social improvement upon quitting (OR = .87, 95% CI [.81, .93]) achieved lower rates of abstinence, with evidence of unique time trends. Similar, near-significant results were found among those who anticipated greater commonly offered benefits of quitting (OR = .93, 95% CI [.87, 1.00]) and greater barriers to formal intervention (OR = .93, 95% CI [.86, 1.00]), as well as among those who were more likely to expect cessation to be unproblematic (OR = .92, 95% CI [.84, 1.01]). **DISCUSSION:** Abstinence-related expectancies may predict tobacco dependence intervention outcome among correctional populations above and beyond a number of established predictors of treatment success. Findings offer direction with regard to tailoring treatment to smokers in the criminal justice system in order to maximize the likelihood of abstinence.

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## POS4-57

### IMPACT OF PROMOTIONS ON AWARENESS, TRIAL AND INTEREST IN DISSOLVABLE TOBACCO

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**Introduction:** RJ Reynolds launched new dissolvable tobacco products into limited US test markets, including Indianapolis. The purpose of the study was to determine public awareness, trial and perceptions of Camel Dissolvables (Orbs, Sticks & Strips) as well as the effectiveness of their promotional effects in the Indiana test market. **Methods:** An internet-based market research firm was used to obtain a stratified sample of adult male and female smokers and nonsmokers living in Indianapolis and eight surrounding counties (N=472). Male smokers were oversampled. Data was post-stratified and weighted to account for the sampling design and to reflect actual Indiana smoking and gender demographics. A 63-item survey instrument piloted in 2010 was used for data collection. **Results:** Of total respondents, 31.2% were aware of Camel Dissolvables, 4.5% had tried them and 9.7% were likely to try them. Tobacco use status was a significant predictor of all three outcomes; dual users were more likely to be familiar with, try and be interested in trying Camel Dissolvables than single tobacco users and non-users (p<0.01). Male gender was only a significant predictor for likelihood of trial (p<0.01). Education was only a significant predictor of trial (p<0.05) with the more educated more likely to have tried the Dissolvables. Exposure to promotions varied by outcome with familiarity being predicted by in-store ads, magazine ads and mail promotions. Trial was predicted by having seen magazine ads. Likelihood of trial was predicted by website exposure. Of those who reported trying Camel Dissolvables (N=37), 49% no longer use them, 43% use them some days, and 8% use them daily. No non-smokers who tried the Dissolvables reported continued use; 87% of dual users continued use, and 26% of single tobacco users who tried the products continued using them (p<0.01). **Conclusion:** Overall, consumer awareness, interest and trial of Camel Dissolvables were low. However, exposure to product promotions was effective at increasing awareness, trial

and likelihood of trial. Smokers and particularly, male dual tobacco users appear most affected by Camel Dissolvable tobacco promotions.

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## POS4-58

### SENSATION SEEKING AND ERROR PROCESSING ERPS DISTINGUISH DAILY AND NON-DAILY SMOKERS

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Personality, cognitive, and psychophysiological factors that protect long-term non-daily smokers (LITS) from transitioning to daily dependent smokers are not well established. We tested whether impulsivity, behavioral control, and event-related potential (ERP) measures of error processing differentiated daily smokers, LITS, and non-smokers. Participants completed self-report questionnaires and a continuous performance task with ERP recording. Daily and non-daily smokers scored lower on conscientiousness and higher on motor impulsiveness, experience seeking, and disinhibition compared to non-smokers. The smoking groups did not differ on self-report measures of personality despite significant differences on measures of nicotine dependence (NDSS) and smoking motivation (WISDM). Additionally, LITS reported greater sensitivity to physical sensation than nonsmokers and marginally lower than daily smokers. No group differences were found for response time or error commission in the behavioral control task. Daily smokers showed an attenuated event-related negativity (ERN) compared to non-smokers, suggesting differences in initial error processing and atypical functioning of the cingulate cortex. Moreover, group differences on the Error Positivity (Pe) component support differences in delayed evaluation of error salience and the functioning of the posterior temporal cortex circuits involved in the ventral attentional network (Helenius et al, 2010). LITS had a greater Pe response than both smokers and non-smokers. Increased sensitivity to physical sensations and differences in error processing separated the LITS from daily and non-smokers, implicating potential neuroprotective factors in nicotine dependence.

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## POS4-59

### PHYSICIAN OFFICE SYSTEM CHANGE FOR SMOKING CESSATION: A QUALITY IMPROVEMENT INITIATIVE

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The Greater Rochester Area Cessation Center (GRATCC) is one of 19 Cessation Centers funded by the NYS Department of Health to provide training and technical assistance to all primary care practitioners. To translate evidence-based interventions to clinical practice, GRATCC assists providers in design and implementation of office-based systems to identify and treat tobacco dependence, using CDC and Department of Health and Human Services Clinical Practice Guidelines. A recent Quality Improvement initiative at a major Health System in Rochester, NY aimed to enhance routine methods to document patient smoking status, assess readiness to change, and assist in quit attempts. The Health System's clinical informatics report was used, with a Nurse or Medical Assistant identifying and documenting information for patients 13 and older. Individuals who smoked at least 100 cigarettes in their lifetime and smoke daily are defined as "Smokers". Patients whose smoking status is "Smoker" or have "Due" present in the "Smoke Counsel" column are asked if they want to speak with a provider about quitting. If "Yes," a green brief office intervention card is placed in the exam room door box to alert the provider that the patient is ready to set a quit date. If "No," a yellow card is placed indicating that the patient is not ready. Both cards prompt providers to counsel patients and document counseling using the 5A model. Evaluation data will be presented for 11 primary care clinics. Rates of screening and cessation counseling increased in all 11 practices from baseline to post-training follow-up, with an average increase of



37.45%. This increase is statistically significant (paired  $t = -0.784$ ,  $df = 10$ ,  $p < .001$ ). Quality improvement and systems change satisfaction were rated favorably. Implications for the partnership include the feasibility of a synergistic collaboration and practice acceptance of these easy, evidence-based office procedure changes. This model of partnering for brief training and academic detailing of EMR-based documentation procedures (using tenets of "Meaningful Use") can be used with other health indicators and health system procedure improvements.

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## POS4-60

### GALANTAMINE ATTENUATES SOME OF THE SUBJECTIVE EFFECTS OF INTRAVENOUS NICOTINE AND IMPROVES VIGILANCE IN ABSTINENT CIGARETTE SMOKERS

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**Rationale:** Galantamine, a reversible and competitive inhibitor of acetylcholinesterase, is used clinically in the treatment of Alzheimer's dementia. Some preclinical and clinical studies support the potential efficacy of cholinesterase inhibitors for smoking cessation. Systematic human studies examining galantamine's effects on the behavioral and physiological responses to nicotine are lacking. The goal of this study was to characterize galantamine's actions on multiple outcomes including withdrawal severity, sustained attention function as well as subjective and physiological responses to nicotine administered intravenously. **Methods:** A total of 12 smokers participated in a double-blind, placebo-controlled, crossover study. Smokers had two, 4-day treatment periods, assigned in random sequence, to galantamine (8 mg/day) or placebo treatment. On day 4 of each treatment phase, smokers had an experimental session, where they received an intravenous dose of saline or 1 mg/70 kg nicotine, one hour apart, in a random order. **Results:** Galantamine attenuated the rating of craving for cigarettes and prevented a decrement in performance over time on a sustained attention task. In response to IV nicotine, galantamine treatment attenuated the rating of stimulated, good drug effects, like the drug effects, bad drug effects, and stimulated. **Conclusions:** These findings support potential utility of galantamine as a treatment for smoking cessation.

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## POS4-61

### PROMOTING CESSATION & REDUCTION IN SMOKERS WHO ARE NOT INTERESTED IN QUITTING

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While most smokers are interested in quitting at some stage in the future, most do not successfully quit in any given year, and many do not even try. A core goal of tobacco control policy has been to motivate smokers to attempt to quit. Traditional "stages of change"-based approaches focus on gradually increasing motivation, but a number of recent studies have found that many quit attempts occur seemingly without pre-planning and without a gradual escalation of stage of change. One way to promote quit attempts might be by offering all smokers immediate access to treatment. In this single group pilot study, we recruited 100 smokers who reported that they were not interested in quitting within the next three months (84% reported no interest in quitting within the next year) to take part in an online survey of smoking. Within a week of completing the initial survey, all participants were mailed a package containing a quit booklet and a 7-day supply of nicotine patches; an accompanying letter explained that while they were not currently interested in quitting, they should seriously consider doing so. Four weeks after the initial survey participants were re-contacted (via email) and asked to complete a brief follow-up survey. Follow-up data was collected on 58% of the initial sample. Despite reporting no initial interest in quitting, 22.4% (13/58) of respondents reported using the patches provided. Of those who completed the follow-up survey, 57% had reduced their smoking rate since the initial survey: the average change in smoking

rate was -20.3% (-4.5 cigarettes per day). Lower nicotine dependence (as measured by time to first cigarette) was associated with greater reduction ( $p = .005$ ); patch use was also associated with greater smoking reduction (-41.2% vs -15.9%;  $p = .020$ ). One respondent reported abstinence at follow-up. While modest, these pilot results suggest that, given the right conditions, even smokers with no stated interest in quitting smoking can be prompted to change their behaviour.

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## POS4-62

### ANXIETY SENSITIVITY AND TOBACCO CONSUMPTION

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Recent studies have focused on emotional vulnerabilities that could favor the development of some psychopathologies such as an anxiety disorder, which has been linked significantly with smoking behavior. Anxiety sensitivity has been derived on anxiety research as an important factor that could lead to an anxiety disorder and to a possible increase in the consumption of tobacco and nicotine dependence. The goal of this study is to determine the relationship between smoking behavior and anxiety, specifically, we focus on anxiety sensitivity (AS). The AS is considered as the fear of anxiety symptoms that arises from the belief that anxiety symptoms have harmful or dangerous consequences to the person experiencing it. The "Fagerström Test for Nicotine Dependence (Heatherton et al., 1991)", the "Anxiety Sensitivity Index" (ASI, Peterson and Reiss, 1992, adapted by Sandin et al., 2005) and the "Positive and Negative Affect Schedule (The PANAS Scales, Watson, Clark y Tellegen, 1988, adapted by Páez y Robles, 2003)" were applied to 187 smokers between 19 and 65 years of age in Michoacan, México. Results showed a correlation between nicotine dependence and the negative affect ( $r = 0.21$ ,  $p < 0.05$ ), the total score of the ASI ( $r = 0.201$ ,  $p < 0.05$ ), the cognitive subscale of the ASI ( $r = 0.245$ ,  $p < 0.05$ ) and with the social subscale of the ASI ( $r = 0.174$ ,  $p < 0.05$ ). Results suggest that, people with higher levels of anxiety sensitivity and negative affect tend to have higher levels of nicotine dependence. We consider that this finding have important theoretical implications to explain the initiation and maintenance of smoking behavior and treatment of people interested in quitting.

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## POS4-63

### A NOVEL EVALUATION OF "WORLD NO TOBACCO DAY" IN LATIN AMERICA

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"World No Tobacco Day" (WNTD) aims to inform the public about tobacco harms. Because tobacco control surveillance is usually annualized, the effectiveness of WNTD remains unexplored into its 25th year. Daily news coverage of and Internet search queries for cessation in seven Latin American nations were monitored from 2006-2011. Cessation news coverage peaked around WNTD, typically increasing 71% (95%CI 61-81), ranging from 61% in Mexico to 83% in Venezuela. Queries indicative of cessation attempts peaked on WNTD, increasing 40% (95% CI: 32-48), ranging from 24% in Colombia to 84% in Venezuela. A doubling in cessation news coverage was associated with approximately a 50% increase in cessation queries. To gain practical perspective, WNTD was compared to several cigarette excise tax increases in Mexico. Cessation queries around WNTD approximated a 2.8% increase in cigarette excise taxes. This was the first evaluation of WNTD, suggesting it had a significant impact on popular (news) and individual (queries) interest in smoking cessation. Because WNTD is constantly evolving, our work is also a framework for real-time surveillance and potential

improvement in WNTD going forward.

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## POS4-64

### THE REACH OF E-CIGARETTES ON THE INTERNET HAS BEEN UNDERSTUDIED AND POTENTIALLY THREATENS GLOBAL HEALTH

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A recent commentary described the woeful state of research on the public health impact of e-cigarettes. This commentary, however, did not recognize the role of the Internet in the growth of e-cigarette use, and how novel digital surveillance may provide real-time and low-cost insight into the reach of e-cigarettes. We present timely estimates of the popularity of e-cigarettes in Australia, Canada, the United Kingdom, and United States by extending methods we have pioneered in tobacco control. E-cigarettes continue to grow more popular on the Internet. Globally there were more than 6.6 million e-cigarette queries on Google each month, with 4.2 million originating in the US followed by 700K, 200K, and 100K in the UK, CA and AU respectively. Comparing mean query levels for all of 2010 to 2011, e-cigarette queries were respectively 75% (95% confidence interval [95%CI], 45-111), 61% (95%CI, 49-73), 19% (95%CI, 12-28), and 35% (95%CI, 19-53) higher in AU, the UK, the US, and CA respectively. E-cigarette discussions on Internet blog archives are increasing at similar rates, while news trends -- avenues for traditional media advocacy -- are declining. For example, e-cigarette blog stories have increased 125% (95%CI, 61-240), 117% (95%CI, 62-206), 125% (95%CI, 54-250), and 117% (95%CI, 48-241) for AU, the UK, the US, and CA from 2010 to 2011 while news stories have decreased 32% (95%CI, 8-53), 27% (95%CI, 3-50), 15% (95%CI, 18-44), and 34% (95%CI, 10-55) in the same regions over the same period. Novel digital surveillance may serve as a principle sentinel for the reach of e-cigarettes given their limited availability at brick-and-mortar retailers. Because e-cigarettes popularity is constantly changing, this work not only provides a snapshot of recent trends but also a framework and toolkit for real-time surveillance going forward. We present an open source website providing continual updates of these trends where investigators may download these data and perform their own analysis.

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## POS4-65

### RICHMOND, CALIFORNIA: DIVERSE PERSPECTIVES ON BECOMING A TOBACCO-FREE MULTI-UNIT HOUSING POLICY PIONEER

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One of the first communities in the country to enact a thorough package of tobacco control laws simultaneously is Richmond, California. These laws include novel secondhand smoke (SHS) exposure reduction measures. The overall objectives of this study are to 1) study what key stakeholders know about development and enforcement of Richmond's smoke-free multi-unit housing (MUH) ordinance, 2) identify any potential barriers to full implementation of the ordinance, and 3) as a result of these efforts, create

forums and materials to improve adherence to the ordinance. This formative and process evaluation case study of the adoption and implementation of this citywide ordinance to reduce SHS exposure in MUH residences includes conducting focus groups and one-on-one interviews with community stakeholders such as residents, landlords, city officials, law enforcement, and local public health advocates. Following entrée into the community through previously established relationships, we have formed a community advisory board (CAB) to assist in building research partnerships with community residents. Analyses of initial interviews and focus groups have highlighted the importance of nonconfrontational educational sessions, working with building managers to display the required signage and the identification of designated smoking areas at least 25 feet from common MUH spaces. Questions of enforceability and definitional refinements regarding tobacco and marijuana smoke are central concerns for enforcement and judicial personnel, who must work within the constraints of a complaint-driven system that requires citizen cooperation. Given that smoke-free policies in MUH represent a new area of interest in tobacco control, it is important to understand how community residents and other stakeholders adopt and carry out these policies. The goal of this project is to ensure that Richmond's ordinance is adopted and implemented citywide, equitably across the socially and economically diverse communities within the city. Additionally, results generated from this study could inform other cities and municipalities how they can smoothly adopt and implement similar policies.

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## POS4-66

### STATISTICAL MODELS, MEASUREMENT, AND NICOTINE DEPENDENCE THEORY DEVELOPMENT

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Complex multivariate statistical models are being used increasingly frequently in tobacco research. Very often these analyses use data and items that were not designed with a particular multivariate model in mind. For example, items may have been developed for surveillance or with a factor analytic model in mind but then used in cluster or mixture analysis. A common assumption is that these multivariate models pull out the important information in the data. This work begins to examine this assumption. The nicotine dependence construct has been treated both continuously and categorically in the literature. However this choice is either assumed or an empirical attempt to decide is made. I compare two simple and very similar latent variable models: the latent class and latent profile models. These models differ in terms of the scale of the data, but the analytic goals are identical. The Nicotine Dependence Syndrome Scale, administered as part of the 2004 National Survey of Drug Use and Health, is analyzed with both models. Sub-scale scores calculated from the raw ordinal data and from recoded binary data were used. To reduce exogenous heterogeneity, the sample was limited to white adults who reported daily smoking in the past 30 days (N=5,926). Clearly one expects the data features driving the results to be strong. Arguably, the information in the positive/negative valence of the ordinal items should largely be captured in the binary data. However, starkly different results emerged, telling quite different stories of the underlying structure of nicotine dependence in this sample. In fact, psychometrically the importance of the sub-scales differed sharply between the analyses. In the latent class analysis, the sub-scales for drive/craving and tolerance are among the most important, whereas in the results of the latent profile analysis, the smoking priority sub-scale dominates the analysis. Possible causes and broad implications of the findings, as well as recommendations are considered. Nicotine dependence is a critically important construct and our thinking about it has been and will continue to be influenced by analyses such as those reported here.

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## POS4-67

### TOBACCO USE CHARACTERISTICS AMONG POLYDRUG USERS

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**Background:** Tobacco dependence among alcohol and drug dependent patients is highly prevalent - nearly three times higher as compared to the general population. Smoking also contributes to the alarmingly high rates of morbidity and mortality in this population. Hence, it is important to assess tobacco dependence with a view to systematically intervene in this population. **Objectives:** To study pattern and severity of tobacco use in treatment seeking polydrug users. **Methods:** In this study, the tobacco use characteristics of 197 consecutive patients attending tobacco cessation clinic of NDDTC(National Drug Dependence Treatment Centre) India were analyzed. **Results:** Majority of the patients were males(98.5%) ,with most(60%) being in the 21-40 yrs age group. Most were married(78%), 23.4% were illiterate and 20.41% were presently unemployed. Nearly half (49.7%) of patients used tobacco in smokable form , 13.8% reporting only smokeless tobacco and 36.4% of patients reported consumption of both smokable and smokeless tobacco products. Mean age of initiation of was 17±6yrs and 23±9yrs for smokable and smokeless tobacco use respectively. All the selected individuals also had a history of polydrug use. The most common of these were heroin dependence (55%), alcohol dependence (37.1%), and cannabis dependence (13.7% ) according to clinical diagnosis by ICD-10. These substance dependence diagnoses were not mutually exclusive. More than half (52 %) of the subjects had high to very high level of tobacco dependence as measured by Fagerstrom's test for nicotine dependence(FTND). Mean FTND scores were significantly higher for users reporting both smoking and smokeless tobacco use compared to smoking only. Further, FTND scores were significantly correlated with age of onset ( $r = -.241, p < .01$ ) and average dose for smokable tobacco users ( $r = .205, p < .05$ ). **Conclusions:** Given their high severity of nicotine dependence and the known morbidity and mortality, it is important to address nicotine dependence in addition to treatment of their primary drug of abuse among poly drug users.

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## POS4-68

### COMMUNITY HEALTH WORKER DELIVERED SHS EXPOSURE REDUCTION INTERVENTION IN HOUSEHOLDS OF YOUNG CHILDREN: A RANDOMISED CONTROLLED TRIAL

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**Objective:** High prevalence of adult smoking in China underscores the widespread exposure to second hand smoke (SHS) among children. No randomized studies of SHS exposure reduction among children in China have been conducted. The objective of this study was to assess whether a Protection Motivation Theory (PMT)-based intervention for household smokers will lead to reduced SHS exposure to children in Chinese families. **Methods:** Participants, smoking parents or caregivers who had children aged 5 years or younger at home, were randomized to the intervention (n=164) or the comparison group (n=154) after the baseline assessment. Outcomes were assessed at 2 months and 6 months follow-up. Participants in the intervention group received two in-person counseling, four telephone counseling and health education pamphlets on smoking and SHS over 4 months. Participants in the comparison group received one in-person counseling, two telephone counseling and health education pamphlets related to child development. Urine cotinine levels of all children were measured at baseline, 2 months and 6 months. The intervention was delivered by trained community health workers (CHWs). **Results:** At the 6-month follow up, parents report of their smoking at home and children's exposure, as measured by urine cotinine level, was not correlated. Twenty seven (16%) intervention group and 15 (9%) comparison group households adopted complete smoking restrictions at home; total exposure from all smokers indoors in the past 7 days was significantly lower among children in the intervention than the comparison group. Children's urine cotinine levels decreased from the baseline level, yet group differences for changes were not significant. Participants rating of the overall usefulness of the intervention was 4.8 +0.8 (1 standard deviation) on the 5 point scale (1 not at all and 5= very useful). **Discussion:** This study demonstrates the feasibility of engaging household members in SHS exposure reduction to children in a developing

country setting. Failure to obtain differential decrease in urine cotinine concentration between the intervention and the comparison groups need to be further explored.

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## POS4-69

### FACTORS ASSOCIATED WITH PARTICIPATION OF SMOKER PARENTS OR CAREGIVERS IN A CHW DELIVERED SHS EXPOSURE REDUCTION INTERVENTION IN CHINA

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**Objective:** To identify the factors associated with participation of smoking parents or caregivers in a Community Health Workers (CHWs) delivered Second-hand Smoking (SHS) exposure reduction intervention program. **Methods:** The smoking parents or caregivers of young children (aged 5 years or younger) in the urban community setting were interviewed and invited to take part in a CHWs delivered SHS exposure reduction intervention program. The characteristics of the parents or caregivers, and the predictors of participation were analyzed by chi-square test and by logistic regression. **Results:** A total of 259 smoking parents or caregivers were interviewed and 203 agreed to participate in the CHWs delivered SHS exposure reduction intervention program (78.4% participation rate). There were few differences between the participants and the nonparticipants. The logistic regression identified three predictors of participation in the intervention program: being from a middle-income household, smoking an average of 11-21 cigarettes daily, and perceiving difficulty in adopting a no smoking policy at home. **Conclusions:** Recruitment approaches should be refined according to the identified factors in this study to target those who might decline an invitation to participate in this or other similar intervention to reduce children's exposure to SHS.

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## POS4-70

### EFFECT OF A PAY-FOR-PERFORMANCE INCENTIVE TO INCREASE SMOKING STATUS DOCUMENTATION IN AN ELECTRONIC HEALTH RECORD

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**BACKGROUND:** Documentation of smoking status enables healthcare systems to implement chronic disease management tools for tobacco users. Despite being a US government standard for EHRs, achieving high rates of documentation is challenging for many systems. Starting in 2010, 3 insurers in our healthcare system participated in a Pay-for-Performance (P4P) measure for practices to document smoking status in the EHR for high-risk patients with chronic conditions. To help practices, a smoking status reminder was added to all patients' EHR. We studied whether P4P plus the reminder improved documentation. **METHODS:** Patients are eligible for P4P if they: (1) visit an outpatient provider during the year, (2) have a participating insurer, and (3) a chronic condition: diabetes, hypertension, or coronary heart disease. We measured the change in smoking status documentation the year before (2009) and the first year after (2010) the P4P program, comparing eligible patients with ineligible patients who had chronic conditions but non-P4P commercial insurance. We used logistic regression models and GEE techniques to compare change in smoking status documentation before and

after implementing the P4P incentive by eligibility, adjusting for patient age, sex, race, language, number of visits, provider age and sex, and clustering by PCP. RESULTS: Over 460,000 adults per year made an outpatient visit, 4% met P4P eligibility criteria in 2009 and 5% were eligible in 2010. Smoking status documentation increased for everyone after 2010: P4P eligible adults increased from 61% to 63% in 2009 and to 80% in 2010. Ineligible adults increased from 61% to 63% in 2009 and to 77% in 2010. In multivariable analyses, P4P eligible adults had the largest increase in smoking status documentation after the P4P was implemented ( $p=0.009$ ), but documentation among ineligible patients also increased significantly after the implementation ( $p=0.002$ ). CONCLUSIONS: A P4P incentive plus an EHR reminder increased smoking status documentation. The effect of these initiatives improved documentation for all patients, especially for the high-risk adults targeted by the intervention.

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## POS4-71

### SMOKING CESSATION INTENTIONS AND BEHAVIORS IN FOURTEEN COUNTRIES

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On behalf of the GATS collaborative group.

Smoking is estimated to cause nearly 6 million deaths annually. Although cessation can dramatically reduce the burden of smoking-related mortality, wide variation exists around the world in the implementation of evidence-based tobacco control policies to help smokers quit. This study examines smoking cessation intentions and behaviors across the 14 countries which conducted the Global Adult Tobacco Survey (GATS) during 2008-2010, a standardized, nationally representative household survey of persons aged  $\geq 15$  years. In each country, a multistage cluster design was used to select a sample of respondents and the survey was administered in the country's local language, using handheld electronic data collection devices. The number of completed interviews ranged from 5,581 in Uruguay to 69,296 in India. In these 14 countries, it is estimated that over 650 million people ages 15 and older were daily smokers at some point in their life, of which 120 million have quit. However, in the two most populous countries in the world, the quit ratios (defined as the percentage of ever daily smokers who were not current smokers at the time of the interview) were the lowest (China: 12.6% for men and 16.8% for women; India: 12.1% for men and 16.2% for women). The highest quit ratios were observed in Brazil and Uruguay (over 40% for both men and women). The percentage of current smokers reporting an interest in quitting ranged from 41.6% in China to 76.7% in Uruguay among men and 33.8% in China to 75.5% in Mexico among women. There was also wide variation across countries in the proportion of smokers during the past year who made a quit attempt and who were abstinent at the time of the survey. Efforts to prevent young people from initiating tobacco use are critical to the long-term goal of reducing the burden of smoking-related disease, but more immediate benefits to public health will be achieved by helping smokers quit through the implementation of evidence-based policies and provision of cessation services. If all countries achieved the highest quit ratios observed in this survey, millions of deaths from smoking would be avoided.

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## POS4-72

### SYSTEMS CHANGES AND MEANINGFUL USE: IMPACT OF A HOSPITAL BASED TOBACCO CESSATION PROGRAM

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Hospitalization is a critical teachable moment for tobacco cessation, and the importance of addressing tobacco use as part of hospital care is increasingly recognized. Effectively treating tobacco use in the hospital setting requires system changes to increase identification, counseling, and follow-up with patients who use tobacco. In the

first year of the UNC inpatient to outpatient (I2O) hospital based tobacco use treatment program, we collaborated with many hospital departments (Information Technology, Quality Improvement, Nursing, Medical residency, Clinical Case Management) to create structural changes that allowed providers to easily identify and document tobacco use and refer patients to the I2O program for counseling. We will share details of changes to existing systems and creation of new systems that have been essential to our program success, including identification and referral mechanisms created within the existing medical records system, and outcomes related to meaningful use measures for tobacco use identification and intervention. Since the implementation of these changes, quantitative data supports the effectiveness of these measures. Inpatient tobacco cessation consult orders more than doubled, increasing from 217 in 2010 to 561 in 2011. In total, for 2011, over 600 bedside tobacco use treatment consults were provided. Participants will gain insight into the multifaceted approaches to achieving structural changes within a complex healthcare setting to create a successful tobacco cessation programs for hospitalized patients.

The Inpatient to Outpatient (I2O) program is funded by a Pfizer medical education grant. The UNC Nicotine Dependence Program has received an unrestricted educational grant from Pfizer to support tobacco cessation in inpatient settings.

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## POS4-73

### LESSONS LEARNED FROM THREE YEARS OF A CANCER HOSPITAL TOBACCO USE TREATMENT PROGRAM

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Tobacco use treatment is an essential service for any cancer center to offer, with tremendous potential to reduce morbidity, mortality, and costs. Cancer diagnosis and treatment present unique opportunities to assist patients with tobacco cessation. Quitting smoking following cancer diagnosis improves treatment efficacy, increases recurrence-free survival, decreases risk of second primary tumors, positively impacts quality of life, and decreases costs. Despite the clear need for and benefits of tobacco use treatment for cancer patients, less than one-third of NCI designated cancer centers offer on-site tobacco use treatment services for patients. In collaboration with the North Carolina Cancer Hospital (NCCH) Department of Radiation Oncology and the UNC Head and Neck Cancer Program, in March 2009 the UNC Nicotine Dependence Program (NDP) established a pilot tobacco use treatment program for head and neck cancer patients. Since that time, the NCCH NDP has grown into a multidisciplinary program serving patients across all NCCH departments. To date, more than 70 providers have referred nearly 400 patients, and we have provided tobacco cessation services to over 250 patients in all stages of treatment for 27 types of cancer. We will present three year process and outcome measures, including provider satisfaction and participant quit rates. Discussion of lessons learned will offer guidance for integrating tobacco use treatment into a complex multidisciplinary healthcare system. Key facilitators of our success include close collaboration with the radiation oncology department, ongoing outreach and education across departments and relationships with key referring providers. Barriers include factors related to the specific patient population, structural issues raised by being an outside entity working within a complex system and variations in provider knowledge and attitudes about tobacco cessation. Current opportunities for continued growth include new collaborative research, expanding treatment services to family members, and working towards improved structural integration.

The NCCH NDP program was funded through a University Cancer Research Fund Clinical Innovation Award in its first year, with continuing funding in yearly grants from the Lineberger Comprehensive Cancer Center.

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## POS4-74

### EXPLORING ALTERNATE MECHANISMS UNDERLYING THE ASSOCIATION BETWEEN PRENATAL TOBACCO EXPOSURE AND ADOLESCENT SMOKING

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Prenatal exposure to tobacco is a known risk factor for chronic smoking in adolescence. However, its mechanisms of action are unknown. Other factors related to prenatal exposure may help explain how the association arises. For example, prenatal exposure may increase risk of chronic smoking in offspring via 1) greater adolescent smoking quantity and frequency following initiation, or 2) increased sensitivity to nicotine dependence symptoms at low levels of smoking. This study used path analysis to investigate these mechanisms by examining whether the relationship between prenatal tobacco exposure and regular adolescent smoking is mediated by these factors, while controlling for parent smoking at baseline. Two smoking groups, experimenters (<100 cigarettes/lifetime and smoked within the past 90 days at baseline) and current smokers (>100 cigarettes/lifetime and smoked within the past 30 days at baseline), were analyzed separately. Data were drawn from the Social and Emotional and Contexts of Adolescent Smoking Patterns Study (P01 CA098262 from NCI), a longitudinal study of developing adolescent smokers. Results revealed that, for experimenters, prenatal exposure is directly associated with increased adolescent smoking frequency at 48 months, rather than being mediated by prior smoking behavior or early onset of nicotine dependence symptoms. This relationship was not accounted for by baseline parent smoking. For current smokers, only prior smoking behavior, and not prenatal exposure, was associated with smoking frequency at 48 months. These results seem to rule out sensitivity to nicotine dependence and increased smoking behavior as factors that explain the relationship between prenatal tobacco exposure and regular adolescent smoking. Further, the independent association between prenatal tobacco exposure and adolescent smoking is not accounted for by postnatal parent smoking, suggesting a direct impact of prenatal exposure extending beyond that of having chronically smoking parents. Future work should test other possible mediators, for example epigenetic changes linked to prenatal tobacco exposure or gene variants that influence the brain's response to nicotine.

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## POS4-75

### ADDRESSING TOBACCO USE IN HOSPITALIZED PATIENTS: PROVIDER BEHAVIOR CHANGE AFTER IMPLEMENTATION OF A HOSPITAL BASED TOBACCO USE TREATMENT PROGRAM

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The Inpatient to Outpatient (I2O) program provides a comprehensive hospital-initiated tobacco use treatment program integrating systems change, quality improvement, and provider education to ensure continuity of tobacco use care from inpatient to outpatient settings. To assess changes in provider knowledge, beliefs, and practices related to tobacco use treatment, as well as program impact, pre and post-program implementation surveys were completed by 108 first and second year medical residents in five specialties. Pre-survey results revealed substantial gaps between perceived importance and self-efficacy of addressing tobacco use. Over 95% agreed that offering cessation counseling to every inpatient is important, but over 25% expressed low confidence in doing so. Similarly, 80% agreed that cessation medications should be offered to all inpatients, but 66% reported low confidence for providing medications at optimal levels. Over 90% agreed that having cessation referral resources available would increase their likelihood to counsel patients, but more than 60% were not familiar with referral sources such as the Quitline fax referral and the I2O program. Additionally, less than 20% always asked patients about their tobacco use at admission and less than 10% regularly documented tobacco use. These results guided implementation of innovative educational techniques to disseminate information about tobacco use treatment counseling and the I2O program. These methods have contributed to a significant increase in orders for tobacco cessation consults, which more than doubled in the first full program year, from 217 pre-program implementation to 561 post-implementation, and increases in the number of inpatients receiving counseling for tobacco use. Follow-up survey results document changes in

providers' tobacco use treatment knowledge, beliefs, and practices. Participants will gain valuable insight into strategies used to support provider behavior change.

*The I2O program is funded by a Pfizer medical education grant. The UNC Nicotine Dependence Program has received an unrestricted educational grant from Pfizer to support tobacco cessation in inpatient settings.*

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## POS4-76

### SMOKING CESSATION ADVICE BY GPs IN ENGLAND: WHAT DO SMOKERS REPORT AND HOW DOES ADVICE RELATE TO QUIT ATTEMPTS AND CESSATION?

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Objectives: To report the incidence of brief GP advice to stop smoking and to examine the association between brief GP advice and both attempts to quit smoking and smoking cessation. Design: A cross-sectional survey of a nationally representative sample of adults. Setting: Monthly household surveys conducted in England for the Smoking Toolkit Study between February 2010 and November 2011. Participants: 6,229 adults who reported smoking and visiting their GP both in the last 12 months. Main outcome measures: Self-report of GP advice to stop smoking in the past year, of a serious attempt to quit smoking and smoking cessation in the last 12 months. Results: Of smokers who recalled visiting their GP in the past year, 60.6% (n=3,772) reported having been advised to stop smoking and 42.8% (n=2,663) were also offered some kind of support. After adjustment for socio-demographic characteristics, those who reported having been offered support were more likely than those receiving advice only or receiving no advice both to have made a quit attempt in the past year (OR = 2.37, 95% CI = 2.04-2.74; OR = 3.13, 95% CI = 2.78-3.52) and to have been successful (OR = 1.46, 95% CI = 1.07-2.00; OR = 1.29, 95% CI = 1.02-1.62). A subgroup of those who received advice only were asked whether they would have been interested in receiving help had it been offered: 50.8% (n=167) would have been interested. Conclusions: Smokers who recall having been offered support from their GP with stopping are more likely to have tried to quit and to have been successful than those who were only advised to stop or received no advice. These results from a nationally representative survey support the finding from a meta-analysis of RCTs of brief GP advice. Less than half of smokers in England report having received such an offer of support while approximately half of those receiving advice only would have been interested in being offered more help.

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## POS4-77

### THE ACUTE EFFECTS OF YOGIC BREATHING EXERCISES ON CRAVING AND WITHDRAWAL SYMPTOMS IN ABSTAINING SMOKERS

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Background: Better interventions are needed to help smokers to stop. Breathing exercises have been proposed as a way of combating cravings and potentially aiding cessation. They may do this by altering the functioning of brain regions mediating withdrawal symptoms, including the insula. This experimental study sought to evaluate the impact of breathing exercises on cigarette craving in abstaining smokers. Methods: Participants visited the laboratory on two occasions, 24 hours apart, and had to be CO-verified abstinent 12 hours prior to the first visit until the end of the second visit. Smokers (N=96) were randomly allocated to either a breathing exercise (BE) or video control (VC) condition. The BE group was instructed in breathing exercises, practised these for 10 minutes and were asked to use these until the next visit. The VC group was shown a breathing exercise video and asked to concentrate on breathing. Ratings of 'craving', 'urge to smoke' and withdrawal symptoms were assessed at the beginning and end of the first visit and again at the second visit. Results: Ratings of craving (F(1,94)=11.1, p<0.001) and urge to smoke (F(1,94)=15.8, p<0.001) were reduced in the BE compared with VC group immediately following the 10 min practice session. There was no difference between conditions in other withdrawal symptoms. At 24h follow-up those in the BE group reported feeling significantly less hungry (F(1,92)=4.3,

$p=0.04$ ) but there was no effect on cravings or urges to smoke. Discussion: Our results suggest an acute effect of breathing exercises on cravings and urges to smoke but further research is needed to determine whether and how this can be extended beyond laboratory conditions.

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## POS4-78

### VARENICLINE REDUCES TOBACCO CRAVING AND WITHDRAWAL IN SMOKERS WITH AND WITHOUT SCHIZOPHRENIA

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Background: Patients with schizophrenia (SCZ) display a high prevalence of smoking and high rates of smoking cessation failure. The central nicotinic acetylcholine receptor (nAChR) system is the main target for nicotine and is hypothesized to be involved in the pathophysiology of SCZ, and the high risk for the initiation and maintenance of tobacco dependence in these patients. Varenicline is a nAChR partial agonist and an effective tobacco pharmacotherapy. Accordingly, we studied the effects of varenicline versus placebo in a laboratory model of abstinence and reinstatement in nicotine-dependent smokers with and without SCZ. Methods: Using the Minnesota Nicotine Withdrawal Scale (MNWS) and the Tiffany Questionnaire of Tobacco Craving (TQSU), SCZ ( $n=9$ ) and control smokers (CON;  $n=9$ ) were assessed at baseline, after overnight abstinence and after smoking reinstatement (biochemically verified by CO and plasma nicotine levels). We utilized a double-blinded, counterbalanced, placebo-controlled design where participants were pretreated with varenicline (0, 0.5 or 1 mg BID) over three separate test weeks (Sacco et al., 2005). Results: Robust effects of overnight abstinence and smoking reinstatement were observed on TQSU and MNWS scores in SCZ ( $p's < 0.004$ ) and CON ( $p's < 0.001$ ). Across sessions, there was a main effect of diagnosis on TQSU Factor 2 and MNWS scores; with higher levels in SCZ ( $p's < 0.005$ ). With respect to varenicline co-treatment, the highest dose of varenicline (1mg BID) resulted in a decrease in TQSU and MNWS scores in CON ( $p's < 0.03$ ) and in SCZ there was a trend for reductions in abstinence-induced increases in TQSU and MNWS scores. Conclusion: Overnight abstinence and reinstatement induced significant changes in withdrawal and craving in SCZ and CON smokers. Our preliminary data suggests a pronounced reduction in tobacco craving and withdrawal by varenicline in SCZ and CON smokers, suggesting that this agent may be an effective pharmacological treatment for smoking cessation in SCZ. In addition, these findings provide support for the predictive validity of this laboratory model of smoking abstinence.

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## POS4-79

### ASSESSMENT OF HIGHER EDUCATION TOBACCO-CONTROL POLICIES, INTENTION FOR POLICY DEVELOPMENT, AND RESPONSE TO A STATE TOBACCO-FREE CAMPUS POLICY INITIATIVE

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Prevalence of cigarette smoking among college students increased by 28% between 1993 and 1997 (Wechsler, et al., 1998). Implementing tobacco-control policies is an effective strategy to prevent tobacco use (CDC, 2007). Consequently, there is a trend among higher education institutions to establish policies that encourage students to quit smoking, as well as reduce exposure to environmental tobacco smoke. The purpose of this study was to assess the types of tobacco-control policies enacted among Florida higher education institutions, intentions for future policy development as well as institutional response to a statewide campus policy initiative. Confidential phone interviews were completed with 39 key informants from institutions in the Florida State College System ( $N=28$ ) as well as the State University System of Florida ( $N=11$ ). The

participation rate was 100% among the sampled institutions. Informants were identified as being knowledgeable about their campus tobacco policy issues. Following data collection, the state of Florida's Department of Health- Bureau of Tobacco Prevention launched a CDC-funded College and University Tobacco-Free Campus Policy Initiative to assist colleges and universities with the adoption of tobacco-free policies. A post-hoc analysis examined whether or not institutions reporting intentions to establish or change their current policy took advantage of the statewide initiative. Preliminary results indicated that more than half (56%) of the higher educational institutions surveyed reported having an institutional tobacco policy. Moreover, 59% ( $N=22$ ) of these institutions reported a desire to make their existing policy more restrictive. Among institutions without a policy, 53% ( $N=9$ ) reported an intention to establish a policy. Interestingly, 28% of the 39 institutions ( $N=11$ ) reported future intentions to enact a campus wide ban on the use of all tobacco. Despite the majority of participating institutions reporting intentions to enhance their tobacco policy, only 25% ( $N=10$ ) enrolled in the University Tobacco-Free Campus Policy Initiative. Potential barriers associated with the minimal response to the statewide initiative are discussed.

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## POS4-80

### THE MAINE TOBACCO HELPLINE: IMPACT OF INSURANCE STATUS ON QUIT OUTCOMES AND UTILIZATION OF SERVICES

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Few studies examine how insurance status relates to quitline utilization and quit outcomes. Evidence suggests that combining cessation medication and counseling is the most effective means to reach and maintain abstinence. The Maine Tobacco HelpLine's (MeTHL) medication program offers vouchers for free, over-the-counter NRT based on medical eligibility. However, current contractual agreements prohibit vouchers for Medicaid clients, who must seek prescriptions from a physician for these medications. The aim of this study was to examine how Medicaid status relates to quit outcome, helpline counseling, and medication use. Data from two 7-month follow-up surveys of the MeTHL conducted in 2007 and 2009 were combined. For this study, the sample consisted of 1,220 out of 2,610 registrants randomly selected for the survey after excluding those who were not using tobacco, were < 18 years old, non-Maine residents, did not provide contact information, and did not agree to follow-up. Participants were primarily female (59.2%), Caucasian (94.6%), high school graduates (51%), between 26 and 65 years of age (82.3%). At follow-up, medication use (NRT, Bupropion, Varenicline) was 84.3%. Insurance distribution was 38.4% commercial, 22.8% Medicaid, 13.5% Medicare, and 25.3% uninsured. Medicaid participants were less likely to report use of medication ( $p < .01$ ), completed fewer calls ( $p < .01$ ), and were less likely to report 30-day point prevalence abstinence ( $p < .05$ ). Logistic regression showed that 30-day abstinence was associated with greater call completion ( $OR=1.3$ ,  $p < .001$ ) and medication use ( $OR=.593$ ,  $p < .05$ ), but not with Medicaid status. Medication use and greater call completion predicted abstinence. While Medicaid status alone was not a significant predictor of quit outcome, Medicaid participants completed less calls and were less likely to use medication. It is possible that MeTHL programming influences engagement in these abstinence promoting behaviors. Without ready access to NRT vouchers, Medicaid participants must navigate another step to receive medication and may have lower incentive to complete counseling. They are likely to have fewer skills to stay quit.

Partnership for a Tobacco-Free Maine, Maine Department of Health and Human Services, Maine Center for Disease Control and Prevention.

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## POS4-81

### PRELIMINARY RCT OF A BEHAVIORAL EXERCISE INTERVENTION FOR SMOKING CESSATION

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The existing exercise intervention studies for smoking cessation identify exercise adherence as a methodological issue limiting the ability to determine the potential

efficacy of aerobic exercise for smokers who want quit. After developing and pilot testing a behavioral exercise intervention that incorporated innovative components designed to increase adherence, we conducted a small, randomized controlled trial comparing this intervention to a health education contact control condition. Sixty-one smokers (66% female, mean age = 47.9 years; smoked a mean of 19.7 cigarettes/day) were randomized to receive either a 12-week group-based behavioral exercise intervention OR 12-week group-based health education contact control. Participants in both conditions received an 8-week telephone-delivered, standard smoking cessation protocol (with the transdermal nicotine patch). Regardless of condition, all participants quit on Week 5 of the 12-week intervention. Follow-ups and smoking abstinence were assessed at the end of treatment (EOT), 6- and 12-month timepoints. There were no differences between conditions with respect to the number of weekly exercise or health education sessions attended (9.3±2.8 vs 9.3±3.0, respectively). While not statistically significant, participants in the exercise condition demonstrated higher verified abstinence rates (EOT: 40% vs 22.6%, OR=2.28; 6-month & 12-month follow-ups: 26.7% vs. 12.9%, OR=2.46). Participants in the exercise condition also demonstrated a trend toward improved fitness at the EOT ( $t=1.8$ ,  $df=57$ ,  $p=.07$ ). Participants in the exercise condition experienced significantly less negative affect withdrawal symptoms in the first two weeks post quit date ( $t=-2.16$ ,  $df=38$ ,  $p<.05$ ). The results of this small, RCT point toward the benefit of a behavioral exercise intervention, designed to increase exercise adherence, for smoking cessation in both male and female smokers. Given the potential public health impact of the demonstrated efficacy of exercise for smoking cessation, the continued development and optimization of exercise interventions for smokers through larger randomized clinical trials merits pursuit.

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## POS4-82

### SHORT-TERM NICOTINE ABSTINENCE EFFECTS ON DELAY AND AMOUNT SENSITIVITY

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Research has shown that acute drug administration may affect impulsivity on delay discounting tasks. Few studies have investigated how drug abstinence affects impulsivity. Investigating how drug abstinence affects impulsivity may be relevant to preventing relapse. The results of two previous studies investigating the effects of short-term nicotine abstinence were mixed. Only one study suggested that choices became more impulsive (i.e., delayed money was devalued) under nicotine deprivation. One goal of the present research was to further investigate how nicotine deprivation affects delay discounting for money rewards (standard task: choice between small, immediate reward vs. larger, later reward). It is unclear if nicotine deprivation affects impulsivity by altering sensitivity to reward delay, amount, or both. A second goal was to analyze the effects of nicotine deprivation on sensitivities to reward amount and delay independently. 15 adult cigarette-smokers completed four tasks (1) a standard delay discounting task, (2) delay only task - preference for delayed rewards when reward amounts were equal, (3) amount only task - preference for reward amounts when delays were equal, and (4) delay and amount task - preference between two alternatives, one having a set delay and large amount vs. a variable delay and smaller amount; delay and amount values were varied systematically. Choice was examined following 24-hr ad-lib smoking and 24-hr of nicotine abstinence (order counterbalanced). Replicating prior research, nicotine deprivation significantly increased discounting on the standard task, but no effects were seen on the delay only and amount only tasks. However, nicotine deprivation significantly decreased preference for the larger reward during the delay and amount task. Analyses of the independent sensitivities to amount and delay indicated that the increased impulsivity during delay discounting may be the result of decreases in sensitivity to reward amount at nonzero delays (delay sensitivity was unaffected), suggesting abstinence affects reward motivation rather than timing processes.

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## POS4-83

### VALIDATION OF SELF-REPORTED NON-TOBACCO USE STATUS IN A DAILY DIARY STUDY: RESULTS FROM THE PENN STATE HOTEL WORK AND WELL-BEING STUDY

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When conducting biomarker research in naturalistic settings, it is important that tobacco and nicotine users accurately are identified to ensure the validity of data. The aim of this study was to determine the accuracy of self-reported non-tobacco/non-nicotine use by assessing salivary cotinine levels in a subsample of participants in the Penn State Hotel Work and Well-Being Study. We hypothesized that 10% of self-reported non-tobacco/non-nicotine users ("non-users") would have detectable cotinine levels. Participants provided 4 saliva samples/day (upon awakening, 30 mins after waking, before lunch, before bedtime) across 4 consecutive days for a total of 16 samples. Participants also completed 8 days of telephone interviews where they reported on daily stressors, health behaviors (including nicotine/tobacco use), and health symptoms. Seventy-nine self-reported non-users were included in these analyses. To test our hypothesis, we screened "before bedtime" samples for cotinine because cotinine has a half-life of 16-20 hrs, allowing us to capture recent tobacco/nicotine exposure. Of the non-users tested, 70 individuals (88%) did not have detectable cotinine levels, and 9 individuals (11%) had detectable cotinine levels in at least one of their before bedtime samples. To further explore nicotine/tobacco exposure of participants with detectable cotinine, we assayed their remaining saliva samples for cotinine. Two non-users (2.5%) had mean cotinine levels consistent with regular tobacco/nicotine use (>100 ng/mL), and 1 non-user (1.3%) had mean cotinine levels indicative of light or infrequent nicotine/tobacco use (i.e., "chipper") (19.28 +/- 13.86 ng/mL). Six non-users (7.6%) had cotinine levels <10 ng/mL, which is consistent with moderate secondhand smoke exposure. These findings provide preliminary data about the validity of self-reported nicotine/tobacco use status and suggest that participants should be screened for cotinine to confirm nicotine/tobacco use status in daily diary studies. Additional studies in larger samples are needed to provide further support for salivary cotinine screening in self-reported non-nicotine/tobacco study participants.

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## POS4-84

### THE EFFECTS OF NICOTINE EXPOSURE ON BODY WEIGHT AND FOOD CONSUMPTION DIFFER BY AGE IN ADOLSCENT AND ADULT FEMALE MICE

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Adolescent and adult female smokers believe one advantage to smoking cigarettes is the perceived body weight-reducing effects of nicotine (Camp et al. 1993; O'Dea et al. 2001). While female adult smokers show a reduction in body weight compared to controls, studies of body weight among adolescent female smokers yield mixed results (Albanes et al. 1987; Klesges et al. 1998; Kvaavik et al. 2003). We investigated the nicotine-body weight relationship and associated changes in food consumption using a mouse model of oral nicotine exposure in adolescent and adult female C57BL/6J mice. Fifty-nine mice (N=39 adolescents; N=20 adults) were given continuous access to either 200ug/ml of nicotine dissolved in tap water (NIC; N=29) or tap water alone (WTR; N=30) for 7 days; all mice had continuous access to standard chow. The percent change in body weight and food consumption comparing Day 1 to Day 7 was calculated for all mice. NIC-exposure resulted in a larger body weight and food consumption increase compared to WTR ( $p<.05$ ), regardless of age. Further, adolescents displayed a larger increase in body weight and food consumption than did adults ( $p<.05$ ). There was an age by NIC-exposure interaction on food consumption. Specifically, among WTR-exposed mice, adolescents increased food consumption whereas adults decreased food consumption ( $p<.05$ ); with no significant difference in NIC-exposed mice. Among adults, NIC-exposure increased food consumption whereas WTR exposure decreased food consumption ( $p<.05$ ); with no significant difference in adolescents. Increased body weight following NIC-exposure in adults is surprising as studies show that nicotine is associated with reduced body weight in adult but not adolescent female rodents (e.g., Faraday et al. 2001). However, increased body weight among NIC-exposed adolescent mice is consistent with previous work from our lab (e.g., Klein et al. 2004). These findings suggest that nicotine's effects on food consumption and body weight may differ between

adolescent and adult female mice. Additional studies are needed to further understand age-related differences in nicotine's effects on body weight and food consumption.

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## **POS4-85**

### **INITIAL RESULTS FROM AN ONLINE AVATAR-BASED CESSATION INTERVENTION FOR YOUNG ADULT SMOKERS**

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**Background:** Young adults (ages 18-24) have the highest rate of smoking among all age groups, yet there is limited evidence of successful programs to help individuals in this age group give up cigarettes. The Internet is a promising channel to reach young adult smokers. **Methods:** The RealU is a 3-group prospective randomized trial to determine the efficacy of providing individually tailored cessation messages and peer support via the Internet to young adult smokers. Tailored cessation messages were presented in the context of an online personal health "makeover" show hosted by an avatar character selected by each participant. Smokers ages 18-30 were recruited from a national panel of volunteers to participate in a 6-week program. Individuals who smoked at least one puff in the past 30 days were randomized to either a general interest website (i.e. control), an avatar-hosted personal "makeover" website that incorporated individually tailored cessation messages, or an avatar-hosted personal "makeover" website plus online peer support. **Results:** 1698 young adult smokers were enrolled in the trial. The follow-up rate at 12-weeks was 78%. By intention-to-treat, the self-reported 30-day abstinence rates at week 12 were 11.29% (95% CI 8.68%, 13.90%) for the control group, 23.32% (95% CI 19.86%, 26.81%) for the tailored "personal makeover" web-only group, and 30.57% (95% CI 26.76%, 34.37%) for the tailored "personal makeover" web plus peer coaching group. **Conclusions:** Rates of 30-day abstinence were significantly higher with the addition of tailored web content and peer coaching. Tailored online interventions have the potential to reach high numbers of young adult smokers, and could be an important resource to support early cessation in this population.

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## **POS4-86**

### **THE RELATIONSHIP OF CUE-MODULATED ACOUSTIC STARTLE RESPONSE TO SMOKING CESSATION PHARMACOTHERAPY OUTCOME**

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We evaluated the utility of the cue-modulated acoustic startle response (ASR) as a predictor of smoking cessation treatment outcome and as a marker of therapeutic action. ASR, measured as the strength of the orbicularis oculi eyeblink response to a sudden and intense sound probe, indexes the motivational salience of foreground stimuli. Smokers (n=172), randomized to one of three treatment conditions (varenicline, bupropion, or placebo), completed laboratory sessions at baseline (1-day pre-medication) and follow-up (1-month post-quit), where we recorded their ASR to pleasant, unpleasant, neutral, and cigarette-related picture cues. Baseline ASR predicted treatment outcome, as smokers with greater emotional reactivity, defined as the difference between ASR to unpleasant and pleasant cues, were more likely to be abstinent at the end of treatment than smokers with less reactivity. At follow-up, abstinent smokers taking varenicline showed less ASR suppression to cigarette-related cues compared to those taking bupropion or placebo or to those taking varenicline who were nonabstinent. The baseline results suggest that individuals with a restricted range of affect may be more likely to relapse. The follow-up results suggest that successful treatment by varenicline leads to a decrease in the motivational salience of cigarette-related cues.

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## **POS4-87**

### **NICOTINE DEPENDENCE AND ADDICTION AMONG COLLEGE STUDENTS**

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**Background:** Young adult (18-25 year old) cigarette smoking prevalence has remained relatively unchanged from 2005-2010 (CDC, 2011). Although education is a supposed protective factor from cigarette smoking, college students are smoking at high rates. Research on addiction, perceived risk for addiction, and nicotine dependence in this population is limited and traditionally assessed on daily or regular smokers. **Objectives:** To assess perceived risk for addiction and measurement of nicotine dependence using reported nicotine addiction and the Short Form Fagerstrom Test of Nicotine Dependence Scale among all groups of current smokers. **Methods:** College student's ages 18-25 from a large Southwestern University completed a cross-sectional survey regarding cigarette-smoking behavior, risk perceptions for nicotine addiction and dependence. **Results:** Out of 490 participants, 31% were classified as current smokers. Only 7.1% were classified as regular smokers and the remaining as non-daily occasional, light, and inconsistent. Among all smokers, 97% scored very low (0-2) for nicotine dependence, with 81% scoring zero. Occasional and regular smokers reporting a higher perceived risk for becoming addicted than the other groups (p < .00). Most of the smokers (93%) reported being able to not smoke for 24 hours and 88.7% do not smoke upon waking. **Conclusion:** More frequent established smokers have a higher risk perception for addiction, although almost all the participants did not meet the criterion for currently addicted. Cessation efforts need to develop methods to target college student smoking that is characterized by low-level of physical dependence for nicotine and a low perceived risk for addiction. The stage of little to no addiction is an opportune time to intervene smoking behavior to prevent more frequent and established use.

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## **POS4-88**

### **PERMISSIVE SOCIAL ENVIRONMENT PROMOTES NICOTINE SELF-ADMINISTRATION IN ADOLESCENT RATS**

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Social environment is critical for the initiation of smoking in adolescents. However, the neurobiological mechanisms via which social environment modulates drug taking behavior are largely unknown. We recently established a novel nicotine self-administration (SA) model where i.v. nicotine was delivered contingently with an olfactogustatory (OG) cue (20mM saccharin and 0.05% unsweetened KoolAid). (Chen, et al. Neuropsychopharmacology, 2011). Oxytocin is involved in many aspects of social interaction in rodents, as well as in human. Therefore, we tested the hypothesis that the effect of a permissive social context is mediated by oxytocin. Adolescent female Sprague-Dawley rats were implanted with a guide cannula for i.c.v. injection and a jugular cannula for nicotine delivery between postnatal days 38-40. A selective oxytocin receptor antagonist OTA2 (1µg/5µl, a gift from Dr. Maurice Manning) was delivered i.c.v. 20 min prior to the 10 daily 3 hr i.v. nicotine SA sessions. Control rats received i.c.v. aCSF. During SA, licking on an 'active' spout resulted the concurrent delivery of i.v. nicotine (30µg/kg, free base) and 60 µl OG under an fixed-ratio 10 schedule, while licking on an 'inactive' spout had no programmed consequence. A second rat present in the operant chamber had free access to the OG solution through a dedicated bottle and was separated from the SA rat by a divider that allowed orofacial contact with the SA rat. The number of licks on the active and inactive spout was significantly different in the control (p < 0.01) but not in the OTA2 (p > 0.05) group. Similarly, the effect of day on the number of active licks was significant in the control (p < 0.05) but not in the OTA2 (P > 0.05) group. Also, the number of self-administered nicotine injections was significantly higher in the control than in the OTA2 rats (p < 0.05). The average number of nicotine injections during the last 3 days was 12.0 ± 2.3 vs 4.8 ± 1.2 for the control and OTA2 groups, respectively. These data suggest that the acquisition of nicotine SA with contingent OG cue in a permissive social context requires oxytocin.

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## POS4-89

### ALTERNATIVE TOBACCO PRODUCT USE AND ASTHMA INCIDENCE AND SEVERITY IN ADOLESCENCE

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The use of alternative tobacco products (ATPs) like smokeless tobacco (SLT), cigars, bidis, and waterpipe tobacco smoking (WTS) among adolescents has increased in recent years. The perceived benefits of ATP use may play an important role in its current popularity among youth. For instance, compared to cigarettes, ATPs smell and taste better; are considered more socially acceptable and attractive; and, pose fewer perceived health risks. Such normative beliefs about ATPs may promote their use among youth populations, especially among youth who experience acute respiratory effects from cigarette smoking. For instance, youth diagnosed with asthma are more likely than their coevals to report current cigar and SLT use. Unfortunately, little is known about the prevalence of other novel ATPs (e.g., WTS) among youth diagnosed with asthma; and, even less is known about the associations between ATP use and asthma incidence (i.e., episodes or attacks) and severity (i.e., emergency care for asthma symptoms). In this study, multinomial logistic regression was used to examine associations between ATP use and asthma status (ND=never diagnosed; AR=asthma, but remitted; AN=asthma, no attacks; AY=asthma, with attacks; and AE=asthma, emergency care) among a statewide sample of middle and high school students who completed the Virginia Youth Tobacco Survey in 2009 (N=3,928). Compared to ND youth, AE adolescents were 2.8 times more likely to report current SLT use; and, 3.2-4.8 times more likely to report use of WTS, cigars, and bidis. AY and AN youth were 2.5-2.9 times more likely to report bidis use than ND youth. Compared to AN youth, AE adolescents were 2.4-3.8 times more likely to report SLT, WTS, and cigar use. Compared to AY youth, AE adolescents were 4.9 times more likely to report current cigar use. Cigar smoking appears to be a rather robust risk factor related to asthma severity; however, the findings are not as clear on the degree to which other ATPs increase the likelihood of asthma incidence (episodes or attacks). Findings may be used to educate youth and inform healthcare specialists about the risks associated with ATP use among youth diagnosed with asthma.

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## POS4-90

### GENETIC EFFECTS ON RESPONSE TO TREATMENT TO AID SMOKING CESSATION: A SYSTEMATIC REVIEW AND META ANALYSIS

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Background: Genetics may predispose to nicotine addiction and hence influence response to treatment for tobacco dependence. Genes affecting dopamine function in the brain have been most studied, however genetic analyses of smoking cessation trials show conflicting results. Aim: To identify genetic markers associated with successful response to smoking cessation treatment. Methods: Methodology followed HUGENet guidance, and involved searches of electronic databases, screening, data extraction and quality assessment by two reviewers. Inclusion criteria specified papers reporting abstinence rates for people with different genetic markers, using data from RCTs of smoking cessation interventions vs. placebo or a different treatment. Results: The searches identified 594 citations, of which 30 met inclusion criteria. The studies reported trials of bupropion, nicotine replacement therapy, venaflaxine, and other interventions, covering 20 genes (DRD2, COMT, SLC6, CYP2B6, HTTLPR, OPRM1 and others). 12 studies reported data on a gene affecting function of the dopamine receptor (DRD2), only four of these presented sufficient data to be combined in a meta-analysis (n=1608). The random effects model showed no difference in abstinence for those with A2/A2 alleles compared with those with other combinations (OR 1.06 [95% CI 0.77-1.46], p=0.71). There was a moderate degree of heterogeneity between the studies (I<sup>2</sup> = 43%). Discussion: The results of the meta-analysis indicate overall lack of association between the DRD2 gene and ability to quit smoking with pharmacological treatment. However, the small number of suitable studies and their heterogeneity reduce the validity of the meta-analysis. Work is currently in progress to analyse the effects on specific genes and treatments.

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## POS4-91

### DEVELOPING A LABORATORY-BASED SMOKING-CHOICE TASK

Krysten L. Williams, B.S.\*<sup>1</sup>, Haewon Yoon, M.S., Gretchen B. Chapman, Ph.D., and Danielle E. McCarthy, Ph.D., Rutgers, The State University of New Jersey

This study aimed to expand the current understanding of smoking maintenance mechanisms by examining how putative risk factors of relapse relate to a single behavioral smoking choice. After 12 hours of nicotine deprivation, eligible participants were exposed to smoking cues and given the choice between smoking up to two cigarettes in a 15-minute window or waiting and receiving four cigarettes after a delay. This single behavioral choice is meant to model real-world choices to forgo the immediate gratification of smoking to achieve delayed benefits associated with abstinence. Greater nicotine dependence, higher impulsivity, and lower distress tolerance were hypothesized to predict earlier and more intensive smoking. Out of 36 participants, 26 chose to smoke with a mean time to a first puff of 128 seconds (standard deviation=161.55s, range=2-637s). Results indicated that younger age, smoking for more years, and having lower distress tolerance predicted greater odds of smoking during the choice task. Self-reported impulsivity was unexpectedly related to lower risk of smoking during the task. Smoking more cigarettes per day significantly increased the odds of smoking immediately in the task. Other smoking outcomes (total number of puffs, length of cigarette smoked, duration of time smoking in the task) and smoking urge after the task were also assessed. Results indicated that higher scores on a baseline measure of craving as a nicotine dependence motive predicted taking more puffs during the task. This novel laboratory choice paradigm may facilitate the modeling of relapse risk processes and intervention development.

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## POS4-92

### EVALUATING IMPUTATION ACCURACY: AN APPLICATION TO SMOKING-ASSOCIATED GENOMIC REGIONS

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Genotype imputation is a method for inferring uncaptured genetic data using linkage disequilibrium (LD) and haplotype patterns between genotyped and untyped variants. However, the imputation accuracy for variants in a region of interest can be difficult to assess since the gold standard is to compare imputed with actual genotypes. Instead, other measures of accuracy that rely only on imputed genotype probabilities are used, such as the allelic R-squared. We present a method to estimate upper bounds for imputation performance and apply it to assess imputability in important genomic regions associated with nicotine dependence and smoking behavior. The key benefits of this approach are (1) the ability to compare imputed and actual genotypes without genotyping the study sample, and (2) use of an optimized reference panel to obtain upper bounds on imputation performance. We use standard reference panels, mask these individuals at single nucleotide polymorphisms (SNPs) not present on a given commercial SNP chip, and impute this masked sample using the fully genotyped reference panel. Having the same individuals in the reference and the sample provides an idealized setting to obtain upper bounds on imputation performance. We used multiple 1000 Genomes continental reference populations (AFR, ASN, and EUR) and commercial SNP chips (Illumina Omni, Duo, Quad; Affymetrix 6.0 and Affy 500K). Imputability is evaluated by multiple statistics including the imputation quality score (IQS), which assesses concordance with true genotypes while accounting for chance agreement, and the allelic R-squared. Although the allelic R-squared often agrees with the IQS, in one of our examples on the CHR9A5/A3/B4 region of chromosome 15q25, it misclassifies 29% of SNPs as accurately imputed, of which 37% were rare and 63% were common. With increasing minor allele frequency (MAF) or maximum LD with a genotyped SNP, accuracy increases, as expected; nevertheless, even at moderate to high MAF and maximum LD values, a number of SNPs have low imputability. Our findings enhance the information available to interpret imputation results in association studies and meta-analyses of smoking.

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## POS4-93

### PROSPECTIVE, GENETICALLY TAILORED TREATMENT FOR SMOKING CESSATION MIXED-METHODS FEASIBILITY TRIAL

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**Background:** Growing evidence suggests bupropion and nicotine replacement therapy (NRT) efficacy is moderated by genetic factors. However, no published studies have examined the feasibility or impact of genetically tailored interventions for smoking cessation. The current pilot trial explored these issues. **Methods:** We used a mixed-methods approach to design and deliver treatment to smokers from a large regional health plan. Participants included smokers previously genotyped for the ANKK1 ("DRD2") rs1800497 polymorphism and those not previously genotyped. Randomized pilot participants (N = 36) were assigned to receive telephone-based genetic feedback (GF), standard cognitive-behavioral phone counseling, and genetically-matched pharmacotherapy (bupropion or NRT; GF group) or counseling and genetically-matched pharmacotherapy without knowledge that the treatment had been genetically-matched (standard treatment; ST). Follow-up data were collected at 3 months. Formative and summative qualitative interviews were conducted to guide intervention development and interpret quantitative results. **Results:** Intent to treat point prevalence abstinence rates (10.5% GF vs. 23.5% ST) were not significantly different, although the pilot was not powered to detect differences. Similarly, differences were not observed for drug adherence, self-efficacy, fatalism, risk perception, motivation to quit, depression, withdrawal, or satisfaction with treatment. Summative interviews conducted during treatment indicated GF participants felt the genetic test results were easy to understand and most expressed a positive view of their anticipated outcome. None expressed ideations of fatalism or genetic determinism. ST participants were evenly divided between negative and ambivalent views about their treatment and expectations of success. **Conclusions:** The results provide preliminary evidence that genetically-tailored intervention does not pose psychological harm or distress to smokers trying to quit. However, observed abstinence rates suggest further evaluation is needed to determine whether the intervention will enhance or undermine cessation outcomes. A larger RCT is warranted.

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## POS4-94

### PARENTAL SMOKING CESSATION AND YOUNG ADULT SMOKING CESSATION: A 12- AND 20-YEAR LONGITUDINAL STUDY OF A HYPOTHESIZED MODEL

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**Objective:** To explain why parental smoking cessation predicts their young adult child's smoking cessation (Bricker, 2005; 2010), we tested, Hypothesis 1: intentions to quit smoking will mediate the relationship between parental smoking cessation and young adult cessation. Hypothesis 2: having friends who smoke and persistence will moderate the mediation of Hypothesis 1 (moderated-mediation). Hypothesis 2 included testing Hypothesis 2.1: having friends who smoke and persistence will moderate the relationship between intentions and young adult cessation. **Design:** 385 participants drawn from 40 school districts of the Hutchinson Smoking Prevention Project were eligible for this study. The parental smoking cessation predictor was measured when the participant was age 8. Mediators, cognitive and behavioral intentions to quit smoking, were measured at age 18. Moderators, friends' smoking and persistence, were measured at age 18. Cessation outcomes were measured at age 20 and 28. **Results:** No significant support for Hypotheses 1 or 2. For Hypothesis 2.1, having friends who smoked moderated the predictive relationship between intentions to quit and cessation. Specifically, age 18 cognitive intentions predicted 3.15 (p=.027) higher odds of quitting smoking by age 28 among those with five or more friends who smoked at age 18 compared to those with one to four friends who smoked. Age 18 behavioral intentions predicted 2.76 (p=.046) higher odds of quitting smoking by age 20 (2.47 higher odds by age 28; p=.068) among those with five or more friends who smoked at age 18 compared to those with one to four friends who smoked. **Conclusion:** While there was no support for Hypotheses 1 or 2, there was evidence for Hypothesis 2.1. Specifically, higher intentions to quit smoking may help young adults quit only when they have a high number of friends who

smoke. Perhaps friends who smoke are more empathetic to those who intend to quit and provide better social support and motivation to quit. Future research is needed to further test these hypotheses in other well-powered datasets and to test alternative theoretical models to explain why parents who quit smoking have young adults who quit.

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## POS4-95

### BRAIN NICOTINE DURING NATURALISTIC CIGARETTE SMOKING: PUFF BY PUFF, BUTT BY BUTT, DAY BY DAY

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The results from tobacco smoking and nicotine self-administration studies highlight the crucial role of brain nicotine dynamics in the manifestation of its pharmacological effects. Recently we have demonstrated that the dynamics of brain nicotine accumulation during cigarette smoking can be accurately calculated based on the PET assessment of brain 11C-nicotine kinetics after a single puff of a cigarette (ACNP 2011 presentation). This observation allows us, for the first time, to estimate the brain nicotine accumulation during naturalistic cigarette smoking. The study was performed in 10 regular smokers (age 46 ± 8), smoking ≥ 10 cigarettes/day. Participants were instructed to smoke their usual brand of cigarettes using the CReSS Micro Topography device over 7 days. During the PET session, the subject's head was scanned over 720 sec (245 frames) after inhalation of a single puff of smoke from a cigarette containing 11C-(S)-nicotine. The brain nicotine accumulation during the smoking of each cigarette by each participant was calculated by the convolution of an individual's brain 11C-nicotine accumulation curve based on topography data (for each cigarette) and FTC cigarette nicotine yield corrected for the puff by puff increase in nicotine delivery. The primary results from this study are: 1) Brain nicotine concentration increased in a nearly linear fashion during a period of cigarette smoking (average slope ± SD, 16 ± 7 ng/g tissue/min) and reached the max value (Cmax) of 108 ± 57 ng/g tissue at the end of smoking; 2) The average Cmax values for each of the subjects were highly correlated with average slope values (r = 0.9, P < 0.001); 3) In contrast to high variability between smokers in the average slope and Cmax values, these parameters were highly conservative from day to day smoking in each of the participants (the average coefficient variation values 15 ± 6% and 11 ± 4%, respectively). These results suggest that the assessment of the brain nicotine accumulation during naturalistic cigarette smoking could be a new powerful tool for the study of the role of brain nicotine kinetics in smoking dependency and the development of new cessation strategies.

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## POS4-96

### SMOKING RATES IN PREGNANCY AND POST-PARTUM IN A MEXICO CITY BIRTH COHORT SERIES

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The Mexican National Addiction Survey has measured cigarette smoking rates since 1988. These surveys have included distinctions by geography, sex, and age, however no data is collected on pregnant women. Tobacco use during pregnancy has been associated with myriad fetal effects including low birth weight, increased risk for childhood respiratory infections, multiple cancers, neurodevelopmental changes, and younger initiation of adolescent tobacco use. The Early Life Exposure in Mexico to Environmental Toxicants (ELEMENT) project is a series of birth cohort studies in Mexico City dedicated to investigating the effect of environmental toxicant exposures on the developing fetus. Data were collected through four separate cohorts recruited from 1992

through 2010; enrollment periods ranged from the 1st trimester of pregnancy to the 1st month postpartum. Smoking histories were collected from the mothers at enrollment and at follow-up visits. In the pooled cohorts, 4.8% (n=2300) of women reported smoking at some point during pregnancy. Pre-pregnancy smoking rates were not assessed, but by 6 to 7 months postpartum, 14.3% (n=1753) reported smoking. The 2006 national survey reported that 18.4% of urban Mexican women identified as smokers. One of our cohorts observed a large difference in postpartum smoking rates between concurrently recruited mothers who initiated breastfeeding and those who did not. Mothers who initiated breastfeeding had a 5.2% (n=193) smoking rate at 1 month postpartum that increased to 11.1% (n=63) at 1 year postpartum. Of mothers who did not initiate breastfeeding, 26.7% (n=15) smoked at month 1 postpartum and 28.7% (n=157) smoked at 1 year postpartum. Rates of exposure to tobacco smoke in the home were much higher than maternal smoking rates; 46.7% (n=3994) of our participants reported that others smoked inside their homes during pregnancy or 1 month postpartum. Further understanding of smoking during pregnancy and the early postpartum period and exposure of pregnant women and infants to environmental tobacco smoke will help to plan and implement more precisely targeted public health measures for the protection of children's health.

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## POS4-97

### MEASUREMENT OF URINARY AROMATIC AMINES IN NON-INSTITUTIONALIZED CIVILIAN US POPULATION NHANES 2005-2006

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Cigarette smoking is a significant risk factor for human lung and bladder cancer. Three aromatic amines found in cigarette smoke, o-toluidine, 2-aminonaphthylene, and 4-aminobiphenyl, are well-established human bladder carcinogens presumably acting via the formation of adducts to DNA. These aromatic amines have been shown to be useful biomarkers in monitoring active cigarette smoking or short term second hand smoke exposure. In this paper, we report for the first time the measurement of these three carcinogens in non-institutionalized civilian US population in NHANES (1/2 subset of NHANES 05-06, age 12+). This analysis included both nonsmokers and smokers within the population. Classification of smoking status will be based as before on a combination of self-report and serum cotinine concentrations observed in each participant. We will evaluate dietary information available in NHANES questionnaire data with level of these three aromatic amines in nonsmokers that have serum cotinine concentrations less than 10 ng/mL (confirmed nonsmokers). We also relate urinary aromatic amine concentrations with smoking history information including cigarettes per day, brands used, etc. in all smokers included in the subset.

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## POS4-98

### EXPERIMENTAL AUCTIONS ON SMOKELESS TOBACCO PRODUCTS

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Although alternative smokeless tobacco (SLT) products are a comparatively safer substitute to cigarettes, actual trial and adoption among smokers remain low. Deciding to switch from cigarettes to SLT may depend on price and perception. Experimental auctions provide a way to estimate behavioral effects of manipulating both product trial and product-related information. Experiments place smokers into auctions where the bids they place for products have real financial consequences and, therefore, provide valid estimates of consumer demand. Here, established adult smokers (N=568) participated in an "nth price auction," which involved two manipulations before bids were placed: 1) type and framing of information presented to participants (pro or anti-alternative and anti-smoking); 2) opportunity to try one of the products up for bid. During the auction, participants placed private bids (in USD) on three SLT products (Camel Snus, Ariva, Nicorette) and a pack of Marlboro cigarettes. In preliminary analyses, we observed that participants bid 49% to 69% less for SLT products than for cigarettes. The average price bid for one package of cigarettes was \$4.12; whereas the price bid for the others was considerably less (Nicorette-\$2.09, Ariva-\$1.58, and Snus-\$1.26). Overall, bids

were significantly higher for Ariva compared to Snus (p>0.001) and bids for Nicorette were higher still (p>0.001). Neither information nor product trial had any general or product specific effects on bids relative to the control – no information/no trial (p's>0.1). Treatment group also had no effect on bids relative to the control (p's>0.1). However, those who tried Ariva paid less for all SLT products compared to cigarettes (p<0.05). These findings suggest that presenting risk information and providing brief trials did not systematically or specifically increase the attractiveness of alternative tobacco products.

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## POS4-99

### ALPHA OSCILLATIONS IN RESPONSE TO AFFECTIVE AND CIGARETTE-RELATED STIMULI IN SMOKERS

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Responses to emotional and cigarette-related cues have been associated with smoking relapse. These responses reflect activation of brain mechanisms underlying emotion, attention, and memory to motivationally relevant cues. EEG alpha desynchronization (i.e., reduction in alpha power) indexes the engagement of these mechanisms. To further understand how smokers process intrinsically emotional and cigarette-related cues, we recorded electroencephalogram in response to neutral, pleasant, unpleasant, and cigarette-related pictures from 179 smokers. We applied wavelet analysis to specifically extract alpha oscillations (8-12 Hz) induced by the presentation of these stimuli. We found that emotional and cigarette-related stimuli induced a higher level of alpha desynchronization than neutral stimuli. In addition, the level of alpha desynchronization induced by cigarette-related stimuli was similar to that induced by highly arousing stimuli (i.e., erotica and mutilations). These results suggest that for smokers, cigarette-related cues are highly significant and engage neural mechanisms normally involved in the processing of highly arousing stimuli.

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## POS4-100

### CHARACTERIZATION OF SELECTED BIOMARKERS OF POTENTIAL HARM IN ADULT SMOKERS AND NONSMOKERS

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It is well established in the scientific literature that cigarette smoking causes serious diseases including emphysema, lung cancer and cardiovascular disease. Characterizing biomarkers representing the underlying mechanisms for smoking related diseases can help identify early surrogates. Biomarkers related to inflammation (interleukin-6 (IL-6)), oxidative stress (oxidized low-density lipoprotein (oxdLDL)), endothelial dysfunction (soluble form of vascular adhesion molecule-1 (sVCAM-1)), soluble inter-cellular adhesion molecule-1 (sICAM-1), lipoprotein-associated phospholipase-2 (LP-sPLA2), monocyte chemoattractant protein-1 (MCP-1) and insulin resistance (leptin and adiponectin) were measured in a cross-sectional sample of 2097 adult smokers (AS) and 641 nonsmokers (NS). Multiple stepwise regression was used to examine the effect of demographic factors (age, gender, body mass index (BMI) and race) and smoking history (smoking duration, cigarettes per day (Model A) or nicotine equivalents per 24 h (NE, Model B) on each biomarker. IL-6 exhibited the greatest difference between AS and NS (28.82% higher in AS, p<0.0001). Differences between AS and NS were not statistically significant (p>0.05) for sVCAM-1 (-0.89%) and adiponectin (-3.99%). In contrast to sVCAM-1, discrimination between AS and NS was observed for sICAM-1 (26.21%, p<0.0001). In the multiple regression analysis, BMI (IL-6, oxdLDL, leptin and adiponectin), age (MCP-1), gender (LP-sPLA2) and race (Model A) and gender (Model B (sVCAM-1) were the most important factors for the biomarkers. For sICAM-1 NE (Model

B) and smoking duration (Model A) emerged as the prominent factors. These results suggest that it is important to adjust for potential confounders when assessing the utility of biomarkers to differentiate between AS and NS. In conclusion some biomarkers (e.g., sVCAM-1 and adiponectin) did not discriminate between AS and NS, and therefore they may not be useful in clinical studies assessing tobacco products. However some of the other biomarkers evaluated in this analysis, e.g., IL-6 and sICAM-1, show promising utility as biomarkers of potential harm.

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## POS4-101

### SMOKING ON THE PATCH: DISSOCIATION BETWEEN CRAVING RELIEF AND OTHER DIMENSIONS OF CIGARETTE REWARD

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Smokers report a variety of rewarding effects from cigarettes, which contribute to dependence. In previous studies, we have shown that smoking while receiving nicotine patch treatment attenuates some of these measures. In our largest trial to date (N=606), we studied how cigarette reward ratings (assessed weekly with the Cigarette Evaluation Questionnaire) changed after smoking while receiving nicotine patch treatment for two weeks before quitting (21 or 42 mg/24 h, depending on baseline CO). Subjective ratings for smoking satisfaction, sensory enjoyment, and mood modulation (e.g., reduced irritability) showed a marked decline within one week of starting patch treatment, continuing to decline in week 2 (decrease from baseline=1.8 for satisfaction, 1.0 for sensory enjoyment and 1.1 for mood modulation). In contrast, the degree of craving reduction experienced after smoking was relatively unaffected (decrease from baseline=0.3). This dissociation between the effects of nicotine patch on craving relief vs. other rewarding effects of cigarette smoking suggests that different physiological processes are involved. New smoking cessation treatments should be developed and evaluated that block and/or substitute for the craving relief obtained from smoking.

*Philip Morris USA.*

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## POS4-102

### CONTINGENCY MANAGEMENT PROMOTES SMOKING ABSTINENCE AMONG ECONOMICALLY DISADVANTAGED PATIENTS OF AN URBAN SAFETY NET HOSPITAL

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Socioeconomic disadvantage is associated with elevated smoking prevalence and a reduced likelihood of smoking cessation; and smoking cessation interventions have had limited success in improving outcomes. The purpose of this ongoing study is to evaluate the efficacy of Contingency Management (CM) as an adjunct to a smoking cessation program offered at an urban safety net clinic. It was hypothesized that the CM approach may be an appealing and effective means to promote abstinence among individuals with limited financial resources. To date, 33 participants have been enrolled in the study through the Parkland Hospital cessation program. Study participants smoked an average of 16 cigarettes per day (SD=6.3), and were primarily of Black (70%) or White (24%) race/ethnicity. A total of 55% were female, and 67% reported an annual household income of <\$16,000. Participants were randomized to either Standard Care (SC; Parkland cessation program; n=13) or CM (Parkland cessation program + CM; n=20), and followed weekly from 1 week pre-quit through 4 weeks post-quit. All participants received \$30 in the form of gift cards for the completion of each of 4 assessments. Individuals randomized to the CM intervention earned additional giftcards for bioverified abstinence. Participants could earn a \$20 giftcard for abstinence on the quit day, and this amount increased by \$5 weekly at each successive abstinent visit (up to \$40 at 4 weeks post-quit). Participants who were non-abstinent at any visit were able to earn contingent payments at the next visit if abstinence criteria were met, though the payment was reset to \$20. Preliminary findings indicate that the CM intervention had a positive impact on abstinence rates relative to SC. Bioverified 7-day point prevalence abstinence rates in the CM compared with the SC groups were 33% vs. 46% (week

+1), 50% vs. 23% (week +2), 31% vs. 18% (week +3), and 63% vs. 27% (week +4). Findings indicate that providing small monetary incentives for abstinence may be an effective means to improve abstinence rates among socioeconomically disadvantaged individuals participating in smoking cessation treatment.

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## POS4-103

### AN INITIAL IDENTIFICATION OF A NOVEL VARIANT IN CYP2A6 SLOW NICOTINE METABOLIZERS

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Nicotine acts as the main addictive ingredient in tobacco. Approximately 80% of nicotine is metabolically inactivated to cotinine in a reaction primarily mediated by CYP2A6. Interindividual and interethnic variation in the CYP2A6 gene, and resulting enzyme, contributes to wide variation in the rates of nicotine metabolism. This variation is associated with altering a number of smoking behaviours including amount smoked, risk for dependence and success in smoking cessation. While many different alleles of the CYP2A6 gene have been identified, many individuals without these known variants have low rates of nicotine metabolism. Our goals were to identify new variants in CYP2A6 and characterize their functional impact. African American clinical trial participants (~500) provided a baseline blood sample from which we determined using LCMS the 3-hydroxycotinine/cotinine, or nicotine metabolite ratio, which is used as a surrogate for nicotine clearance. From this we selected individuals with low rates of nicotine metabolism. DNA samples were extracted from blood and the CYP2A6 gene region was amplified using PCR. The product was sub-cloned and sequenced. A new variant was identified located in CYP2A6 exon 3 (1747C>G) which predicts a change in amino acid 149 from isoleucine to methionine. Bioinformatic analysis using the CYP2A6 crystal structure revealed that the amino acid change predicted by the novel variant has a potential detrimental effect on the overall enzymatic function. This prediction is consistent with the very low activity in this individual (3-hydroxycotinine/cotinine ratio of 0.12 compared to the average ratio of 0.38 in the total sample set). We then developed a genotyping assay and verified specificity by sequencing. We are currently assessing the frequency of this variant in this, and other populations, which we will present. In addition we have continued the screening of low activity samples and will present data on new variants identified. This pilot study indicates the utility of sequencing slow metabolizers in order to identify additional sources of variability in CYP2A6 and resulting nicotine metabolism.

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## POS4-104

### FDA'S CENTER FOR TOBACCO PRODUCTS: THE FIRST 2 1/2 YEARS

Corinne G. Husten, M.D., M.P.H.\*, Center for Tobacco Products FDA

FDA was granted authority to regulate tobacco products in June 2009. FDA implements its authority by publishing guidance and regulation documents. To date, FDA has published 34 guidance and regulation documents to begin FDA's role regulating tobacco products. The topics of these include: tobacco industry registration with FDA; submission of a list of all products and information on tobacco product ingredients; restrictions to reduce the access and attractiveness of cigarettes and smokeless tobacco to youth; prohibition of use of misleading descriptors (light, low, and mild); substantial equivalence and exemptions and new product applications; harmful and potentially harmful constituents; civil money penalties for violations of FDA regulations; and cigarette graphic health warnings, among others. FDA has also aggressively enforced all regulations which, as of January 1, 2012, include conducting over 35,000 undercover inspections of tobacco retail establishments to check for compliance with all current

regulations including minors' access provisions, cigarette and smokeless advertising, misleading descriptors, smokeless warning statements, and the cigarette flavor ban. This presentation will discuss the public health implications of these initial regulatory and enforcement actions.

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## POS4-105

### SMOKING QUIT SUCCESS GENOTYPE SCORE PREDICTS SUCCESS AND LOWER/SLOWER PACED INVOLVEMENT WITH COMMON ADDICTIVE SUBSTANCES

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We have developed a 12000 SNP v1.0 "quit success" score for individual differences in abilities to quit smoking. In a trial in which nicotine replacement (NRT) dose was randomly assigned to individuals, the score successfully predicted quit success as an interaction with NRT dose (Uhl et al, 2010). We now report results of use of this v1.0 score (Affymetrix 6.0 genotyping) to: a) a new smoking cessation trial in which NRT dose was matched to the intensity of smoking and b) a community based sample whose addictive substance use was monitored periodically from ages 14 – 24. The score predicted ability to quit ( $p = 0.00056$ , area under ROC curve 0.657). About 12% vs 43% of individuals in the lower vs upper tercile of v1.0 scores quit (11 wks). The v 1.0 score also displayed significant association with the pace of change in use of common addictive substances during childhood and adolescence. Latent class growth analyses identified three latent classes based on development of substance use. Higher v1.0 scores were associated with higher probabilities that a subject would be a member of a latent class that displayed slower and less robust development of use of common addictive substances during adolescence ( $p = 0.0004$ ), and lower probabilities of membership in a class that reported rapidly escalating use ( $p = 0.001$ ). These results support the ideas that: a) aid for smoking cessation can be personalized based on genetic predictors of outcome and b) genetic influences on remission of an active addiction overlap with those that influence the rate at which addictive substance use is taken up during development. This work provides replicated, successful prediction of ability to achieve smoking cessation, based on a complex genotype score. This work also provides some of the first evidence that genetic influences on abilities to quit use of an addictive substance overlap with those that help to determine the way in which use of addictive substances is taken up during development.

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## POS4-106

### INTERACTIONS OF NICOTINE AND VARENICLINE WITH NACHR SUBTYPES: IMPLICATIONS FOR THE CARDIOVASCULAR SYSTEM

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Cigarette smoking is a major cause of cardiovascular (CV) disease, with carbon monoxide, oxidant gases and nicotine as likely contributors to CV disease. Results from studies with nicotine and nAChR ligands suggest that ganglionic  $\alpha 3\beta 4$  and  $\alpha 7$  nAChRs, as well as central  $\alpha 7$ , and possibly  $\alpha 4\beta 2$  nAChRs, could mediate nicotine's CV effects. However, preclinical studies on nicotine generally use concentrations that are orders of magnitude higher than those from smoking or delivered by NRT and it is thus imperative to examine how these nicotine concentrations functionally interact with nAChR subtypes. It is also important to evaluate this for varenicline, since the same nAChR subtypes have been hypothesized to mediate CV adverse events suggested to be associated with varenicline, based on post-marketing surveillance data reported in the literature. This study assessed the functional effects of nicotine, at concentrations found in smokers and NRT users, and of varenicline, at clinical concentrations achieved in patients after 1 mg BID, on human  $\alpha 3\beta 4$  and  $\alpha 7$  nAChRs. The results showed that nicotine concentrations delivered by NRT did not activate  $\alpha 3\beta 4$  nAChRs and that the highest concentrations in smokers activated only a small fraction. The main effect of nicotine from NRT and smoking was moderate inactivation of  $\alpha 3\beta 4$  nAChRs. Nicotine concentrations from either NRT or smoking were not able to activate  $\alpha 7$  nAChRs, while high concentrations

caused a small degree of inactivation of this subtype. Varenicline's functional effects were generally comparable to those of nicotine. Mean clinical varenicline concentrations did not activate  $\alpha 3\beta 4$  nAChRs and at the highest exposures the fraction of activated  $\alpha 3\beta 4$  nAChRs was less than that activated by nicotine. A difference with nicotine was that at these concentrations varenicline did not inactivate  $\alpha 3\beta 4$  nAChRs. Finally, therapeutic varenicline concentrations did not activate  $\alpha 7$  nAChRs, but high concentrations caused minimal inactivation, similar to the effects of nicotine. These data suggest that therapeutic levels of varenicline would not affect the cardiovascular system via these nAChR-mediated mechanisms.

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## POS4-107

### FACTORS ASSOCIATED WITH NONDAILY SMOKERS' MOTIVATION TO QUIT SMOKING

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Among current smokers, 23.8% of African Americans and 16.6% of non-Hispanic Whites are considered nondaily smokers (NDS), defined by smoking <30 days/month. Despite an overall decrease in smoking rates, the prevalence of nondaily smoking is increasing. Previous work suggests that motivation to quit smoking plays a vital role in successful cessation. Smokers with higher motivation make more frequent quit attempts and abstain from smoking for longer than lower motivated smokers. However, few studies have examined motivation to quit among NDS. We investigated the relationship between motivation to quit smoking and factors including race, gender, time to first cigarette, past year quit attempts, income, and education in a convenience sample of NDS in Minnesota. Participants (n=60) were African American (n=35) and Caucasian (n=25) with a mean age of 43 years. 45% (n=27) were female. Participants were asked to rate the importance for them to quit smoking on a scale of 0 to 10, with 0 being not at all important and 10 being absolutely important. Responses were dichotomized into "Highly Motivated" (ratings 8-10; n=35) and "Less Motivated" (ratings 0-7; n=25) categories. We calculated relative risks separately for each of the factors, and tested their statistical significance using a two-sided Fisher Exact test at a 10% level. African American NDS were 1.6 times more likely to be highly motivated than Whites to quit smoking ( $p=.07$ ). Participants who made at least one quit attempt in the last 12 months were 2.7 times more likely to be highly motivated ( $p=.0004$ ). There were no other significant differences by motivation level. While this study is limited by the small sample size, it suggests that motivation to quit may differ by race among NDS. Previous studies found that African Americans have more difficulty quitting smoking than Whites, despite high levels of motivation. This study supports the idea that lower quit rates among African Americans may not stem from a lack of motivation. The associations among race and motivation to quit should be explored further in smoking cessation research for daily smokers and NDS.

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## POS4-108

### WHAT HAPPENS TO CIGARETTE SMOKING BEHAVIOR WHEN ADOLESCENTS PARTICIPATE IN A MARIJUANA CESSATION PHARMACOTHERAPY TRIAL?

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Objective: Given the frequent co-occurrence of marijuana and cigarette smoking in adolescents, it is important to investigate whether adolescent marijuana-targeted treatments affect cigarette smoking behavior. A recently completed 8-week randomized controlled trial of N-acetylcysteine (NAC), added to brief weekly counseling and a contingency management intervention, for marijuana cessation in adolescents provided an opportunity to track cigarette smoking-related variables among participants who smoked both marijuana and cigarettes. Methods: Among the 29 (15 in NAC group, 14 in placebo group) participants who were identified as cigarette smokers and who

completed the entire 8-week trial, we compared baseline and end-of-treatment measures of cigarette craving (Questionnaire of Smoking Urges—Brief [QSU-B], total possible score range 1-7) and nicotine dependence (Modified Fagerström Tolerance Questionnaire [mFTQ], total possible score range 0-9), and additionally used a Wilcoxon rank sum test statistic to compare changes in these measures between NAC versus placebo participants. Results: Though no study psychosocial interventions targeted cigarette smoking, QSU-B scores decreased significantly over time (pre-treatment median 3.4 to post-treatment median 1.6;  $p < 0.01$ ). However, mFTQ scores did not change (pre- and post-treatment median 4;  $p = 0.6$ ). Despite prior research suggesting a potential treatment role of NAC in nicotine dependence, there were no NAC versus placebo differences in QSU-B or mFTQ changes, though this study was not powered to detect such differences. Conclusions: Engagement in psychosocial treatment for marijuana cessation may lead to reduced cigarette craving in adolescents but does not appear to impact nicotine dependence. Craving reductions may indicate a window of opportunity for cigarette smoking cessation, but cigarette smoking-specific interventions are likely warranted to impact dependence.

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## **POS4-109** **EFFECTS OF NICOTINE ON TOP-DOWN AND BOTTOM-UP ATTENTION IN SMOKERS**

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Animal and human studies consistently show that attending to stimuli is dependent on the integrity of cholinergic projections from the nucleus basalis of Meynert to the frontal cortex. There is abundant evidence that acetylcholine improves attention through both top-down (TD) and bottom-up (BU) mechanisms, and preliminary evidence suggests that this effect is mediated via muscarinic receptors. The purpose of this study was to determine whether TD and BU processing of stimuli was affected by nicotine. Participants (N=32) smoked at least 10 cigarettes a day for the past year, had an estimated IQ  $\geq 85$  (WASI), and were between the ages of 18 and 55. Participants received each dose of nicotine nasal spray (0, 1, 2, and 3 mg) on 4 separate sessions in random order. Five min after the nicotine dose, they performed the 30-min faces/houses selective attention task. On each task trial, participants were presented with two double-exposed pictures showing a face superimposed over a house. On some trials, attention was cued to the face (rapid BU processing) and on other trials, the house (slower TD processing) was cued. Participants determined if the cued stimulus (face or house) in each picture was a match or not. We analyzed the first trial after a stimulus shift vs. later trials to the same stimulus to investigate the effects of nicotine on attentional shifting and the maintenance of attention, both of which are cholinergically mediated. Faces have more salience than objects and are preferentially processed, which was evident by faster response time to faces than to houses across nicotine doses. Nicotine (2 mg) improved performance preferentially during the shifting of attention to faces, as evidenced by significantly faster response time and a nearly significant ( $p = .058$ ) improvement in accuracy. In contrast, nicotine enhanced performance to houses preferentially during the maintenance of attention, evidenced by significantly faster response time (3 mg) and improved accuracy (2 mg). These preliminary results suggest that the influence of nicotine on shifting and maintaining attention is dependent on the relative salience of the stimulus.

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## **POS4-110** **DOES THE DRD4 VNTR POLYMORPHISM AFFECT THE REACTIVITY TO DYNAMIC SMOKING CUES IN MOVIES?**

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Many studies have indicated that smoking cues are important triggers for craving. It has also been shown that variability in the susceptibility to smoking cues might be related to a genetic predisposition. The DRD4 VNTR polymorphism, which is related to dopamine function, has been reported to be associated with cue-induced craving. In a pictorial cue reactivity study, smokers carrying the DRD4 7-repeat allele demonstrated higher levels of craving than non-carriers (Hutchison, 2002). It is still unclear whether dynamic smoking cues in movies trigger craving and whether a genetic predisposition moderates this association. Therefore, the objective of the present study was first to examine whether dynamic smoking cues in movies trigger craving, and second to explore whether DRD4 genotype modifies this relationship. Using an experimental design, 112 daily smokers were assigned randomly to one of two movie conditions. In the experimental condition, 56 smokers were exposed to the edited version of the movie *Alfie* (2007) in which several characters smoked. In the control condition, 56 smokers were exposed to a version of the same movie in which the smoking was completely edited out. Saliva samples were collected for DNA isolation before movie exposure. Craving was assessed at 4 times: before and after the movie, and in two advertisement breaks during the movie. The results showed no significant interaction effect between condition and DRD4 VNTR polymorphism on craving. The main effect of condition on craving was not significant. There was a significant main effect of the DRD4 VNTR polymorphism on craving ( $p = .04$ ), indicating that smokers carrying the DRD4 7-repeat allele showed higher levels of craving compared with smokers without the DRD4 7-repeat allele (independent of the experimental condition). In conclusion, dynamic smoking cues in movies did not affect smokers' craving. However, smokers carrying the DRD4 7-repeat allele developed higher levels of craving in the context of watching a movie than non-carriers.

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## **POS4-111** **USING EXPIRED AIR CARBON MONOXIDE TO DETERMINE SMOKING STATUS DURING PREGNANCY: DETERMINING AN APPROPRIATELY SPECIFIC AND SENSITIVE CUT-POINT**

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Background: Measurement of carbon monoxide (CO) in expired air samples has been used as a non-invasive and cost-effective biochemical marker for smoking. Cut points of 6ppm-8ppm in the general population have been established, however, the CO level at which a pregnant woman can be considered positive for smoking has been debated due to increased metabolism rates during pregnancy. The purpose of this report was to assess whether a CO cut-point identifying at least 90% of pregnant smokers, and misidentifying fewer than 10% of non-smokers, could be established. Methods: Pregnant women (N=167) completed a validated self-report assessment of smoking, a urine drug screen for cotinine (UDS), and provided an expired air sample at two points during pregnancy (prior to and after 26 weeks gestation). Results: Approximately half of the sample reported being non-smokers at the initial (51%) and late (53%) pregnancy assessments, and this was confirmed by UDS. Using the traditional cut-point of 6ppm+ for the early pregnancy reading, only 2% of non-smokers were incorrectly identified as smokers, but only 75% of all smokers, and 83% of those who had smoked at least 5 cigarettes in the previous 24 hours, were identified. At 8ppm+, the false positive rate was 1%, but only 56% of all smokers, and 67% of those who had smoked at least 5 cigarettes in the previous 24 hours, were classified as smokers. However, at a cut-point of 4ppm+, only 8% of non-smokers were misclassified as smokers, and 90% of all smokers and 96% of those who had smoked at least 5 cigarettes in the previous 24 hours were identified. Results were virtually identical for the late pregnancy CO reading, and were not significantly impacted by environmental tobacco smoke exposure. Conclusions: Based on these findings, a lower 4ppm CO cut-point may be necessary to identify pregnant smokers using expired air samples. Additionally, this cut-point appears to be valid throughout pregnancy. Work is ongoing to validate these findings in a larger

sample, but it appears that if an appropriate cut-point is used, expired air CO is a valid, low cost, and non-invasive method for determining smoking status in pregnant women.

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## **POS4-112**

### **LESSONS LEARNED FROM THE IMPLEMENTATION OF A TOBACCO USE TREATMENT PROGRAM FOR HOSPITALIZED PATIENTS**

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The inpatient to outpatient (I2O) program is a comprehensive hospital-initiated tobacco use treatment program that integrates systems changes, QI strategies, and provider education to ensure continuity of care from inpatient to outpatient (I2O) settings. One year after implementation we will share lessons learned on factors contributing to program success, barriers encountered during implementation, and opportunities identified for program growth. Facilitators of program success include making several systems-level changes, incorporating a user friendly referral and documentation system into the electronic medical record system, presence of a full time certified tobacco treatment specialist in the hospital, achievable program promotion strategies, and multi-faceted approaches for provider education. Barriers that continue to be addressed include challenges related to addressing a chronic medical condition in an acute care setting, attitudes of providers and medical unit on smoking cessation medications, and disseminating information and change across a large medical facility. The first year of the program has laid the groundwork for multiple exciting opportunities, such as assessing the impact of addressing an underlying chronic medical issue (such as tobacco use) on acute care outcomes and readmission rates. Given the Joint Commission's 2012 optional measure for tobacco treatment this is a timely topic of discussion and allows our institution to exceed compliance measures. Future goals include reducing readmission rates for patients admitted with heart failure, pneumonia, and heart disease associated with ongoing tobacco use by providing intensive bedside tobacco use consults. Participants will gain relevant information on the development and implementation of a tobacco use treatment program in the hospital setting.

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## **POS4-113**

### **ECONOMIC PREDICTORS OF SMOKING CESSATION AMONG LATINO SMOKERS**

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Evidence suggests that higher SES smokers are more successful at smoking cessation. Among Latino smokers, both education and occupation are associated with quitting; however, income has not shown such an association. This study assessed different income measures, examining which were predictive of smoking cessation. The sample (N=131, 72.9% female, 51.9% Puerto Rican 22.6% Dominican Republic, M=10.6 cigarettes per day) was part of a cessation induction trial for Latino smokers of children with asthma. Inclusion criteria did not involve quitting smoking. If participants wanted to quit, the nicotine patch was provided at no cost. Income was measured in four ways: 1) debt level (having money to pay bills, debts equaling assets and, owing money) 2) having money to buy prescription medications (never, sometimes, often/always) 3) having money to see to the doctor (never, sometimes, often/always) and 4) yearly income. These variables were examined in a sequential logistic regression model with typical measures of SES such as education and occupation. Not having debt resulted in 9 times higher odds of 30-day prolonged abstinence at 3 months follow-up ([OR] = 9.18, 95% [CI] = 2.33 – 36.11, p < .002) and nearly 7.5 fold increased odds of 7 day point prevalence abstinence at 3 months follow-up ([OR] = 7.39, 95% [CI] = 2.06 – 26.51, p < .003). Those with money to see a doctor resulted in almost 6 fold increased odds of 30-day prolonged abstinence at 3 months follow-up ([OR] = 5.89, 95% [CI] = 1.05 – 32.99, p < .05) and around 5 times higher odds of 7 day point prevalence abstinence at 3 months follow-up ([OR] = 4.86, 95% [CI] = 1.08 – 21.86, p < .04). Due to collinearity,

separate models for annual income and money to buy prescription medications were run and these variables were not predictive of smoking outcomes. Having debt and not having enough money to see a doctor are two possible indicators of smoking treatment failure, even when behavioral interventions and NRT are offered at no-cost. These economic indices could more accurately capture income effects upon smoking cessation and suggest potential mechanisms between SES and health among Latino smokers.

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## **POS4-114**

### **THE ASSOCIATION BETWEEN SMOKING CESSATION ATTEMPTS AND PAIN: FINDINGS FROM THE NHIS (2010) STUDY**

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**INTRODUCTION:** Smoking and pain often co-occur; however, many people with pain are interested in quitting. To date, no studies have investigated the association between smoking cessation and pain. The aim of this study was to investigate the association between smoking status, quit attempts, and pain occurrence. We hypothesized that, compared to those without recent pain, those with pain would have lower successful quit rates and greater failed quit attempts over the past 12 months. **METHODS:** Data were extracted from the 2010 National Health Interview Survey (Adult Sample; see CDC.gov for survey methods). Subjects were included if they were current smokers or had successfully quit smoking in the 12 months prior to assessment. The eligible sample included 5,753 adults (21.2% of total sample), and were 49% Female, 75% White, 18% African American, and averaged 44 years-old. Subjects were coded as having pain if they reported neck, back, or joint pain during the past 3 months (56.1%). Smoking status groups were: 1) Ex-smokers (ES, people who quit in the past year; 10.5%), 2) Failed-quiters (FQ, current smokers with  $\geq 1$  quit attempts in the past year; 42.3%), and 3) Non-quiters (NQ, current smokers with no quit attempts in the past year; 47.2%). **RESULTS:** Data were analyzed via logistic regression and chi squares. Analysis revealed a significant association between smoking status and recent pain ( $\chi^2(2, N=5,753)=22.1$ ,  $p<.001$ ) suggesting that the odds of having pain vs. no pain was higher for FQ than for either ESs or NQs (OR = 1.29, CI 1.06-1.58 and OR = 1.37, CI 1.19-1.57 respectively). Among ex-smokers, 52.3% reported pain and 47.7% did not. Among failed quitters, 59.3% reported pain and 40.7% did not. Among non-quiters, 53.1% reported pain and 46.9% did not. **DISCUSSION:** The hypothesis was partially supported. While pain was unrelated to successful quitting, it was associated with increased risk of failed quit attempts. These findings expand the literature by suggesting that the occurrence of pain may be associated with failed smoking quit attempts. Future research should investigate the potential mechanisms by which smoking quit attempts and pain are associated.

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## **POS4-115**

### **TOBACCO SMOKE EXPOSURE AMONG LESBIAN, GAY, AND BISEXUALS: RESULTS FROM THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY 2001-2010**

Manuel A. Ocasio\*, Alberto J. Cabán-Martínez, Tulay Koru-Sengul, John D. Clark III, Kristopher L. Arheart, William G. LeBlanc, Lora E. Fleming, and David J. Lee

In the United States (US), the tobacco industry has increased marketing efforts targeting lesbian, gay, and bisexual (LGB) communities, utilizing nightclub and bar promotions and event sponsorships among other strategies to increase visibility and promote the use of their products in public settings. Smoking rates in these communities have been reported to be as much as three times higher relative to heterosexuals although these samples are not generalizable to the US population. To address this deficit, we pooled data on 14,940 U.S. adults ages 20-59 (representing an annual 138 million adults) from the nationally representative 2001-2010 National Health and Nutrition Examination Survey (NHANES) who responded to questions about sexual orientation, smoking status and who had available serum cotinine information, to determine exposure to secondhand smoke (SHS). Compared to heterosexuals, there was a significantly lower proportion of self-reported never smokers among LGB (42.5±2.5% vs. 53.1±0.5%) and a significantly higher proportion of current smokers

among LGB (38.9±2.4 vs. 26.4±0.4). Serum cotinine values (cutoff at 3 ng/mL) were utilized to assess for SHS exposure among former and never smokers for which no significant differences were found between LGB and heterosexual non-smokers. A subgroup analysis among current smokers was conducted and significant differences were found between ten-year age groups and sexual orientation ( $\chi^2=11.02$ ,  $p=0.049$ ). Age group-specific analysis indicated that the highest smoking prevalence was found among LGB adults 20-29 years of age (34.3±3.5). The use of NHANES has allowed for the first time nationally-representative estimates of primary and SHS exposure in LGB populations. There are a significantly smaller proportion of LGB adults who are never smokers suggesting that these sexual minorities engage in tobacco use more so than heterosexual adults. Additional surveillance efforts both local and national for LGB smokers are needed to further examine disparities in tobacco exposure. The high rate of smoking in this portion of the US population also suggests that targeted tobacco control efforts need to be developed.

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## POS4-116

### NONSMOKERS' ATTITUDES TOWARD ETS AND ITS POTENTIAL INFLUENCE ON POPULATION QUIT RATE

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Nonsmokers are a key group for changing social norms on smoking. Nonsmokers' attitudes toward Environmental Tobacco Smoke (ETS) is one good indicator of social norm towards smoking. This study hypothesized that nonsmokers' attitude towards ETS in a given geopolitical area (e.g., state) predicts the quit rate of smokers living in the same area. The study used Current Population Survey (CPS-TUS, 2001-2002) and grouped the U.S. states into three groups, based on their nonsmokers' attitudes toward smoking restrictions at restaurants, hospitals, indoor work areas, bars and cocktail lounges, indoor sporting events, and indoor shopping malls. These measures were summed to create an ETS attitude index. States were then grouped into three groups: Low, Medium, and High states based on the index. The analysis showed that the smokers living in these three groups of states have significantly different rates of making serious quit attempts in a given 12-month period: 37.1%, 41.1%, and 43.5%, respectively. These states also differ significantly in annual cessation rate: 5.9%, 7.1%, and 8.3%, respectively. The study demonstrates that nonsmokers may hold the key to increasing tobacco cessation at the population level.

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## POS4-117

### AFFECT STATES MODERATE THE RELATIONSHIP BETWEEN IMPLICIT SMOKING ATTITUDES AND CRAVING

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Most models of smoking and relapse suggest that negative affect states exert direct effects on smoking behavior. Recent research has examined the influence of automatic psychological processes on smoking motivation and smoking behavior. Some research suggests negative affect may influence smoking motivation and behavior by depleting resources necessary to inhibit automatic/implicit psychological processes. The current study examined whether affect states moderate the relationship between implicit attitudes and cigarette craving. We hypothesized that implicit smoking attitudes would be related to craving under conditions of high negative affect, but not in other states. Adolescent smokers ( $n = 132$ ), aged 14-18 ( $M = 16.58$ ,  $SD = 1.14$ ), were audibly prompted at random times to report state affect and craving on hand-held devices during 7 days of ad lib smoking prior to a quit attempt. Items addressed each quadrant of the mood circumplex (valence by activation level). Participants also completed a pre-quit smoking implicit association test with higher values indicating more positive attitudes. Data were analyzed using hierarchical linear modeling. State craving was related negatively to feeling relaxed ( $p < .05$ ) and positively to feeling stressed ( $p <$

.01), irritable ( $p < .01$ ), fidgety ( $p = .05$ ), and cheerful ( $p < .01$ ), but was not related to feeling sad. Implicit smoking attitude (ISA) was not related to craving initially, but interacted with feeling stressed ( $p < .01$ ) and cheerful ( $p < .05$ ) in predicting craving. At +1 SD stressed, ISA was positively associated with craving ( $p < .01$ ) but not at -1 SD stressed. Similarly, ISA was positively related to craving at +1 SD cheerful ( $p < .05$ ) but not at -1 SD cheerful. These data suggest that various affect states are associated with craving among adolescent smokers. Implicit attitudes were only related to craving under select high arousal affect states, supporting recent research linking automatic processes to substance use via the activation component of affect. This suggests a complex association between affect states and automatic processing that may play an important role in determining smoking and relapse.

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## POS4-118

### PERCEIVED VULNERABILITY AND INTENTION TO QUIT AMONG NONDAILY SMOKERS

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Cigarette smoking continues to be the leading cause of preventable death in the United States. Although the overall current prevalence of smoking has decreased (currently 19.3% US), the percentage of nondaily smokers (NDS) of the current smoking population has increased from 16% in 1998 to 33% in 2011. Previous research suggests that smokers' perception of smoking-related health risks and they are positively correlated with intentions to quit. However, little is known about this relationship among NDS. In this study, a NDS is defined as having smoked over 100 cigarettes in his/her lifetime, currently smoking between 4-24 days in a month and have been doing so for at least 6 months. A sample ( $n = 60$ ) of NDS in Minnesota completed a survey assessing demographics, smoking behaviors, future perceived vulnerability to developing smoking-related diseases, and intention to quit. This sample was 45% female, had a mean age of 43.3 years ( $SD = 9.8$ ), averaged 3.8 cigarettes per day ( $SD = 4.1$ ) on days smoked, smoked an average of 13.1 days per month ( $SD = 5.6$ ), and had been smoking nondaily for an average of 10.5 years ( $SD = 10.8$ ). Intention to quit in the next 30 days was relatively low (13.3%,  $n = 8$ ), and remained low for intention in the next 6 months (23.3%,  $n = 14$ ). Only 5% ( $n = 3$ ) intended to never quit. Due to small sample size, nonparametric Spearman's rank correlations were calculated to determine the association between perceived vulnerability associated with continued smoking and intention to quit. Future perceived vulnerability was positively correlated with intention to quit ( $r = 0.31$ ,  $p < 0.05$ ). Overall, increased perception of risk was associated with greater intentions to quit. Increasing the awareness of health risks among NDS may be essential in promoting smoking cessation. However, the degree to which NDS perceive such health risks may be attributed to other factors and requires further investigation.

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## POS4-119

### COTININE LEVELS IN DRIED BLOOD SPOTS COLLECTED FOR CHILDHOOD LEAD SCREENING

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Secondhand smoke (SHS) is an important risk factor for childhood disease, and SHS exposure and health effects vary by race, ethnicity and socioeconomic status. Clinical response to childhood SHS exposure depends on parental report. Population-based data are sometimes supplemented by plasma, urine or salivary biomarkers. Current lead screening recommendations are that all children be screened at least once between 1 and 2 years of age. Lead is often measured from dried blood spots (DBS). DBS can be collected relatively noninvasively, are more hygienic than urine or saliva, and are easy to acquire by fingerstick from small children. We have developed valid and reliable



high throughput methods to test cotinine in DBS as a biomarker of tobacco exposure. The objective of this study was to estimate the rate of SHS exposure in children ages 6-36 months by race by applying high throughput cotinine assay methods to extant dried blood spots collected in U.S. clinics and submitted to a commercial laboratory for lead analysis. An anonymous associated data set provided month and year of birth, date of specimen collection, zip code, race and lead level. To analyze DBS, three 4.8 mm punches were extracted and then analyzed for cotinine by solid phase extraction, followed by liquid chromatography tandem mass spectrometry (LC/MS/MS). 639 DBS anticipated have been analyzed to date (of 2100 anticipated). 329 (51%) had cotinine levels <0.5 ng/g, 203 (32%) showed ≥0.5-3.0 ng/g, 79 (12%) showed ≥3.0-8 ng/g, and 28 (4%) showed ≥8.0 ng/g. Cotinine levels were higher in Blacks than Whites ( $p=.003$ ). The correlation between cotinine and lead was 0.25 for Blacks and 0.22 for Whites (both  $p$ -values<0.001). We conclude that SHS exposure in children who participate in lead screening programs is prevalent, varies significantly by race, and is associated with lead exposure, perhaps because childhood tobacco and lead exposure share sociodemographic risk factors. Laboratory documentation of SHS exposure in children may be used to prompt clinical intervention to promote parental cessation and home smoking restrictions.

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## POS4-120

### ENGAGING "REAL WORLD" HOSPITAL PATIENTS IN A HOSPITAL INITIATED TOBACCO DEPENDENCE INTERVENTION

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Background: Oregon Health & Science University Hospitals (Portland, OR) have supported a Tobacco Dependence (TD) Consult Service for hospital patients for several years. Patients with a current/recent history of tobacco use at admission are referred to the TD Consult Service for bedside cessation assessment/education, brief behavioral intervention, medication recommendations and post-discharge follow-up. Orders/referrals are made in the electronic medical record (EMR) at admission, or shortly after. Patient motivation to stop smoking or mental health/substance abuse histories are not considered in initiating orders/referrals. Objective: To assess patient engagement in a hospital initiated tobacco cessation intervention. Methods: Recent TD Consult Service data for January –November, 2011 were analyzed from the OHSU EMR and TD Consult Service databases. Data included number of consults ordered/referred in the EMR; number of patients that engaged in tobacco dependence consult interventions; and proportion of patients remaining engaged in intervention post-discharge. Tobacco use was assessed at the follow-up phone intervention approximately 7-14 days post-discharge via self-report. Results: Orders/referrals were initiated from a broad range of specialty providers in the hospitals. Of 873 patient orders/referrals, 734 (84%) patients engaged in intervention. Of these 452 (61.5%) agreed to attempt to remain abstinent and remain engaged in intervention post-discharge. Self-reported abstinence assessed approximately 7-14 days post-discharge was 19% (140/734). Conclusions: Our "real world" data suggest that most tobacco using patients would be willing to engage in a cessation intervention initiated in the hospital and more than half would agree to attempt to remain abstinent and remain engaged in the intervention post-discharge. Post-discharge abstinence rates would be expected to be modest.

Support for this analysis and the OHSU Tobacco Dependence Consult service was provided by OHSU Hospitals and the OHSU Smoking Cessation Center.

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## POS4-121

### RELATIONS AMONG AFFECT, ABSTINENCE MOTIVATION AND CONFIDENCE, AND DAILY LAPSE RISK AMONG SMOKERS TRYING TO QUIT

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Aims: This study prospectively tested the hypothesis that changes in momentary affect, abstinence motivation, and confidence would predict lapse risk over the next 12-48 hours using Ecological Momentary Assessment (EMA) data from smokers attempting to quit smoking. The moderating effects of high-risk contexts on relations between cognitions

(motivation and confidence) and lapse risk were also tested. Method: 79 adult, daily smokers recorded their momentary affect, motivation to quit, abstinence confidence, and smoking behaviors in near real time with multiple EMA reports using electronic diaries post-quit. Results: Multilevel models indicated that increases in negative affect predicted greater lapse risk up to 12 hours, but not 24 hours later. Neither positive nor negative affect had significant effects on subsequent cognitions. High levels of motivation appeared to reduce increases in lapse risk that occur over hours. Momentary increases in confidence predicted greater lapse risk over 12 hours in high-risk situations, but not in the absence of potent smoking triggers. Conclusion: Momentary changes in negative affect, motivation, and confidence during a quit attempt all had short-term effects on smoking lapse. Negative affect had short-lived effects on lapse risk, whereas high levels of motivation protected against the risk of lapsing that accumulates over time. Contrary to expectations, an acute increase in confidence may increase vulnerability to lapse in the context of potent smoking triggers. Relations observed among affect, cognitions, and lapse seem to depend critically on the timing of assessments and the contexts in which the assessments occur.

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## POS4-122

### THE IMPACT OF SOCIAL SUPPORT ON QUITTING SUCCESS AMONG YOUNG ADULTS ENROLLED IN A CAMPUS-BASED PROVINCIAL QUIT AND WIN CONTEST

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PURPOSE. In Ontario, 23% of young adults (aged 20-24) still smoke. Given that 80% of Canadians have attended post-secondary school by their mid-20s, campus-based tobacco interventions can reach a large proportion of young adult smokers. Quit and Win contests—which are free to use, easy to access, and allow smokers to quit "on their own"—are consistent with young adult smokers' preference for self-directed quitting. Given the natural social networks that exist on campus, the social support components of such contests may be particularly effective in helping young adult smokers to quit. This study examines: (1) the outcomes of a province-wide, campus-based Quit and Win contest; (2) the role of social support components offered in the contest on quitting success. METHODS. Hosted by the provincially-funded Leave The Pack Behind tobacco control initiative, the 6-week wouldrather... contest is promoted at 42 Ontario post-secondary institutions. Eligible contestants were invited to complete a baseline survey and telephone interviews 1-month and 3-months after the contest start date. RESULTS. Of the estimated 144,732 smokers attending the campuses offering wouldrather..., 1,535 (1.1%) joined the contest; 631 were eligible to participate in this study; 288 (45.0%) agreed to do so; and 178 (61.8%) completed the telephone interviews. Intention-to-treat estimates show that 99% of contestants made a quit attempt; 27.4% stayed smoke-free for the contest period; and 20% sustained their abstinence 3-months after the quit date. On 5-point scales (1 = not valuable, 5 = very valuable), contestants rated the email support, buddy support and community of support as 3.42, 3.76 and 4.05, respectively. Three-month follow-up data show that although social support was valuable to young adults' quit attempts in the contest, it was not related to quitting success. SIGNIFICANCE. Age-tailored, campus-based Quit and Win contests can effectively support young adults smokers to quit. Future research should examine whether and how contests can support long term cessation. Results will be used to guide interventions and research aimed at reducing smoking prevalence among this age group.

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## POS4-123

### AUTO CONTRACTIVE MAPPING: APPLICATION OF AN ARTIFICIAL NEURAL NETWORK APPROACH TO THE ANALYSIS OF PERINATAL SMOKING CESSATION EFFECTIVENESS DATA

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**Introduction:** The purpose of this study is to re-analyze data from the Smoke Free Baby & Me study examining the effectiveness of a program based on the 5 A's that was integrated into the "real world" of routine perinatal care in a rural population. Previous analyses using SPSS found no differences in validated smoking cessation between control and intervention groups in the total sample during pregnancy, a profound discordance between self-reported smoker status and urinary cotinine levels, and no significant differences for most birth and pregnancy outcomes. New neural network based methods have challenged these traditional approaches. Methods: A non-linear statistical approach based on artificial neural networks, called the Auto Contractive Map (AutoCM) was utilized to identify hidden relationships existing among variables and the association strength of demographic, pregnancy-related and smoking status factors with prenatal smoking cessation/continuance and birth outcomes. This innovative method visually depicts these associations in a connectivity map or tree. Results: Data on 156 subjects that included 66 variables were processed by AutoCM. The mapping shows that the intervention group is more closely aligned to higher Apgar scores and the control group to the presence of other smokers in the household. The closest variables to positive urinary cotinine at 24 weeks gestation were positive urinary cotinine at the first prenatal visit and gravidity of 4. Four principal hubs were identified: presence of other smokers in the household; self-reported smoker status at the first prenatal visit; < ½ pack of cigarettes per day as reported at the first prenatal visit, and a minimum of a high school education. Each of these hubs is connected to an average of 10 other variables. The results of this analysis by AutoCM are compared to that of SPSS. Conclusion: The complexity of smoking cessation during pregnancy is well-documented. By utilizing Auto Contractive Mapping software we are able to capture the dynamic interactions of myriad variables associated with perinatal tobacco use and birth outcomes.

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## POS4-124

### MEDICAL INTERVENTION TO STOP SMOKING IN YOUNG ADULTHOOD (MISSYA): A PROVINCE-WIDE PROJECT

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Brief tobacco interventions delivered by health professionals can increase smokers' likelihood of successfully quitting smoking, yet young adult smokers are the least likely of all age groups to be asked about, to be offered or to use assisted methods of quitting. There is a need for health professionals to more frequently, proactively, and effectively intervene to assist young adult smokers to quit. The MISSYA project is supplying, free of charge, full-course treatments of Nicotine Replacement Therapy (NRT) to health clinics on 44 post-secondary institutions across the province of Ontario, Canada. In the fall of 2011, the MISSYA project also hosted 10 medical educational workshops for campus health professionals. The workshops included information on: Motivational Interviewing; the best-practice guideline for smoking cessation intervention; and the use of NRT and pharmacotherapies with young adults and light smokers. The aim of the workshops was to encourage clinicians to routinely provide evidence-based brief tobacco intervention and free NRT (when clinically appropriate) to the 155,000 smokers in the post-secondary student population. Over 80 health professionals attended a workshop, and many of them went on to champion the workshop goals in their campus clinics. Workshop attendees highly valued the practical, hands-on training they received, and almost all expected to increase the time they would dedicate to cessation counselling. Most attendees felt the training provided useful strategies and resources that would make them more successful at encouraging smokers to quit. Despite the availability of medical educational training and the free supply of full-course treatments of NRT, sluggish distribution of the NRT to campuses hints at a continued reluctance among some campus health professionals to provide NRT to young adult smokers. This suggests that other factors contribute to health professionals' decisions and actions to provide smoking cessation counseling to

young adults. Future research is needed to understand barriers to providing young adult smokers with effective cessation aids.

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## POS4-125

### SHORT-TERM FLUCTUATIONS IN MOTIVATION TO QUIT SMOKING

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Motivation to quit has been a much-studied topic in tobacco research. Typically, motivation to quit is assessed as a static variable; a smoker's motivation to quit is assumed to be fixed a given point in time. The stability (or instability) of motivation to quit over short periods of time has been overlooked. The current study explores the issue of short-term fluctuations in motivation to quit in a multi-ethnic sample of adult smokers in Hawaii (N=1,307). Participants were recruited from the community through newspaper advertisements as part of a larger NIH-funded study. The sample was 49% female; mean age was 45 (SD=13). The ethnic distribution was: 35% Caucasian, 30% Native Hawaiian, 21% Asian, 7% African American, and 7% other. Participants smoked a mean of 19 cigs/day (SD=12). To assess short-term fluctuations in motivation, participants were asked to respond "True" or "False" to the statement: "My motivation to quit smoking changes from one day to the next." This statement was endorsed as true by 65% of smokers, and false by 35%. Further analyses revealed that the smokers who indicated fluctuating motivation were significantly more interested in quitting as compared to smokers without fluctuations. For example, those indicating a fluctuating day-to-day motivation had a mean of 4.0 (SD=1.1) on a five point scale assessing desire to quit (i.e., "Do you want to quit smoking?"), whereas those not fluctuating day-to-day had a mean of 3.0 (SD=1.6). This difference in means was statistically significant [ $t(1,293)=13.49$ ,  $p<.001$ , Cohen's  $d=.74$ ]. Similar results were observed for other measures of motivation to quit and measures of confidence in quitting (all  $ps<.001$ ). This set of analyses reveals two major findings. First, day-to-day fluctuations in motivation to quit appear to be very common. Second, day-to-day fluctuations in motivation to quit are strongly associated with higher motivation to quit and greater confidence in future quitting. These findings indicate that cessation motivation is changeable over short periods of time, and that motivational tension is often associated with an affirmative engagement in an ongoing struggle to quit smoking.

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## POS4-126

### SUPPORTING THE PEDAGOGICAL INFRASTRUCTURE OF NURSING STUDENT PARTICIPATION IN TOBACCO RELATED RESEARCH: ONE METHOD TO PROMOTE CLINICIAN EDUCATION AND TRAINING

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**Background:** The 2008 Clinical Practice guidelines recommend that all clinical disciplines incorporate tobacco dependence treatment education in their curricula. Aggressive curricular changes have been developed by schools of medicine and pharmacy, but a majority of nursing schools nationwide do not have dedicated content in tobacco use and cessation on the undergraduate level. In addition, while undergraduate nursing education has long included a didactic research component, few programs provide experiential opportunities with active research teams. Purpose: This study presents focus group findings regarding the experiences of undergraduate nursing students at a northeastern university who were members of an Interdisciplinary Tobacco Use Research Program. Methods: After one year of project activities that included their analyzing focus group transcripts of pregnant smokers and their providers, students were invited to be participants in their own focus group to explore how their overall learning as students and future practitioners in the nursing profession was affected. Four focus group questions guided the semi-structured discussion. The transcription was analyzed

for key words, phrases, and themes by the student participants and two outside analysts using the method of constant comparative analysis. Results: Four common themes were identified: 1) perception checking: becoming more aware of their own attitudes and the importance of not being judgmental, 2) reflective practice: increasing their listening skills, 3) smoking cessation for pregnant women: implementing best practices, and 4) research lessons: learning the research process, and looking forward to making research part of their futures). A follow-up focus group with other students revealed similar themes. Conclusion: This study illustrates how nursing programs that actively involve undergraduate students in tobacco use research are affecting curricular change, not only in education about the research process, but also about tobacco dependence treatment, and in first-hand understanding of a clinical population, such as pregnant smokers.

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## POS4-127

### PILOT RANDOMIZED TRIAL OF A BRIEF INTERVENTION TO FACILITATE ENGAGEMENT OF SMOKING CESSATION TREATMENT AMONG HOSPITALIZED SMOKERS WITH DEPRESSION

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Despite persistent tobacco control efforts, the prevalence of smoking among people with depression has not declined in step with non-depressed populations. Sustained rates of smoking can not be attributed to a lack of motivation to quit in this population as smokers with depression report a similar desire to quit, similar rates of recent quit attempts, and similar rates of using nicotine replacement as non-depressed smokers. Epidemiology, clinical research and randomized trials support the high-risk for early relapse among smokers with depression and the efficacy of specialized behavioral mood management treatment for smokers with depression. The overall objective of this research program is facilitate links between clinical care for depression and effective smoking cessation treatments for this difficult to reach population of smokers. We developed a brief motivational interviewing (MI) approach for delivery during acute inpatient psychiatric services that was designed to facilitate engagement in an outpatient cessation treatment. Inpatient smokers (mean FTND = 5.7±2.24) with depression (mean PHQ = 27.31±6.09) were randomized (n=80; 61% Female) in sequential cohorts to receive either MI or self-guided Resource Information (RI). Both MI and RI included an invitation to attend a no-cost 8-week outpatient counseling with free nicotine patches. Upon discharge, we observed significant interest in cessation with 54% of smokers in MI and 40% of smokers in RI reporting intentions to quit smoking completely. However, engagement in outpatient treatment differed significantly. Smokers who received a single session of MI (35%) were 3.2 (95%CI = 1.07-9.41, p<0.04) times more likely than smokers receiving RI (15%) to attend the outpatient cessation treatment. Quitters in MI relative to RI had significantly lower odds (AOR = 0.18, 95%CI=0.04-0.90, p<0.04) of early lapse (<7days). We expect that as a result of this project, we will have developed a brief intervention that will increase utilization of smoking cessation programs, increase success in quitting, and lower impact of morbidity and mortality from tobacco use within this high-risk population of smokers with depression.

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## POS4-128

### RELATIONSHIP BETWEEN NEGATIVE AFFECT, ANXIETY, AND NICOTINE DEPENDENCE

Jose Luis Gonzalez-Luna\*, Jennifer Lira-Mandujano, and Fabiola Gonzalez-Betanzos

Different studies have focused on some variables such as depression, anxiety, self-efficacy and motivation that predict the relapse in smokers who have attended a smoking cessation treatment. In this sense, different models have been derived trying to explain the relapse process in people who is abstinent. From the affect regulation model of nicotine dependence has been noted that an important factor in this issue is the negative affect and anxiety disorders. Therefore, the purpose of this study was to evaluate the relationship between the level of nicotine dependence, negative affect and

anxiety level. 22 People who assisted to a motivational brief intervention for smoking cessation participated in this study. We applied The Fagerström Test for Nicotine Dependence (Heatherton et al., 1991), the Positive and Negative Affect Schedule (The PANAS Scales, Watson, Clark y Tellegen, 1988, adapted by Páez y Robles, 2003) and the State-Trait Anxiety Inventory (STAI; Spielberg & Diaz-Guerrero, 1982). A Spearman correlation analysis shows that both negative affect ( $r = 0.262$ ,  $p < 0.05$ ) and anxiety ( $r = 0.32$ ,  $p < 0.05$ ) predict nicotine dependence. We discuss the inclusion of cognitive-behavioral techniques used in the treatment of panic disorder to prevent relapse in smokers with high negative affect attending smoking cessation interventions.

*Coordinación de la investigación científica. Universidad Michoacana de San Nicolas de Hidalgo.*

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## POS4-129

### FACTOR ANALYTIC STRUCTURE OF A BRIEF VERSION OF THE WISCONSIN INVENTORY OF SMOKING DEPENDENCE MOTIVES AMONG AFRICAN AMERICAN LIGHT SMOKERS

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Despite smoking fewer cigarettes per day, African American smokers have greater difficulty quitting when compared to Caucasian smokers. Further elucidating the impact of smoking motivations on smoking behavior as it pertains to nicotine dependence would contribute to understanding the difficulties African American light smokers face when quitting. This study examined the internal validity of the WISDM-30 (Smith et al., 2007) among a sample of 540 African American light smokers enrolled in a randomized controlled smoking cessation trial. An exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted with a principle components using an oblimin rotation. Participants reported smoking an average of 8.0 cigarettes per day (SD=2.5), were predominately female (66.1%), had a mean age of 46.5 (SD=11.3), and had relatively high baseline serum cotinine 275.8 ng/ml (SD=155.8). Seventy-two percent of the sample reported smoking a cigarette within 30 minutes of awakening. Results from the EFA analysis produced an 8-factor model, explaining 69% of the variation in responses. The overall Measure of Sampling Adequacy (MSA) was 0.88 with item level MSA ranging 0.94 -0.68 across the 30 items of the WISDM scale. Five of the original subscales of the WISDM-30 were replicated (Affiliative Attachment, Automaticity, Social/Environmental Goals, Taste/Associative Processes, and Weight Loss). Items from the Cognitive Enhancement and Negative/Positive Reinforcement subscales loaded on a single factor, while items from the Craving and Tolerance/Loss of Control subscales as well as a single Cue Reactivity item loaded together on one factor. Results from the CFA replicated the findings of the EFA; however, the item "I smoke within the first 30 minutes of awakening in the morning" loaded on the factor with the two Cue Reactivity items from the EFA. These findings continue to support the hypothesis of a multidimensional approach to conceptualizing nicotine dependence, and provide information regarding characteristics of nicotine dependence related to smoking behaviors of African American light smokers.

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## POS4-130

### ASSESSMENT OF A HOOKAH SMOKER'S EXPOSURE TO TOXIC COMPOUNDS

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In this paper, a comparison between the chemical ingredients of cigarettes and hookah smoke is addressed while applying different sampling and analysis methods. Since moving toward new forms of chemically modified hookah products such as flavored tobacco and instant igniting charcoals have made the filtration by water process much less efficient, the effect of the type of both flavoring and charcoals on the smoke ingredients has been incorporated into this study. Direct and indirect sampling methods of the smoke were performed either into solvents of different polarity or through

adsorbent tubes. Different sampling instrumentations were developed for the purpose of this project. In addition to sampling under direct constant flow, a test bench that simulates a human smoking process by generating pulsing sinusoidal pneumatic flow via a robot machine was developed by "IREADYCo LLC", a Minnesota based company, for the purpose of this study. Several analytical techniques were used that include: Gas Chromatography-Mass spectrometer (GC-MS), Thermogravimetric analysis (TGA), Thermal desorption-Gas Chromatography-Mass spectrometer (TD-GC-MS) and Liquid Chromatography-MS. The results from different sampling and extraction methods were compared. It is observed that, in addition to glycerin and nicotine which are usually basic components in most mouassal tobacco brands, significant amounts of chemicals are introduced into the smoke stream either by evaporation from the mouassal tobacco or as products of the chemical combustion reactions. It was evident that the main factors that impact the chemical composition of the hookah smoke are the type of molasses/tobacco, the type of the charcoal used, the temperature at which heating of the tobacco is performed and most importantly the concentration of oxygen in the air stream. As of means of comparing hookah smoke to cigarettes, more risk resulting from hookah smoke are expected due to lack of any available efficient filtration technique. Moreover, the longer smoking session of hookah will also result in longer exposure of the blood and body cells to continuous attacks by toxic "sticky" compounds.

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## **POS4-131**

### **SMOKING CESSATION PROGRAMS IN SUBSTANCE ABUSE TREATMENT FACILITIES: WHAT ARE WE DOING?**

Jessica Legge Muilenburg\*<sup>1</sup> and Lillian T. Eby<sup>2</sup>, <sup>1</sup>Project MERITS Health Promotion and Behavior University of Georgia; <sup>2</sup>Project MERITS Psychology University of Georgia

The prevalence of smoking among individuals seeking treatment for a co-occurring substance abuse condition is very high, between 70%-95%. However, many drug treatment facilities do not encourage smoking cessation during treatment, even though patients often show interest in quitting smoking. The purpose of this study is to investigate the treatments and methods used in providing smoking cessation resources to patients in a substance abuse treatment facility. Data were collected from in-depth telephone interviews administered to 1005 program administrators. The substance abuse treatment facilities were randomly selected using the SAMHSA database. There was not an abundance of pharmacological treatments available for patients. Program administrators reported that only 24.2% of substance abuse treatment facilities administer the nicotine patch, 17.5% gum, 10.5% lozenge, 2.9% nasal spray, 16% bupropion (Zyban, Wellbutrin), 12.5% varenicline (Chantix), 6.7% clonidine (Catapres), and 5.0% nortriptyline (Aventyl, Pamelor). In terms to behavioral treatments, there is a range of availability. Specific to smoking, most programs have some sort of self-help materials (76.9%) followed by individual counseling focused on problem solving skills (38.3%), individual counseling focusing on social support and smoking cessation (37.5%), four or more counseling session on smoking (32.1%), the "Five As" (30.5%), group counseling (29.4%), telephone quitlines (16.2%). A large amount provide the patient with a community resource referral (72.7%). Only 22.5% combine counseling and medication treatment. With the behavioral research in smoking cessation supporting the practice of behavioral therapy along with pharmacological interventions, research needs to focus on the barriers to providing smoking cessation treatment in substance abuse facilities. Further, strategies to evaluate effective treatments in these facilities are encouraged.

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## **POS4-132**

### **THE RISK OF ADVERSE CARDIOVASCULAR EVENTS FROM VARENICLINE AGAINST THE BENEFITS IN MORTALITY FROM SMOKING CESSATION**

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Cardiovascular mortality remains the primary cause of death in the United States, with smoking the largest population attributable risk factor. Behavioral counseling and pharmacotherapy lead to the highest smoking cessation rates, with varenicline having success rates higher than other approved medications. A recent meta-analysis describes higher risk of cardiovascular events from varenicline, calling for a reappraisal of the risks and benefits of varenicline for smoking cessation. While varenicline may increase the odds of adverse cardiovascular events, it also increases the chance of successfully quitting tobacco, which decreases mortality. For a 50 year old female smoker seeking assistance with smoking cessation, we need to communicate the chances of quitting successfully with and without varenicline, any excess number of cardiovascular events and the expected mortality reduction from varenicline attributable to tobacco cessation. Using published data, for every 1000 women who take varenicline for smoking cessation compared to placebo, approximately three additional women would have an adverse cardiovascular event over a year, 217 would quit smoking at the end of the year, and slightly more than four of these women would be alive at ten years. This knowledge allows clinicians to adequately describe the risks and benefits of varenicline use in terms more meaningful to patients.

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## **POS4-133**

### **DEVELOPMENT AND IMPLEMENTATION OF A TOBACCO USE REGISTRY IN A PRIMARY CARE PRACTICE**

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To provide optimal tobacco cessation interventions, expert panel guidelines recommend clinicians use the "5 A's": ask about tobacco use; advise cessation; assess willingness to quit; assist in a quit attempt; and arrange follow up. Despite these recommendations, few instruments exist to ensure comprehensive structured care and coordinated counseling occurs for tobacco users in primary care settings. Workflow-focused interventions can improve implementation of recommendations with or without concurrent provider education interventions. One effective workflow-focused intervention is a clinical decision support system, which can increase guideline-oriented care for many chronic conditions. If decision support tools are automatically supplied to providers as part of clinician workflow, guideline implementation can improve more than 75%. The UNC Family Medicine Center has successfully used disease registries to support clinical decision support for patients with diabetes, congestive heart failure, and coronary artery disease for years. The Center initiated a tobacco use registry in fall, 2011, with the goal to improve the care of patients who use tobacco across all "5 A's". The registry prompts clinical staff to ask every tobacco user (identified by tobacco as a vital sign) about tobacco use and assess the patient's willingness to quit. Providers then use that information to advise cessation and devise an appropriate cessation plan. The registry form encourages motivational interviewing, referrals to the Nicotine Dependence Clinic (an onsite tobacco counseling service) and use of the Quitline. Patients receive handouts about these services and a tobacco cessation self-management tool. Pharmacotherapy is an important component, and the form aides physicians in starting a tobacco cessation medication as appropriate. Within several months of initiating the registry, over three hundred patients were enrolled, with a goal of entering over 75% of clinic patients that use tobacco within a year. We will present this novel tobacco use registry, its development and early outcomes, including those that affect provider training and those that affect patient participation and quality of care, such as quit rates and referrals for nicotine dependence counseling.

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