

AWARD NUMBER: W81XWH-20-1-0820

TITLE: Automated Assessment of Visual Photosensitivity in Traumatic Brain Injury

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CONTRACTING ORGANIZATION: University of Miami

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14. ABSTRACT In this study, we focus on validating a clinical automated instrument, the Ocular Photosensitivity Analyzer (OPA), to quantify an important sequela of Traumatic Brain Injury (TBI), visual photosensitivity (i.e. photophobia). Additionally, we will also assess the effect of various light filtering eyewear with the OPA to investigate whether specific wavelengths of light have significant impact on the management of visual photosensitivity in TBI subjects. Study Questionnaires will be administered in conjunction with OPA testing to better understand the complex interactions between visual photosensitivity and other TBI associated sequela (Dry Eye, Ocular Pain). We will measure VPT in fifty healthy and fifty TBI subjects via the OPA at Visit#1 (baseline) and Visit#2 (1 month) (both with and without light filtering eyewear, in random order) and correlate VPT to the Study Questionnaires. Fifty-five study participants have been Recruited, Screened, Enrolled, and Completed Visit#1 as well as forty-nine of those study participants have Completed Visit#2.						
15. SUBJECT TERMS Traumatic Brain Injury, Eye, Photophobia, Visual Photosensitivity, Ocular Photosensitivity Analyzer, Visual Photosensitivity Threshold, Pain, Dry Eye, VLSQ-8, Questionnaires						
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1. INTRODUCTION:

Traumatic brain injury (TBI) is a condition with devastating lifelong consequences. Visual photosensitivity, or extreme sensitivity to light, is a common and incapacitating condition associated with TBI. The purpose of this research is to assess visual photosensitivity using a novel instrument, the Ocular Photosensitivity Analyzer (OPA) in healthy and TBI study participants. Additionally, we will administer study questionnaires in conjunction with OPA testing to better understand the complex interactions between visual photosensitivity and other TBI associated sequela. Finally, we will evaluate the effect of various light filtering eyewear with the OPA and explore whether specific wavelengths of light play a significant role in the management of visual photosensitivity in TBI. For conditions such as TBI where increased visual photosensitivity is a prominent feature, quantitative clinical outcome measures are important to establish a baseline, examine disease progression, and evaluate the efficacy of emerging treatments.

2. KEYWORDS:

Traumatic Brain Injury, Eye, Photophobia, Visual Photosensitivity, Ocular Photosensitivity Analyzer, Visual Photosensitivity Threshold, Pain, Dry Eye, Light Sensitivity, VLSQ-8, Questionnaires

3. ACCOMPLISHMENTS:

What were the major goals of the project?

AIM 1: VALIDATE THE OCULAR PHOTSENSITIVITY ANALYZER (OPA) IN HEALTHY AND TRAUMATIC BRAIN INJURY (TBI) SUBJECTS.

AIM 2: DEMONSTRATE THE OPAS ABILITY TO DETECT TREATMENT EFFECT.

Major Tasks	Months	% of Completion
Major Task 1: Clinical Research Study Protocol		
Refine eligibility criteria, exclusion criteria, screening protocol	0-3	100%
Finalize informed consent form and human subjects' protocol	0-3	100%
Coordinate with Site for IRB protocol submission	0-3	100%
Submit amendments (modifications) and protocol deviations to IRB, as needed	As Needed	100%
Coordinate with Site for annual IRB report for continuing review	Annually	
<i>Milestone Achieved: IRB approval obtained</i>	0-3	100%
Submit for HRPO Regulatory Review	2-3	100%
<i>Milestone Achieved: HRPO Regulatory Review approval</i>	2-3	100%
Major Task 2: Training, Checklists, and Assessments		
Coordinate with Sites for training to maintain GCP compliance with protocol	0-3	100%
<i>Milestone Achieved: Research staff trained</i>	0-3	100%
Checklists and flow charts for all study steps, data collection, and database requirements	1	100%
Generate randomization scheme for OPA testing: (1) no filtering (plano lenses (PL)), (2) blue-light blocking lenses (BL), (3) FL-41	1	100%

lenses (FL) (an established treatment for visual photosensitivity), and (4) gray lenses (GL) (neutral density)		
<i>Milestone Achieved: Finalized study assessments</i>	0-3	100%
Work with data core and dissemination of findings (abstracts, presentation, publications, DOD)	6-24	49%
<i>Milestone Achieved: Report results from the data analyses</i>	6-24	49%
Major Tasks	Months	% of Completion
Major Task 3: Study Begins		
Source light filtering eyewear: (1) no filtering (plano lenses (PL)), (2) blue-light blocking lenses (BL), (3) FL-41 lenses (FL) (an established treatment for visual photosensitivity), and (4) gray lenses (GL) (neutral density)	1	100%
Begin subject recruitment (Healthy/Controls), n=50	6-21	62%
Begin subject recruitment (TBI), n=50	6-21	48%
<i>Milestone Achieved: Schedule the first subject first visit, obtain informed consent, screened, and enrolled</i>	6	100%
Administer the VLSQ-8 and Study Questionnaires prior to OPA testing (Healthy/Controls and TBI) – Visit #1	6-21	55%
Perform baseline OPA testing with and without light filtering eyewear according to the assigned randomization scheme (Healthy/Controls and TBI) – Visit #1	6-21	55%
<i>Milestone Achieved: Complete subject baseline questionnaires and OPA testing with and without light filtering eyewear (Healthy/Controls and TBI) – Visit #1</i>	6-21	55%
Administer the VLSQ-8 and Study Questionnaires prior to OPA testing (Healthy/Controls and TBI) – Visit #2	6-21	49%
Assess all subjects at the 1-month timeframe using the OPA with and without light filtering eyewear according to the assigned randomization scheme (Healthy/Controls and TBI) – Visit #2	6-21	49%
Assess and report all SAEs to IRB, DSMB; enact and see approval for protocol amendments to ensure patient safety, as needed	As needed	
<i>Milestone Achieved: Report findings from baseline – Visit #1 and 1-month – Visit #2 follow-up assessments</i>	3	49%
Major Task 4: Data Analysis		
Coordinate biostatistician/study staff for monitoring data collection rates of VPT and questionnaires and data quality	6-24	49%
Perform all analyses according to specifications, share output and findings with all investigators	6-24	49%
Work with data core and dissemination of findings (abstracts, presentation, publications, DOD)	6-24	49%
<i>Milestone Achieved: Report results from the data analyses</i>	6-24	49%

Projected Quarterly Enrollment:

Target Enrollment	Year 1				Year 2				Total
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
UM	-	10	15	20	25	30	-	-	100
Target Enrollment (cumulative)	-	10	15	20	25	30	-	-	100

What was accomplished under these goals?

1) Major Activities:

- Submitted IRB Modification and Continuing Review (MODCR00002791) which was approved by the IRB on January 21, 2022 to Add a New Study Personnel: Heather Durkee, Ph.D., Removing Study Personnel: Veena Karanam, and Adding a new Email Address to the Recruitment Flyer: obc@miami.edu to assist with Study Recruitment and Communications.
- Study Team Member Training to Review the Protocol/Procedures, Documents, Administration of Study Questionnaires/Assessments as well as practice using the Devices (i.e. Ocular Photosensitivity Analyzer (OPA), Spot Vision Screener, etc...) and Proper Handling and Disinfecting of the Filtered Eyewear (Figure 1) in a Mock Setting was Completed by New Study Personnel: Heather Durkee, Ph.D. at the end of January 2022.



Figure 1. Filtered Eyewear.

- HRPO Continuing Review – Submission Form to the USAMRMC HRPO on March 13, 2022 via email.
- HRPO – E01763.1a – Continuing Review Acknowledgement Memorandum (Proposal Number VR190009, Award Number W81XWH-20-1-0820) on March 25, 2022.
- Fifty-five Study Participants (Healthy/Controls and TBI) have been Recruited, Screened, Enrolled, and Completed Visit #1.
- Performed the interim analysis on the OPA VPT data collected once ~ 50% of the Study Participants have completed Visit #1 and ~ 45% have completed Visit #2*. **NOTE:** (* = One Study Participant relocated to another state and was unable to complete Visit #2 at one-month – Lost to Follow-up)
- A Phone Interview was scheduled between Visit #1 and Visit #2 to complete some of the Study Questionnaires/Assessments (BTACT) in order to help mitigate unnecessary COVID-19 exposure burden on both the study participants and study team members.
- Forty-nine Study Participants (Healthy/Controls and TBI) have Completed the Phone Interview and Visit #2.
- A No-Cost Extension Letter was submitted on July 1, 2022 to request an additional 12 months to complete the remaining work for our project since we have Recruited, Screened, and Enrolled ~ 55% of the Healthy and TBI Study Participants. No additional funds are being requested and the No-Cost Extension request does not involve a change in the approved objectives/aims or the scope of the project. (Approval is Under Process as of August 12, 2022 - Pending).

2) Specific Objectives:

- AIM 1: VALIDATE THE OCULAR PHOTOSENSITIVITY ANALYZER (OPA) IN HEALTHY AND TRAUMATIC BRAIN INJURY (TBI) SUBJECTS.** We will measure Visual Photosensitivity Thresholds (VPT) via the Ocular Photosensitivity Analyzer (OPA) at baseline and one-month (both with and without light filtering eyewear, in random order) in (50) healthy and (50) Traumatic Brain Injury (TBI) subjects. Additionally, VPT will be correlated Study Questionnaires.
- AIM 2: DEMONSTRATE THE OPAS ABILITY TO DETECT TREATMENT EFFECT.** We will evaluate the effect of various light filtering eyewear on VPT ranging from: (1) no filtering (plano lenses (PL)) up to varying filters such as (2) blue-light blocking lenses (BL), (3) FL-41 lenses (FL) (an established treatment for visual photosensitivity), and (4) gray lenses (GL) (neutral density) presented in an randomized order in (50) healthy and (50) TBI subjects. Various light filtering lens tints have been hypothesized to reduce light sensitivity by blocking the shorter light wavelengths implicated in the pathophysiology of visual photosensitivity. Along with demonstrating sensitivity to change with treatment, we will evaluate the effect of various light filtering eyewear on VPT which may provide valuable insights on whether specific wavelengths of light play a significant role in eliciting visual photosensitivity in TBI.

3) Key Outcomes:

AIM 1: VALIDATE THE OPA IN HEALTHY AND TBI SUBJECTS.

- Once ~ 50% of the Study Participants have completed Visit #1 and ~ 45% have completed Visit #2* and interim analysis was performed on the OPA VPT data collected. NOTE: (* = One Study Participant relocated to another state and was unable to complete Visit #2 at one-month – Lost to Follow-up)

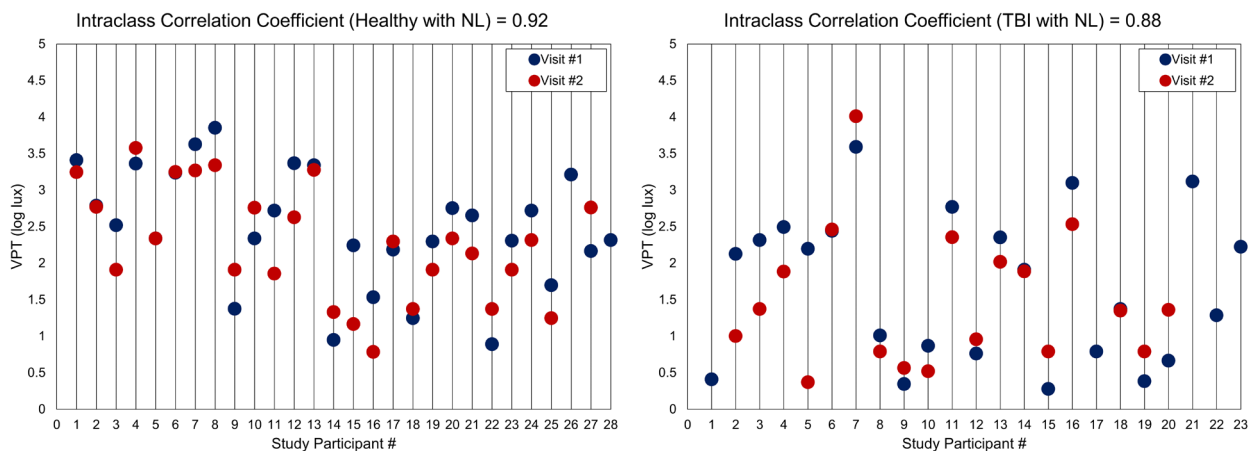


Figure 2. Intraclass Correlation Coefficient: Healthy with NL (left) and TBI with NL (right).

- The interim data analysis was completed for twenty-eight Healthy Study Participants that have completed Visit #1 and twenty-six Healthy Study Participants that have completed the Phone Interview and the Visit #2*. Visual Photosensitivity Thresholds were measured via the Ocular Photosensitivity Analyzer (OPA) at baseline and one-month (both with and without light filtering eyewear, in random order). *NOTE: (* = Two Healthy Study Participants were pending the Phone Interview and Visit #2 at a one-month)*
- The interim data analysis was completed for twenty-three TBI Study Participants that have completed Visit #1 and eighteen TBI Study Participants that have completed the Phone Interview and the Visit #2**. Visual Photosensitivity Thresholds were measured via the Ocular Photosensitivity Analyzer (OPA) at baseline and one-month (both with and without light filtering eyewear, in random order). *NOTE: (** = Four TBI Study Participants were pending the Phone Interview and Visit #2 after one-month and one Study Participant relocated to another state and was unable to complete Visit #2 due to Lost to Follow-up.)*
- The OPA test-retest reproducibility for VPT measured at each visit was analyzed by reliability analysis. An Intraclass Correlation Coefficient (ICC) between 0.75 and 0.90 indicates good reliability and ≥ 0.90 was considered to indicate excellent reliability. *NOTE: Visit #1 and Visit #2 were conducted one-month apart.*
- The mean measured VPT in the Healthy Study Participants with no light filtering eyewear (“NL = No Lens”) were 2.5 ± 0.8 log lux at Visit #1 and 2.3 ± 0.8 log lux at Visit #2. The test-retest reproducibility for Healthy Study Participants measured during the two in-person visits had excellent reliability (ICC = 0.92) (Figure 2 (left)).
- The mean measured VPT in the TBI Study Participants with no light filtering eyewear (“NL = No Lens”) were 1.7 ± 1.0 log lux at Visit #1 and 1.5 ± 0.9 log lux at Visit #2. The test-retest reproducibility for TBI Study Participants measured during the two in-person visits had good reliability (ICC = 0.88) (Figure 2 (right)).
- In summary, the data indicates that the OPA is a reliable tool for quantifying visual photosensitivity in individuals with and without ocular disease.
- Additionally, Study Participants were administered the Visual Light Sensitivity Questionnaire-8 (VLSQ-8, range 8 to 40), prior to being tested with the OPA, to assess the presence and severity of visual photosensitivity symptoms. A higher VLSQ-8 score indicates more visual photosensitivity symptoms and a lower VLSQ-8 score indicates less visual photosensitivity symptoms. The VPT and VLSQ-8 scores of Healthy and TBI Study Participants were compared.
- The VPT of Healthy and TBI Study Participants were 2.5 ± 0.9 and 1.7 ± 1.0 log lux, respectively, $p < 0.05$. VLSQ-8 scores of Healthy and TBI Study Participants were 11.6 ± 3.2 and 22.2 ± 8.3 , respectively, $p < 0.05$. VPT scores were negatively correlated with VLSQ-8 scores ($r = -0.56$, $p < 0.01$).

- In summary, visual photosensitivity was assessed in healthy and TBI study participants using the OPA. TBI Study Participants had lower VPT and higher VLSQ-8 scores compared to Healthy Study Participants indicating less tolerance to light and more visual photosensitivity symptoms.

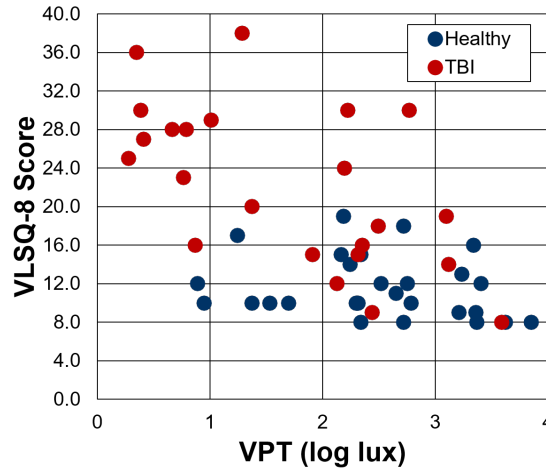


Figure 3. Correlation between the VPT (log lux) and the VLSQ-8 Score.

AIM 2: DEMONSTRATE THE OPAS ABILITY TO DETECT TREATMENT EFFECT.

- The interim data analysis was completed for twenty-eight Healthy Study Participants (15 females and 13 males, age = 33.3±13.6) and twenty-three TBI Study Participants (6 females and 17 males, age = 41.3±13.2) that were tested using the OPA under an IRB approved protocol.

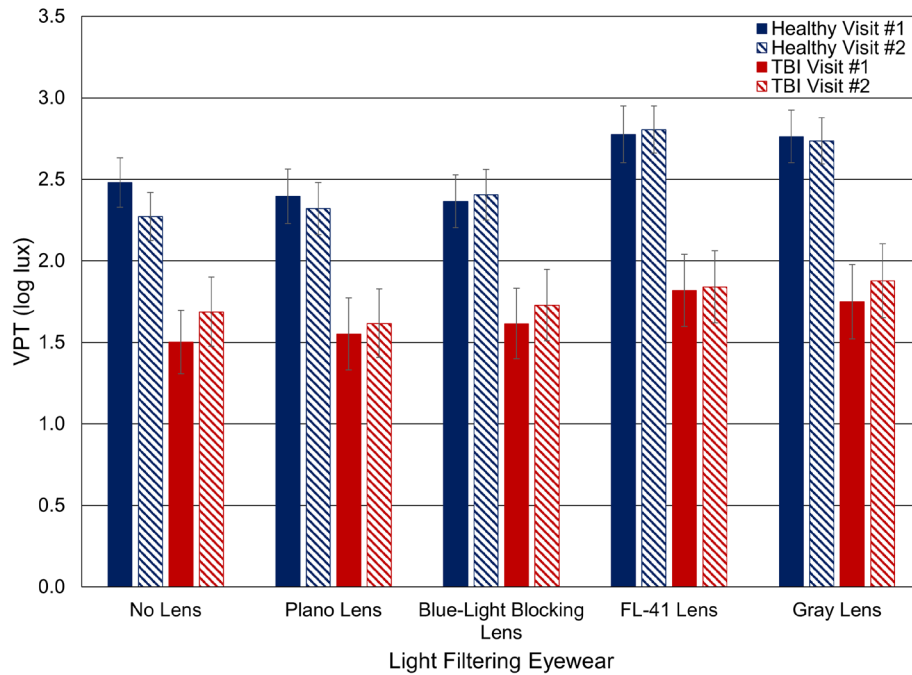


Figure 4. VPT (log lux) of Healthy and TBI Study Participants at Visit #1 and Visit #2 with and without Light Filtering Eyewear.

HEALTHY	VISIT #1 (n = 28)					VISIT #2 (n = 26)				
	No Lens	Plano Lens	Blue-Light Blocking Lens	FL-41 Lens	Gray Lens	No Lens	Plano Lens	Blue-Light Blocking Lens	FL-41 Lens	Gray Lens
MEAN	2.5	2.4	2.4	2.8	2.8	2.3	2.3	2.4	2.8	2.7
STD	0.8	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8
SE	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.1

TBI	VISIT #1 (n = 23)					VISIT #2 (n = 18)				
	No Lens	Plano Lens	Blue-Light Blocking Lens	FL-41 Lens	Gray Lens	No Lens	Plano Lens	Blue-Light Blocking Lens	FL-41 Lens	Gray Lens
MEAN	1.7	1.6	1.7	1.8	1.9	1.5	1.6	1.6	1.8	1.7
STD	1.0	1.0	1.0	1.1	1.1	0.9	1.1	1.0	1.1	1.1
SE	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

Figure 5. VPT (log lux) of Healthy (top) and TBI (bottom) Study Participants at Visit #1 and Visit #2 with and without Light Filtering Eyewear.

- The interim analysis of the visual photosensitivity thresholds (VPT) obtained from the OPA indicated that there are significant differences between the Healthy and TBI Study Participant groups with no light filtering eyewear (“NL = No Lens” condition), $p < 0.05$. NOTE: A higher VPT indicates more tolerance to light while a lower VPT indicates less tolerance to light.
- Overall, the “No Lens” and the “Plano Lens” conditions yielded comparable VPT values within the Healthy and TBI Study Participant groups. Additionally, the “Blue-light Blocking Lens” condition yielded similar VPT values compared to the “No Lens” and the “Plano Lens” conditions within the Healthy and TBI Study Participant groups, most likely due to the OPA LED light source stimuli containing minimal power in the spectral band where the Blue-light filter has its cut-off.
- Furthermore, the “FL-41 Lens” and the “Gray Lens” conditions yielded comparable VPT values within the Healthy and TBI Study Participant groups. The “FL-41 Lens” and “Gray Lens” conditions reduced the light transmittance by 50% and significantly increased the VPT in the Healthy Study Participants when compared to the TBI Study Participants.
- In summary, the Healthy and TBI Study Participant groups are significantly different across all conditions (both with and without light filtering eyewear). The “No Lens”, “Plano Lens”, and “Blue-light Blocking Lens” conditions are not different from each other within the Healthy and TBI Study Participant groups. The “FL-41 Lens” and “Gray Lens” conditions are not different from each other within the Healthy and TBI Study Participant groups but are significantly different from “No Lens”, “Plano Lens”, and “Blue-light Blocking Lens” conditions, $p < 0.05$.

4) Other Achievements:

- Mariela C. Aguilar, Ph.D. – Received an NIH Loan Repayment Program Award Renewal through the National Eye Institute (NEI) for the period of two years (July 2021 – June 2023) to continue conducting research with: Jean-Marie Parel, Ph.D. and Anat Galor, MD, MSPH (Co-Mentors).
- Heather A. Durkee, Ph.D. – Received an NIH Loan Repayment Program Award through the National Eye Institute (NEI) for the period of two years (July 2021 – June 2023) to continue conducting research with: Jean-Marie Parel, Ph.D. (Mentor).

What opportunities for training and professional development has the project provided?

Trainings:

- Study Team Member Training to Review the Protocol/Procedures, Documents, Administration of Study Questionnaires/Assessments as well as practice using the Devices (i.e. Ocular Photosensitivity Analyzer (OPA), Spot Vision Screener, etc...) and Proper Handling and Disinfecting of the Filtered Eyewear (Figure 1) in a Mock Setting was Completed by New Study Personnel: Heather Durkee, Ph.D. at the end of January 2022.

How were the results disseminated to communities of interest?

- Mariela C. Aguilar Ph.D., Heather A. Durkee Ph.D., Alex Gonzalez BA, Jean-Marie Parel, Ph.D. presented project activities at the Beauty of Sight – Florida Lions Eye Bank virtual session via Zoom on March 28, 2022; 5:00 – 6:00pm

What do you plan to do during the next reporting period to accomplish the goals?

- Continue Healthy and TBI Study Participant Recruitment, Screening, Enrollment, and the Ocular Photosensitivity Analyzer (OPA) Testing without and with the light filtering eyewear presented in a randomized order according to the OPA testing randomization scheme for Visit #1 and Visit #2.
- Continue performing the Phone Interviews between Visit #1 and Visit #2 to administer the Brief Test of Adult Cognition by Telephone (BTACT) Assessment. *NOTE: A Phone Interview was scheduled between Visit #1 and Visit #2 to help mitigate unnecessary COVID-19 exposure burden on both the Study Participants and Study Team Members.*
- Manuscripts are being drafted and prepared for submission expanding upon the Association for Research in Vision and Ophthalmology (ARVO) and 2022 Military Health System Research Symposium Poster Presentations.
- Correlations between the OPA VPT and the Study Questionnaires V2.0 (Figure 6) administered during Visit #1 and Visit #2 will be investigated (in depth statistical analysis will be performed).

STUDY QUESTIONNAIRES V2.0	VISIT #1	PHONE INTERVIEW	VISIT #2
Visual Light Sensitivity Questionnaire-8 (VLSQ-8)	X		X
DEQ 5	X		X
Ocular Surface Disease Index (OSDI)	X		X
NRS of Pain Intensity	X		X
Neuropathic Pain Symptom Inventory - modified for the eye (NPSI-Eye)	X		X
HIT-6	X		X
Pain History Questionnaire		X	
PCS-EN		X	
Patient Health Questionnaire (PHQ-9)		X	
SF-12V2 OPPERA		X	
BTACT (Brief Test of Adult Cognition by Telephone)		X	

DEMOGRAPHICS V1.0	VISIT #1	PHONE INTERVIEW	VISIT #2
Demographics/Medical History	X		

DATA SHEET V1.0	VISIT #1	PHONE INTERVIEW	VISIT #2
Visual Photosensitivity Threshold (VPT) Data Sheet	X		X

Figure 6. Study Questionnaires V2.0 and Administration Schedule.

4. IMPACT:

What was the impact on the development of the principal discipline(s) of the project?

- Utilizing innovative technology such as the Ocular Photosensitivity Analyzer to significantly advance the understanding and diagnosis of visual dysfunction (visual photosensitivity/photophobia) in TBI will enable the development of more robust therapeutic trials for photophobia, a symptom with few therapeutic options.

What was the impact on other disciplines?

- The Ocular Photosensitivity Analyzer (OPA) could potentially be used in other disciplines to investigate visual photosensitivity in populations of patients suffering from various diseases (i.e. migraineurs, individuals suffering from chronic pain, fibromyalgia, etc...). Developing a diagnostic tool to quantify visual photosensitivity will improve our ability to screen patients, quantify disease severity, and monitor disease course over time. Such a machine can also help evaluate the efficacy of emerging therapies to improve the quality of life for those affected.

What was the impact on technology transfer?

Nothing to Report

What was the impact on society beyond science and technology?

Nothing to Report

5. CHANGES/PROBLEMS:

- Due to the impacts of the COVID-19 pandemic, our research activities have been affected over the course of the grant.
- Subject Recruitment, Screening, Enrollment and OPA testing, commenced in late Quarter 3 of Year 1 due to supply chain issues delaying the procurement of the raw materials needed for the manufacturing of the custom light filtering eyewear: (1) no filtering (plano lenses – non-prescription lenses), (2) blue-light blocking lenses, (3) FL-41 chromatic filtered lenses, and (4) gray (neutral density (ND)) lenses needed to perform the Study Visits.
- A No-Cost Extension Letter was submitted on July 1, 2022 to request an additional 12 months to complete the remaining work for our project since we have Recruited, Screened, and Enrolled ~ 55% of the Healthy and TBI Study Participants. No additional funds are being requested and the No-Cost Extension request does not involve a change in the approved objectives/aims or the scope of the project. (Approval is Under Process as of August 12, 2022 - Pending).

Changes in approach and reasons for change

Nothing to Report

Actual or anticipated problems or delays and actions or plans to resolve them

- To mitigate the delay, we have been ramping up our Recruitment Efforts, Screening, Enrollment, and OPA Testing.
- Afterhours and weekend appointments have been added to the Study Schedule to accommodate more Study Participants and increase Enrollment.
- Additionally, we have Added New Study Personnel as well as Added a New Email Address to the Recruitment Flyer: obc@miami.edu to assist with Study Recruitment and Communications.

Changes that had a significant impact on expenditures

Nothing to Report

Significant changes in use or care of human subjects, vertebrate animals, biohazards, and/or select agents

Nothing to Report

Significant changes in use or care of human subjects

Nothing to Report

Significant changes in use or care of vertebrate animals

Nothing to Report

Significant changes in use of biohazards and/or select agents

Nothing to Report

6. PRODUCTS:

- **Publications, conference papers, and presentations**

Journal publications.

Nothing to Report

Books or other non-periodical, one-time publications.

Nothing to Report

Other publications, conference papers and presentations.**Association for Research in Vision and Ophthalmology (ARVO) Meeting:**

- Aguilar MC, Mittal R, Gonzalez A, Graham V, Sepulveda-Beltran PA, Leviste K, Arrieta E, Maceo Heilman B, Feuer WJ, Alvarez G, Hurwitz B, Lam BL, Felix E, Galor A, Parel JM. Automated Assessment of Visual Photosensitivity in Healthy and Traumatic Brain Injury Study Participants. Investigative Ophthalmology & Visual Science June 2022, Vol.63, 4231 – A0159.
- Mittal R, Aguilar MC, Gonzalez A, Graham V, Leviste KD, Sepulveda-Beltran PA, Arrieta E, Maceo Heilman B, Feuer WJ, Alvarez G, Hurwitz B, Lam BL, Felix E, Parel JM, Galor A. Assessing the Test-Retest Reproducibility of the Ocular Photosensitivity Analyzer to Quantify Visual Photosensitivity. Investigative Ophthalmology & Visual Science June 2022, Vol.63, 4233 – A0161.
- Moulton E, Choudhury A, Mehra D, Felix E, Galor A. Clinical functional magnetic resonance imaging of photophobia in individuals with chronic ocular pain: provisional analysis. Investigative Ophthalmology & Visual Science June 2022, Vol. 63, 1514 – A0239.

Military Health System Research Symposium:

- Galor A, Aguilar MC, Mittal R, Gonzalez A, Graham V, Sepulveda-Beltran PA, Leviste K, Arrieta E, Maceo Heilman B, Feuer WJ, Alvarez G, Hurwitz B, Lam BL, Felix E, Parel JM. Automated Assessment of Visual Photosensitivity in Healthy and Traumatic Brain Injury Study Participants. 2022 Military Health System Research Symposium, Abstract# MHSRS-22-05050. Accepted on May 2, 2022: Abstract Notification - Acceptance for Poster Presentation #273 for Expeditionary Eye Care on 12 - 15 September 2022 at the Gaylord Palms Resort and Convention Center, Kissimmee, FL, USA.

World Cornea Congress VIII:

- Reyes N, Choudhury A, Felix E, Galor A, Moulton E. Clinical neuroimaging of FL-41 tinted lenses treatment on neural pathways of photophobia in patients with chronic ocular pain, World Cornea Congress VIII, Chicago, September 2022.

- Website(s) or other Internet site(s)**

Nothing to Report

- Technologies or techniques**

Nothing to Report

- Inventions, patent applications, and/or licenses**

Nothing to Report

- Other Products**

Nothing to Report

7. PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS

What individuals have worked on the project?

Name: Anat Galor, MD, MSPH
Project Role: PI
Researcher Identifier (e.g. ORCID ID): 0000-0002-3026-6155
Nearest person month worked: 7.2
Contribution to Project: Dr. Galor has performed work in the development of Clinical Research Study Protocol (refining the eligibility criteria, exclusion criteria, screening protocol), IRB submission, IRB Modification, HRPO regulatory review, and conducted Study Team Member Trainings as well as assisted with Recruitment Activities. Dr. Galor has been supervising the Study Database and performing interim data analysis with the Study Team.

Name: Mariela C. Aguilar, Ph.D.
Project Role: Assistant Scientist – Biomedical Engineer
Researcher Identifier (e.g. ORCID ID): 0000-0003-1891-7813
Nearest person month worked: 12
Contribution to Project: Dr. Aguilar has performed work in the development of Clinical Research Study Protocol (refining the eligibility criteria, exclusion criteria, screening protocol), IRB Submissions (Modifications/Continuing Reviews), HRPO regulatory reviews, FITBIR trainings, Checklists and Flowcharts for all Study Steps, Database requirements, and Filtered Eyewear Sourcing. Additionally, she has conducted the Study Team Member Trainings, performed Recruitment Activities, Phone Screenings, and assisted with the Greenphire ClinCard Activation/Study Compensation for Study Participants as well as performed several Phone Interviews (BTRACT). Dr. Aguilar has been supervising the Study Database and performing interim data analysis with the Study Team.

<i>Name:</i>	Alex Gonzalez, BA
<i>Project Role:</i>	Programmer
<i>Researcher Identifier (e.g. ORCID ID):</i>	0000-0002-0774-0031
<i>Nearest person month worked:</i>	7.2
<i>Contribution to Project:</i>	Mr. Gonzalez has performed work in the development of Clinical Research Study Protocol, IRB submissions, Checklists and Flowcharts for all study steps, Database requirements, and Filtered Eyewear Sourcing. Additionally, he has conducted the Study Team Member Trainings and performed the Benchtop Testing and Analysis of the Filtered Eyewear to verify the Spectral Filtering Characteristics as well as Enrolled Study Participants and Conducted the Visit #1/Visit #2 – OPA Testing/Administered Study Questionnaires, and performed Phone Interviews (BTACTION). Mr. Gonzalez has been reviewing the Study Database and performing interim data analysis with the Study Team.
<i>Name:</i>	Rhiya Mittal, BS
<i>Project Role:</i>	MD/MPH Student
<i>Researcher Identifier (e.g. ORCID ID):</i>	0000-0002-0584-0848
<i>Nearest person month worked:</i>	4.8
<i>Contribution to Project:</i>	Ms. Mittal is an MD/MPH Student who has completed the Study Team Member Trainings and has performed Recruitment Activities as well as Enrolled Study Participants, Conducted the Visit #1 – OPA Testing/Administered Study Questionnaires, Performed Phone Interviews (BTACTION), as well as Conducted the Visit #2 – OPA Testing/Administered Study Questionnaires.
<i>Name:</i>	Heather Durkee, Ph.D.
<i>Project Role:</i>	Senior Research Associate III
<i>Researcher Identifier (e.g. ORCID ID):</i>	0000-0002-5476-5813
<i>Nearest person month worked:</i>	2.4
<i>Contribution to Project:</i>	Dr. Durkee is a Senior Research Associate III who has completed the Study Team Member Trainings and has performed Recruitment Activities as well as Enrolled Study Participants, Conducted the Visit #1 – OPA Testing/Administered Study Questionnaires, Performed Phone Interviews (BTACTION), as well as Conducted the Visit #2 – OPA Testing/Administered Study Questionnaires. Dr. Durkee has been supervising the Study Database and performing interim data analysis with the Study Team.

Has there been a change in the active other support of the PD/PI(s) or senior/key personnel since the last reporting period?

Nothing to Report

What other organizations were involved as partners?

Nothing to Report

8. SPECIAL REPORTING REQUIREMENTS

COLLABORATIVE AWARDS:

Not Applicable

QUAD CHARTS:

Please see the updated Quad Chart in the Attachments.

9. APPENDICES:

- Original Copies of Abstracts and Poster Presentations
- Anat Galor, MD, MSPH Curriculum Vitae
- Study Questionnaires

Automated Assessment of Visual Photosensitivity in Healthy and Traumatic Brain Injury Study Participants

Mariela C. Aguilar; Rhiya Mittal; Alex Gonzalez; Victoria Graham; Paula A. Sepulveda Beltran; Katherine Leviste; Esdras Arrieta; Bianca Maceo Heilman; William J Feuer; Gemayaret Alvarez; Barry Hurwitz; Byron L Lam; Elizabeth Felix; Anat Galor; Jean-Marie Parel

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Footnotes

Commercial Relationships **Mariela Aguilar** None; **Rhiya Mittal** None; **Alex Gonzalez** None; **Victoria Graham** None; **Paula Sepulveda Beltran** None; **Katherine Leviste** None; **Esdras Arrieta** None; **Bianca Maceo Heilman** None; **William Feuer** None; **Gemayaret Alvarez** None; **Barry Hurwitz** None; **Byron Lam** None; **Elizabeth Felix** None; **Anat Galor** None; **Jean-Marie Parel** None

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Investigative Ophthalmology & Visual Science June 2022, Vol.63, 4231 – A0159. doi:

Abstract

Purpose : Traumatic brain injury (TBI) is a condition with devastating lifelong consequences. Visual photosensitivity is a common and incapacitating symptom associated with TBI. The purpose of our study was to assess visual photosensitivity in healthy and TBI study participants using the Ocular Photosensitivity Analyzer (OPA, Aguilar et al. BOE2018,9(11): 5583-5596).

Methods : Twenty-five healthy study participants (13 females and 12 males, age = 32.5 ± 13.3) and nine TBI study participants (2 females and 7 males, age = 35.7 ± 14.5) were tested using the OPA under an IRB approved protocol. The automated OPA produces light stimuli of varying intensities utilizing unequal ascending and descending steps. Each stimulus is presented for 2 seconds, followed by a rest period of 4 seconds. The subject is instructed to indicate whether the light stimulus is “uncomfortable” by pressing a hand-held button. The visual photosensitivity threshold (VPT) is calculated from the mean of 10 response reversals. A higher VPT indicates more tolerance to light while a lower VPT indicates less tolerance to light. Additionally, study participants were administered the Visual Light Sensitivity Questionnaire-8 (VLSQ-8), prior to being tested with the OPA, to assess the presence and severity of visual photosensitivity symptoms. The VPT and VLSQ-8 scores of healthy and TBI study participants were compared.

Results : The VPT of healthy and TBI study participants were 2.5 ± 0.8 and 1.6 ± 0.9 log lux, respectively, $p < 0.05$. VLSQ-8 scores of healthy and TBI study participants were 11.6 ± 3.3 and 20.7 ± 8.9 , respectively, $p < 0.05$. VPT scores were negatively correlated with VLSQ-8 scores ($r = -0.56$, $p < 0.01$).

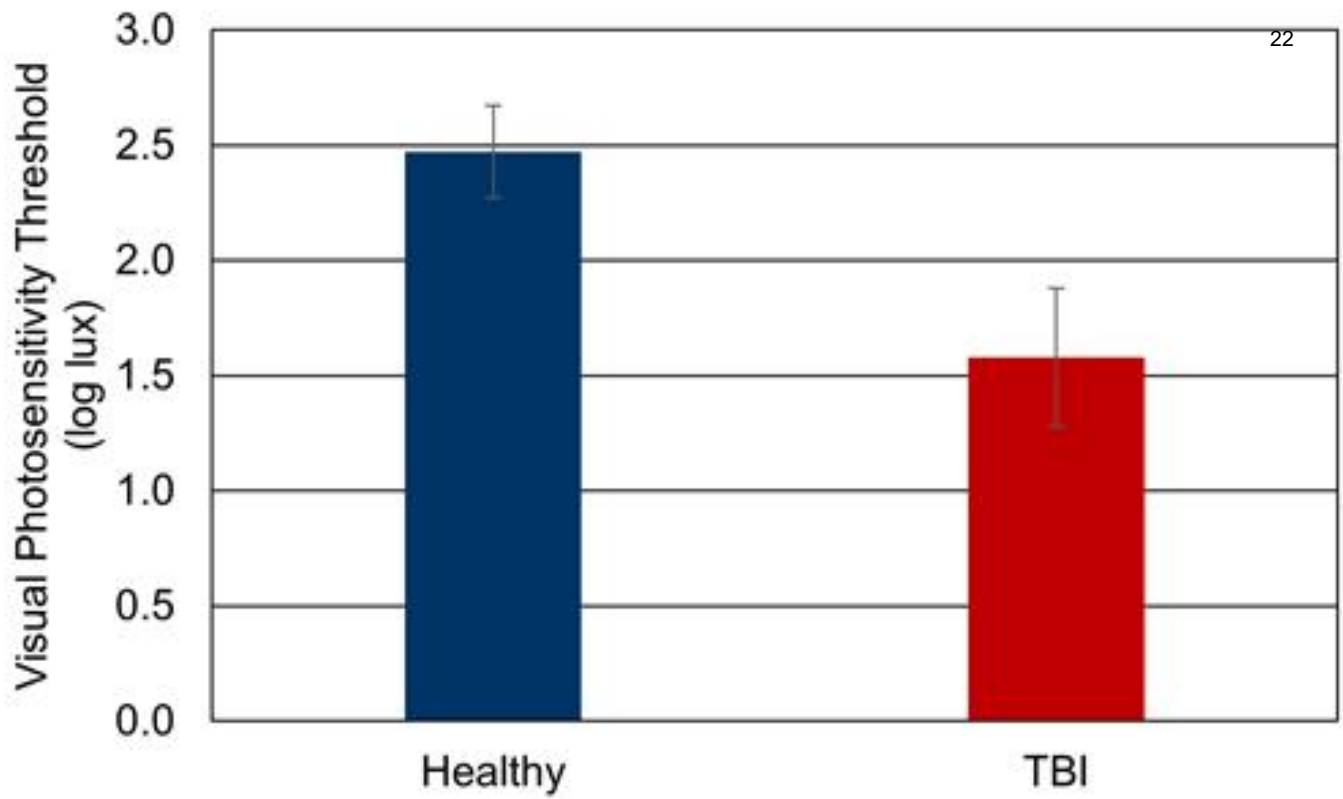
Conclusions : Visual photosensitivity was assessed in healthy and TBI study participants using the OPA. Healthy study participants had higher VPT and lower VLSQ-8 scores compared to TBI study participants. Quantitative clinical outcome measures are needed in TBI to better characterize disease severity, monitor progression, and evaluate efficacy of emerging treatments.

This abstract was presented at the 2022 ARVO Annual Meeting, held in Denver, CO, May 1-4, 2022, and virtually.



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Figure 1. Ocular Photosensitivity Analyzer testing a healthy study participant.



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Figure 2. Visual Photosensitivity Threshold of the healthy and TBI study participants.

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AUTOMATED ASSESSMENT OF VISUAL PHOTSENSITIVITY IN HEALTHY AND TRAUMATIC BRAIN INJURY STUDY PARTICIPANTS

Mariela C. Aguilar¹, Rhiya Mittal¹, Alex Gonzalez¹, Victoria Graham¹, Paula A. Sepulveda-Beltran¹, Katherine Leviste¹, Esdras Arrieta¹, Bianca Maceo Heilman^{1,2}, Heather A. Durkee¹, William J. Feuer³, Gemayaret Alvarez⁴, Barry E. Hurwitz^{2,5}, Byron L. Lam³, Elizabeth R. Felix^{4,6}, Anat Galor^{3,6}, Jean-Marie A. Pareil^{1-3,7}

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PURPOSE

Traumatic brain injury (TBI) is a condition with devastating lifelong consequences. Visual photosensitivity is a common and incapacitating symptom associated with TBI.¹⁻⁴

The purpose of our study was to assess visual photosensitivity in healthy and TBI study participants using the Ocular Photosensitivity Analyzer (OPA).⁵

METHODS

Twenty-eight healthy study participants (15 females and 13 males, age = 33.3±13.6) and twenty-three TBI study participants (6 females and 17 males, age = 41.3±13.2) were tested using the OPA under an IRB approved protocol.

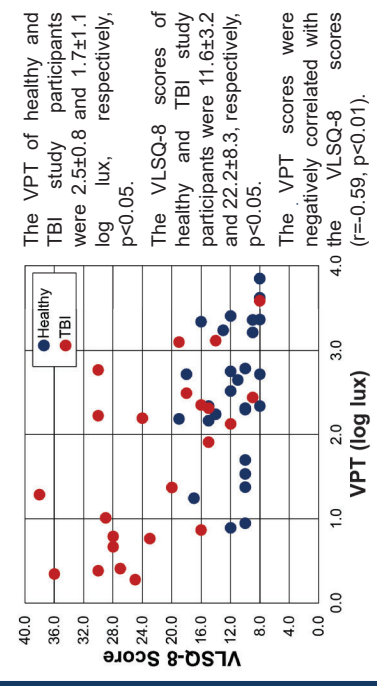
The automated OPA produces light stimuli of varying intensities ranging from 1 to 32,000 lux (0 to 4.51 log lux) utilizing unequal ascending and descending steps. Each stimulus is presented for 2 seconds, followed by a rest period of 4 seconds. The subject is instructed to indicate whether the light stimulus is "uncomfortable" by pressing a hand-held button. The Visual Photosensitivity Threshold (VPT) is calculated from the mean of 10 response reversals.⁵ A higher VPT indicates more tolerance to light and a lower VPT indicates less tolerance to light.

Reliability of the responses is tracked throughout the test utilizing catch trials. Power output and irradiance were measured to ensure the OPA meets safety exposure limits set forth by the International Organization for Standardization Standard for Ophthalmic Instruments (ISO 15004-2). Additionally, study participants were administered the Visual Light Sensitivity Questionnaire-8 (VLSQ-8, range 8 to 40)⁶ prior to being tested with the OPA, to assess the presence and severity of visual photosensitivity symptoms. A higher VLSQ-8 score indicates more visual photosensitivity symptoms and a lower VLSQ-8 score indicates less visual photosensitivity symptoms. The VPT and VLSQ-8 scores of healthy and TBI study participants were compared.

OCULAR PHOTSENSITIVITY ANALYZER



RESULTS



CONCLUSION

Visual photosensitivity was assessed in healthy and TBI study participants using the OPA. TBI study participants had lower VPT and higher VLSQ-8 scores compared to healthy study participants indicating less tolerance to light and more visual photosensitivity symptoms.

The VPT appears to be a useful quantitative measure that may provide clinical outcome information in TBI patients to characterize disease severity, monitor progression, and evaluate efficacy of treatments.

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DISCLOSURES: NONE

Assessing the Test-Retest Reproducibility of the Ocular Photosensitivity Analyzer to Quantify Visual Photosensitivity

Rhiya Mittal; Mariela C. Aguilar; Alex Gonzalez; Victoria Graham; Katherine Leviste; Paula A. Sepulveda Beltran; Esdras Arrieta; Bianca Maceo Heilman; William J Feuer; Gemayaret Alvarez; Barry Hurwitz; Byron L Lam; Elizabeth Felix; Jean-Marie Parel; Anat Galor

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Footnotes

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Investigative Ophthalmology & Visual Science June 2022, Vol.63, 4233 – A0161. doi:

Abstract

Purpose : As few methods exist to reliably quantify visual photosensitivity, the Ocular Photosensitivity Analyzer (OPA) was devised (Aguilar et al. BOE 2018, 9(11): 5583-5596). This study was conducted to assess the test-retest reproducibility of the OPA to quantify visual photosensitivity thresholds (VPT) in healthy subjects across two visits.

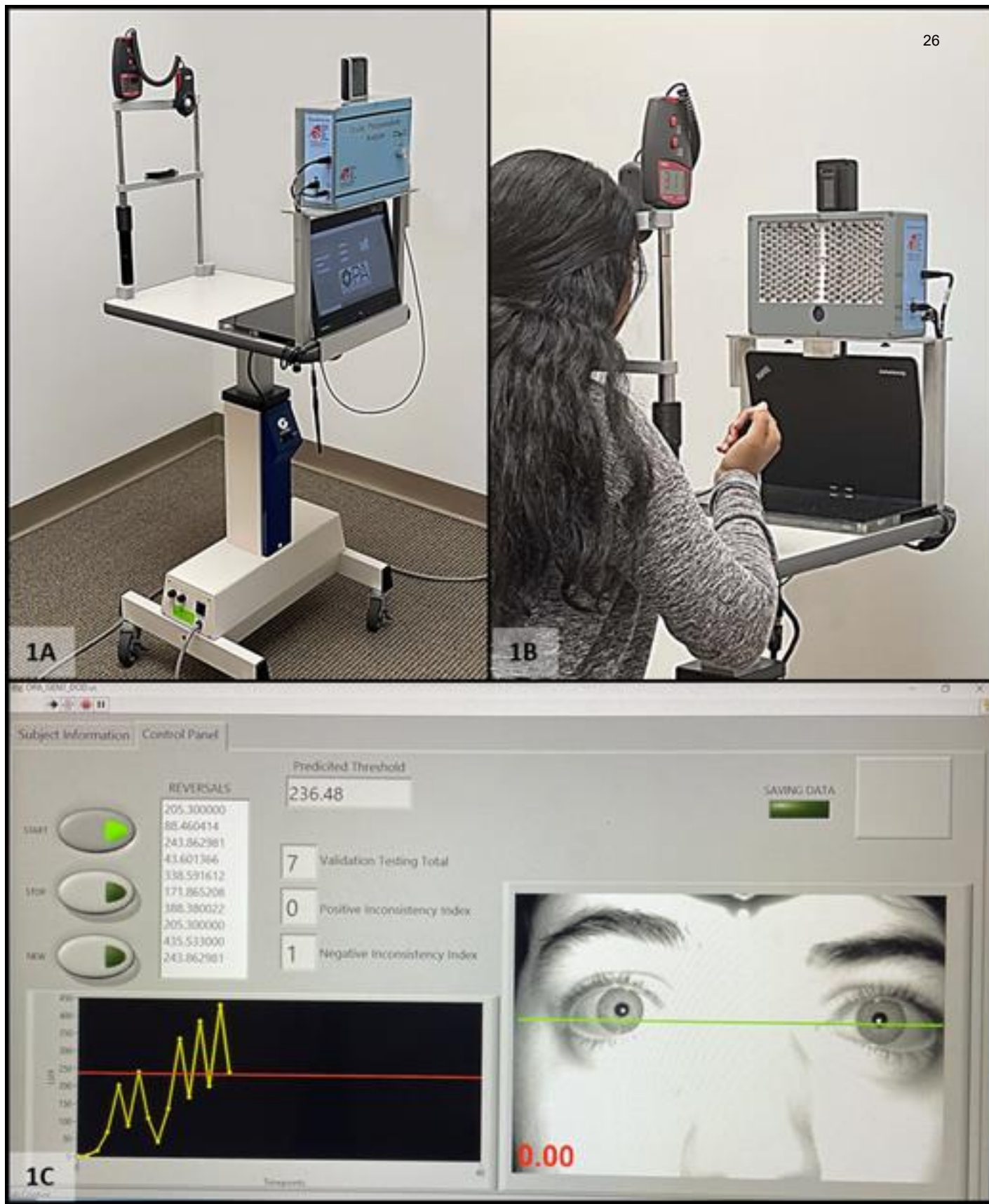
Methods : This IRB-approved study included 25 healthy adults with no history of ocular abnormality. During two in-person visits, subjects were administered study questionnaires (VLSQ-8: Visual Light Sensitivity Questionnaire-8, OSDI: Ocular Surface Disease Index, NPSI-E: Neuropathic Pain Symptom Inventory for the Eye) and filled out a medical history form. VPT was measured with the OPA, an automated device that assesses subjects' responses to multiple light stimuli presented at varying intensities. The test-retest reproducibility for VPT measured at each visit was analyzed by reliability analysis. An Intraclass Correlation Coefficient (ICC) ≥ 0.90 was considered to indicate excellent reliability. Correlation between VPT and study questionnaire responses were assessed via linear regression. An $R^2 \geq 0.7$ was considered significant.

Results : The average age of the subjects (n=25) was 32.5 ± 13.3 years, 48.0% self-identified as male, 64.0% as White, and 24.0% as Hispanic. Visit #1 and Visit #2 were conducted 34.1 ± 7.1 days apart. The mean measured VPT in healthy subjects were 2.5 ± 0.8 log lux at Visit #1 and 2.3 ± 0.8 log lux at Visit #2. The test-retest reproducibility for healthy subjects measured during the two in-person visits had excellent reliability (ICC = 0.92). Overall, dry eye and ocular pain scores were low in our healthy population (VLSQ-8 11.3 ± 3.5 , OSDI 1.2 ± 1.8 , NPSI-E 0.8 ± 1.6). No significant correlations were found between VPT and study questionnaire responses ($R^2=0.03 - 0.06$, $p>0.05$).

Conclusions : The data indicate that the OPA is a reliable tool for quantifying visual photosensitivity in individuals without ocular disease. Ongoing studies are being performed to increase our subject population and examine repeatability in subjects with TBI associated visual photosensitivity.

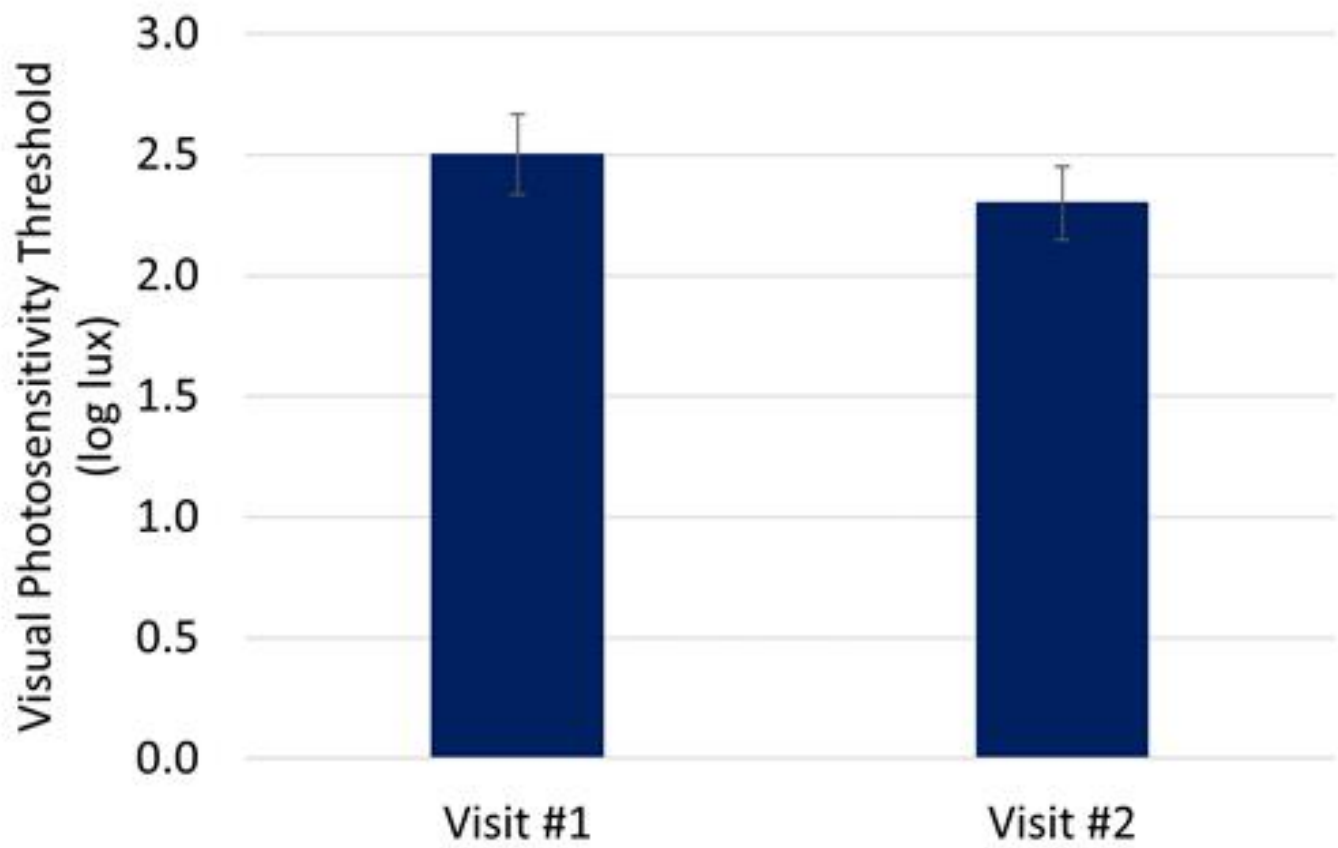
This abstract was presented at the 2022 ARVO Annual Meeting, held in Denver, CO, May 1-4, 2022, and virtually.

-



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Figure 1. 1A) Operator view of the OPA. 1B) Subject view of the OPA. 1C) The OPA graphical user interface - testing control panel displaying a healthy subject's VPT.



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Figure 2. VPT of the Healthy Subjects (n=25) at Visit #1 and Visit #2.

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ASSESSING THE TEST-RETEST REPRODUCIBILITY OF THE OCULAR PHOTOSENSITIVITY ANALYZER TO QUANTIFY VISUAL PHOTSENSITIVITY

Rhiya Mittal¹, Mariela C. Aguilar¹, Alex Gonzalez¹, Victoria Graham¹, Katherine Leviste¹, Paula A. Sepulveda-Beltran¹, Esdras Arrieta¹, Bianca Maceo Heilman^{1,2}, William J. Feuer³, Gemayaret Alvarez⁴, Barry E. Hurwitz^{2,5}, Byron L. Lam³, Elizabeth R. Felix^{4,6}, Jean-Marie A. Pareil^{1-3,7}, Anat Galor^{3,6}

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PURPOSE

Few methods exist to reliably quantify visual photosensitivity, leading to the development of the Ocular Photosensitivity Analyzer (OPA), an automated device that assesses subjects' responses to multiple light stimuli presented at varying intensities.¹⁻² This study was conducted to assess the test-retest reproducibility of the OPA to quantify visual photosensitivity thresholds (VPT) in healthy subjects across two visits.

METHODS

This IRB-approved study included 25 healthy adults (age: 32.5±13.3 years, 52.0% self-identified as female, 64.0% White, 24.0% Hispanic) with no history of ocular abnormality who attended two in-person visits over the course of 34-1±7.1 days. During the visits, subjects completed a medical history form and were administered study questionnaires including the Visual Light Sensitivity Questionnaire-8 (VLSQ-8, range 8 - 40)³, Ocular Surface Disease Index (OSDI, range 0 - 48)³, and Neuropathic Pain Symptom Inventory for the Eye (NPSI-E, range 2 - 130).⁴

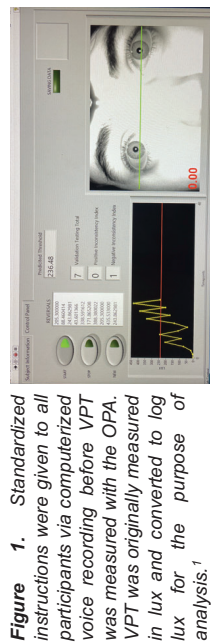


Figure 1. Standardized instructions were given to all participants via computerized voice recording before VPT was measured with the OPA. VPT was originally measured in lux and converted to log lux for the purpose of analysis.¹ The test-retest reproducibility for VPT measured at each visit was analyzed by reliability analysis. An Intraclass Correlation Coefficient (ICC) ≥ 0.90 was considered to indicate excellent reliability. Correlation between VPT and study questionnaire responses were assessed via linear regression. An $r \geq 0.7$ was considered strong.

OCULAR PHOTSENSITIVITY ANALYZER

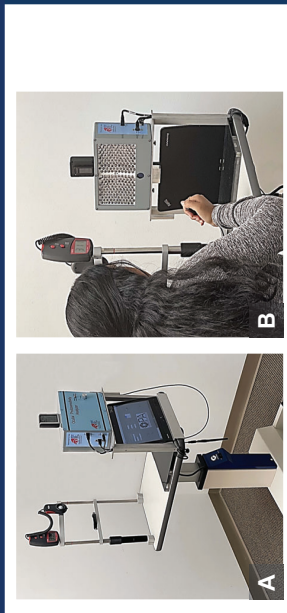


Figure 2. A) Operator view of the OPA; B) Subject view of the OPA.

RESULTS

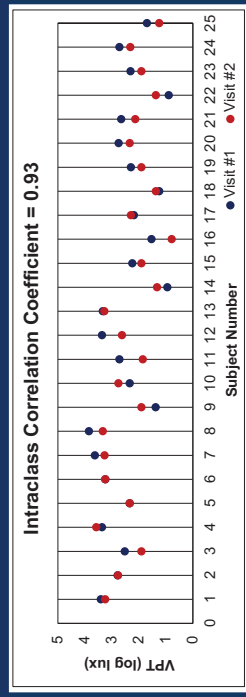


Figure 3. Visual photosensitivity threshold (VPT) for each subject. An excellent degree of reliability was found among the VPT for 25 healthy subjects measured during two visits. The average measured ICC was 0.93 with a 95% confidence interval from 0.845 - 0.970, $p < 0.001$. The mean VPT was 2.5±0.8 log lux at Visit #1 and 2.3±0.8 log lux at Visit #2. Overall, dry eye and ocular pain scores were low (VLSQ-8 11.3±3.5, OSDI 1.2±1.8, NPSI-E 0.8±1.6). No significant correlations were found between VPT and study questionnaire responses ($r = 0.19 - 0.40$, $p > 0.05$).

CONCLUSION

The test-retest reproducibility of the OPA was assessed and the data indicated that the OPA is a reliable tool for quantifying visual photosensitivity in individuals without ocular disease. Therefore, the OPA may be used in future studies to reliably measure VPT among individuals in other populations.

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1. Aguilar MC, Gonzalez A, Rowaan C, de Freitas C, Alawa K, Durkee H, Feuer WJ, Mams F, Asfour SS, Lam BL, Pareil JM. Automated instrument designed to determine visual photosensitivity thresholds. Biomedical Optics Express. 2018; 9(11), 5583-5596.
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4. Farhang M, Feuer W, Galor A, et al. Modification of the Neuropathic Pain Symptom Inventory for use in eye pain (NPSI-Eye). Pain. 2019;160(7):1541-1550.

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Supported in part by: Department of Defense Vision Research Program W81XWH-20-1-0820 (Dr. Galor), Florida Lions Eye Bank and the Beauty of Sight Foundation, Donations from: Drs. Harry W. Flynn Jr, Karl R. Olsen, Martha E. Hildebrandt, Raksha Urs, Aaron Furtado, NIH Center Grant P30EY14801, NIH NEI – LRP (Dr. Aguilar), Research to Prevent Blindness – Unrestricted Grant to BPEI (GR004596), Henri and Flore Lesieur Foundation (Dr. Pareil). **The authors would like to acknowledge the contributions of:** Heather Durkee, Ph.D.; Cornelis Rowaan, BS; David Sliney, Ph.D.; Randy Kardon, M.D. Ph.D.; Scott Mist, Ph.D.; Joseph Carroll, Ph.D.; Kimberly Cabrera, MS; Haley Peterson, BS; and Hong Jiang, MD, Ph.D.

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DISCLOSURES: NONE

Clinical functional magnetic resonance imaging of photophobia in individuals with chronic ocular pain: provisional analysis

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Footnotes

Commercial Relationships **Eric Moulton** None; **Anjalee Choudhury** None; **Divy Mehra** None; **Elizabeth Felix** None; **Anat Galor** None

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Abstract

Purpose : Individuals with neuropathic ocular pain are similar to those with chronic neurological disorders in that they often report symptoms of sensory hypersensitivity, such as increased corneal sensitivity and evoked pain to light. The latter, often referred to as "photophobia", is a particular topic of interest in the realm of chronic pain. Specifically within ocular pain, patients with discordant symptoms are more likely to report photophobia, which suggests underlying contribution by centrally-sensitized mechanisms in response to light. In this study, we hypothesized that trigeminal sensory processing contributes to photophobia in patients with neuropathic ocular pain.

Methods : fMRI was used to evaluate brain pathways in individuals with neuropathic ocular pain. Subjects were screened to meet criteria for 1 of 2 groups: dry eye symptoms with chronic ocular pain and photophobia (n=8 cases) and no ocular pain or photophobia (n=8 controls). Subjects were presented with intermittent light stimuli during two scans: 1) a control scan after artificial tear instillation, and 2) after pharmacological blockade of afferents in the ocular surface with instillation of 0.5% proparacaine. Pain ratings elicited by light were acquired, and clinical ophthalmic signs and symptoms were recorded.

Results : Light-induced greater group-level activation in cases vs. controls in the somatosensory cortices (S1), spinal trigeminal nucleus, bilateral insula, anterior mid-cingulate cortex (aMCC). Patients with chronic ocular pain and photophobia reported higher pain intensity and unpleasant ratings to light than controls. Correlations between activity and ratings were greater in cases than controls.

Following proparacaine in cases, decreased light-related activation was observed in S1 and MCC. At the group level, cases demonstrated decreased pain intensity and unpleasantness ratings to light following proparacaine, but half of cases did not show a decrease in these ratings.

Conclusions : The trigeminal nociceptive system may contribute to photophobia symptoms among individuals suffering from chronic ocular pain. We demonstrate partial modulation of cortical structures in this pathway by means of topically applied anesthetic³⁰ to the eyes. Further understanding of the modulatory interactions underlying ocular pain and photophobia is critical for developing effective therapies and guiding treatment plans.

This abstract was presented at the 2022 ARVO Annual Meeting, held in Denver, CO, May 1-4, 2022, and virtually.

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Abstract Details:

Breakout Session: Expeditionary Eye Care
Submission Category: Oral Presentation
Title: Automated Assessment of Visual Photosensitivity in Healthy and Traumatic Brain Injury Study Participants
Abstract:

Purpose: Traumatic brain injury (TBI) is a condition with devastating lifelong consequences. Visual photosensitivity is a common and incapacitating symptom associated with TBI. The purpose of our study was to assess visual photosensitivity in healthy and TBI study participants using the Ocular Photosensitivity Analyzer (OPA, Aguilar et al. BOE 2018, 9(11): 5583-5596).

Methods: Twenty-five healthy study participants (13 females and 12 males, age = 32.5±13.3) and nine TBI study participants (2 females and 7 males, age = 35.7±14.5) were tested using the OPA under an IRB approved protocol. The automated OPA produces light stimuli of varying intensities utilizing unequal ascending and descending steps. Each stimulus is presented for 2 seconds, followed by a rest period of 4 seconds. The subject is instructed to indicate whether the light stimulus is "uncomfortable" by pressing a hand-held button. The visual photosensitivity threshold (VPT) is calculated from the mean of 10 response reversals. A higher VPT indicates more tolerance to light while a lower VPT indicates less tolerance to light. Additionally, study participants were administered the Visual Light Sensitivity Questionnaire-8 (VLSQ-8), prior to being tested with the OPA, to assess the presence and severity of visual photosensitivity symptoms. The VPT and VLSQ-8 scores of healthy and TBI study participants were compared.

Results: The VPT of healthy and TBI study participants were 2.5±0.8 and 1.6±0.9 log lux, respectively, p<0.05. VLSQ-8 scores of healthy and TBI study participants were 11.6±3.3 and 20.7±8.9, respectively, p<0.05. VPT scores were negatively correlated with VLSQ-8 scores (r=-0.56, p<0.01).

Conclusion: Visual photosensitivity was assessed in healthy and TBI study participants using the OPA. Healthy study participants had higher VPT and lower VLSQ-8 scores compared to TBI study participants. Quantitative clinical outcome measures are needed in TBI to better characterize disease severity, monitor progression, and evaluate efficacy of emerging treatments.

Disclaimer:

Learning Objectives

1. Understand the capabilities of the Ocular Photosensitivity Analyzer in quantifying photosensitivity.
2. Determine whether individuals with mild traumatic brain injury have differences in visual photosensitivity thresholds compared to controls.
3. Examine whether filtered lenses improve photosensitivity as determined by the Ocular Photosensitivity Analyzer.

Submit for Young Investigators Competition? No

At the time of abstract submission, has the abstract been approved for final clearance by your organization (e.g., For DoD submitters: Public Affairs and OPSEC)? N/A

Does the research abstract being submitted have a DoD affiliation or does it represent DoD funded research? Yes

May We Publish Abstract on the MHSRS website? Yes

AUTOMATED ASSESSMENT OF VISUAL PHOTSENSITIVITY IN HEALTHY AND TRAUMATIC BRAIN INJURY STUDY PARTICIPANTS

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PURPOSE

Traumatic brain injury (TBI) is a condition with devastating lifelong consequences. Visual photosensitivity is a common and incapacitating symptom associated with TBI.¹⁻⁴

The purpose of our study was to assess visual photosensitivity in healthy and TBI study participants using the Ocular Photosensitivity Analyzer (OPA).⁵

METHODS

Twenty-eight healthy study participants (15 females and 13 males, age = 33.3±13.6) and twenty-three TBI study participants (6 females and 17 males, age = 41.3±13.2) were tested using the OPA under an IRB approved protocol.

The automated OPA produces light stimuli of varying intensities ranging from 1 to 32,000 lux (0 to 4.51 log lux) utilizing unequal ascending and descending steps. Each stimulus is presented for 2 seconds, followed by a rest period of 4 seconds. The subject is instructed to indicate whether the light stimulus is "uncomfortable" by pressing a hand-held button. The Visual Photosensitivity Threshold (VPT) is calculated from the mean of 10 response reversals.⁵ A higher VPT indicates more tolerance to light and a lower VPT indicates less tolerance to light.

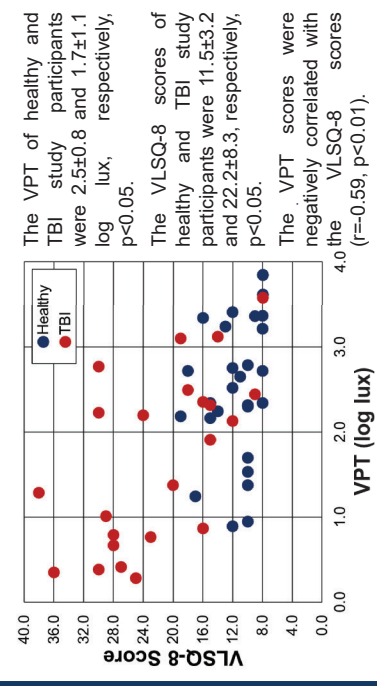
Reliability of the responses is tracked throughout the test utilizing catch trials. Power output and irradiance were measured to ensure the OPA meets safety exposure limits set forth by the International Organization for Standardization Standard for Ophthalmic Instruments (ISO 15004-2).

Additionally, study participants were administered the Visual Light Sensitivity Questionnaire-8 (VLSQ-8, range 8 to 40)⁶ prior to being tested with the OPA, to assess the presence and severity of visual photosensitivity symptoms. A higher VLSQ-8 score indicates more visual photosensitivity symptoms and a lower VLSQ-8 score indicates less visual photosensitivity symptoms. The VPT and VLSQ-8 scores of healthy and TBI study participants were compared.

OCULAR PHOTSENSITIVITY ANALYZER



RESULTS



CONCLUSION

Visual photosensitivity was assessed in healthy and TBI study participants using the OPA. TBI study participants had lower VPT, and higher VLSQ-8 scores compared to healthy study participants indicating less tolerance to light and more visual photosensitivity symptoms.

The OPA VPT appears to be a useful quantitative measure that may provide clinical outcome information in TBI patients to characterize disease severity, monitor progression, and evaluate efficacy of treatments.

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DISCLOSURES: NONE

ANAT GALOR

Curriculum Vitae

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III. EXPERIENCE

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IV. PUBLICATIONS

17. Books and monographs published:

1. Nandini Venkateswaran, Carolina Mercado, Sarah C. Wall, **Anat Galor**, Jianhua Wang & Carol L. Karp (2020) High resolution anterior segment optical coherence tomography of ocular surface lesions: A review and handbook, Expert Review of Ophthalmology, DOI: 10.1080/17469899.2021.1851598
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18. Juried or refereed journal articles or exhibitions:

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1. Rusciano D, Bagnoli P, Gallar J, **Galor A**. Editorial: Eye Pain: Etiology and Therapeutic Approaches. *Front Pharmacol*. 2022 Apr 27;13:914809.
2. **Galor A**. How Depression Might Relate to Dry Eye Disease. *JAMA Ophthalmol*. 2022 Apr 1;140(4):399-400.
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PEER REVIEWED PUBLICATIONS:

1. Theotoka D, Liu Z, Wall S, **Galor A**, Al Bayyat GJ, Feuer W, Jianhua W, Karp CL. Optical coherence tomography angiography in the evaluation of vascular patterns of ocular surface squamous neoplasia during topical medical treatment. *Ocul Surf*. 2022 Mar 29;25:8-18.
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MEETING PRESENTATIONS:

1. Harkness B, Betz J, Behrens H, Stutzman R, Chamberlain W, **Galor A**, Aicher S. Neuroscience 2022, November 12-16, 2022. San Diego, CA. 2022-S-4413-SfN.
2. Locatelli E, Hwang J, Baksh B, Mehra D, Hernandez M, **Galor A**. How does diabetes mellitus impact the dry eye phenotype? American Academy of Ophthalmology, Chicago, September 2022.
3. Tovar A, Levine H, Locatelli E, Cabrera K, Mangwani S, **Galor A**. Relationships between systemic inflammatory markers, Gulf War Illness and dry eye symptoms and signs. AAO Annual meeting 2022. Chicago, IL. September 2022. (Poster)
4. Tovar A, Locatelli E, Shah A, Mones K, Jean P, Komanduri K, Wang T, **Galor A**. Ocular surface inflammation and dry eye symptoms at day 100 post-transplantation are not predictive factors for the development of chronic Graft Versus Host Disease. Ocular Microbiology and Immunology Group (OMIG) annual meeting 2022. Chicago, IL. September 2022. (Oral presentation)
5. Betz J, Behrens H, Harkness B, Stutzman R, Chamberlain W, Aicher S, **Galor A**. Epidemiology and Risk Factors for Ocular Pain after Refractive Surgery, World Cornea Congress VIII, Chicago, September 2022.
6. Locatelli E, Hwang J, Baksh B, Mehra D, Hernandez M, **Galor A**. How does diabetes mellitus impact the dry eye phenotype? World Cornea Congress VIII, Chicago, September 2022.
7. Reyes N, Choudhury A, Felix E, **Galor A**, Moulton E. Clinical neuroimaging of FL-41 tinted lenses treatment on neural pathways of photophobia in patients with chronic ocular pain, World Cornea

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- Congress VIII, Chicago, September 2022.
8. Mangwani-Mordani S, Ramirez-Miranda A, Graue-Hernandez E.O, Navas A, **Galor A**. Effect of Trigeminal Nerve Stimulation on Chronic Ocular Pain and Corneal Nerve Density in Sub-basal Plexus, World Cornea Congress VIII, Chicago, September 2022.
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 12. Locatelli E, Tovar A, Levine H, Goldhagen B, Galor A. Use of artificial intelligence to analyze activated dendritic cells in central cornea through in-vivo confocal microscopy imaging, Women in Ophthalmology, Monterrey, August 2022.
 13. Tovar A, Locatelli E, Hernandez M, **Galor A**. What is diabetic dry eye? Women in ophthalmology (WOI) annual meeting 2022. Monterrey, CA. August 2022. (Poster)
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 17. Reyes N, Choudhury A, **Galor A**, Moulton E. "Clinical Neuroimaging of FL-41 Tinted Lenses Treatment on Neural Pathways of Photophobia in Patients with Chronic Ocular Pain" poster presentation at the 2022 Summer Symposium. Women in Ophthalmology.
 18. **Galor A**, Aguilar M, Parel JM. MHSRS-22-05050 for Expeditionary Eye Care - Automated Assessment of Visual Photosensitivity in Healthy and Traumatic Brain Injury Study Participants. 2022 Military Health System Research Symposium (MHSRS). 12-15 September 2022.
 19. **Galor A**, Kalahasty K, Lee Y, Cabrera K. # MHSRS-22-05049 for Military Exposures and Subsequent Long-term Outcomes - OCULAR MARKERS ASSOCIATED WITH GULF WAR ILLNESS SYMPTOMS. 2022 Military Health System Research Symposium (MHSRS). 12-15 September 2022.
 20. Locatelli E, Tovar A, Levine H, Cohen-Karp A, **Galor A**, Goldhagen B. Use of Artificial Intelligence to Analyze Activated Dendritic Cells in Central Cornea through In-vivo Confocal Microscopy Imaging. Women in Ophthalmology. Monterey, California August 25-28, 2022.
 21. Betz J, Aicher S, Behrens H, Harkness B, Stutzman R, Chamberlain W, **Galor A**. Epidemiology and Risk Factors for Refractive Surgery Associated Ocular Pain. Association for Research in Vision and Ophthalmology Annual Meeting, Denver, CO; 2022.
 22. Harkness, B, Hegarty, D; Behrens, H; David, L; Zientek, K; Saugstad, J; Lapidus, J; Chamberlain, W; Stutzman, R; Perez-Blanco, M; Betz, J, 4; **Galor, A**, 4; Aicher, S. Detection of tear protein biomarkers associated with contact lens use. Association for Research in Vision and Ophthalmology Annual Meeting, Denver, CO; 2022.
 23. Locatelli E, Choudhury A, Cabrera K, Jensen K, Klimas N, Abreu M, Aenlle K, **Galor A**. Relationships between serum levels of brain-derived neurotropic factor and symptoms and signs of corneal nerve function. Association for Research in Vision and Ophthalmology Annual Meeting, Denver, CO; 2022.
 24. **Galor A**, Gibson A, Blemker G, Hendrix L. # 3701866, OC-01 (varenicline solution) Nasal Spray for the

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- Treatment of Dry Eye Disease Signs and Symptoms in Subjects with Autoimmune Disease: Integrated Data from ONSET-1 and ONSET-2, has been accepted for presentation during the 2022 ARVO Annual Meeting.
25. Moulton E, Choudhury A, Mehra D, Felix E, **Galor A**. Clinical functional magnetic resonance imaging of photophobia in individuals with chronic ocular pain: provisional analysis. Association for Research in Vision and Ophthalmology Annual Meeting, Denver, CO; 2022.
 26. Kalahasty, K., Lee, Y., Cabrera, K., Abreu, M., Aenlle, K., Klimas, N., and **Galor, A**. Ocular Markers Associated with Gulf War Illness Symptoms. Association for Research in Vision and Ophthalmology Annual Meeting; May 1-4, 2022; Denver, CO.
 27. Goodman, C, Doan, T, Mehra, D, Betz, J, Locatelli, E, Hernandez, M, Hwang, J, and **Galor A**. Composition of the gut microbiome in immune-mediated dry eye. Accepted for presentation at the Association for Research in Vision and Ophthalmology, Denver, CO, May 1-4, 2022.
 28. Sanchez V, **Galor A**, Jensen K, Mondal K, Mandal NA. Ocular Surface Sphingomyelinases, Meibum and Tear Sphingolipids, and Clinical Parameters of Meibomian Gland Dysfunction. Association for Research in Vision and Ophthalmology (ARVO) Annual Meeting. Denver, CO, May, 2021.
 29. Tovar A, Levine H, Cohen-Karp A, **Galor A**, Goldhagen B. Automated Assessment of Visual Photosensitivity in Healthy and Traumatic Brain Injury Study Participants, 2022 ARVO Annual Meeting.
 30. Sanchez V, Baksh B, Cabrera K, Choudhury A, Jensen K, Klimas N, **Galor A**. Assessment of dry eye signs and symptoms in veterans with Gulf War Illness. Society of Toxicology Annual Meeting, March 27-31, 2022, San Diego, CA.
 31. Mehra D, Cavuoto K, Banerjee S, Doan T, **Galor A**. Sjögren's Syndrome and Composition of the Gut Microbiome" OMIG presentation, November 12, 2021. New Orleans
 32. Rodriguez D, Levitt R, Felix ER, **Galor A**. ABSTRACT ID: 30068049 TITLE: Dry eye (DE) disease GWAS identifies genomic variants correlated with symptom severity and comorbidities, but not DE signs. Poster presentation. Nov. 12-15 - AAO 2021 New Orleans
 33. Huang A, Felix ER, **Galor A**. ABSTRACT ID: 30068197 TITLE: Role of conditioned pain modulation in dry eye. Paper presentation. Nov. 12-15 - AAO 2021 New Orleans
 34. Mehra D, Moulton E, Felix ER, **Galor A**. ABSTRACT ID: 30068199. TITLE: fMRI Activity and Modulation of Central Photophobia Pathways in Dry Eye Patients. Poster presentation. Nov. 12-15 - AAO 2021 New Orleans
 35. Mehra D, **Galor A**. Long-Term Trigeminal Nerve Stimulation as a Treatment for Ocular Pain. Poster presentation for AOS May 21 – 23, 2021 virtual meeting.
 36. Levine H, Hwang J, Dermer H, Mehra D, **Galor A**. Relationships between activated Dendritic Cells and Dry Eye Symptoms and Signs. ARVO virtual meeting 2021. Award recipient.
 37. Theotoka D, Liu Z, Wall S, **Galor, A**, Wang, J, Jiang H, Karp CL. Alterations of Vascular Network Patterns in Ocular Surface Squamous Neoplasia With Topical Medical Therapy Detected Via OCTA. 30065538. AAO 2021. Virtual meeting.
 38. Naranjo A, Pirakitikulr N, Martinez JD, Amescua G, **Galor A**, Dubovy SR. Clinicopathologic correlations of retrocorneal membranes associated with lamellar corneal graft failure. Abstract Number: 30064974. AAO 2021. Virtual meeting.
 39. Hwang, J, Dermer H, **Galor A**. Corneal Microneuromas: Markers of Neuropathic Corneal Pain? Abstract Number: 30064045. AAO 2021. Virtual meeting.
 40. Staropoli PC, **Galor A**. Transcutaneous Electrical Nerve Stimulation for the Long-Term Treatment of Ocular Pain. ASCRS. Boston 2020. Second place in resident and fellow poster category.
 41. Idarraga M, Guerrero J, **Galor A**, Kumar N. Short-term exposure to indoor environment and the severity of dry eye symptoms. Abstract Number: 3357519. ARVO 2020. Baltimore, MD.
 42. Wall S, Theotoka D, Friehmann A, **Galor A**, Karp CL. Anterior Segment High Resolution Optical Coherence Tomography (HR-OCT) as a Diagnostic Tool for Clinically Ambiguous Ocular Surface Lesions. Abstract Number: 3362829. ARVO 2020. Baltimore, MD.

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43. Rock S, Kumar, N, **Galor, A**. Indoor Airborne Microbial Concentration and Dry Eye. Abstract Number: 3357116. ARVO 2020. Baltimore, Maryland.
44. Naranjo A, Pirakitikulr N, Martinez JD, Amescua G, **Galor A**, Dubovy SR. Characterization of fibrocellular retrocorneal membranes associated with lamellar corneal graft failure. Abstract Number: 3366550. ARVO 2020. Baltimore, MD.
45. Mangwani-Mordani S, **Galor A**, Goldhardt R. Use of Transcutaneous Supraorbital Nerve Stimulation with Cefaly® Device in Patients with Chronic Ocular Pain and Dry Eye Case Series. Abstract number: 3355149. ARVO 2020. Baltimore.
46. Miralles, F., Kumar, N., **Galor, A**. "Indoor Carbon Monoxide and Ocular Surface Inflammation." Abstract Number: 3366590. ARVO 2020. Baltimore, MD.
47. Patel S, **Galor A**, Kumar N. The Effects of Temperature Change on Allergic Conjunctivitis. Abstract Number: 3356626. ARVO 2020. Baltimore, MD.
48. Hwang J, Karanam V, Goldhardt R, Feuer W, Tamariz L, Wang J, **Galor A**. Conjunctival hemodynamic changes in diabetes. Abstract Number: 3359127. ARVO 2020. Baltimore, Maryland.
49. Zayan K, **Galor A**, Aggarwal S, Sarantopoulos K, Felix E, Goldhardt R. Transcutaneous Electrical Nerve Stimulation for the Long-Term Treatment of Ocular Pain. Abstract Number: 3357323. ARVO 2020. Baltimore, MD.
50. **Galor A**, Nau J. 3347680, ONSET-1 Phase 2b study of OC-01 Nasal Spray for the Treatment of the Signs and Symptoms of Dry Eye, 2020 ARVO Annual Meeting. May 3-7. Baltimore, MD.
51. Baksh B, Goldhardt R, **Galor A**. "Could the Nerve Fiber Layer Serve as a Biomarker of Gulf War Illness?" North American Neuro-Ophthalmology Society 46th Annual Meeting, March 7-12, 2020 Amelia Island, FL
52. Han E, Paranjpe V, and **Galor A**. Demographics and socioeconomic status are associated with low vision and perception of vision limiting daily activities. American Academy of Ophthalmology Annual Meeting, San Francisco, California. October 2019.
53. Farhangi M, Chang A, **Galor A**. 30060254 Effect of Noninvasive Intranasal Neurostimulation on Tear Volume, Dryness and Ocular Pain by Dry Eye Subtype. AAO meeting. San Fransisco 2019.
54. Huang A, Kumar N, **Galor A**. 30060337 Impact of the Personal Microenvironment on Dry Eye Metrics. AAO meeting. San Fransisco 2019.
55. Hwang J, **Galor A**. 30059675 Conjunctival Blood Flow Metrics Correlate With Diabetes-Related Complications. AAO meeting. San Fransisco 2019.
56. Venkateswaran N, Hwang J, Rong A, Levitt A, Levitt RC, Lee W, **Galor A**. 30060805 OnabotulinumtoxinA Improves Photophobia and Sensations of Dryness Independent of Ocular Surface Parameters in Patients With Neuropathic-Like Dry Eye Without a history of Migraine. AAO meeting. San Fransisco 2019.
57. **Galor A**, Yoel Cohen, Yoel Arieli, Shlomi Epshtin, Raanan Gefen, Alon Harris 0293: Blink dynamics in healthy versus dry eye subjects as assessed by a novel device. Thu, May 02. ARVO 2019. Vancouver. Canada.
58. Rojas M, Felix E, Small L, Goldhardt R, **Galor A**. Autonomic Function Testing and After-sensations as Predictors for Post-operative Dry Eye Symptoms after Laser-Assisted in Situ Keratomileusis. 5202. ARVO 2019. Vancouver, Canada.
59. Gefen R, Segev F, Geffen N, **Galor A**, Cohen Y, Arieli Y, Epshtin S, Harris A. A new hyperspectral imaging method to evaluate dry eye disease – 3D-WLT study results. Posterboard#: Abstract Number: 6780 - B0304. ARVO 2019. Vancouver, Canada.
60. Small L, Mendez R, Farhangi M, Cavuoto KM, Budree S, **Galor A**, Banerjee S. Gut dysbiosis in individuals with and without Sjögren's disease. Abstract Number: 5204. ARVO 2019. Vancouver, Canada.
61. Paranjpe V, Rabinovich EP, Sharma N, Srivastava A, **Galor A**, Hackam A, Jeng bH, Kumar N. Solid fuel exposure and the development of cataracts. Abstract Number: 4254. ARVO 2019. Vancouver, Canada.

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62. Venkateswaran N, Hwang J, Rong A, Levitt A, Levitt RC, Lee W, **Galor A**. Onabotulinum toxin A improves photophobia and sensations of dryness independent of ocular surface parameters. Abstract Number: 6757 - B0281. ARVO 2019. Vancouver, Canada.
63. Huang A, Menendez DM, **Galor A**, Kumar N. Impact of bioaerosols and particulate matter on dry eye symptoms and signs. Abstract Number: 2773 - B0523. ARVO 2019. Vancouver, Canada.
64. Rothfield L, Hubschman S, Rojas M, Goldhardt R, **Galor A**. ASSOCIATION BETWEEN EARLY SJOGREN MARKERS AND SYMPTOMS AND SIGNS OF DRY EYE. Abstract Number: 2762 - B0512. ARVO 2019. Vancouver, Canada.
65. Kaplan C, **Galor A**, Blackwelder P, Hackam A, Jeng BH, Menendez D, Kumar N. Human Ocular Surface Particulate Composition: Home vs. Clinical Environment. Abstract Number: 1746 ARVO 2019. Vancouver, Canada.
66. Betancourt NR, Field MG, Wang G, Karp CL, Dávila-Alquisiras JH, Hernandez-Zimbrón LF, García-Vazquez R, Vazquez Romo KA, Hernandez-Quintela E, Fromow-Guerra J, **Galor A**. Whole Exome Profiling and Mutational Analysis of Ocular Surface Squamous Neoplasia. Abstract Number: 3554 - A0595. ARVO 2019. Vancouver, Canada.
67. Bussies P, Diel R, **Galor A**. Efficacy of Autologous Serum Tears for the Treatment of Ocular Surface Disease. Abstract Number: 2098 - B0396. ARVO 2019. Vancouver, Canada.
68. Chen Y, Levine H, Quan A, Goldhardt R, Galor A. Subconjunctival bevacizumab injections in the management of impending recurrent pterygium. Abstract Number: 6269 - B0250. ARVO 2019. Vancouver, Canada.
69. Monsalve P, Garcia AL, Zhou XY, Elgart SW, Karp CL, Johnson TE, Galor A, Dubovy S. Atypical Fibroxanthoma Affecting the Ocular Surface and Adnexa: A Case Series. Abstract Number: 3574 - A0615. ARVO 2019. Vancouver, Canada.
70. Garcia AL, Monsalve P, Wester ST, Lee W, Tse DT, Karp CL, Galor A, Dubovy S. Extranodal Rosai-Dorfman disease of the eye and ocular adnexa: A clinicopathologic series of 8 cases. Abstract Number: 3579 - A0620. ARVO 2019. Vancouver, Canada.
71. Janecki J, **Galor A**, Hackam A, Jeng BH, Kumar N. Impact of the personal microenvironment on dry eye metrics. Abstract Number: 2742 - B0492. ARVO 2019. Vancouver, Canada.
72. Pirakitikulr N, Martinez JD, Garcia AL, Goldhardt R, Dubovy S, Amescua G, **Galor A**. Myofibroblastic membranes after corneal surgery: a clinical histopathologic correlation study. Abstract Number: 6297 - B0348. ARVO 2019. Vancouver, Canada.
73. Quan A; Patel N; Pirakitikulr N; Laura D; Fan K, **Galor A**. Oral Tacrolimus for the Treatment of Refractory Atopic Keratoconjunctivitis and Dermatitis. ASCRS Paper ID 55838. San Diego, CA. May 6, 2019
74. Venkateswaran, N; Hwang J; Rong A; Levitt A; **Galor A**; Lee W. Onabotulinum Toxin a Improves Photophobia and Sensations of Dryness Independent of Ocular Surface Parameters. ASCRS Paper ID 53254. San Diego, CA. May 6, 2019
75. Rojas M, Small L, **Galor A**. Pregabalin for the Prevention of Dry Eye Symptoms after Laser-Assisted in Situ Keratomileusis: A Pilot Study. ASCRS Paper ID 57472. San Diego, CA. May 4, 2019.
76. Aggarwal S, **Galor A**. Transcutaneous Electrical Nerve Stimulation for Treatment of Neuropathic Corneal Pain. ASCRS Paper ID 56410. San Diego, CA. May 6, 2019.
77. **Galor A**, Gefen R, Harris A. Dynamic assessment of the Tear Film Muco-Aqueous and Lipid Layers Using a Novel Tear Film Imager (TFI). OMIG meeting. AAO, Chicago, IL, October 26, 2018.
78. Hwang J, Diel R, Levitt R, Sarantopoulos CD, Felix ER, **Galor A**. Botulinum toxin A improves photophobia and sensations of dryness independent of ocular surface parameters. OMIG meeting. AAO, Chicago, IL, October 26, 2018.
79. Paranjpe V, **Galor A**. Socioeconomic Factors Are Associated with Access to Cataract Surgery in the United States. Poster presented at: The American Academy of Ophthalmology Annual Meeting, Chicago, IL. October 27-30, 2018.

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80. Lara D, Fan K, Goldhardt R, Mirsaeidi, M, **Galor A.** # 2920911, Ocular manifestations of sarcoidosis in a South Florida population. 2018 ARVO Annual Meeting, April 29 - May 3, 2018 in Honolulu, Hawaii.
81. Cavuoto K, **Galor A,** Miller D, Banerjee S. # 2915825, Determining the Ideal Swab Material for Analyzing the Ocular Surface Microbiome. 2018 ARVO Annual Meeting, April 29 - May 3, 2018 in Honolulu, Hawaii.
82. Goldhardt R, Batawi H, **Galor A.** # 2925912, In Vivo Confocal Microscopy of Corneal Nerves in Patients Receiving Intravitreal Anti-VEGF. 2018 ARVO Annual Meeting, April 29 - May 3, 2018 in Honolulu, Hawaii.
83. Small L, Levitt RC, Sarantopoulos KD, **Galor A.** # 2925844, Periocular nerve blocks for the treatment of ocular pain. 2018 ARVO Annual Meeting, April 29 - May 3, 2018 in Honolulu, Hawaii.
84. Paranjpe V, Mandal N, Tan, J, Nguyen J, Lee, JY, **Galor A.** # 2903993, Associations between meibum quality and sphingolipid quantity and composition. 2018 ARVO Annual Meeting, April 29 - May 3, 2018 in Honolulu, Hawaii.
85. Gibbons, A; Iglesias E; Sajjani R; Levitt, RC; Sarantopoulos KD; **Galor A.** # 2903095, Epidemiology of persistent dry eye-like symptoms after cataract surgery. 2018 ARVO Annual Meeting, April 29 - May 3, 2018 in Honolulu, Hawaii.
86. Venkateswaran N, **Galor A,** Karp C. # 2919700, Application of high resolution anterior segment optical coherence tomography for non-invasive diagnosis and differentiation of benign lymphoid hyperplasia, conjunctival lymphoma and conjunctival amyloidosis. 2018 ARVO Annual Meeting, April 29 - May 3, 2018 in Honolulu, Hawaii.
87. Sajjani RS, Allister G, Chang V, Levitt RC, **Galor A.** # 2906282, Epidemiology of persistent post-surgical pain manifesting as dry eye symptoms after cataract surgery. 2018 ARVO Annual Meeting, April 29 - May 3, 2018 in Honolulu, Hawaii.
88. Venkateswaran N, Tran VA, **Galor A,** Karp CL. The use of ultra-high resolution anterior segment optical coherence tomography for the diagnosis and differentiation of benign lymphoid hyperplasia, conjunctival lymphoma and conjunctival amyloidosis, in Washington DC. Paper presentation - Young Eye Surgeons (YES) Best Papers and Posters by Residents and Fellows session on Sunday, April 15th Paper presentation Tuesday April 17th Ocular Surface/Pterygium, AMT session.
89. Tran VA, Venkateswaran N, **Galor A,** Karp CL. Treatment of Clinically Occult Subclinical Ocular Surface Squamous Neoplasia Using High Resolution Anterior Segment Optical Coherence Tomography. 2018 ASCRS Annual Meeting, April 15, 2018 in Washington DC.
90. Lee C, Felix ER, Sarantopoulos CS, Levitt RC, **Galor A.** 30051997 Dry Eye Associated with Chronic Pain Conditions in the U.S. Veteran Population. AAO meeting paper presentation 2018. New Orleans.
91. Ong E, Felix ER, Sarantopoulos CS, Levitt RC, **Galor A.** 30051484 Epidemiology of Discordance between Symptoms and Signs of Dry Eye. AAO meeting poster presentation 2018. New Orleans.
92. Cavuoto K, Miller D, Banerjee S, **Galor A.** 30052008 Ocular Surface Microbial Signatures Change with Age. AAO meeting poster presentation 2018. New Orleans.
93. Hatim B, Rodriguez A, Felix ER, Sarantopoulos CS, Levitt RC, **Galor A.** 30052182 Assessment of Central Sub-basal Corneal Nerve Plexus in patients with Multiple Comorbid Chronic Pain Syndromes. AAO meeting poster presentation 2018. New Orleans.
94. Aguilar M, Asfour SS, Lam BL, **Galor A,** Gregori NZ, Gonzalez A, Rowaan CJ, Durkee, HA, Rosa RP, Parel JMA. #2691838, B0023: Quantifying Visual Photosensitivity in Veterans with Traumatic Brain Injury. ARVO, Baltimore. May 2017.
95. Diel R, Galor, Kroeger ZA, Sered H, **Galor A.** #2678037, A0355, Botulinum toxin for the treatment of photophobia in chronic migraine patients. ARVO, Baltimore. May 2017.
96. Cavuoto K, Miller D, **Galor A,** Alfonso EC, Chang TC, Osigian P, Carla J. Relationship between the Ocular Surface and the Head and Neck Microbiomes in Children. ARVO, Baltimore. May 2017.
97. Rodriguez M, Gregori N, Junk AK, **Galor A,** Wellik S, Goldhardt, R, Staropoli P, Phung, L, She W. The impact of cataract surgery on eyes with epiretinal membranes. ARVO, Baltimore. May 2017.

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98. Small L, Felix ER, Levitt RC, Sarantopoulos C, Galor A. A0239: The epidemiology of ocular itch by dry eye symptoms and signs. ARVO, Baltimore. May 2017.
99. Swaminathan S, Sant D, Wang G, **Galor A**, Harbour WJ, Dubovy S, Karp CL. B0621: Whole Exome Sequencing of Conjunctival Melanoma. ARVO, Baltimore. May 2017.
100. Mercado C, **Galor A**, Karp CL. B0628: Immunosuppression as a possible risk factor for interferon non- response in ocular surface squamous neoplasia. ARVO, Baltimore. May 2017.
101. Zhang L, Mercado C, **Galor A**, Wang G, Karp CL. A0179: Atopy and Ocular Surface Squamous Neoplasia. ARVO, Baltimore. May 2017.
102. Lee C, Felix ER, Levitt RC, Sarantopoulos C, **Galor A**. The link between pain syndromes and dry eye in patients with traumatic brain injury. Paper presentation. ARVO, Baltimore. May 2017.
103. Cavuoto K, Miller D, **Galor A**, Alfonso EC, Chang TC, Osigian P, Carla J. Ocular Surface Microbiome in Children. Session: Cataract Surgery, Congenital Cataracts, and IOL Power Calculations. May 8, 2017. ASCRS, Los Angeles, CA, 2017.
104. Chang V, Karp CL, Rose T, **Galor A**. ID: 31670. Dry Eye Symptoms Correlate With Non-Ocular Conditions. ASCRS, Los Angeles, CA, May 5-9, 2017.
105. Mercado CL, Pole C, Wong JR, Shaikh N, Batlle JF, Murillo JC, **Galor A**, Karp CL. Surgical versus Medical treatment for ocular surface squamous neoplasia: A Quality of life comparison. *American Academy of Ophthalmology (AAO) Annual Meeting*. Chicago, IL – October 2016
106. **Galor A**, Felix ER, Levitt RC, Sarantopoulos KD. 30047203: Somatosensory function in patients with idiopathic dry eye symptoms. *American Academy of Ophthalmology (AAO) Annual Meeting*. Chicago, IL – October 2016
107. Goldhardt R, Hatim B, **Galor A**. 30047709: In Vivo Confocal Microscopy of Human Nerves in Patients Receiving Intravitreal Anti-VEGF. *American Academy of Ophthalmology (AAO) Annual Meeting*. Chicago, IL – October 2016
108. Cabot F, Parel JM, Yoo S, Karp CK, **Galor A**, Aguilar M, Chhadva P, Mote KL, Alawa KA, Joag M, Durkee HA. Improving ophthalmology resident surgical training using novel 3D printed eye models for teaching corneal suturing. *American Academy of Ophthalmology (AAO) Annual Meeting*. Chicago, IL – October 2016
109. Hatim B, Wellik S, Junk A, Anderson M, **Galor A**. 30048470: Evaluation of epithelial and stromal central corneal thickness in primary open angle glaucoma and non-glaucoma patients. *American Academy of Ophthalmology (AAO) Annual Meeting*. Chicago, IL – October 2016
110. Chhadva P, Seiden B, Park JJ, McClellan AL, Felix ER, Sarantopoulos CD, Levitt RC, Wallace DM, **Galor A**. The Association of Dry Eye and Insomnia. *American Academy of Ophthalmology (AAO) Annual Meeting*. Chicago, IL – October 2016
111. **Galor A**, Felix ER, Levitt RC, Sarantopoulos KD. Dry Eye: Neuropathic pain: a missing piece of the dry eye puzzle. XXII Biennial Meeting of the International Society for Eye Research, taking place from September 25 – 29, 2016 in Tokyo, Japan.
112. **Galor A**, Felix ER, Levitt RC, Sarantopoulos KD. Expanding the functions of ocular surface innervation: photophobia and photoallodynia: Clinical relevance of photophobia in dry eye. XXII Biennial Meeting of the International Society for Eye Research, taking place from September 25 – 29, 2016 in Tokyo, Japan.
113. Yim M, **Galor A**, Karp C. # 2438052, Ability of novice clinicians to use the high resolution ocular coherence tomography to assess lesions of the ocular surface, 2016 ARVO Annual Meeting, Research: A Vision of Hope, May 1-5, 2016, in Seattle, Washington.
114. Alawa, Karam Al-Rahman, **Galor A**. # 2450888, Assessment of corneal suturing performance on novel 3D-printed ophthalmic teaching models using a custom photogrammetry-based software, 2016 ARVO Annual Meeting, Research: A Vision of Hope, May 1-5, 2016, in Seattle, Washington.
115. Levitt A, **Galor A**. # 2450283, Microvascular responses of the bulbar conjunctiva in dry eye, 2016 ARVO Annual Meeting, Research: A Vision of Hope, May 1-5, 2016, in Seattle, Washington.

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116. Bilonik R, **Galor A.** # 2447409, A Structural Equation Model (SEM) Relating Eye Pain (EP) and Ocular Surface Measurements (OSMs), 2016 ARVO Annual Meeting, Research: A Vision of Hope, May 1-5, 2016, in Seattle, Washington.
117. **Galor A.** # 2447340, Does dry eye severity correlate with somatosensory function in the V1 distribution of the trigeminal nerve? 2016 ARVO Annual Meeting, Research: A Vision of Hope, May 1-5, 2016, in Seattle, Washington.
118. Cabot F, Joag M, Alawa K, Chhadva P, Durkee H, Aguilar M, **Galor A**, Parel JM, Yoo SH, Karp C. Assessment of Corneal Suturing Performance Using Novel 3D-Printed Ophthalmic Teaching Models. ASCRS Paper Session 3-L CATARACT: Epidemiology, Techniques, Outcomes, ASCRS Paper ID 21813. New Orleans, May 9, 2016.
119. Kothari N, Levitt RC, McClellan A, **Galor A.** Elevated CRP is associated with multiple chronic comorbid pain conditions and neuropathic ocular pain. ASCRS Paper Session CORNEA: Conjunctival Disease and Corneal Imaging, Paper ID 22064. New Orleans, May 9, 2016.
120. Crane A, Levitt RC, Felix ER, Sarantopoulos KD, **Galor A.** Patients with More Severe Symptoms of Neuropathic Ocular Pain Exhibit More Frequent and Severe Centralized Pain Conditions and Psychiatric Disease ASCRS Paper Session 2-A CORNEA Dry Eye: MGD and Aqueous Tear Deficiency. ASCRS Paper ID 23019. New Orleans, May 8, 2016.
121. Tran KD, Falcone MM, Choi DS, Goldhardt R, Karp CL, Davis JL, **Galor A.** Epidemiology of Herpes Zoster Ophthalmicus: Recurrence and Chronicity. OMIG meeting. AAO 2015. Las Vegas.
122. Palioura S, Sivaraman K, Sise A, Battle J, Miller D, Amesuca G, **Galor A**, Karp CL. Fungal endophthalmitis after Descemet Stripping Automated Endothelial Keratoplasty Due to Endogenously Infected Grafts from the Same Donor. OMIG meeting. AAO 2015. Las Vegas.
123. Chang VS, Lanza NL, Valenzuela F, Perez VL, **Galor A.** Dry Eye Profiles in Patients with a Positive Elevated Surface Matrix Metalloproteinase 9 Point of Care Test versus Negative Patients. OMIG meeting. AAO 2015. Las Vegas.
124. Batawi H, Covington D, McManus KT, Seiden B, Felix ER, Kalangara J, Feuer W, Patin D, Marin ER, Sarantopoulos KD, Levitt RC, **Galor A.** Features of Neuropathic Ocular Pain in Dry Eye are Associated with Chronic Comorbid Pain Syndromes (CPS). OMIG meeting. AAO 2015. Las Vegas.
125. Joag M, Sise A, Murillo JC, Osama-Sayed Ahmed I, Wong J, Mercado C, **Galor A**, Karp CL. Topical 5-Fluorouracil (5FU) 1% in the treatment of ocular surface squamous neoplasia. EBAA meeting. AAO 2015. Las Vegas.
126. Chhadva P, Yesilirmak N, **Galor A**, Cabot F, Yoo SH. Post-LASIK Epithelial Ingrowth: Correction, Recurrence, and Long-term Follow-up. Meeting Presentation. AAO 2015. Las Vegas.
127. Atallah M, Joag M, **Galor A**, Amescua G, Nani A, Karp CL. Role of Ultra-High Resolution Optical Coherence Tomography (UHR-OCT) in the Diagnosis of Ocular Surface Squamous Neoplasia (OSSN) in Complex Ocular Surface Diseases. Meeting Presentation. AAO 2015. Las Vegas.
128. Palioura S, **Galor A**, Garg N, Nanji A, Joag M, Nuovo G, Wang G, Karp CL. Human papillomavirus infection does not predict response to interferon therapy in ocular surface squamous neoplasia. Meeting Poster. AAO 2015. Las Vegas.
129. Choi D, Goldhardt R, **Galor A.** Let's give it a shot. SPEIO meeting. AAO 2015. Las Vegas.
130. Tran KD, **Galor A**, Goldhardt R. Looking for love in all the wrong places. SPEIO meeting. AAO 2015. Las Vegas.
131. Ahmed S, **Galor A**, Karp CL, Sant D, Joag M, Shalabi N, Gustafson CB, Wang G. Whole Exome Profiling of Ocular Surface Squamous Neoplasia. SPEIO meeting. AAO 2015. Las Vegas.
132. Dixit L, **Galor A**, Karp CL. Differentiation of conjunctival amyloid and lymphoma by high resolution anterior segment OCT. SPEIO meeting. AAO 2015. Las Vegas.
133. Alghamdi Y, Shalabi N, McClellan A, **Galor A.** Meibomian gland dysfunction and hypercholesterolemia. The Association for Research and Vision in Ophthalmology (ARVO). Denver, CO – May 2015.

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134. Batawi H, Levitt RC, Felix E, Margolis TP, Sarantopoulos C, Martin E R, **Galor A**. Incomplete Response To Artificial Tears is Associated With Self-reported Features of Neuropathic Ocular Pain. The Association for Research and Vision in Ophthalmology (ARVO). Denver, CO – May 2015.
135. Gibbons A, Lanza N, Valenzuela F, Perez V, **Galor A**. Dry eye profiles in patients with a positive elevated surface matrix metalloproteinase 9 point of care test versus negative patients The Association for Research and Vision in Ophthalmology (ARVO). Denver, CO – May 2015.
136. McClellan A, Spierer O, Ehrmann K, Parel JM, Gonzalez A, Felix E, Feuer WJ, Sarantopoulos C, Levitt R, **Galor A**. Corneal Mechanical Hypersensitivity is Correlated with Wind Hyperalgesia, Ocular Symptoms, and Systemic Complaints. The Association for Research and Vision in Ophthalmology (ARVO). Denver, CO – May 2015.
137. Chhadva P, Lee T, Hackam AS, McClellan A, Sarantopolous KD, Felix ER, Levitt RC, **Galor A**. Human Tear Serotonin Levels and Neuropathic Ocular Pain in Dry Eye. The Association for Research and Vision in Ophthalmology (ARVO). Denver, CO – May 2015.
138. Chhadva P, Alexander A, McClellan AL, **Galor A**, "The Impact of Conjunctivochalasis on Dry Eye Symptoms", poster presentation. World Cornea Congress VII of ASCRS 2015. April 2015 - San Diego, CA
139. Walter S, Levitt R, Gronert K, **Galor A**. Correlation Between Arachadonic Acid–Derived Tear–Film Lipids and Ocular Surface Disease in Dry Eye. Presentation Date Sunday, April 19, 2015. San Diego, CA.
140. Alghamdi Y, Shalabi N, McClellan A, **Galor A**. Title for Printed Programs Epidemiology of Meibomian Gland Dysfunction in Elderly Population. ASCRS Paper ID 16899. Presentation Date Sunday, April 19, 2015. San Diego, CA.
141. Cabot F, Chhadva P, Yesilirmak N, **Galor A**, Yoo S. ASCRS Paper Assessment of IOL Centration 1 Day and 1 Month After Cataract Surgery. Presentation Date Sunday, April 19, 2015. San Diego, CA.
142. Stringham J, Ashkenazi N, **Galor A**, Wellik S. ASCRS Paper Barriers to Glaucoma Medication Compliance Among Veterans: Dry Eye Symptoms and Anxiety Disorders. Presentation Date Saturday, April 18, 2015. ASCRS Paper ID 15529. San Diego, CA.
143. Kaakour AH, Cabot F, Yesilirmak N, Chhadva P, **Galor A**, Yoo S. ASCRS Paper Inter-Device Agreement in Keratometric Readings Measured With Scheimpflug-Based Topography and Ray-Tracing Technology. Presentation Date Sunday, April 19, 2015, ASCRS Paper ID 17453, San Diego, CA.
144. Chhadva P, Cabot F, **Galor A**, Yoo S. Long-Term Outcomes of Flap Amputation After LASIK. ID: 17420. ASCRS Symposium, April 17–21, 2015, San Diego, CA.
145. Read, S, **Galor A**. Treatment of Refractory Filamentary Keratopathy After LASIK With Autologous Serum Tears, ID: 15391. April 17–21, 2015, San Diego, CA.
146. Junk A, **Galor A**. Open Sky Anterior Segment Surgery: Cataract, Glaucoma and Cornea. ASCRS Film program for the ASCRS ASOA Symposium and Congress. San Diego, 2015.
147. Camp A, **Galor A**, Wellik S. The epidemiology of meibomian gland disease in those with and without glaucoma drops. American glaucoma society meeting. San Diego 2015.
148. Zlotcavitch L, Felix ER, Feuer W, Martin ER, Margolis TP, Sarantopoulos KD, Levitt RC, **Galor A**. Characterization of Ocular Pain Features in Dry Eye. Ocular microbiology and immunology group (OMIG) meeting at AAO, Chicago 2014.
149. Walter S, Felix ER, Feuer W, Martin ER, Margolis TP, Sarantopoulos KD, Levitt RC, **Galor A**. Dry Eye Symptom Severity and Persistence are Associated with Symptoms of Neuropathic Pain. Ocular microbiology and immunology group (OMIG) meeting at AAO, Chicago 2014.
150. Galor A, Felix ER, Feuer, W, Shalabi N, McClellan AL, Patin DJ, Martin ER, Margolis TP, Sarantopoulos KD, Levitt RC. Dry eye symptoms align more closely to non-ocular complaints than to tear film parameters. AAO annual meeting, Chicago 2014.
151. Moon C, Nanji A, **Galor, A**, Karp CL. Surgical versus medical treatment of ocular surface squamous neoplasia: A comparison of costs. AAO annual meeting, Chicago 2014.

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152. Murillo JC, Joag MG, Sayed-Ahmed IO, Nanji A, Shalabi NM, **Galor A**, Karp C. Ultra-High Resolution Optical Coherence Tomography for the Differentiation of Ocular Surface Squamous Neoplasia and Melanoma. 2014 ISIE/Imaging Conference, Saturday, May 3, 2014, Orlando, FL.
153. Joag MG, Sayed-Ahmed IO, Nanji A, Shalabi NM, **Galor A**, Karp C. Confocal microscopy for the analysis of the sub-basal corneal nerves. 2014 ISIE/Imaging Conference, Saturday, May 3, 2014, Orlando, FL.
154. Atallah M, Sayed-Ahmed IO, Nanji A, Shalabi NM, **Galor A**, Amescua G, Karp C. Role of Ultra High Resolution Optical Coherence Tomography (UHR-OCT) in the Diagnosis of Ocular Surface Squamous Neoplasia (OSSN) in Complex Ocular Surface Diseases. 2014 ISIE/Imaging Conference, Saturday, May 3, 2014, Orlando, FL.
155. Joag MG; Wong J; Murillo JC; Sayed-Ahmed IO; Nanji A; Shalabi NM; **Galor A**; Karp CL. The Bioniko ophthalmic surgery model: an innovative approach for teaching capsulorhexis. 1295. ARVO, Orlando 2014.
156. Ansari Z; Singh R; Dang S; Alabiad C; **Galor A**. Prevalence, risk factors, and morbidities of eye lid laxity in a Veteran population. 1493 - C0132. ARVO, Orlando 2014.
157. Sayed-Ahmed IO, Wong J, Murillo JC, Joag MG, Shalabi NM, Nanji A, **Galor A**, Karp CL. Blue Nevus of the Ocular Surface. 1498 - C0137. ARVO, Orlando 2014.
158. Zlotcavitch L; Modi Y; Qurban Q; Echeverri R; Feuer WJ; Florez H; **Galor A**. Ocular surface symptoms in veterans returning from Operation Iraqi Freedom and Operation Enduring Freedom. 1998 - B0297. ARVO, Orlando 2014.
159. Nanji A; **Galor A**; Feuer WJ; Wong J; Joag MG; Murillo JC; Sayed-Ahmed IO, Shalabi NM; Karp CL. Evaluation of high resolution optical coherence tomography among novice users in the diagnosis of ocular surface squamous neoplasia. 2448 - B0233. ARVO, Orlando 2014.
160. Martinez JD; Tourkmani-Masri AK; **Galor A**; Beltran F. Brown-McLean syndrome in a pediatric patient and literature review. 2799 - A0384. ARVO, Orlando 2014.
161. Gonzalez A; Ehrmann K; Rowaan C; Lee W; Aguilar MC; McClellan AL; Shalabi NM; **Galor A**; Parel JMA. Age-Related Corneal Sensitivity assessed with a modified BHVI-Belmonte Aesthesiometer: a preliminary study. 3649 - A0163. ARVO, Orlando 2014.
162. Shalabi NM; Tuzhikov AI; **Galor A**; Dong Q; Panchin AU; Thanathanee O; Van Gelder R; O'Brien TP; Shestopalov V. Experimental approaches in the analysis of microbial community in ocular samples. 6288 - B0207. ARVO, Orlando 2014.
163. Walter S, **Galor A**, Wellik SR. Glaucoma Medications Differentially Affect Dry Eye Incidence. ASCRS, Boston 2014.
164. Nanji AA, Moon CS, **Galor A**, Sein J, Oellers P, Karp CL. Surgical vs. Medical Treatment of Ocular Surface Squamous Neoplasia: A Comparison of Recurrences and Complications. Cornea Society meeting, AAO meeting, New Orleans 2013.
165. Murillo JC, **Galor A**, Karp CL. Corneal and Intraocular Invasion of Ocular Surface Squamous Neoplasia After Intraocular Surgery". OMIG meeting, New Orleans 2013.
166. Shalabi N, Karp CL, Aziz H, Jeng B, **Galor A**. Superficial keratectomy, cautery, amniotic membrane transplant for the treatment of painful bullous keratopathy in eyes with poor visual potential. OMIG meeting, New Orleans 2013.
167. McClellan AJ, McClellan AL, Pezon CF, Karp CL, Feuer W, **Galor A**. Epidemiology of Ocular Surface Squamous Neoplasia in a Veterans Affairs Population. OMIG meeting, New Orleans 2013.
168. Nikpoor N, Gregori NZ, Goldhardt R, **Galor A**. Setting the mood. SPEIO meeting, New Orleans 2013.
169. McClellan A, Gregori, NZ, Goldhardt R, **Galor A**. Infection vs inflammation? SPEIO meeting, New Orleans 2013.
170. **Galor A**, Invited Panelist: Cornea Original Paper Session Panelist (DMEK) AAO meeting, New Orleans 2013.
171. **Galor A**, Kumar N, Feuer W, Florez H, Lee DJ. Environmental Factors and Dry Eye Syndrome: A

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- Study Utilizing the National United States Veterans Affairs Administrative Database. AAO meeting, New Orleans 2013.
172. Nanji AA, Moon CS, **Galor A**, Sein J, Oellers P, Karp CL. Surgical vs. Medical Treatment of Ocular Surface Squamous Neoplasia: A Comparison of Recurrences and Complications. AAO meeting, New Orleans 2013.
 173. Morkin M, **Galor A**. Hanging by a thread. VISTA meeting at ARVO, Seattle 2013.
 174. Martínez JD, Bentancourt NR, **Galor A**, Beltran Diaz de la Vega F, Ozorno Zarate J, Sanches Huerta V, Torres MA. Frequency and Risk Factors Associated with Ocular Surface Disease in Patients Attending a Tertiary Care Ophthalmology Center in Mexico City. Pan-American Research Day, Seattle, 2013.
 175. Martínez JD, Bentancourt NR, **Galor A**, Beltran Diaz de la Vega F, Ozorno Zarate J, Sanches Huerta V, Torres MA. Frequency and Risk Factors Associated with Ocular Surface Disease in Patients Attending a Tertiary Care Ophthalmology Center in Mexico City. ARVO meeting, Seattle 2013.
 176. **Galor A**, Venincasa VD, Feuer W, Lee DJ, Florez H, Venincasa MJ. Long-Term Effects of Cataract Surgery on Tear Film Parameters. ARVO meeting, Seattle 2013.
 177. Chhadva P, Canto APFS, **Galor A**, Yoo S, Vaddavalli P, Cabot F, Culbertson W. Comparison of IOL Calculation Methods and Intraoperative Wavefront in Eyes That Have Undergone Refractive Surgery. Eastern-Atlantic Student Research Forum, Miami FL 2013.
 178. Tzu J, **Galor A**, Wellik S. Quality Of Life In Veterans Using Glaucoma Drops: Health Care Disparities. American Glaucoma Society annual meeting, San Francisco 2013.
 179. **Galor A**, Ashley C, Feuer W. The relationship between C-reactive protein (CRP) and tear film parameters. Ocular microbiology and immunology group (OMIG) meeting at AAO, Chicago 2012.
 180. El Sayyad F, **Galor A**, Dubovy SR, Karp CL. Anterior Segment OCT for Imaging of Ocular Surface Lesions. Cornea Society/EBAA Meeting, Chicago 2012.
 181. **Galor A**, Feuer W, Lee DJ, Perez VL. Depression, Post Traumatic Stress Disorder, and Dry Eye Syndrome. 2012 Joint Meeting of the American Academy of Ophthalmology and the Asia-Pacific Academy of Ophthalmology. Chicago 2012. PO053.
 182. Canto APFS, Chhadva P, **Galor A**, Yoo S, Vaddavalli P, Cabot F, Culbertson W. Comparison of IOL Calculation Methods and Intraoperative Wavefront in Eyes That Have Undergone Refractive Surgery. Abstract #: 101679. 2012 Refractive Surgery Subspecialty Day Meeting of the International Society of Refractive Surgery (ISRS). Chicago, IL, USA. 2012
 183. Young R, Goldhardt R, Gregori NZ, **Galor A**. A Bird in Hand. SPEIO meeting at AAO. Chicago, 2012
 184. Fernandez, CA, **Galor A**, Arheart KL, Florez H, Musselman D, Lee DJ. Dry Eye Syndrome, Posttraumatic Stress Disorder (PTSD), and Depression in Older Male Veterans. American Public Health Association Student Assembly Latebreakers. Paper #273895. APHA 140th annual meeting. San Francisco, 2012.
 185. Karp CL, **Galor A**, Oellers P, Kao AA, Abdelaziz A, Feuer W, Dubovy SR. Predictors of ocular surface squamous neoplasia recurrence after exisional surgery. ARVO meeting, Ft. Lauderdale, 2012.
 186. Martinez JD, **Galor A**, Perez VL, Karp CL, Yoo SH, Alfonso EC. Endothelial Graft Failure after Contralateral Autologous Corneal Transplantation. ARVO meeting, Ft. Lauderdale, 2012. Travel award recipient.
 187. Dunn E, **Galor A**, Junk A, Wellik S, Pelletier J, Gregori NZ. Cumulative Probability and Risk Analysis for Nd:YAG Laser Posterior Capsulotomy After Phacoemulsification. ARVO meeting, Ft. Lauderdale, 2012.
 188. Fernandez CA. **Galor A**. Zheng DD, Arheart KL, Lam BL, McCollister KE, Ocasio MA, Lee DJ. Influence of Demographic Characteristics on Eye Care Expenditures: Data from the Medical Expenditure Panel Survey 2007. ARVO meeting, Ft. Lauderdale, 2012.
 189. Shah C, Tzu J, **Galor A**, Junk AK, See CW, Wellik SR. Refractive Outcomes of Combined Cataract and Glaucoma Surgery at a VA Hospital. ARVO meeting, Ft. Lauderdale, 2012.

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190. Canto A, Henry C, **Galor A**, Yoo SH. Epithelial Ingrowth Under LASIK Flap: Characteristics, Associated Factors And Visual Outcomes In Patients Requiring Flap Lift. ARVO meeting, Ft. Lauderdale, 2012. Travel award recipient.
191. Hurmeric V, Vaddavalli, P, **Galor A**, Yoo SH. The Effect Of Single And Multiple Injections Of Subconjunctival Ranibizumab In Patients With Recurrent Pterygium. ARVO meeting, Ft. Lauderdale, 2012.
192. Craig S, Pouyeh B, Bilonick RA, **Galor A**. Composite Index Scores for Dry Eye Syndrome: a Comparative Approach. ARVO meeting, Ft. Lauderdale, 2012. Travel award recipient.
193. Oellers P, Karp, CL, Sheth A, Kao AA, Abdelaziz A, Dubovy SR, **Galor A**. Incidence, treatment and outcomes of ocular surface squamous neoplasia associated with pterygium. ARVO meeting, Ft. Lauderdale, 2012.
194. Wellik S, Pouyeh B, Guan H, **Galor A**. Impact Of Ocular Surface Disease On Quality Of Life In Glaucoma Patients. ARVO meeting, Ft. Lauderdale, 2012.
195. Guan H, Wellik S, Pouyeh B, **Galor A**. Impact Of Ocular Surface Disease On Quality Of Life In Glaucoma Patients. Miami VA meeting, Miami, 2012.
196. Tzu J, Shah C, **Galor A**, Junk AK, See C, Wellik SR. Refractive Outcomes of Combined Cataract and Glaucoma Surgery at a VA Hospital. Miami VA meeting, Miami, 2012.
197. Dunn E, **Galor A**, Junk A, Wellik S, Pelletier J, Gregori NZ. Cumulative Probability and Risk Analysis for Nd:YAG Laser Posterior Capsulotomy After Phacoemulsification. Miami VA meeting, Miami, 2012.
198. McCollister A, **Galor A**, Feuer W, Lee D, Faler A, Florez H, Perez VL. Depression, Post Traumatic Stress Disorder and Dry Eye Syndrome: A Study Utilizing the National United States Veterans Affairs Administrative Database. Miami VA meeting, Miami, 2012.
199. Junk A, Dunn E, **Galor A**, Wellik S, Pelletier J, Gregori NZ. Cumulative Probability and Risk Analysis for Nd:YAG Laser Posterior Capsulotomy After Phacoemulsification. Association of VA Surgeons meeting, Miami Beach, 2012.
200. **Galor A**, Martinez J, Perez VL, Karp CL, Yoo SH, Alfonso EC. Endothelial Graft Failure after Contralateral Autologous Corneal Transplantation. Association of VA Surgeons meeting, Miami Beach, 2012.
201. Tzu J, Shah C, **Galor A**, Junk AK, See C, Wellik SR. Refractive Outcomes of Combined Cataract and Glaucoma Surgery at a VA Hospital. ASCRS, Chicago, 2012.
202. Henry C, Canto A, **Galor A**, Yoo S. Epithelial Ingrowth Under LASIK Flap: Clinical Characteristics, Risk Factors, and Visual Outcomes in Patients Requiring Flap Lift. ASCRS, Chicago, 2012.
203. Weiss M, **Galor A**. Anterior chamber worm, SPEIO meeting, AAO, Orlando, 2011.
204. Oellers P, Miller D, Karp CL, **Galor A**, Alfonso EC. Acanthamoeba keratitis with polymicrobial infections, OMIG meeting, AAO, Orlando, 2011.
205. Kao AA, **Galor A**, Karp CL, Dubovy SR. Clinicopathologic Correlation of Ocular Surface Squamous Neoplasms at Bascom Palmer Eye Institute: 2001 – 2010, OMIG meeting, AAO, Orlando, 2011.
206. **Galor A**, Feuer W, Lee DJ, Florez H, Carter D, Prunty WJ, Perez VL. Prevalence and risk factors of dry eye syndrome in a veteran population. ARVO meeting, Ft. Lauderdale, 2011.
207. Viteri E, Pouyeh B, **Galor A**, Lee DJ, Florez H, Fabian J, Perez VL. Prevalence And Morbidity Of Ocular Surface Symptoms In A Veteran Population. ARVO meeting, Ft. Lauderdale, 2011.
208. Pouyeh B, **Galor A**, Junk AK, Pelletier J, Wellik SR, Gregori NZ, Trentacoste J. Surgical and refractive outcomes in cataract surgery with toric intraocular lens implantation in a resident-teaching institution. ARVO meeting, Ft. Lauderdale, 2011.
209. Hodson K, **Galor A**, Karp CL, Davis JL, Albini TA, Perez VL, Miller D, Forster RK. Diagnosis, Treatment, and Outcomes of Patients with Infectious Scleritis: a 20-year review. ARVO meeting, Ft. Lauderdale, 2011.
210. Kao A, **Galor A**, Karp CL, Dubovy SR. Pathologic Characteristics of Ocular Surface Squamous Neoplasm at Bascom Palmer Eye Institute: 2001 - 2010. ARVO meeting, Ft. Lauderdale, 2011.

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211. Davis JL, **Galor A**, Ruiz P, Amador A, Albin TA. Simultaneous Cytokine and Cytofluorographic Analysis of Aqueous Humor in Active Uveitis. ARVO meeting, Ft. Lauderdale, 2011.
212. Lemelman B, Lee B, **Galor A**, Feuer W, Pouyeh B, Pelletier J, Vaddavalli P, Yoo SH. Agreement Between Pentacam and IOLMaster in Patients Undergoing Toric Intraocular Lens Implantation. ARVO meeting, Ft. Lauderdale, 2011.
213. Ocasio M, **Galor A**, Zheng DD, Arheart KL, Lam BL, Perez VL, McCollister KE, McClure LA, Lee DJ. Dry Eye Medication Use and Expenditures: Data from the Medical Expenditure Panel Survey 2001-2006. ARVO meeting, Ft. Lauderdale, 2011.
214. Karp CL, Kieval JZ, Abou Shousha M, **Galor A**, Hoffman RA, Dubovy SR, Wang J. Ultra-High Resolution Optical Coherence Tomography for Differentiation of Ocular Surface Squamous Neoplasia and Pterygia. ARVO meeting, Ft. Lauderdale, 2011.
215. Abou Shousha M, Perez V, Feuer W, **Galor A**, Wang J. Epithelial Irregularity Factor (EIF): A new diagnosis of dry eye syndrome. ACSRS meeting, San Diego, 2011.
216. Fishler J, Hurmeric V, **Galor A**, Yoo SH, Perez VL. Subconjunctival ranibizumab for recurrent pterygium. ACSRS meeting, San Diego, 2011.
217. Hodson K, **Galor A**, Karp CL, Albin TA, Perez VL, Davis J, Miller D, Forster RK. Diagnosis, Treatment, and Outcomes of Patients with Infectious Scleritis. OMIG meeting at AAO meeting, Chicago, 2010.
218. Perez V, Abou Shousha M, Feuer W, **Galor A**, Wang J. Epithelial Irregularity Factor (EIF): A new diagnosis of dry eye syndrome. Tear film and ocular surface society (TFOS) meeting, Florence, Italy, 2010.
219. **Galor A**, Feuer W, Kempen JH, Kaçmaz RO, Liesegang TL, Suhler EB, Foster CS, Jabs DA, Levy-Clarke, GA, Nussenblatt, RB, Rosenbaum JT, Thorne FE. Adverse effects of smoking on patients with ocular inflammation. ARVO. 2010
220. Driscoll D, **Galor A**, Yoo SH, Piccoli FVR, Schmitt AJ, Chang V, Perez VL. Ranibizumab for the Inhibition of Neovascularization in the Cornea in High Risk Corneal Transplant Surgery. ACSRS meeting, Boston, 2010.
221. **Galor A**, Davis JL, Flynn HW, Feuer W, Dubovy SR, Setlur V, Kesen MR, Goldstein DA, Tessler HH, Bykhovskaya Ganelis I, Jabs DA, Thorne JE. Sympathetic ophthalmia: Incidence of ocular complications and vision loss in the sympathizing eye. ARVO. 2009
222. Gonzalez M, **Galor A**, Goldman D, O'Brien TP. Outcomes after intraocular lens exchange surgery in dissatisfied patients with refractive intraocular lenses. ARVO. 2009
223. **Galor A**, Davis JL, Flynn HW, Feuer W, Dubovy SR, Setlur V, Kesen MR, Goldstein DA, Tessler HH, Bykhovskaya Ganelis I, Jabs DA, Thorne JE. Sympathetic ophthalmia: Incidence of ocular complications and vision loss in the sympathizing eye. AAO meeting, Atlanta. 2008.
224. Barnes SD, Karp CL, Chabra S, **Galor A**, Alfonso EC. Subconjunctival/perilesional Recombinant Interferon Alpha 2b for Ocular Surface Squamous Neoplasia: a 10 year review. OMIG meeting at AAO meeting, Atlanta. 2008.
225. **Galor A**, Karp CL, Chhabra S, Barnes S, Alfonso EC. Topical Interferon Alpha 2b Eye Drops for Treatment of Ocular Surface Squamous Neoplasia: A Dose Comparison Study. OMIG meeting at AAO meeting, Atlanta. 2008.
226. Leder HA, Jabs DA, **Galor A**, Kedhar SR, Dunn FP, Peters GB, Thorne JE. Posterior subtenons corticosteroid injections for cystoid macular edema complicating noninfectious uveitis. ARVO. 2008.
227. **Galor A**, Karp C. Pegylated interferon alpha 2b for treatment of ocular surface squamous neoplasia: A pilot study. ARVO. 2008.
228. **Galor A**, Jabs DA, Leder HA, Kedhar SR, Dunn JP, Peters GB III, Thorne JE. Comparison of antimetabolite therapies for noninfectious ocular inflammation. AAO Meeting, New Orleans. 2007.
229. **Galor A**, Jabs DA, Leder HA, Kedhar SR, Dunn JP, Peters GB III, Thorne JE. Comparison of antimetabolite therapies for noninfectious ocular inflammation. American Uveitis Society meeting at

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- ARVO. 2007.
230. Lowder CY, **Galor A**, Margolis R, Kaiser PK. Complications associated with the intravitreal, fluocinolone acetonide implant (Retisert™). ARVO meeting. 2007.
 231. **Galor A**, Ference SF, Singh AD, Lee MS, Stevens GHJ, Perez VL, Peereboom DM. Maculopathy as a complication of blood brain barrier disruption in patients with CNS lymphoma. ARVO meeting. 2007.
 232. Mucci J, Miraldi VA, **Galor A**, Jeng BH. Recurrence rates of herpes simplex virus keratitis in contact lens wears compared to non-contact lens wearers. Ocular Microbiology and Immunology Group, AAO Meeting, Las Vegas. 2006.
 233. **Galor A**, Lowder CY, Perez VL, Kaiser PK, Sears JE. Surgical management of long-standing retinal detachments associated with uveitis: a pilot study. American Uveitis Society Winter Meeting, Colorado. 2006.
 234. **Galor A**, Brasil OFM, Smith S, Bakri S, Sears JE, Kaiser PK, Lowder CY. Comparison of adverse events from intravitreal triamcinolone in patients with and without uveitis. AAO Meeting, Chicago. 2005.
 235. **Galor A**, Carlson EC, Amescua G, Yang X, Perez VL. The immunological milieu of vascularized high risk corneas. Resident day presentation. Cole Eye Institute. 2005.
 236. **Galor A**, Meisler D, Yang X, Perez VL. The immunological milieu of human high risk corneal transplant recipients. ARVO meeting. 2005.
 237. **Galor A**, Perez VL, Lowder CY. Differential effectiveness of etanercept and infliximab in the treatment of ocular inflammation. American Uveitis Society Winter meeting, Utah. 2005.
 238. **Galor A**, Carlson EC, Rodriguez JP, Yang X, Perez VL. Differential migration of inflammatory cells in the vascularized high risk cornea. ARVO meeting. 2004.

NON-PEER REVIEWED PUBLICATIONS

1. <https://atlasofscience.org/> Uveitis and aging.
2. Eye world interview. <http://eyeworld.org/article-newer-dry-eye-diagnostic-tools-show-promise>
3. Vu S, Karp CL, **Galor A**, Wester ST. OCT can be useful in diagnosis of conjunctival lymphangiectasis. Ocular Surgery News U.S. Edition, May 25, 2013
4. **Galor A**, Lowder CY, Jeng BH. Sudden onset of bilateral corneal edema and blurry vision. EyeNet 2007 Jan:41-2.
5. **Galor A**, Lowder CY. Steroid therapy and the eye. Focal Points. 2006 Sept;24(7):10-13.
6. **Galor A**, Perez VL. Ophthalmic puzzler: syphilitic anterior uveitis. Ophthalmology Update. 2005; Fall: 7-8.
7. **Galor A**, Singh A. Ophthalmic puzzler: Indeterminate choroidal melanocytic lesion. Ophthalmology Update. 2005; Winter: 7-9.
8. **Galor A**, Singh A. Ophthalmic puzzler: pediatric choroidal melanoma. Ophthalmology Update. 2004; Winter: 7-9.

20. Other works accepted for publication:

V. PROFESSIONAL

21. Funded Research Performed:

- | | |
|-------------|--|
| 05/21-04/23 | Phase 2 Clinical Trial to Evaluate OC-01 Nasal Spray in Subjects With Neurotrophic Keratopathy. PI Dr. Galor. Oyster point |
| 07/20-06/22 | Observational Study of Conjunctivitis in the Setting of DUPIXENT® Treatment for Atopic Dermatitis. PI Dr. Galor. Regeneron |
| 03/21-02/23 | Study of efficacy and safety of SAF312 eye drops in subjects with post-operative chronic ocular surface pain (COSP). PI Dr. Galor. Novartis. |

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- 09/20-08/25 Biomarkers of ocular pain after refractive surgery. Dr. Galor/Aicher. R61 NS114960-01A1. NEI
- 07/20-06/22 Automated Assessment of Visual Photosensitivity in Traumatic Brain Injury. Dr. Galor. VR190009, DOD
- 04/20-03/24 Neural mechanisms of ocular pain. Principal Investigator Dr. Galor, Total direct costs \$650,000 funded by the Department of Veterans Affairs, CSRD
- 04/20-03/24 Lipid Mediators in Meibomian Gland Disease. Principal Investigators Drs. Galor and Mandel, Total direct costs \$1M funded by the Department of Veterans Affairs, BLRD
- 04/20-03/23 Gulf War Illness: Eye-Brain connection. Funded by the DOD.
- 06/18-05/19 SAC internal grant. FMT for Sjogrens. \$25,000
- 09/17-08/19 Sjogrens syndrome (SS) foundation, \$50,000 pilot award to study FMT for SS
- 04/17-03/22 ZEDS, U of Miami site, funded by NEI, Steering committee member
- 09/16-08/21 Micro-environment and dry eye: Principal Investigators Drs Galor and Kumar, Total direct costs \$1.7M funded by NEI (R01EY026174)
- 01/16-12/20 Neuropathic pain: A missing piece of the dry eye puzzle. Principal Investigator Dr. Galor, Total direct costs \$650,000 funded by the Department of Veterans Affairs, Veterans Health Administration, Office of Research and Development, Clinical Sciences Research EPID-006-15S
- 01/17-12/17 2016 ARVO Foundation/Collaborative Research Fellowship with Nalle Ramos from the Asociacion para Evitar la Ceguera en México (APEC), \$10,000.
- 03/16-02/17 LASIK-induced Neuropathic Pain: New Paradigms for Perioperative Management of Corneal Nerve Injury and Dry Eye. Principal Investigator Dr. Galor, Total direct costs \$50,000 provided by the University of Miami, CTSI program.
- 12/14-12/15 The environment and dry eye. Principal Investigator Dr. Galor, Total direct costs \$10,000 provided by the University of Miami.
- 10/10-10/15 The Scope of Dry Eye Syndrome in a Veteran Population, Principal Investigator Dr. Galor, Total direct costs \$1,100,000 provided by the Department of Veterans Affairs, Veterans Health Administration, Office of Research and Development, Clinical Sciences Research and Development's Career Development Award CDA-2-024-10S, 75% effort
- 07/13-06/14 Identification of tumor and patient characteristics that predict interferon treatment success in ocular surface squamous neoplasia. Principal Investigator Dr. Galor, Total direct costs \$40,000 provided by the Stanley Glaser award, University of Miami.
- 10/12-10/14 The ocular microbiome and dry eye syndrome, Principal Investigator Russ Van Gelder, Total direct costs \$60,000 provided by an Alcon grant, 5% effort
- 11/08-06/11 Analysis of Intraocular Fluids in Patients with Uveitis, Principal Investigator: Janet Davis, Total direct costs \$70,000 provided by Bascom Palmer and the Jaime Marti Foundation, 10% effort
- 11/08-06/11 Ranibizimab in the treatment of pterygium and high risk corneal transplantation, Principal Investigator: Sonia Yoo, Total direct costs \$25,000 provided by Genentech, 10% effort

22. Reviewer and Editorial responsibilities:

Book Editor

- 2021 *Gut microbiome and dry eye: What's the connection (to be published by Elsevier)*
- 2020 *Dry Eye Diseases (Published by Elsevier)*

Special issue Editor

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2022	<i>Current Ophthalmology Reports: Ocular surface and cornea</i>
2020	<i>Current Ophthalmology Reports: Ocular surface</i>
2020	<i>Frontiers in Pharmacology: Eye Pain: Etiology and Therapeutic Approaches</i>
2020	<i>Journal of Clinical Medicine: Dry Eye Syndrome: Climate, environment, and disease</i>
2019	<i>Journal of Clinical Medicine: Dry Eye Syndrome: New Insights on Epidemiology and Management</i>

Section Editor for

2020-present	<i>Clinical and Experimental Ophthalmology</i>
2019-present	<i>Eye and Contact Lens</i>
2019-present	<i>British Medical Journal Ophthalmology</i>
2018-present	<i>Ophthalmology</i>
2018-present	<i>British Journal of Ophthalmology</i>
2018-present	<i>Ocular Surface</i>

Reviewer for

American Journal of Ophthalmology
American Journal of Ophthalmology Case Reports
Ophthalmology
Ophthalmology Science
JAMA Ophthalmology
British Journal of Ophthalmology
Ocular Surface
IOVS
Eye
Cornea
Ocular Immunology and Inflammation
BMC Ophthalmology
Eye and Contact Lens
Case reports in ophthalmology
European Journal of Pain

23. Professional and Honorary Participation in National Organizations:

2018-present	AMPC committee, ARVO, representative of Cornea section.
2018-present	Study section member and chair of the NEI ZRG1 BDCN J 81 group.
2018-present	Council position for the Ocular Microbiology and Immunology Group
2018-2020	AAO Focal Points committee
2018-present	AAO corneal abstract and instructional course committee
2013-present	ARVO (The Association for Research in Vision and Ophthalmology) CME committee
2013-present	ONE (Ophthalmic News and Education network) editorial committee member, AAO (American Academy of Ophthalmology), chair of cornea section
2010-present	Tear Film Ocular Surface Society (member)
2010-2017	Self-assessment committee, American Academy of Ophthalmology: responsibilities include writing cornea/external disease questions to assist ophthalmologists in preparing for the board and Maintenance of Competency (MOC) examinations
2009-present	Ocular Microbiology and Immunology Group (past-president)
2009-present	Society of HEED fellows (member)
2009-present	Miami Ophthalmology Society (member)
2006-present	American Uveitis Society (member)

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- 2003-present American Academy of Ophthalmology (AAO) (member)
 2003-present Association for Research in Vision and Ophthalmology (ARVO) (member)
 2010-2015 ISTA's Women Leadership Forum, AAO (member)

24. Honors and Awards

- 2022 Recognized as one of the top ophthalmologists in the world (The Ophthalmologist)
 2021 Recognized as one of the top women ophthalmologists in the world (The Ophthalmologist)
 2020 2020 Ludwig Von Sallmann Clinician-Scientist Award recipient, ARVO
 2018 Induction into the American Ophthalmology Society
 2017 American Academy of Ophthalmology's *Senior Achievement Award*
 2016 Selected to participate in AAO Leadership Development Program
 2015 Chhadva, P. Best paper award AAO "Post-LASIK Epithelial Ingrowth: Correction, Recurrence, and Long-term Follow-up. Meeting Presentation" Senior mentor
 2015 Chhadva, P. First Place Clinical Science Presentation "*The Impact of Eyelid Laxity on Dry Eye*" Senior mentor
 2015 Shalabi, N. First Place Young Investigator Clinical Science Presentation "*Confocal microscopy for the analysis of the sub-basal corneal nerves*" Senior mentor
 2014 AAO paper "*Dry eye symptoms align more closely to non-ocular complaints than to tear film parameters*" poster award
 2013 AAO paper on dry eye and environment highlighted in press release as "new and newsworthy"
 2013 McClellan, A. First Place Young Investigator Clinical/Health Services Presentation "*Epidemiology of OSSN in veteran population*" Senior mentor
 2012 AAO paper on dry eye in veterans highlighted in press release as "new and newsworthy"
 2012 Guan H. First Place Young Investigator Clinical/Health Services Presentation "*Impact Of Ocular Surface Disease On Quality Of Life In Glaucoma Patients*" Senior mentor
 2010 Professor of the Year Award, Bascom Palmer Eye Institute, awarded by the BPEI residents for outstanding teaching
 2010 American Academy of Ophthalmology's *Achievement Award*
 2007 Herminia Greig Memorial Award, Bascom Palmer Eye Institute
 2007 ARVO travel grant
 2006 HEED fellowship recipient
 2006 Highest resident quiz score, Cole Eye Institute
 2006 Highest OKAP score award, Cole Eye Institute
 2005 Travel grant for best abstract, TNF & Beyond Summit, CCF
 2005 Highest resident quiz score, Cole Eye Institute
 2005 Highest OKAP score award, Cole Eye Institute
 2004 Resident day research award for best paper, Cole Eye Institute
 2004 Highest OKAP score award, Cole Eye Institute
 2002 Alpha Omega Alpha, Washington University
 2002 Glasgow Memorial achievement – for graduating in top10% of class
 2002 Max and Evelyn grand prize – excellence in ophthalmic research
 2002 John Kirk Scholastic award – high scholastic standing
 2002 Alumni scholarship – full tuition scholarship to student with highest rank
 2001 Steven Dresler prize – excellence in community service
 2000 Dr. Margaret Smith award – outstanding women in medicine
 1999 Carl and Gerty Cori prize – performance in Biochemistry
 1997 Phi Beta Kappa, Carnegie Mellon University

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- | | |
|------|--|
| 1997 | Bennett award – for excellence in mechanical engineering |
| 1997 | University honors and college research honors |
| 1997 | Mortar Board – national senior service honor society |

25. Post-Doctoral Fellowships: N/A

26. Other Professional Activities (e.g. papers presented; performances; conference proceedings; seminar or conference panel member; catalogue work; etc)

Visiting Professorships

1. Scheie Eye Institute, Department of Ophthalmology of the University of Pennsylvania June 1, 2023 —In person
2. University of Pittsburgh April 12, 2023 —In person
3. Kyoto Cornea Club 2022 November 25-26, 2022
4. Columbia November 10, 2022—In person
5. Mount Sinai /NYEE EVRI Seminar Series -May 26th and 27th, 2022—Virtual presentation
6. UC Davis- March 4, 2022—Virtual presentation
7. Augusta University Department of Ophthalmology, February 17, 2022—Virtual presentation
8. University of Texas Southwestern Medical Center December, 2-3/2021—Virtual presentation
9. UT Health San Antonio Cornea Day-September 24, 2021—Virtual presentation
10. Hamilton Eye- August 11,2021—Virtual presentation
11. UCSF/Proctor - Dept of Ophthalmology, April 28, 2021—Virtual presentation
12. UT Austin Dell Medical School - Dept of Ophthalmology, January 14, 2021—Virtual presentation
13. University of Utah, January 15, 2021—Virtual presentation
14. University of Iowa, July 15, 2020—Virtual presentation
15. Augusta University, June 12, 2020—Cancelled due to COVID19
16. UT Southwestern, June 4, 2020—Cancelled due to COVID19
17. UC Davis, April 24, 2020—Cancelled due to COVID19
18. École d'Optométrie/School of Optometry, Université de Montréal, November 11, 2019
19. Stony Brook University, New York October 17, 2019
20. Schepens Eye Research Institute /Mass Eye and Ear Distinguished lecture, Boston, February 22, 2019
21. University of Iowa, Department of Ophthalmology, December 7, 2018
22. Indiana University Department of Ophthalmology, November 7, 2018
23. University of San Francisco, October 18, 2018.
24. Center for Pain and the Brain at Boston Children's Hospital, David Borsook, October 8, 2018.
25. Physiology & Pharmacology department at OHSU, Sue Aicher, November 2, 2017.
26. Proctor Foundation, June 10, 2017.
27. Wills Eye Hospital. April 12, 2017
28. Case Western Reserve University. March 31, 2017
29. University of Maryland. September 20, 2016
30. Virginia Society of Eye Physicians and Surgeons. June 4, 2016
31. University of Seattle. April 16-17, 2016.

Courses Director

1. Ocular Surface Masqueraders: What Not to Miss and How Not to Miss It, AAO, Chicago, September 30, 2022.
2. Evaluation and Management of Painful Dry eye Symptoms: Nerves vs tears, AAO, AAO, Chicago, September 30, 2022.
3. Ocular dermatology: what the ophthalmologist needs to know about the periocular skin. AAO, Chicago, September 30, 2022.
4. Ocular Surface Masqueraders: What Not to Miss and How Not to Miss It, AAO, New Orleans, November

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- 12, 2021.
5. Evaluation and Management of Painful Dry eye Symptoms: Nerves vs tears, AAO, New Orleans, November 12, 2021.
6. Ocular Surface Masqueraders: What Not to Miss and How Not to Miss It, AAO, Virtual meeting, November 15, 2020.
7. Evaluation and Management of Painful Dry eye Symptoms: Nerves vs tears, AAO, Virtual meeting, November 15, 2020.
8. Ocular Surface Masqueraders: What Not to Miss and How Not to Miss It, AAO, San Francisco, October 14, 2019.
9. Evaluation and Management of Painful Dry eye Symptoms: Nerves vs tears, AAO, San Francisco, October 13, 2019.
10. Ecourse director: Ocular Pain: An Important Yet Under-Evaluated Feature of Dry Eye. AAO website, 2018.
11. Ocular Surface Pain: Principles and Practice, AAO, Chicago, October 28, 2018.
12. Ocular Surface Pain: Principles and Practice, AAO, New Orleans, November 17, 2017.
13. Ocular Surface Pain: Principles and Practice, AAO, Chicago, October 17, 2016.

Didactic Lectures

1. Course participant: Approach to Cataract Surgery in Corneal Diseases. AAO, In person course. September 30, 2022.
2. Invited lecture, Israeli Ophthalmology Society. Dry eye or neuropathic pain. June 14, 2022. Jerusalem.
3. Course participant: Approach to Cataract Surgery in Corneal Diseases. AAO, Virtual course, November 12, 2021.
4. Course participant: Immune diseases of the cornea: atopic keratoconjunctivitis. AAO, In person course, November 12, 2021.
5. Invited lecture, Heidelberg Engineering. What can my confocal do for me? September 21, 2021. Virtual presentation.
6. Invited lecture, 8th Annual World Congress of SBMT (Society of Brain Mapping and Therapeutics), July 8, 2021. Los Angeles, California.
7. Invited lecture, EUDEC 2021: European Dry Eye Congress: Paris. June 18-19, 2021
8. Invited lecture, Knapp Symposium AOS 2021: COVID19 and the eye. Naples, May 21, 2021
9. Invited lecture, The microbiome and dry eye. Bowman's Club. March 26, 2021
10. Invited lecture, University of Miami Anesthesia Department, Chronic Ocular Pain: Real, Often Misdiagnosed And Difficult To Treat, March 4, 2021
11. Invited lecture, The environment and the eye. BPEI corneal consultation. February 27, 2021
12. Invited lecture, Pain and sensation. ADVANCES IN DIAGNOSIS AND MANAGEMENT FOR DRY EYE: Understanding better the Dry Eye Workshop Study (DEWS II), transmitted in Mexico and Latin America. February 27, 2021.
13. Invited lecture, Neuropathic pain. Cornea virtual summit, December 12, 2020.
14. Course participant. Ocular pain. US Association for the Study of Pain Meeting. December 9, 2020.
15. Invited lecture, CORSO meeting, Bascom Palmer Eye Institute, November 21, 2020,
16. Invited lecture, Dry eye 360: Role of environment on the ocular surface, November, 3, 2020, Virtual meeting, Journal of Clinical Medicine lecture series.
17. Invited lecture, Neuropathic Ocular Pain - Real, Often Misdiagnosed & Difficult to Treat, Oct 29,2020, Joint meeting with Dr. Nigel Baker at the Queen Elizabeth Hospital in Barbados.
18. Invited lecture, Dry Eye "Desert!" 2020 Course! October 18, 2020, Virtual meeting put on by Dr. Ashiyana Nariani, MD, MPH in Maharashtra India.
19. Invited lecture, Ocular pain and dry eye: What's the connection? Portland Oregon VAMC, October 14, 2020.

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20. Invited lecture, The Emirates Society of Ophthalmology, September 12, 2021.
21. Invited lecture, Tear Film and Ocular Surface Society Meeting 2020, September 9-12, 2020, Cernobbio, Italy.—cancelled due to COVID19.
22. Invited lecture, Association of Contact Lens Educators. May 29, 2020, Nova Southeastern University, Florida. —cancelled due to COVID19.
23. Mini-symposium organizer, Ocular Pain, ARVO, May 3rd, 2020. Baltimore. —cancelled due to COVID19.
24. Invited lecture, Bowman's conference. March 27, 2020, Liverpool, England. —cancelled due to COVID19.
25. Invited lecture, Cornea Gordon Research Conference. February 16-21, 2020, Lucca, Italy.
26. Invited lecture, Ocular Surface Workshop 2020. January 13-19, 2020, Hyderabad, India.
27. Participant. Cornea day at AAO, San Francisco, CA. October 11, 2019.
28. Participant. Management of Common Allergic and Immunologic Diseases of the Conjunctiva and Cornea. AAO, San Francisco, October 14, 2019.
29. Participant. Cornea fellowship summit. September 5-8, 2018. Atlanta, GA.
30. Invited lecture, SSO (Societe Suisse d'Ophthalmologie) Annual Meeting 2019. August 29-30, 2019, Interlaken, Switzerland
31. Invited lectures, Clínica Barraquer de Bogotá Cornea meeting, August 22-25, 2019 Bogota, Columbia.
32. Invited lectures, Georgia Society of Ophthalmology, Amelia Island, August 2-4, 2019.
33. Invited lectures, 35rd Pan-American Congress of Ophthalmology 2019, May 25-28, Cancun, Mexico.
34. Participant. Climate and Health Symposium, May 11, 2019, Miami, FL.
35. Invited lecture, New advances in keratoconus, March 23, 2019, Bascom Palmer Eye Institute, Miami, FL.
36. Invited lecture, Birmingham Corneal Meeting, March 9, 2019, Birmingham, England.
37. Invited lecture, Interactive Consultations in Cornea and Refractive Surgery, Feb 22, 2019, Bascom Palmer Eye Institute, Miami, FL.
38. Invited lecture, EnVision Summit, February 15-18, 2019, San Juan, Puerto Rico.
39. Invited lecture, I Curso Bascom Palmer Eye Institute Ecuador, January 10-14, 2019, Cuenca, Ecuador
40. Invited lecture, XL Inter-American Course in Clinical Ophthalmology, Nov 4-7, 2018, DoubleTree by Hilton Hotel, Miami, FL
41. Participant. Cornea day at AAO. October 27, 2019. Chicago, IL.
42. Participant. Cornea fellowship summit. September 6-8, 2018. Tampa, FL.
43. Invited lecture. National Medical Association. August 14, 2018. Orlando, FL.
44. Invited lecture. Paraguayan Ophthalmology Society. August 2-3, 2018. Asunción.
45. Invited lecture. North Carolina Retina Associates, April 25, 2018.
46. Participant. Cornea Day, ASCRS, April 13, 2018.
47. Invited lecture. Interactive Consultations in Cornea and Refractive Surgery, Bascom Palmer, February 23-24, 2018.
48. Invited lecture. Sarcoidosis patient advocacy day, University of Miami, February 24, 2018.
49. Invited lecture, XXXVIIV Inter-American Course in Clinical Ophthalmology Nov 19, 2017, InterContinental Hotel, Miami, FL
50. Invited lectures, 33rd Pan-American Congress of Ophthalmology 2017, August 9-11, Lima, Peru.
51. Invited lecture, Ocular Surface Diseases Course 2017, Mar 18 2017, Bascom Palmer Eye Institute, Miami, FL.
52. Invited lecture, Ophthalmology Exchange Meeting 3rd March 2017, London, England.
53. Invited lecture, PanCornea International Congress. February 24 - 25, 2017. Miami FL.
54. Invited lecture, Interactive Consultations in Cornea and Refractive Surgery, Feb 3 - Feb 4 2017, Bascom Palmer Eye Institute, Miami, FL
55. Invited lecture, *Ophthalmology Congress*. Quito, Equator, January 13, 2017.
56. Invited lecture, XXXVIII Inter-American Course in Clinical Ophthalmology October 30, 2016. Trump

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Hotel Dural, Miami, FL

57. Reconstrucción de cornea y superficie ocular: Ciudad de Mexico, October 27-29 2016
58. New Developments in Dry Eye Diagnosis and Treatment: Ocular microbiome in dry eye, *Cornea sub-specialty day*, AAO, Chicago, IL, October 15, 2016.
59. AAO-OMIG (Ocular Microbiology and Immunology Group) Joint Symposium entitled Rethinking The Ophthalmologists' Approach to Inflammatory Diseases of the Ocular Surface, Chicago, October 18, 2016.
60. Neuropathic pain: a missing piece of the dry eye puzzle, *Dry eye session*, XXII Biennial Meeting of the International Society for Eye Research, September 25-29, 2016 | Tokyo, Japan
61. Clinical relevance of photophobia in dry eye. *Expanding the functions of ocular surface innervation: photophobia and photoallodynia*. XXII Biennial Meeting of the International Society for Eye Research, September 25-29, 2016 | Tokyo, Japan
62. Diagnosis and management of corneal somatosensory dysfunction. *Neuropathic pain session*. Tear film and ocular surface society meeting, Montpellier, France, September, 8, 2016.
63. Invited lecture, *Video Conferencia Congreso Nacional de Oftalmología*. Venezuela, June 16, 2016
64. Invited lecture, *XXII Biennial Meeting of the International Society for Eye Research*, Tokyo, Japan. September 25 – 29, 2016
65. Invited lecture, *Keynote Speaker in the 8th International Conference on the Tear Film & Ocular Surface: Basic Science and Clinical Relevance*, Montpellier, France. September 7- 10, 2016.
66. Invited lecture, *La Oftalmología de hoy. Un Curso Del Bascom Palmer Eye Institute and Sociedad Peruana De Oftalmología*. Lima, Peru. June 10, 2016.
67. Invited lecture, *Ocular Surface Diseases Course 2016*. BPEI. April 16, 2016.
68. Invited lecture, *Interactive Consultations in Cornea and Refractive Surgery*. BPEI. March 4-5, 2016.
69. Invited lecture, *BPEI-FOLA-Barraquer-Course*, Santiago, Chile, December 3-4, 2015.
70. Invited lecture, *XXXVII Curso Interamericano*, Miami, November 22, 2015.
71. Invited lecture, *Cornea sub-specialty day*. Adenoconjunctivitis. AAO 2015 November 14, 2015.
72. Invited lecture, *Centro Mexicano de Córnea y Cirugía Refractiva A.C*, Cancun, Mexico. September 14-16, 2015.
73. Invited lecture, *XXXI Pan-American Congress of Ophthalmology*, Bogota, Columbia. August 5-8, 2015.
74. Invited lecturer, *Association for Ocular Pharmacology and Therapeutics meeting*, Dry eye and Aging, Charleston, SC, February 27, 2015.
75. Invited lecturer, *52nd Actualization Course in Ophthalmology*, Mexico City, Mexico, February 18-21, 2015.
76. Conference presenter and session organizer/moderator: *XXXVI Curso Interamericano*, Miami, October 26, 2014.
77. Skills Transfer Instructor "*Microsurgical Suturing Techniques*", American Academy of Ophthalmology annual meeting, Chicago, November, 2014.
78. Conference presenter, *Cornea 2014: Restocking the Toolbox: Concepts and Techniques for the Toughest Jobs: Anti-angiogenesis Therapy*. Corneal subspecialty day. AAO Chicago, 10/18/2014.
79. Invited lecturer for webinar, *Pan-American Association of Ophthalmology (PAAO) "Neuropathic pain: a missing piece of the dry eye puzzle?"* September 8, 2014.
80. Invited lecturer, Tel hashomer hospital, Tel Aviv Israel "*Neuropathic pain: a missing piece of the dry eye puzzle?*" July 10, 2014.
81. Invited lecturer, *23rd Pan-American Regional Course*, Punta del Este, Uruguay, May 29 - 31 2014
82. Invited lecturer, *Bascom Palmer Eye Institute & Fundación Oftalmológica Los Andes*. Santiago, Chile, December 5 - 7, 2013.
83. Conference presenter "*Oops I didn't mean for that to happen, now what?*" XXXV Curso Interamericano, Miami, November 24, 2010.
84. Skills Transfer Instructor "*Microsurgical Suturing Techniques*", American Academy of Ophthalmology annual meeting, New Orleans, November, 2013.

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85. Dry eye syndrome and glaucoma. CME event at the AAO meeting, New Orleans 2013.
86. Invited lecturer, *XXX Pan-American Congress of Ophthalmology & XXXVII Brazilian Congress of Ophthalmology*. August 7 - 10, 2013 Rio de Janeiro, Brazil.
87. Visiting Professor, *The 11th annual John Dickerson Memorial Ophthalmic lecture*, Norfolk, VA, May 3-4, 2013.
88. Skills Transfer Instructor “*Microsurgical Suturing Techniques*”, American Academy of Ophthalmology annual meeting, Chicago, November 12, 2012.
89. Invited lecturer, *18th International Course on Cornea and Refractive Surgery*, Cancun, Mexico, August 8-11, 2012.
90. Invited lecturer, *Masters in Ophthalmology 2012*, Orlando, Florida, June 22, 2012.
91. Invited lecturer, *Sociedad Puertorriquena de Oftalmologia 43rd Annual Congress*, San Juan, Puerto Rico, May 25-28, 2012.
92. Invited lecturer, *VIII Uruguayan National Ophthalmology Congress & International Course of Bascom Palmer Eye Institute*, Montevideo, Uruguay, November 30, 2011.
93. Invited lecturer, *XIV Peruvian Prevention of Blindness Congress & XIII Regional Congress of Ophthalmology*, Arequipa, Peru, September 30, 2011.
94. Conference presenter “*Dry eye syndrome – men also have it*” XXXIV Curso Interamericano, Miami, October 31, 2011.
95. Skills Transfer Instructor “*Microsurgical Suturing Techniques*”, American Academy of Ophthalmology annual meeting, Orlando, October 25, 2011.
96. Conference presenter “*Refractive surgery after penetrating keratoplasty*” XXXIII Curso Interamericano, Miami, October 30, 2010.
97. Conference presenter “*Persistent inflammation after cataract surgery*” Cataract and refractive surgery conference, Miami, February 26, 2010.
98. Conference presenter “*Epidemiology of blepharitis*” 5th International Conference in Ocular Infections, Palm Beach, February 20, 2010.
99. Conference presenter “*The young endothelium*” Cataract and refractive surgery conference, Miami, February 6, 2009.
100. Conference presenter “*The unstable lens*” Cataract and refractive surgery conference, Miami, February 8, 2008.

Professional Service

National Responsibilities:

Grant review process

2022-present	Ad hoc reviewer for National Eye Institute, K08/K23 session, 7/2022
2019-2020	Ad hoc reviewer for National Science Center, Poland
2017-present	Member of the Ocular Surface, Cornea, and Refractive Error special emphasis panel, NEI 10/2020; 2/2020; 3/2019 05/2019 ZRG1 BDCN-J (81), chair of section 11/2020 ZRG1 BDCN-J (91) 2/2021 PED2
2017-present	Ad hoc reviewer for the CSRD and BLRD VA study sections
2017-present	Ad hoc reviewer for The French National Research Agency

National service

2020-present	Executive committee, TFOS DEWS III Workshop. Chair of Lifestyle Challenges Committee
2018-present	Cornea section representative, <i>Association for Vision and Research in Ophthalmology</i>
2017-2020	Focal point member, <i>American Academy of Ophthalmology</i>
2017-present	AAO Annual Meeting Program Committee

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- 2017-2018 Cornea sub-specialty day sub-committee, ASCRS
 2015-2017 President, *Ocular Microbiology and Immunology Group*
 2014-2018 Pain and sensation sub-committee member, TFOS DEWS II Workshop
 2013-present Mentor for the annual Heed Ophthalmic Foundation Residents Retreat, Chicago IL
 2013-2021 Continuing medical education committee member, ARVO. The CME committee is advisory in nature and serves to ensure that ARVO's continuing medical education program meets or exceeds the Essential Areas and policies of the ACCME and AMA.
 2013-present Ophthalmic News and Education (ONE) assistant senior editor, cornea, AAO. The ONE network provides a single source of ophthalmic news and education for ophthalmologists around the world. The role of the committee members include: providing breaking news, reports from meetings, journal studies, information on new drugs, technologies and procedures, review of Academy content and advice as to what additional educational materials are needed in each area.
 2013-present Assistant Senior Editor Cornea, ONE network for *American Academy of Ophthalmology*
 2011-present Examiner for the oral board examination; *American Board of Ophthalmology*
 2011-2017 Member of the Self Assessment Committee for the *American Academy of Ophthalmology* responsibilities include writing cornea/external disease to assist ophthalmologists in preparing for the board and Maintenance of Competency (MOC) examinations

Advocacy

- 2022 Participation in NAEVR /AEVR Congressional Briefing. Researching the Impact of Lifestyle on Ocular Surface Disease, Washington DC
 2019 Mid-year forum for the American Academy of Ophthalmology, April 11-12. Washington DC
 2018 Mid-year forum for the American Academy of Ophthalmology, April 18-21. Washington DC
 2017 Dry Eye Research Advocates, sponsored by TFOS, National Alliance for Eye and Vision Research (NAEVR)/Alliance for Eye and Vision Research (AEVR), Washington DC
 2016 Mid-year forum for the American Academy of Ophthalmology, Washington DC

VI. TEACHING

27. **Teaching Awards Received:** Professor of the Year, 2010
 28. **Teaching Specialization**

Online education: Ocular pain content development in conjunction with AAO in the form of CME based case problem based learning. Launched on the AAO website October 2016.

Clinical Supervision and Teaching

- 2009-present Participate in cataract skills transfer course bi-yearly, Bascom Palmer Eye Institute.
 2009-present Staffing residents in OR and clinics at the Veterans Administration hospital, Miami
 1 day per week outpatient clinic, 1 day per week in operating room.
 2009-present Weekly cornea/uveitis lecture for first and second year residents on VA rotation, Mondays 5-6 pm
 2009-present Supervise medical students during their VA ophthalmology rotation and serve as the director of the VA eye clinic medical student rotation, <https://sites.google.com/site/ophthalmologymdr861/home>
 2009-present Teach corneal to the 3rd and 4th year medical students during their ophthalmology rotation at Bascom Palmer Eye Institute, 6 lectures/year

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2009-present Teach 2nd year students during their ophthalmology course, one a year

2009-present Teach residents during the 7 am lecture series/ 3x year

2015-2016 Small group leader for 1st year MD/MPH students

National cataract skills transfer activities

- 15th Annual Harvard Ophthalmology Intensive Cataract Surgical Training Course. May 17-18, 2019. Boston, MA
- 13th Annual Harvard Ophthalmology Intensive Cataract Surgical Training Course. May 20-21, 2017. Boston, MA
- 12th Annual Harvard Ophthalmology Intensive Cataract Surgical Training Course. May 21-22, 2016. Boston, MA

Trainee research supervision (topic; student name; date)

Medical student supervision

1. *Automatic assessment of activated dendritic cells.* Harry Levine, 4/2021-present. In Progress
2. *The impact of gulf war exposures on symptoms and signs of dry eye.* Lauren Elisabeth Truax, 6/2021-present. In Progress
3. *Genetic of ocular pain.* Daniel Rodriguez, 3/2021-present. In Progress
4. *Autologous serum tears for the treatment of dry eye.* Jordan Taylor Mandell, 6/2021-present. In Progress
5. *The role of the innate immune system in diseases of the anterior segment.* Jordan Taylor Mandell, 2/2021-present. Favorable review, Survey of Ophthalmology
6. *OCT and serum inflammatory markers as biomarkers of GWI.* Shah, Ankit Mitesh Shah and Yonghoon Lee. 5/2021-present. In Progress
7. *The impact of proparacaine on ocular pain: an fMRI study.* 7/2021-present. Anjalee Choudhury. In Progress
8. *The impact of FL-41 on ocular pain: an fMRI study.* 1/2022-present. Nicholas Reyes. In Progress
9. *The impact of tinted lenses on photosensitivity in individuals with TBI.* Rhiya Mittal. In Progress
10. *Smases and their relation to SPL in MGD.* Victor Sanchez, 6/2021-present. Submitted to Ocular Surface
11. *Gut microbiome dysbiosis in immune mediated dry eye,* Courtney Goodman, 7/21-present. Submitted to Ocular Surface
12. *Fecal Microbial Transplant in Individuals With Immune-Mediated Dry Eye,* Arjun Watane, 7/19-2022. Published in AJO
13. *Differential Effects of Treatment Strategies in Individuals With Chronic Ocular Surface Pain With a Neuropathic Component.* Sneh Patel, 5/21-2022. Published in Frontiers of Pharmacology.
14. *OCT as a biomarker for Gulf War Illness.* Brandon Baksh, 6/19-2021. Published in Scientific Reports 2021.
15. *Diabetes and functional slit lamp biomicroscopy.* Jodi Hwang. 10/2018-2021 Published in Cornea 2021.
16. *Transcutaneous Electrical Nerve Stimulation for the Long-Term Treatment of Ocular Pain.* Kristen Zayan. 8/2018-2020. Published in Neuromodulation 2020.
17. *Quantitative sensory testing in photophobia.* Daniel Rodriguez. 12/2018-2021. Published in J Pain 2021.
18. *Epidemiology of chalazion.* Sneh Patel. 7/2017-2021. Published in British Journal of Ophthalmology

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- 2021.
19. *Confocal nerve parameters and dry eye.* Harrison Dermer; 7/2017-2021. Published in British Journal of Ophthalmology 2022.
 20. *Real world experience with TENS for ocular pain.* Divy Mehra. 7/2018- 2021. Published in Neuromodulation 2021.
 21. *Coping mechanisms in dry eye.* Sneh Bhupendraku Patel. 9/2018-8/2019. Published in Clinical J of Medicine.
 22. *Early markers of Sjögrens in dry eye.* Sasha Hubschman. 8/2018-11/2019. Published Cornea
 23. *Epidemiology of OSSN in veterans.* Logan M Smith. 7/2017-8/2018. Published Eye and Vision
 24. *TrueTear for the treatment of dry eye.* Monika Farhangi. 6/2018-9/1019. Published BJO
 25. *IgE levels in the tears of dry eye patients.* Harrison Dermer; 03/2017-8/2019; Published in Journal of Clinical Medicine.
 26. *Pregabalin for the prevention of dry eye symptoms after LASIK.* Michael Venincasa and Stephen E Valido. 5/2017-8/2019; Published in Journal of Clinical Medicine
 27. *Ocular pain in those using glaucoma drops.* Hua Hong-Uyen Thanh and James Parrish. 6/2015-9/2019; Published in Journal of Clinical Medicine
 28. *Meibum lipid composition and dry eye.* Vikram Paranjpe, 6/2016-1/2019; Published Ocular Surface
 29. *Quality of life in patients undergoing treatment for OSSN.* James Wong; Carolina Mercado; 12/2013-7/2018. Published, Ocular Surface.
 30. *Seasons and dry eye.* Harrison Dermer; 1/2017-12/2018. Published Clinical Ophthalmology.
 31. *Dry eye symptoms after cataract surgery.* Ravin Sajnani, 7/2017-7/2018. Published Cornea.
 32. *A comparative study of central corneal epithelial, stromal and total thickness in primary open angle glaucoma patients and non-glaucoma patients.* Cima P Maliakal, 7/2016-1/2018; Published, Cornea
 33. *Atopic Disease Associated With Poorer Prognosis In Ocular Surface Squamous Neoplasia,* Lilly Zhang, 7/2016-1/2018; Published Ocul Immunol Inflamm.
 34. *Botulinum toxin for the treatment of photophobia.* Ryan Diel and Zachary Kroeger, 7/2016-1/2018; Published Ophthalmology
 35. *Central sensitization: A link between traumatic brain injury and dry eye.* Charity Lee; 6/2015-1/2018; Published BJO.
 36. *Dry eye symptoms in OEF/OIF clinics.* Vikram Paranjpe. 6/2015-1/2018
 37. *Blue nevus of the ocular surface,* James Wong; Carolina Mercado, Ibrahim Osama, 11/2013- 1/2018. Published Ophthalmology.
 38. *Risk factors for dry eye discordance.* Erin Ong; 7/16-1/2017; Published BJO
 39. *Longitudinal Examination of Frequency of and Risk Factors for Severe Dry Eye Symptoms in US Veterans.* Erin Ong; 7/2016-1/2017; Published in JAMA Ophthalmology.
 40. *The Association of Dry Eye Symptom Severity and Comorbid Insomnia in US Veterans.* Benjamin Ethan Seiden; Published in Eye and Contact Lens.
 41. *Immunosuppression as a Possible Risk Factor for Interferon Nonresponse in Ocular Surface Squamous Neoplasia.* Noy Ashkenazy, noyashkenazy@gmail.com; Published in Cornea.
 42. *Dry eye cases.* Nisreen Ezuddin 06/2015-1/2017. Published in Ocular Surface Disease (Book Chapter)
 43. *Chronic dry eye symptoms after LASIK: parallels and lessons to be learned from other persistent post-operative pain disorders.* Alexandra Levitt, MS II; 7/2013-9/2015. Published in Molecular Pain
 44. *Ocular surface symptoms and quality of life in patients using glaucoma drops.* Noy Ashkenazi; 12/2013-2015. Published in Eye and contact lens.
 45. *Impact of Eyelid Laxity on Symptoms and Signs of Dry Eye Disease.* Priyanka Chhadva; 03/2015-2/2016. Published in Cornea
 46. *The Matrix Metalloproteinase 9 Point-of-Care Test in Dry Eye and Dry Eye Profiles in Patients with a Positive Elevated Surface Matrix Metalloproteinase 9 Point-of-Care Test Versus Negative Patients.* Nicole Lanza 03/15-2/2016. Published in Ocular Surface.

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47. *The Impact of Conjunctivochalasis on Dry Eye Symptoms and Signs*, Priyanka Chhadva; 03/15-12/2015. Published in IOVS
48. *Human papillomavirus in ocular surface squamous carcinoma does not predict response to interferon treatment*. Nisha Garg; 02/2015-2015. Published in Ophthalmology
49. *Tear serotonin levels in dry eye syndrome*. Priyanka Chhadva; 12/2013-12/2015. Published in Ophthalmology
50. *Epidemiology of anterior segment inflammation in patients with autoimmune disease*. Alexandra Levitt, MS II; 7/2013-3/2015. Published in Cornea
51. *Seasonality and dry eye*. Nicole Lanza. 10/2014-3/2015, Published in Ophthalmology
52. *Cyclosporine ophthalmic emulsions for the treatment of dry eye - a review of the clinical evidence*. Philip Ames; 10/2014-2/2015. Published in Future Science
53. *Pseudopemphigoid as caused by topical drugs and pemphigus disease*. Laura Huang; Published World J Ophthalmol.
54. *Management of conjunctival malignant melanoma: a review and update*. James Wong; 8/2014-12/2014. Published in Expert Rev Ophthalmol
55. *Ocular pain in dry eye syndrome*. Leonid Zlotcavitch; 12/2013-12/2014. Published in BJO
56. *Dry eye associated morbidity from glaucoma medications*. Ananth Sastry; 7/2013-12/2014. Published in Eye and Contact Lens.
57. *Prevalence, risk factors, and morbidities of eye lid laxity in a veteran population* Zubair Ansari; 7/2013-12/2014. Published in Cornea.
58. *Androgen Deficiency and Dry Eye Syndrome in the Aging Male* Patrick Azcarate; 7/2013-12/2014. Published in IOVS.
59. *Ocular surface symptoms in veterans returning from Operation Iraqi Freedom and Operation Enduring Freedom*. Leonid Zlotcavitch; 8/2013-12/2013. Published in IOVS.
60. *Current Thoughts in Fungal Keratitis: Diagnosis and Treatment*. Zubair Ansari; 12/2012-7/2013. Published in Curr Fungal Infect Rep.
61. *OCT can be useful in diagnosis of conjunctival lymphangiectasis*. Sawlar Vu; 12/2012-07/2013. Published in Ocular Surface News.
62. *Outcomes after combined cataract and glaucoma surgery*, Ananth Sastry; 8/2011-7/2013. Published in J Glaucoma.
63. *Calculation Methods and Intraoperative Wavefront in Eyes That Have Undergone Refractive Surgery*. Priyanka Chhadva; 1/2012-8/2013. Published in J Refract Surg.
64. *Composite score formulation in dry eye syndrome*; Craig See; 8/2011-8/2013. Published in IOVS.
65. *Comparison of outcomes between interferon and surgery in the treatment of OSSN*; Julia Sein.; 6/2011-7/2013. Published in Ophthalmology.
66. *Anterior chamber Angiostrongyliasis*, Ashley Crane, MS IV; 2/2012-1/2013. Published in JAMA Ophthalmology.
67. *C-reactive protein and dry eye syndrome*, Ashley Crane; 7/2012-1/2013. Published in Ophthalmology.
68. *Long-term effects of cataract surgery on tear film parameters*, Vincent D Venincasa; 7/2012-12/2012. Published in Scientific World Journal.
69. *The diagnostic utility of anterior chamber paracentesis in anterior uveitis*, Zane Anwar; 7/2012-12/2012. Published in Am J Ophthalmol.
70. *Ocular surface disease in glaucoma*, Zane Anwar; 7/2012-12/2012. Published in Curr Opin Ophthalmol.
71. *Comparison of Pentacam and IOL Master for preoperative planning in patients undergoing a toric IOL*, Benjamin Lemelman; 10/2010-6/2012. Published in J Refract Surg.
72. *Refractive Outcomes of Combined Cataract and Glaucoma Surgery*. Christopher Shah; 8/2011-6/2012. Published in J Glaucoma.
73. *Incidence of YAG capsulotomy in a resident-teaching institution*; Evan Dunn; 6/2011-6/2012.

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Published in World Journal of Ophthalmology

74. *Endothelial Graft Failure after Contralateral Autologous Corneal Transplantation*, Jaime Martinez; 8/2011-12/2011 Published in Cornea.
75. *Ocular surface symptoms in veteran patients*, Eduardo Viteri; 8/2010-6/2011. Published in Am J Ophthalmol.
76. *Morbidity of ocular surface symptoms in a veteran population*; Ehsan Mozayan; 6/2010-7/2010. Published in Am J Ophthalmol.

Resident supervision

1. *What is diabetic dry eye?* Lily Zhang; 07/2021-present. In Progress
2. *Clinical outcomes of conjunctival melanoma*, Eric Hansen, Carolina Mercado, Nandini Venkateswaran, Basil Williams; 07/13-present. In Progress
3. *Conjunctival keratoacanthoma*. Nandini Venkateswaran, 7/17-present. In Progress.
4. *OSSN vs metaplasia: clinical and OCT comparisons*. 7/2020-2022. Shanlee Stevens and Daniela Reyes-Capo. Published in Clin Ophthalmol.
5. *Contractile anterior segment membranes as a cause of DSAEK failure*. Nathan Pirakitikulr, 7/18-2021. Published in AJO.
6. *Ocular sarcoidosis*, Kenneth Fan and Diana Laura, 7/17-2020. Published in Clin Ophthalmol.
7. *Pain sensitivity and autonomic function as predictors of dry eye symptoms after LASIK*. Alexandra Levitt. 06/2019-2021. Published in Ocular Surface.
8. *Amyloid versus lymphoma: An OCT study*. Nandini Venkateswaran, 7/17-8/19. Published Eye and Vision.
9. *Clinical versus OCT exams for ocular surface squamous neoplasia*. Nandini Venkateswaran and Van Anne Tran, 7/17-8/19. Published Eye and Vision.
10. *5FU versus interferon for the treatment of ocular surface squamous neoplasia*. Nandini Venkateswaran, 7/16-12/2018. Published, AJO.
11. *Genetics of conjunctival melanomas*, Swarup Swamanathan, 07/16-1/2018. Published in JAMA.
12. *Orbital ocular surface squamous neoplasia*; Benjamin Erickson; 07/13-1/2018.
13. *Utility of high resolution OCT in management of ocular surface lesions*. Michael Yim; 10/14-1/2018. Published Canadian Journal of Ophthalmology.
14. *Evidence of central sensitisation in those with dry eye symptoms and neuropathic-like ocular pain complaints: incomplete response to topical anaesthesia and generalised heightened sensitivity to evoked pain*. Ashley Crane, 1/2016. Published in British Journal of Ophthalmology.
15. *Assessment of Somatosensory Function in Patients With Idiopathic Dry Eye Symptoms*. Derek Covington (Anesthesia Resident, 07/2015-12/2016); Published in JAMA Ophthalmology.
16. *High-Resolution Optical Coherence Tomography in the Differentiation of Inflammatory Versus Noninflammatory Peripheral Corneal Thinning*, Marianeli Rodriguez; 07/2016-12/2016. Published in Cornea
17. *Patients with more severe symptoms of neuropathic ocular pain report more frequent and severe chronic overlapping pain conditions and psychiatric disease..* Ashley Crane; 11/2015-12/2016. Published in British Journal of Ophthalmology.
18. *Ocular surface symptoms and quality of life in patients using glaucoma drops*. Jack Stringham; 12/2013-2/2016. Published in Eye and Contact Lens.
19. *Lid hygiene for the treatment of dry eye: who responds?* Andrew Camp; 10/2014-3/2016. Published in Eye and Contact Lens.
20. *ω -3 Tear Film Lipids Correlate With Clinical Measures of Dry Eye*. Scott Walters; 7/2013-5/2016. Published in IOVS
21. *Epidemiology of Herpes Zoster Ophthalmicus: Recurrence and Chronicity*. Kimberly Tran; 10/2014-5/2016. Published in Ophthalmology.

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22. *Neuropathic ocular pain due to dry eye is associated with chronic comorbid pain syndromes.* Derek Covington (anesthesia resident) 10/2014-2/2016. Published in Journal of Pain
23. *Autologous serum tears for the treatment of filamentary keratopathy.* Sarah Read; 07/2014-12/2015. Published Eye contact lens.
24. *Burning Eye Syndrome: Do neuropathic pain mechanisms underlie chronic dry eye?* Jerry Kalangara (anesthesia resident); 12/2013-12/2014. Published Pain medicine
25. *Prevalence and risk factors of dry eye in patients using glaucoma medications;* Scott Walters; 07/2013-12/2014. Presented at ASCRS 2014.
26. *Quality of life disparities in veterans using glaucoma drops,* Jonathan Tzu; 8/2012-12/2014. Published to Eye and Contact Lens.
27. *Treatment of ocular exposure in ICU patients;* Neda Nikpoor. 07/2013-05/2014. Presented at Residents day 2014.
28. *Superficial Keratectomy, Cautery, Amniotic Membrane transplant for the Treatment of Painful Bullous Keratopathy in Eyes with Poor Visual Potential,* Hassan Aziz; 05/1202-12/2013. Published in Cornea.
29. *Ocular surface symptoms in veterans returning from Operation Iraqi Freedom and Operation Enduring Freedom;* Yasha Modi; 07/2013-12/2013. Published in IOVS
30. *Ultra high-resolution anterior segment optical coherence tomography in the diagnosis and management of ocular surface squamous neoplasia.,* Benjamin Thomas; 2/2012-12/2013. Published in Ocular Surface.
31. *Epidemiology of Ocular Surface Squamous Neoplasia in a Veterans Affairs Population.* Andrew McClellan; 7/2012-8/2013. Published in Cornea.
32. *Outcomes after combined cataract and glaucoma surgery,* Jonathan Tzu; 8/2011-8/2013. Published in J Glaucoma.
33. *An Atypical Allergy to Brimonidine.* Yasha Modi; 11/2012-3/2013. Published in J Glaucoma.
34. *Comparison of Pentacam and IOL Master for preoperative planning in patients undergoing a toric IOL,* Bradford Lee; 10/2010-12/2012. Published in J Refract Surg.
35. *Outcomes after flap lift for epithelial ingrowth,* Christopher Henry; 9/2011-6/2012. Published in J Refract Surg.

Fellow research supervision

1. *Epidemiology of persistent pain after refractive surgery.* Jason Betz, 6/2021-present. In Progress.
2. *Lifitegrast vs cyclosporine for the treatment of dry eye,* Elyana Locatelli, 5/2021-present. In Progress.
3. *Randomized study of TNS for ocular pain,* Simran Mangwani, 10/2021-present. In Progress.
4. *Gulf War, Inflammatory markers, and Dry eye.* Arianna Alicia Tovar Vetencourt, 10/2021-present. In Progress.
5. *Perioperative mapping of OSSN.* Kavitha Sivaraman. 10/2014-9/18. Published in AJO.
6. *Optical coherence tomography angiography in the evaluation of vascular patterns of ocular surface squamous neoplasia during topical medical treatment.* Despoina Theotoka, 10/2016-2022. Published in Ocular Surface.
7. *SEM for direct quantification of ocular surface exposure to air pollution.* 10/2017-4/2019 Published Cornea.
8. *Ocular pain characteristics in patients presenting to a comprehensive clinic.* Victoria Chang, 06/2015-1/2018. Published Eye and Contact lens.
9. *Confocal microscopy and anti-VEGF injections,* Hatim Batawi; 10/14-present. Published, Cornea.
10. *Conjunctival amyloidosis.* Lena Dixit, 6/2015-12/2017. Presented ARVO.
11. *Genetics of OSSN,* Afshan Nanji, Madhura Joag; 7/2013-1/2016. Published in Ophthalmology
12. *Characteristics of Ocular Pain Complaints in Patients With Idiopathic Dry Eye Symptoms.* Jerry Kalangera (Anesthesia Resident). 1/2015-2/2016. Published in Eye and Contact Lens.
13. *Cataract Surgery After Refractive Surgery.* Ravi Patel (Cornea Fellow 2015-16). Published in

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International Ophthalmology Clinics.

14. *Frequency and risk factors associated with dry eye in patients attending a tertiary care ophthalmology center in Mexico City.* Jaime Martinez 7/2015-10/2016. Published in Clinical Ophthalmology.
15. *Bulbar conjunctival microvascular responses in dry eye.* Hatim Batawi; 07/2015-1/2017. Published in Ocular Surface.
16. *Compliance and Subjective Patient Responses to Eyelid Hygiene.* 8/2015- 5/2016. Yousef Alghamdi, Published in Eye and Contact Lens
17. *Epidemiology of MGD in a veteran population.* 8/2012- 2/2016. Yousef Alghamdi, Published in Cornea
18. *5FU for the treatment of OSSN,* Madhura Joag and Adam Sise, 07/2013- 02/2016. Published in Ophthalmology
19. *Corneal and Intraocular Invasion of Ocular Surface Squamous Neoplasia After Intraocular Surgery. Report of two cases and review of the literature.* Juan Carlos Murillo, 07/2013- 4/2016. Published in Ocular Oncology and Pathology
20. *Cost of medical versus surgical treatment of ocular surface squamous neoplasia.* Christina Moon, 7/2012- 2015. Published in Ophthalmology.
21. *Human papillomavirus in ocular surface squamous carcinoma does not predict response to interferon treatment,* Afshan Nanji and Madhura Joag, 7/2013-2015. Published in Ophthalmology
22. *RTvue in the evaluation of conjunctival lesions.* Fouad El Sayyad and Afshan Nanji, 7/2012- 12/2014. Published in Ocular Surface.
23. *Delayed expulsive choroidal hemorrhage after penetrating keratoplasty.* Madhura Joag, 07/2013- 12/2014. Published in Ophthalmic Surg Lasers Imaging Retina
24. *ORange intraoperative aberrometer for post refractive patients,* Ana Canto, 12/11-7/13. Published in J Refract Surg.
25. *Outcomes after flap lift for epithelial ingrowth,* Christopher Henry and Ana Canto, clinical fellow; 9/2011-6/2012. Published in J Refract Surg.
26. *Medical versus surgical management of ocular surface squamous neoplasia.* Afshan Nanji, 12/2011- 6/2012; Published in Ophthalmology.
27. *Ranibizumab for the treatment of early pterygium recurrence,* Pravin Vaddavalli and Volkan Hurmeric, 8/2009-6/2012. Published in Clinical Ophthalmology.
28. *Surgical and refractive outcomes in resident-performed cataract surgery utilizing toric intraocular lenses;* Bozorgmehr Pouyeh; 6/2010-6/2011. Published in Am J Ophthalmol.
29. *Clinicopathologic Correlation of Ocular Surface Squamous Neoplasms at Bascom Palmer Eye Institute: 2001 - 2010,* Andrew Kao; 10/2010-6/2011. Published in Ophthalmology.
30. *Infectious Scleritis;* Kelly Hodson, pre-residency fellow; 8/2010-6/2011 Published in Cornea.

Faculty mentorship

1. *TBI and photophobia.* Mariela Aguilar, PHD; 8/19-present: Published in Cornea.
2. *Management strategies for ocular pain.* Leslie Small, OD; 7/17-8/19: Published in Eye and Contact Lens.
3. *Defining the ocular microbiome in children and adults;* Kara Cavuoto; 7/16-present; In Progress. Mentor on her K23 application.

Supervision of Grand rounds presentations:

1. Ophthalmology grand rounds discussant “*Diablito does not wear Prada*” presenter Shanlee Stevens, MD September 10, 2020. (OSSN in atopy)
2. Ophthalmology grand rounds discussant “*Reading between the lines*” presenter Caroline Lieux, MD August 20, 2020. (Recurrent erosion syndrome in lattice corneal dystrophy)
3. Ophthalmology grand rounds discussant “*Suffering from Success.*” presenter Wade Reddick, MD December 19, 2019. (GVHD)

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4. Ophthalmology grand rounds discussant “*Cardi A.*” presenter Benjamin Fowler, MD September 19, 2019. (Nocardia keratitis)
5. Ophthalmology grand rounds discussant “*Here comes the sun*” presenter Humberto Salazar, MD September 5, 2019. (ASOCT imaging for OSSN)
6. Ophthalmology grand rounds discussant “*Bad Blood*” presenter Anne Kunkler, MD August 22, 2019. (HLA27 anterior uveitis)
7. Ophthalmology grand rounds discussant “*Looking at your viral eyes*” presenter Diana Laura, MD August 15, 2019. (Adenovirus conjunctivitis)
8. Ophthalmology grand rounds discussant “*So Basic*” presenter Patrick Staropoli, MD August 15, 2019. (Chemical injury)
9. Ophthalmology grand rounds discussant “*The way you make me feel*” presenter Michelle Latting, MD August 1, 2019. (Neurotrophic keratitis treated with topical NGF)
10. Ophthalmology grand rounds discussant “*Surfer’s Eye*” presenter Ying Chen, MD June 6, 2019. (Pterygium)
11. Ophthalmology grand rounds discussant “*Roid Rage*” presenter Alex Levitt, MD March 14, 2019. (Corneal keloid)
12. Ophthalmology grand rounds discussant “*The Pain Killers*” presenter Eric Duerr, MD October 18, 2018. (Management of neuropathic ocular pain)
13. Ophthalmology grand rounds discussant “*Healing with feeling*” presenter Nathan Pirakitikulr, MD Sept 20, 2018. (Management of neurotrophic keratitis)
14. Ophthalmology grand rounds discussant “*Getting rejected*” presenter Kenneth Fan, MD June 7, 2018. (Management of allograft rejection in corneal transplant)
15. Ophthalmology grand rounds discussant “*Lumps and Bumps*” presenter Ying Chen, MD February 22, 2018. (Corneal lesions in NF1)
16. Ophthalmology grand rounds discussant “*Eye want to be one less*” presenter Diana Laura, MD January 18, 2018. (Conjunctival papilloma)
17. Ophthalmology grand rounds discussant “*Neither corny nor funny*” presenter Kenny Fan, MD October 12, 2017. (Fungal keratitis)
18. Ophthalmology grand rounds discussant “*Pro VI*” presenter Eric Deurr, MD August 31, 2017. (VZO)
19. Ophthalmology grand rounds discussant “*All that glitters is not gold*” presenter Jonathan Russell, MD August 3, 2017. (Synchysis scintillans)
20. Ophthalmology grand rounds discussant “*Here comes the sun*” presenter Nicolas Yannuzzi, MD July 27, 2017. (Porphyria)
21. Ophthalmology grand rounds discussant “*The price of beauty*” presenter Dan Choi, MD February 2, 2017. (Cosmetic conjunctival surgery)
22. Ophthalmology grand rounds discussant “*Muffin top*” presenter Nicolas Yannuzzi, MD February 11, 2016. (Conjunctival chalasis)
23. Ophthalmology grand rounds discussant “*Out of Place*” presenter Nimish Patel, MD January 14, 2016. (Atopic conjunctivitis)
24. Ophthalmology grand rounds discussant “*Let’s give it a shot*” presenter Dan Choi, MD November 5, 2015.
25. Ophthalmology grand rounds discussant “*Blinded by the light*” presenter Eric Hansen, MD October 29, 2015. (Photophobia)
26. Ophthalmology grand rounds discussant “*Restoring balance*” presenter Nikisha Kotari, MD August 13, 2015. (Amantadine toxicity)
27. Ophthalmology grand rounds discussant “*Peripheral mysteries*” presenter Marianeli Rodriguez, MD January 8, 2015. (Peripheral keratitis)
28. Ophthalmology grand rounds discussant “*Pumped up tricks by zoster the people*” presenter Daniel Choi, MD November 6, 2014. (VZO)

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29. Ophthalmology grand rounds discussant "*Its not a tumor*" presenter Andrew Camp, MD September 25, 2014. (Pterygium)
30. Ophthalmology grand rounds discussant "*Musical Chairs*" presenter Ashley Crane, MD August 21, 2014. (Corneal cautery and AMT for the treatment of painful bullous keratopathy)
31. Ophthalmology grand rounds discussant "*Stinkeye*" presenter Andrew McClellan, MD July 24, 2014.
32. Ophthalmology grand rounds discussant "*Tip of the iceberg*" presenter Daniel Churgin, MD July 17, 2014.
33. Ophthalmology grand rounds discussant "*All that is superficial is not plastics*" presenter Hassan Aziz, MD April 17, 2014. (Cautery/AMT as treatment for painful bullous keratopathy)
34. Ophthalmology grand rounds discussant "*Growing, growing, gone?* " presenter Korey Jaben, MD March 20, 2014
35. Ophthalmology grand rounds discussant "*To Creep or Not to Creep* " presenter Basil Williams, MD October 31, 2013 (HSV keratitis)
36. Ophthalmology grand rounds discussant "*If at first you don't succeed dry dry again* " presenter Sarah Read, MD August 29, 2013 (Filamentary conjunctivitis)
37. Ophthalmology grand rounds discussant "*Moody Moles* " presenter Andrew McClellan, MD August 1, 2013 (Blue nevus of the conjunctiva)
38. Ophthalmology grand rounds discussant "*Two birds with one stone* " presenter Korey Jaben, MD January 24, 2013 (corneal dystrophy)
39. Ophthalmology grand rounds discussant "*A bird in hand* " presenter Ryan Young, MD December 6, 2012 (Candida endophthalmitis)
40. Ophthalmology grand rounds discussant "*I'm too steep* " presenter Audrey Ko, MD September 13, 2012 (Managing astigmatism after corneal transplant)
41. Ophthalmology grand rounds discussant "*What a blast* " presenter: Sara Grace, MD August 30, 2012
42. Ophthalmology grand rounds discussant "*What would Ben Stein say* " presenter: Yasha Modi, MD May 31, 2012 (glaucoma medication associated ocular surface disease)
43. Ophthalmology grand rounds discussant "*That's what she said...* " presenter: Daniel Chao, MD May 16, 2012
44. Ophthalmology grand rounds discussant "*Chopsticks: A cautionary tale* " presenter: Christopher Henry, MD March 15, 2012 (Trauma after LASIK)
45. Ophthalmology grand rounds discussant "*Another Tequila Sunrise* " presenter: Matthew Weiss, MD July 28, 2011
46. Ophthalmology grand rounds discussant "*Epic Failure* " presenter: Ashkan Abbey, MD June 2, 2011 (Autologous corneal transplantation)
47. Ophthalmology grand rounds discussant "*Give me a word, any word, and I show you that the root of that word is Greek* " presenter: Anil Vedula, MD January 13, 2011
48. Ophthalmology grand rounds discussant "*The case of the unblanched soldier*" presenter: Marco Gonzalez, MD August 12, 2010
49. Ophthalmology grand rounds discussant "*Don't forget to smell the roses*" presenter: David Samimi, MD January 28, 2010 (Rosacea)
50. Ophthalmology grand rounds discussant "*It's all in the jeans*" presenter: David Weiss, MD December 3, 2009 (HLA-B27)
51. Ophthalmology grand rounds discussant "*Connecting the dots*" presenter: Kara Cavouto, MD December 3, 2009 (Rosai Dorfman)
52. Ophthalmology grand rounds discussant "*Are you inquisita about bullosa acquisita?*" presenter: Lejla Mutapcic, MD January 15, 2009 (cicatrizing conjunctivitis)

Supervision of Resident Day Projects:

2017 Resident's day: Nandini VenkateswaranMD, 5-FU versus Interferon for the treatment of primary

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- ocular surface squamous neoplasia
- 2016 Resident's day: Ashley M. Crane, MD, Patients with more Severe Symptoms of Neuropathic Ocular Pain Report more Frequent and Severe Chronic Overlapping Pain Conditions and Psychiatric Disease
- 2016 Resident's day: Zubair A. Ansari, MD; Bulbar Conjunctival Microvascular Responses in Dry Eye
- 2016 Resident's day: Victoria S. Chang, MD, Dry Eye Symptoms Correlates with Non- Ocular Conditions
- 2015 Resident's day: Jack Stringham, MD, Dry eye symptoms and quality of life in patients using glaucoma drops.
- 2015 Resident's day: Scott Walter, MD, Lipid mediators and dry eye.
- 2015 Resident's day: Michael Yim, MD, Utility of UHR-OCT in the management of ocular surface lesions
- 2015 Resident's day: Kimberley Tran, MD, The epidemiology of HZO in the veteran population
- 2015 Resident's day: Andrew Camp, MD, Lid hygiene for dry eye: Who gets better?
- 2015 Resident's day: Sotiria Palioura, MD, HPV in OSSN
- 2014 Resident's day: Eric Hansen, MD, Conjunctival melanoma.
- 2014 Resident's day: Neda Nikpoor, MD, Ophthalmology practice patterns of ICU nurses.
- 2013 Resident's day: Andrew McClellan, MD, The epidemiology of ocular surface squamous neoplasia in a Veterans Affairs population.
- 2013 Resident's day: Cristina Moon, MD, Medical versus surgical management of ocular surface squamous neoplasia: comparison of cost.
- 2013 Resident's day: Afshan Nanji, MD, Medical versus surgical management of ocular surface squamous neoplasia: comparison of efficacy and side effects.
- 2012 Resident's day: Benjamin Thomas, MD, Ultrahigh resolution Optical Coherence Tomography for the evaluation of complex ocular surface lesions.
- 2011 Resident's day: Bradford Lee, MD, Agreement Between Pentacam and IOLMaster in Patients Undergoing Toric Intraocular Lens Implantation.
- 2011 Resident's day: Andrew Kao, MD, Clinicopathologic Correlation of Ocular Surface Squamous Neoplasms at Bascom Palmer Eye Institute: 2001 - 2010
- 2010 Resident's day: Jane Fishler, MD, Subconjunctival ranibizumab for recurrent pterygium.
- 2010 Resident's day: Natalie Stanciu, MD, Ultra-High Resolution Optical Coherence Tomography for Differentiation of Ocular Surface Squamous Neoplasia and Pterygia.

28. Thesis and Dissertation Supervision

- 2016 MSPH thesis: Hatim Batawi, MD, Evaluation of central corneal epithelial, stromal and total thickness in primary open angle glaucoma patients and non-glaucoma patients
- 2016 MPH capstone: Yousef Alghamdi MD, Compliance and Subjective Patient Responses to Eyelid Hygiene.
- 2015 MSPH thesis: Nabeel Shalabi, MD, Confocal microscopy for the analysis of the sub-basal corneal nerves.

VII. SERVICE

29. University Committee and Administrative Responsibilities:

- | | |
|--------------|---|
| 2014-present | Cornea lecture organizer, Bascom Palmer Eye Institute |
| 2014-present | ESRF Alving Judge |
| 2013-present | Research budget committee, Miami VAMC |
| 2013-present | Research equipment committee, Miami VAMC |
| 2013-present | Corneal co-fellowship director, Bascom Palmer Eye Institute |
| 2009-present | Medical student lecturer, Bascom Palmer Eye Institute |
| 2008-present | Medical student coordinator of ophthalmology rotation at the Miami VAMC |
| 2014-2018 | IRB committee member and sub-chair, Miami VAMC |
| 2014-2015 | Eye surgery infection prevention workforce, Miami VAMC |

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2011-2013 Surgical eye flow committee, Miami VAMC (chair)

30. National service:

Listed above under Professional Service

31. Community Activities:

01/09-06/09 Community based participatory research evaluating environmental concerns in
Liberty City, Miami

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Visual Light Sensitivity Questionnaire-8 (VLSQ-8)

This questionnaire is designed to detect visual sensitivity to light. Please circle one answer for each question. Choose the response that best describes your situation. Answer all of the questions as if you are wearing your regular glasses or contact lenses. Take as much time as needed to answer each question. All your answers are.

1) In the past month, how often did you have visual light sensitivity outdoors during daylight?

Never Rarely Sometimes Often Always

2) In the past month, how often did you have a sense of glare in your eyes?

Never Rarely Sometimes Often Always

3) In the past month, how often did you have visual light sensitivity from flickering lights or bright colors?

Never Rarely Sometimes Often Always

4) Please rate the severity of the worst visual light sensitivity you experienced in the past month.

None Moderate Severe
1 2 3 4 5

5) When you have sensitivity to light, do you also experience headache?

Never Rarely Sometimes Often Always

6) When you have sensitivity to light, how often is your vision blurry?

Never Rarely Sometimes Often Always

7) How often does sensitivity to light limit your ability to read, watch TV, or use the computer?

Never Rarely Sometimes Often Always

8) In the past month, how often did you need to wear dark glasses on cloudy days or indoors?

Never Rarely Sometimes Often Always

DEQ 5

1. Questions about **EYE DISCOMFORT**:

a. During a typical day in the past month, **how often** did your eyes feel discomfort?

- 0 Never
- 1 Rarely
- 2 Sometimes
- 3 Frequently
- 4 Constantly

b. When your eyes felt discomfort, **how intense was this feeling of discomfort** at the end of the day, within two hours of going to bed?

Never <u>have it</u>	Not at All <u>Intense</u>				Very <u>Intense</u>
0	1	2	3	4	5

2. Questions about **EYE DRYNESS**:

a. During a typical day in the past month, **how often** did your eyes feel dry?

- 0 Never
- 1 Rarely
- 2 Sometimes
- 3 Frequently
- 4 Constantly

b. When your eyes felt dry, **how intense was this feeling of dryness** at the end of the day, within two hours of going to bed?

Never <u>have it</u>	Not at All <u>Intense</u>				Very <u>Intense</u>
0	1	2	3	4	5

3. Question about **WATERY EYES**:

During a typical day in the past month, **how often** did your eyes look or feel excessively watery?

- 0 Never
- 1 Rarely
- 2 Sometimes
- 3 Frequently
- 4 Constantly

Score: $1a + 1b + 2a + 2b + 3 = \text{Total}$
 $\underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}$

Ocular Surface Disease Index[®] (OSDI[®])²

Ask your patient the following 12 questions, and circle the number in the box that best represents each answer. Then, fill in boxes A, B, C, D, and E according to the instructions beside each.

HAVE YOU EXPERIENCED ANY OF THE FOLLOWING DURING THE LAST WEEK:

	All of the time	Most of the time	Half of the time	Some of the time	None of the time
1. Eyes that are sensitive to light?	4	3	2	1	0
2. Eyes that feel gritty?	4	3	2	1	0
3. Painful or sore eyes?	4	3	2	1	0
4. Blurred vision?	4	3	2	1	0
5. Poor vision?	4	3	2	1	0

Subtotal score for answers 1 to 5 (A)

HAVE PROBLEMS WITH YOUR EYES LIMITED YOU IN PERFORMING ANY OF THE FOLLOWING DURING THE LAST WEEK:

	All of the time	Most of the time	Half of the time	Some of the time	None of the time	
6. Reading?	4	3	2	1	0	N/A
7. Driving at night?	4	3	2	1	0	N/A
8. Working with a computer or bank machine (ATM)?	4	3	2	1	0	N/A
9. Watching TV?	4	3	2	1	0	N/A

Subtotal score for answers 6 to 9 (B)

HAVE YOUR EYES FELT UNCOMFORTABLE IN ANY OF THE FOLLOWING SITUATIONS DURING THE LAST WEEK:

	All of the time	Most of the time	Half of the time	Some of the time	None of the time	
10. Windy conditions?	4	3	2	1	0	N/A
11. Places or areas with low humidity (very dry)?	4	3	2	1	0	N/A
12. Areas that are air conditioned?	4	3	2	1	0	N/A

Subtotal score for answers 10 to 12 (C)

ADD SUBTOTALS A, B, AND C TO OBTAIN D
(D = SUM OF SCORES FOR ALL QUESTIONS ANSWERED)

(D)

TOTAL NUMBER OF QUESTIONS ANSWERED
(DO NOT INCLUDE QUESTIONS ANSWERED N/A)

(E)

Please turn over the questionnaire to calculate the patient's final OSDI[®] score.

Schiffman RM, Christianson MD, Jacobsen G, Hirsch JD, Reis BL. Reliability and validity of the Ocular Surface Disease Index. Arch Ophthalmol. 2000;118:615-621

NRS of Pain Intensity

Over a period of time, pain often varies in intensity.

Please think about the intensity of your ocular surface / eye pain.

1. How would you describe the overall intensity of your eye pain right now?

No pain 0 sensation imaginable	1	2	3	4	5	6	7	8	9	10	The most intense eye pain sensation
--------------------------------------	---	---	---	---	---	---	---	---	---	----	--

2. How would you describe the overall intensity of your eye pain when it was worst during the past week?

No pain 0 sensation imaginable	1	2	3	4	5	6	7	8	9	10	The most intense eye pain sensation
--------------------------------------	---	---	---	---	---	---	---	---	---	----	--

3. How would you describe the overall intensity of your eye pain on average during the past week?

No pain 0 sensation imaginable	1	2	3	4	5	6	7	8	9	10	The most intense eye pain sensation
--------------------------------------	---	---	---	---	---	---	---	---	---	----	--

Now, please think about the intensity of all other pain you may have (besides your eye).

4. How would you describe the overall intensity of your pain right now?

No pain 0 sensation imaginable	1	2	3	4	5	6	7	8	9	10	The most intense eye pain sensation
--------------------------------------	---	---	---	---	---	---	---	---	---	----	--

5. How would you describe the overall intensity of your pain when it was worst during the past week?

No pain 0 sensation imaginable	1	2	3	4	5	6	7	8	9	10	The most intense eye pain sensation
--------------------------------------	---	---	---	---	---	---	---	---	---	----	--

6. How would you describe the overall intensity of your pain on average during the past week?

No pain 0 sensation imaginable	1	2	3	4	5	6	7	8	9	10	The most intense eye pain sensation
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Neuropathic Pain Symptom Inventory- modified for the Eye

We wish to know if you feel spontaneous eye pain, that is, pain without any stimulation. For each of the following questions, please select the number that best describes your average spontaneous pain severity during the past 24 hours. Select the number 0 if you have not felt such pain (circle one number only).

1. Does your eye pain feeling like burning?

No burning	0	1	2	3	4	5	6	7	8	9	10	Worst burning imaginable
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2. Does your eye pain feel like squeezing?

No squeezing	0	1	2	3	4	5	6	7	8	9	10	Worst squeezing imaginable
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3. Does your eye pain feel like pressure?

No pressure	0	1	2	3	4	5	6	7	8	9	10	Worst pressure imaginable
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4. During the past 24 hours, your spontaneous pain has been present:

(Select the response that *best describes* your case)

Permanently _____

Between 8-12 hours _____

Between 4-7 hours _____

Between 1-3 hours _____

Less than 1 hour _____

We wish to know if you have brief attacks of eye pain. For each of the following questions, please select the number that best describes the average severity of your painful attacks during the past 24 hours. Select the number 0 if you have not felt such pain (circle one number only).

5. Does your eye pain feel like electric shocks?

No electric shocks	0	1	2	3	4	5	6	7	8	9	10	Worst electric shocks imaginable
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6. Does your eye pain feel like stabbing?

No stabbing	0	1	2	3	4	5	6	7	8	9	10	Worst stabbing imaginable
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7. During the past 24 hours, how many of these pain attacks have you had?

(Select the response that *best describes* your case)

More than 20 _____

Between 11-20 _____

Between 6-10 _____

Between 1-5 _____

No pain attack _____

Kalangara JP, Galor A, Levitt RC, Covington DB, McManus KT, Sarantopoulos CD, Felix ER. Characteristics of Ocular Pain Complaints in Patients With Idiopathic Dry Eye Symptoms. Eye Contact Lens. 2017 May;43(3):192-198.

We wish to know if you feel eye pain provoked or increased by wind, light, or contact with cold/hot. For each of the following questions, please select the number that best describes the average severity of your provoked pain during the past 24 hours. Select the number 0 if you have not felt such pain (circle one number only).

8. Is your eye pain provoked or increased by wind?

No pain	0	1	2	3	4	5	6	7	8	9	10	Worst pain imaginable
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9. Is your eye pain provoked or increased by light?

No pain	0	1	2	3	4	5	6	7	8	9	10	Worst pain imaginable
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10. Is your eye pain provoked or increased by contact with something hot or cold (air conditioned/warm weather?)

No pain	0	1	2	3	4	5	6	7	8	9	10	Worst pain imaginable
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We wish to know if you feel abnormal eye sensations. For each of the following questions, please select the number that best describes the average severity of your abnormal sensations during the past 24 hours. Select the number 0 if you have not felt such sensation (circle one number only).

11. Do you feel pins and needles?

No pins & needle	0	1	2	3	4	5	6	7	8	9	10	Worst pins & needle imaginable
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12. Do you feel tingling?

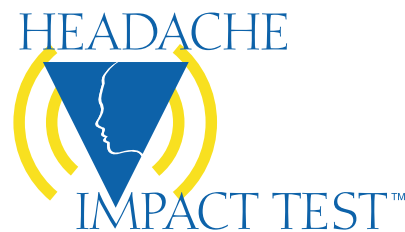
No tingling	0	1	2	3	4	5	6	7	8	9	10	Worst tingling imaginable
-------------	---	---	---	---	---	---	---	---	---	---	----	---------------------------

HIT-6™

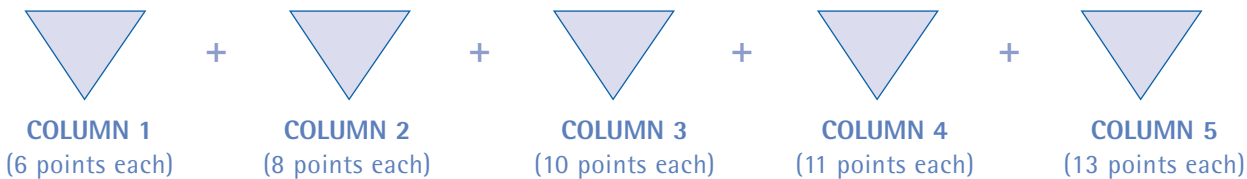
(VERSION 1.1)

This questionnaire was designed to help you describe and communicate the way you feel and what you cannot do because of headaches.

To complete, please circle one answer for each question.



1	When you have headaches, how often is the pain severe?				
	Never	Rarely	Sometimes	Very Often	Always
2	How often do headaches limit your ability to do usual daily activities including household work, work, school, or social activities?				
	Never	Rarely	Sometimes	Very Often	Always
3	When you have a headache, how often do you wish you could lie down?				
	Never	Rarely	Sometimes	Very Often	Always
4	In the past 4 weeks, how often have you felt too tired to do work or daily activities because of your headaches?				
	Never	Rarely	Sometimes	Very Often	Always
5	In the past 4 weeks, how often have you felt fed up or irritated because of your headaches?				
	Never	Rarely	Sometimes	Very Often	Always
6	In the past 4 weeks, how often did headaches limit your ability to concentrate on work or daily activities?				
	Never	Rarely	Sometimes	Very Often	Always



To score, add points for answers in each column.
Please share your HIT-6 results with your doctor.

Total Score

Higher scores indicate greater impact on your life.

Score range is 36-78.



HEADACHE IMPACT TEST™

What Does Your Score Mean?

▼ If You Scored 60 or More

Your headaches are having a very severe impact on your life. You may be experiencing disabling pain and other symptoms that are more severe than those of other headache sufferers. Don't let your headaches stop you from enjoying the important things in your life, like family, work, school or social activities.

Make an appointment **today** to discuss your HIT-6 results and your headaches with your doctor.

▼ If You Scored 56 – 59

Your headaches are having a substantial impact on your life. As a result you may be experiencing severe pain and other symptoms, causing you to miss some time from family, work, school, or social activities.

Make an appointment **today** to discuss your HIT-6 results and your headaches with your doctor.

▼ If You Scored 50 – 55

Your headaches seem to be having some impact on your life. Your headaches should not make you miss time from family, work, school, or social activities.

Make sure you discuss your HIT-6 results and your headaches at your next appointment with your doctor.

▼ If You Scored 49 or Less

Your headaches seem to be having little to no impact on your life at this time. We encourage you to take HIT-6 monthly to continue to track how your headaches affect your life.

▼ If Your Score on HIT-6 is 50 or Higher

You should share the results with your doctor. Headaches that are disrupting your life could be migraine.

Take HIT-6 with you when you visit your doctor because research shows that when doctors understand exactly how badly headaches affect the lives of their patients, they are much more likely to provide a successful treatment program, which may include medication.

HIT is also available on the Internet at www.headachetest.com.

The Internet version allows you to print out a personal report of your results as well as a special detailed version for your doctor.

Don't forget to take HIT-6 again or try the Internet version to continue to monitor your progress.

▼ About HIT

The Headache Impact Test (HIT) is a tool used to measure the impact headaches have on your ability to function on the job, at school, at home and in social situations. Your score shows you the effect that headaches have on normal daily life and your ability to function. HIT was developed by an international team of headache experts from neurology and primary care medicine in collaboration with the psychometricians who developed the SF-36® health assessment tool.

HIT is not intended to offer medical advice regarding medical diagnosis or treatment. You should talk to your healthcare provider for advice specific to your situation.

SF-36® is a registered trademark of Medical Outcomes Trust and John E. Ware, Jr.

HIT-6 Scoring Interpretation English Version 1.1

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Pain History Questionnaire

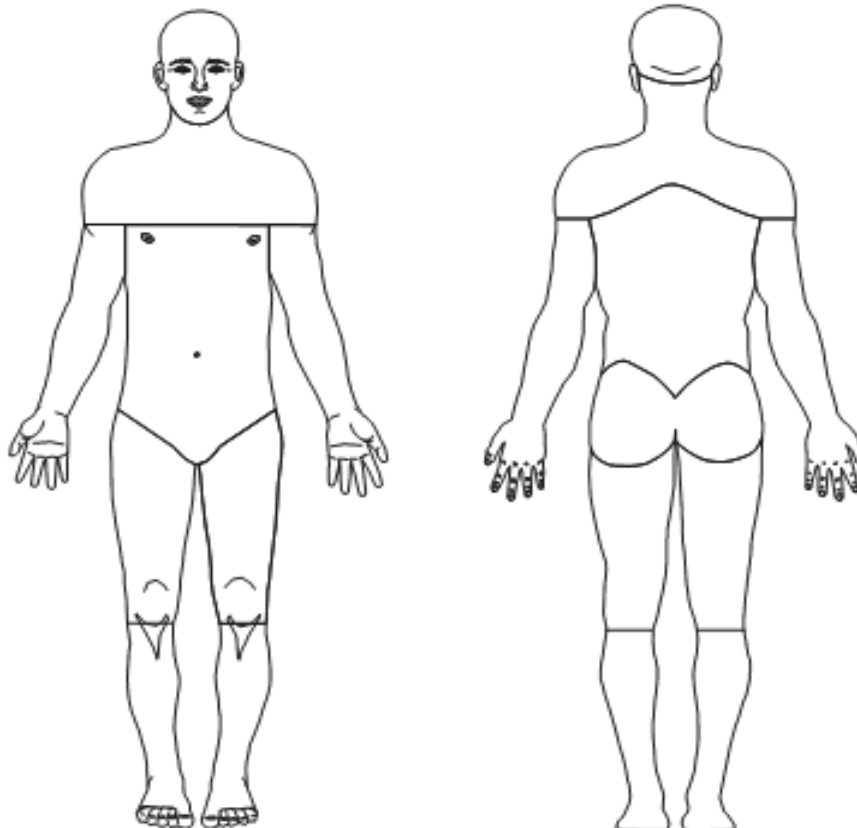
A. Do you currently experience persistent pain that has been present for the last 3 months or more?

yes

no

IF NO - STOP

B. Please draw on the pictures below to tell us where you have persistent pain.



C. How many different pain problems do you have?

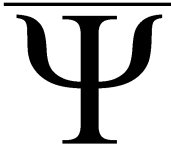
- 1
- 2
- 3
- 4
- 5 or more

Please tell us which of the follow chronic pain conditions you currently have, or have had in the past. Please only tell us about the pain conditions that persisted for AT LEAST 3 months. If you have not had this condition for more than 3 months, please leave the boxes blank.

Condition	Ever	Now
Burning mouth syndrome		
Headaches		
Migraines		
Temporomandibular disorder		
Trigeminal neuralgia pain		
Arthritis		
Low back pain		
Burn pain		
Cancer pain		
Central pain syndrome		
Complex regional pain syndrome / causalgia		

Condition	Ever	Now
Diabetic neuropathy pain		
Fibromyalgia		
Muscle pain		
Sciatica		
Shingles		
Post-surgical pain		
Tendonitis		
Vulvodynia		
Chronic fatigue		
Irritable bowel		
Interstitial cystitis		

Others: _____



PCS-EN

Client No.: _____ Age: _____ Sex: M() F() Date: _____

Everyone experiences painful situations at some point in their lives. Such experiences may include headaches, tooth pain, joint or muscle pain. People are often exposed to situations that may cause pain such as illness, injury, dental procedures or surgery.

We are interested in the types of thoughts and feelings that you have when you are in pain. Listed below are thirteen statements describing different thoughts and feelings that may be associated with pain. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.

0 – not at all **1** – to a slight degree **2** – to a moderate degree **3** – to a great degree **4** – all the time

When I'm in pain ...

- 1 I worry all the time about whether the pain will end.
- 2 I feel I can't go on.
- 3 It's terrible and I think it's never going to get any better.
- 4 It's awful and I feel that it overwhelms me.
- 5 I feel I can't stand it anymore.
- 6 I become afraid that the pain will get worse.
- 7 I keep thinking of other painful events.
- 8 I anxiously want the pain to go away.
- 9 I can't seem to keep it out of my mind.
- 10 I keep thinking about how much it hurts.
- 11 I keep thinking about how badly I want the pain to stop.
- 12 There's nothing I can do to reduce the intensity of the pain.
- 13 I wonder whether something serious may happen.

...Total

Updated 11/11

PATIENT HEALTH QUESTIONNAIRE (PHQ-9)

NAME: _____ DATE: _____

Over the last 2 weeks, how often have you been bothered by any of the following problems?
(use "✓" to indicate your answer)

	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself—or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead, or of hurting yourself	0	1	2	3

add columns + +

(Healthcare professional: For interpretation of TOTAL, TOTAL:
please refer to accompanying scoring card).

<p>10. If you checked off <i>any problems</i>, how <i>difficult</i> have these problems made it for you to do your work, take care of things at home, or get along with other people?</p>	<p>Not difficult at all _____</p> <p>Somewhat difficult _____</p> <p>Very difficult _____</p> <p>Extremely difficult _____</p>
--	--

PHQ-9 Patient Depression Questionnaire

For initial diagnosis:

1. Patient completes PHQ-9 Quick Depression Assessment.
2. If there are at least 4 ✓s in the shaded section (including Questions #1 and #2), consider a depressive disorder. Add score to determine severity.

Consider Major Depressive Disorder

- if there are at least 5 ✓s in the shaded section (one of which corresponds to Question #1 or #2)

Consider Other Depressive Disorder

- if there are 2-4 ✓s in the shaded section (one of which corresponds to Question #1 or #2)

Note: Since the questionnaire relies on patient self-report, all responses should be verified by the clinician, and a definitive diagnosis is made on clinical grounds taking into account how well the patient understood the questionnaire, as well as other relevant information from the patient.

Diagnoses of Major Depressive Disorder or Other Depressive Disorder also require impairment of social, occupational, or other important areas of functioning (Question #10) and ruling out normal bereavement, a history of a Manic Episode (Bipolar Disorder), and a physical disorder, medication, or other drug as the biological cause of the depressive symptoms.

To monitor severity over time for newly diagnosed patients or patients in current treatment for depression:

1. Patients may complete questionnaires at baseline and at regular intervals (eg, every 2 weeks) at home and bring them in at their next appointment for scoring or they may complete the questionnaire during each scheduled appointment.
2. Add up ✓s by column. For every ✓: Several days = 1 More than half the days = 2 Nearly every day = 3
3. Add together column scores to get a TOTAL score.
4. Refer to the accompanying **PHQ-9 Scoring Box** to interpret the TOTAL score.
5. Results may be included in patient files to assist you in setting up a treatment goal, determining degree of response, as well as guiding treatment intervention.

Scoring: add up all checked boxes on PHQ-9

For every ✓ Not at all = 0; Several days = 1;
More than half the days = 2; Nearly every day = 3

Interpretation of Total Score

Total Score	Depression Severity
1-4	Minimal depression
5-9	Mild depression
10-14	Moderate depression
15-19	Moderately severe depression
20-27	Severe depression

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Date filled out (mm-dd-yyyy)

		-			-				
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SF-12v2 OPPERA

RESPONDENT ID LABEL 97

Mark (☒) one response for each item and do not skip any items unless specified. If you change your mind, fill the incorrect mark completely and then mark (☒) the new response.

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities.

	Excellent	Very good	Good	Fair	Poor
1. In general, would you say your health is:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?	Yes, limited a lot	Yes, limited a little	No, not limited at all		
a. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
b. Climbing several flights of stairs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
3. During the last 4 weeks , how much of the time have you had any of the following problems with your work or other regular daily activities as a result of your physical health ?	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a. Accomplished less than you would like.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Were limited in the kind of work or other activities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. During the last 4 weeks , how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a. Accomplished less than you would like.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Did work or other activities less carefully than usual.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. During the last 4 weeks , how much did pain interfere with your normal work (including both work outside the home and housework)?	Not at all	A little bit	Moderately	Quite a bit	Extremely
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. These questions are about how you feel and how things have been with you during the last 4 weeks . For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the last 4 weeks ...	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a. Have you felt calm and peaceful?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Did you have a lot of energy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Have you felt downhearted and depressed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. During the last 4 weeks , how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?	All of the time	Most of the time	Some of the time	A little of the time	None of the time
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

STUDY PARTICIPANT ID# _____

DATE: _____

Time Started: _____

**MIDUS II Cognitive Test Battery
PO1 AG20166 & RO1 AG17920**

Brief Test of Adult Cognition by Telephone (BTACTION)

Margie E. Lachman, Project Leader

Patricia A. Tun, Co-Investigator

Brandeis University

April 2003

(Updated January 2012)

In this phone interview I will ask you to try and do some exercises that involve remembering and making judgments about words and numbers. Before we begin, I need to tell you a few things. Your participation is completely voluntary. If you prefer not to answer any question, just let me know and we will go on to the next question. The information that you give me will be confidential and used for statistical analysis only. It will be identified only by computer code and at no time will your name or other identifying information be attached to the survey results. Therefore, I won't be able to give any specific feedback.

These tasks are not harmful in any way. The exercises will take about 15 minutes. Do you have any questions about your participation in this study?

We will be tape recording the interview today so that we can score the exercises later. Do I have your permission to go ahead with this?

(If participant seems distracted, or there is noise or commotion in background such as young children, TV or radio, or other people talking, say "It is important that you are able to concentrate without being distracted while we do these exercises. Would it be better for me to call you back another time?" If so, make an appointment for another time.)

First I would like to make sure that you are able to hear me clearly. Please repeat these numbers after me: 2, 8, 3, 6, 9. *(If not loud enough, ask person to speak up clearly.)* Could you hear me clearly?

Now you will hear some words and numbers. Please do not use a paper and pencil for any of the questions. We suggest that you close your eyes while you are doing these to help you concentrate. Some of the questions will be easy for you, and some will be harder. We do not expect anyone to get all of these correct - just do the best you can.

WORD LIST RECALL (1.5 minutes on average)

Rey Auditory-Verbal Learning Test (Lezak, 1983)

“I am going to read a list of 15 words. Listen carefully. When I am finished, you are to repeat as many of the words as you can remember. It doesn’t matter in what order you repeat them. Just try to remember as many as you can. I will say each word only one time, and I cannot repeat any words. You will have up to one and a half minutes, and I will not say anything until I tell you that your time is up. Do you have any questions? Are you ready?”

(Read with one second interval between each word)

	Word List	Recalled?	Repetitions (tally)	Intrusions (list)
Total Correct Primacy:	DRUM			
	CURTAIN			
	BELL			
	COFFEE			
	SCHOOL			
Total Correct Middle:	PARENT			
	MOON			
	GARDEN			
	HAT			
	FARMER			
Total Correct Recency:	NOSE			
	TURKEY			
	COLOR			
	HOUSE			
	RIVER			
	Total	# Correct (0-15):	# Repetitions:	# Intrusions:

“Now tell me as many words as you can remember.”

(Record each word recalled in order by writing down the first 1-2 letters of each word in the space above, as well as repetitions of same word and intrusions).

Plurals of a word are scored as Correct. Words not on the list or variants of words on the list (e.g., farm, home) are Intrusions.

If person stops before 1 1/2 minutes is up, say, “There’s still time left, can you think of any more?”

“Good, now let’s go on.”

DIGITS BACKWARD (2.5 minutes)

WAIS III (1997)

“I am going to say some strings of numbers, and when I am done I would like you to repeat them backwards, in the reverse order from which I said them. So if I said “3, 8”, you would say “8, 3”. Do you understand? The sets will get larger as we go.”

(Read in monotone, 1 sec per number. Drop your voice on the last digit to indicate it is time to respond. If they get the first trial on one level, move on to the next level. Discontinue after 2 trials missed on a level).

	Response	Correct?
2. 2 - 4 (4 - 2) 5 - 7 (7 - 5)	_____ _____	_____ _____
3. 6 - 2 - 9 (9 - 2 - 6) 4 - 1 - 5 (5 - 1 - 4)	_____ _____	_____ _____
4. 3 - 2 - 7 - 9 (9 - 7 - 2 - 3) 4 - 9 - 6 - 8 (8 - 6 - 9 - 4)	_____ _____	_____ _____
5. 1 - 5 - 2 - 8 - 6 (6 - 8 - 2 - 5 - 1) 6 - 1 - 8 - 4 - 3 (3 - 4 - 8 - 1 - 6)	_____ _____	_____ _____
6. 5 - 3 - 9 - 4 - 1 - 8 (8 - 1 - 4 - 9 - 3 - 5) 7 - 2 - 4 - 8 - 5 - 6 (6 - 5 - 8 - 4 - 2 - 7)	_____ _____	_____ _____
7. 8 - 1 - 2 - 9 - 3 - 6 - 5 (5 - 6 - 3 - 9 - 2 - 1 - 8) 4 - 7 - 3 - 9 - 1 - 2 - 8 (8 - 2 - 1 - 9 - 3 - 7 - 4)	_____ _____	_____ _____
8. 9 - 4 - 3 - 7 - 6 - 2 - 5 - 8 (8 - 5 - 2 - 6 - 7 - 3 - 4 - 9) 7 - 2 - 8 - 1 - 9 - 6 - 5 - 3 (3 - 5 - 6 - 9 - 1 - 8 - 2 - 7)	_____ _____	_____ _____

Enter the highest level reached (this is the longest number of digits correctly repeated in sequence) (Range 0, 2-8): _____

**Immediate self-corrections can be scored as correct.*

“Good, now let’s go on.”

CATEGORY FLUENCY (1.5 minutes)

Drachman & Leavitt (1972)

“Now I am going to name a category and you will name things that belong in that category. Let’s practice with the category “fruit”. You could say peach, or pear. Can you think of any other fruits? (*wait for 2 correct items*). In a moment I will give you another category. When I say begin, you will name all the things from this **new** category you can think of, as fast as you can. You will have one minute to do this. I will let you know when your time is up. The new category is animals. Do you have any questions? Ready?”

Begin. (***Time for one minute***). If person stops before 1 minute is up, say “There’s still more time, can you think of any more?”

(If person asks whether birds, fish, insects, reptiles, etc. are acceptable, say yes. If a participant says a category such as “bird”, then names a specific, “robin”, give credit for each. Do not accept mythical animals such as dragons and unicorns.)

1 – 15 sec.

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Total 1 – 15s: _____**15 – 30 sec.**

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Total 15 – 30s: _____**30 – 45 sec.**

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Total 30 – 45s: _____**45 – 60 sec.**

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Total 45 – 60s: _____

(Ask about any words you did not understand).

Scoring:**Total Number Correct:** _____**Total Number of Repetitions:** _____**Total Number of Intrusions:** _____**“Good, now let’s go on.”**

NUMBER SERIES (REASONING TEST) (2.5 minutes)

Salthouse & Prill (1987)

“In the next exercise I will read you a series of numbers that may get larger or smaller in value. At the end you will try to figure out what the next number would be. So if the numbers were 2,4,6,8,10, the next number would be 12. After I say each number I will pause for as long as you need, and then you should say “okay” when you are ready for me to go on to the next number in the group. So if I said 2, you should say “okay” when you are ready for me to go on to the next number, then I say 4, you say “okay”, 6, “okay”, 8, “okay”, 10, and at the end I will ask you what you think the next number would be. In this case the next number would be 12, as each number has increased by 2.

Let’s try one for practice: 35 (okay), 30 (okay), 25 (okay), 20 (okay), 15 (okay) **AND** the next number would be....???? (The answer should be 10 as each number has decreased by 5). There will be different patterns, and some of these will be harder than others, so just do the best you can. If you are not sure of the answer, it is okay to guess. Do you have any questions?”
(Pause after each of the first 4 items for okay response; after the last item, say **AND** the next number is...?). There is no discontinuation rule for this subtest.

Trial	Stimulus	Correct Response	Response Given
1	18, 20, 24, 30, 38.....	48	
	“Okay. Are you ready for another?”	The next set is:”	
2	81, 78, 75, 72, 69.....	66	
	“Okay. Are you ready for another?”	The next set is:”	
3	7, 12, 16, 19, 21.....	22	
	“Okay. Are you ready for another?”	The next set is:”	
4	28, 25, 21, 16, 10.....	3	
	“Okay. Are you ready for another?”	The next set is:”	
5	20, 37, 18, 38, 16.....	39	
Enter Score for EACH ITEM on the NDB Data entry Form.			
TOTAL CORRECT (0-5):			

**Immediate self-corrections can be scored as correct.*

“Good, let’s move on.”

BACKWARD COUNTING (45 seconds)

“Next, I would like to see how fast you can count backwards. When I give the signal to begin, start counting backwards from 100 out loud, as fast as you can. So you will say 100, 99, 98 and so on. You will have half a minute. Do you have any questions? I will let you know when the time is up.”

“Begin” (*Time for 30 seconds*)

On record form:

- / over **skipped** numbers (omissions)
- ← Over top of numbers to denote number **reversals**
- # For **incorrect** responses (errors)

RECORD FORM:

100	99	98	97	96	95	94	93	92	91	90
	89	88	87	86	85	84	83	82	81	80
	79	78	77	76	75	74	73	72	71	70
	69	68	67	66	65	64	63	62	61	60
	59	58	57	56	55	54	53	52	51	50
	49	48	47	46	45	44	43	42	41	40
	39	38	37	36	35	34	33	32	31	30
	29	28	27	26	25	24	23	22	21	20
	19	18	17	16	15	14	13	12	11	10
	9	8	7	6	5	4	3	2	1	

SCORING:

Last Number Reached: _____

Total Number of Errors (Reversals, skips, incorrect numbers): _____

Total Number of Digits Produced (100 - (number reached + number errors)): _____

Total Time (If less than 30 seconds): _____

“Good, now one more question.”

SHORT-DELAY WORD RECALL (1 minute)

“Do you remember the very first list of 15 words that I read to you in the beginning? It was the very first thing we did. (WAIT FOR SUBJECT TO RESPOND YES. MAKE SURE THEY UNDERSTAND THAT IT IS THE WORD LIST, NOT THE CATEGORY FLUENCY TEST). I want you to tell me as many of the words from that list as you can. You will have up to one minute. I will tell you when your time is up.” (*Record words recalled, including intrusions and repetitions.*)
If person stops before 1 minute is up, say, “there is still more time; can you think of any more?”

	Word List (Do Not read)	Recalled?	Repetitions (tally)	Intrusions (list)
Total Correct Primacy:	DRUM			
	CURTAIN			
	BELL			
	COFFEE			
	SCHOOL			
Total Correct Middle:	PARENT			
	MOON			
	GARDEN			
	HAT			
	FARMER			
Total Correct Recency:	NOSE			
	TURKEY			
	COLOR			
	HOUSE			
	RIVER			
	Total	# Correct (0-15):	# Repetitions:	# Intrusions:

Thank you very much for your help. We appreciate your taking the time to help us with this research project.
THANK YOU!

Time Completed: _____ Duration of entire BTACT: _____ minutes

Encouraging comments to be used if the person expresses concern about performance:

During the test: “Just do the best you can.”

Remember, we do not expect anyone to get all of these questions correct.”

“Don’t worry. We have deliberately made these questions challenging. If people could get them all right, we would not learn anything. We’re trying to find which questions are harder than others.”