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STUDY SUMMARIES

May 2022 Study Summaries #Dietitians #SportsNutrition

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Autoimmune Disease & Allergies

Vitamin D and the incidence and severity of atopic dermatitis

This meta-analysis found that (i) participants with atopic dermatitis had lower vitamin D levels compared to healthy controls, (ii) participants with severe atopic dermatitis had lower vitamin D levels compared to those with mild or moderate atopic dermatitis, and (iii) vitamin D supplementation improved atopic dermatitis severity.

Background

Although observational research suggests that there is a link between vitamin D status and different skin conditions, it's unclear whether vitamin D deficiency is associated with the incidence and severity of *atopic dermatitis* (AD; an inflammatory skin condition) and whether supplementation with vitamin D can improve the severity of AD.

The study

This meta-analysis of 20 studies (16 observational and 4 interventional) looked at the following:

- Serum vitamin D levels in participants with AD compared to healthy control participants in 14 observational studies
- Serum vitamin D levels in participants with severe AD compared to those with mild or moderate AD in 11 observational studies
- The effect of vitamin D supplementation on the severity of AD in 4 interventional studies

The results

Compared to healthy controls, participants with AD had serum vitamin D levels that were 7.4 ng/mL lower, on average. Participants with severe AD had average serum vitamin D levels that were 10 ng/mL lower than those with mild AD and 3 ng/mL lower than those with moderate AD.

In the analysis of interventional studies, vitamin D supplementation at an average daily dose of approximately 1,700 IU for approximately 3 months improved AD severity, with an average reduction of 11.5 points in the SCORAD severity index.

Note

The SCORAD score ranges from 0 to 103 points and defines three classes of AD severity: mild (SCORAD of <25), moderate (SCORAD of 25–50), and severe (SCORAD of >50).

#Dietitians

Omega-3 supplementation for lupus

This systematic review found some evidence that omega-3 fatty acid supplementation may improve disease activity, clinical features, endothelial function, and inflammatory biomarkers in people with lupus.

Background

Systemic lupus erythematosus (SLE), also known as lupus, is an autoimmune inflammatory disease characterized by symptoms such as fatigue, joint and muscle pain, and skin lesions and rashes. Omega-3 fatty acids have anti-inflammatory properties; does omega-3 supplementation benefit patients with SLE?

The study

This systematic review assessed the efficacy of omega-3 fatty acids on SLE-associated outcomes. The authors included 13 studies (11 interventional clinical trials, 1 survey-based case-control study, and 1 cross-sectional cohort study).

The results

Disease activity: Of the 11 studies assessing disease activity, 9 reported a beneficial effect of omega-3s.

Specific clinical features: Four studies reported improvements in clinical features (constitutional symptoms, energy/fatigue, emotional well-being, sleep disturbances, and components related to the integumentary, neuromuscular, and musculoskeletal systems).

Biomarkers: One of 2 studies assessing erythrocyte sedimentation rate reported a reduction following omega-3 supplementation, 1 study reported a decrease in CRP levels, and 1 study reported a reduction in urinary 8-isoprostane (a biomarker of oxidative stress) following fish oil supplementation. In contrast, there were no effects of omega-3s on complement 3 or complement 4 proteins, IgM, IgG (all markers of immune function), or double-stranded dsDNA antibodies (a marker used in diagnosis of lupus).

Kidney parameters: Omega-3s did not affect serum creatinine, urinary IgG, or 24-hour urinary protein.

Endothelial function: One of 2 studies assessing red blood cell membrane flexibility and whole blood viscosity reported improvements in both markers. Similarly, 1 of 2 studies assessing flow-mediated dilation reported an improvement following fish oil supplementation.

#Dietitians

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Cancer

Does daily supplementation with multivitamins and multiminerals reduce the risk of cancer and cardiovascular disease?

In this randomized controlled trial with a median follow-up period of 3.6 years, daily supplementation with multivitamins and multiminerals did not affect cancer or cardiovascular disease risk.

Background

Multivitamin-multimineral (MVM) supplements lack a universal definition but typically provide at least 100% of the recommended daily value of most essential vitamins and minerals. They are the most common dietary supplement taken in the U.S.[100] Many people take MVM supplements for general health and well-being or to reduce the risk of chronic diseases, but there is a lack of evidence to support their use for the latter effect.

The study

This randomized controlled trial examined the effect of a daily MVM supplement use on the incidence of cancer and *cardiovascular disease* (CVD) in 10,723 U.S. adults (average age of 72) free of CVD and *recently diagnosed* cancer over a median follow-up period of 3.6 years. To be included in the study, the participants agreed to forgo personal MVM supplement use and limit supplemental vitamin D and calcium to no more than 1,000 IU/day and no more than 1,200 mg/day during the trial. They also had to complete a placebo run-in phase of at least two months.

Nutrition label for the multivitamin used in the study

Supplement Facts
Serving Size: 1 Tablet

Amount Per Serving	% DV
Vitamin A 750 mcg (40% as Beta-Carotene)	83%
Vitamin C 60 mg	67%
Vitamin D_3 25 mcg (1,000 IU)	125%
Vitamin E 22.5 mg	150%
Vitamin K 30 mcg	25%

Amount Per Serving	% DV
Thiamin 1.5 mg	125%
Riboflavin 1.7 mg	131%
Niacin 20 mg	125%
Vitamin B_6 3 mg	176%
Folate 667 mcg DFE (400 mcg Folic Acid)	167%
Vitamin B_{12} 25 mg	1,042%
Biotin 30 mcg	100%
Pantothenic Acid 10 mg	200%

Amount Per Serving	% DV
Calcium 220 mg	17%
Phosphorus 20 mg	2%
Iodine 150 mcg	100%
Magnesium 50 mg	12%
Zinc 11 mg	100%
Selenium 19 mcg	35%
Copper 0.5 mg	56%
Manganese 2.3 mg	100%
Chromium 50 mcg	143%

Amount Per Serving	% DV
Molybdenum 45 mcg	100%
Chloride 72 mg	3%
Potassium 80 mg	2%
Lutein 250 mcg	*
Lycopene 300 mcg	*

* Daily Value (DV) not established.

The primary outcome was total invasive cancer, excluding nonmelanoma skin cancer. The secondary outcomes included site-specific cancers (i.e., melanoma, breast cancer, colorectal cancer, lung cancer, and prostate cancer), all-cause mortality, individual cardiovascular events, and total CVD, defined as a composite outcome that included incident heart attack, stroke, coronary revascularization, cardiovascular mortality, carotid artery surgery, peripheral artery surgery, and unstable angina requiring

hospitalization.

The results

During follow-up, there were 1,053 cases of cancer. Total cancer incidence did not differ between the MVM and placebo groups. There was also no effect of MVM on cancer incidence in participants with a history of cancer. In terms of secondary outcomes, there was no difference between MVM and placebo for the incidence of breast cancer, colorectal cancer, prostate cancer, or melanoma. However, MVM decreased the incidence of lung cancer by 38%, compared to placebo.

During follow-up, there were 866 cases of CVD. Total CVD incidence did not differ between the MVM and placebo groups. There was also no difference between groups for individual cardiovascular events, CVD mortality, or all-cause mortality.

Note

This trial was limited by a short intervention. A longer intervention duration might be needed to observe a decrease in cancer and CVD incidence with MVM supplementation. Another limitation is the population that was studied. Among the participants, only 35% reported consuming less than 4 servings of fruit and vegetables per day, and only 4% were current smokers, although 41.3% were former smokers. Therefore, the results may not be generalizable to less health-conscious populations.

The researchers did not adjust for multiple comparisons, despite the inclusion of several outcomes, which increases the risk of false-positive results. Therefore, the secondary outcomes should be considered exploratory.

The big picture

The rationale behind advocating for the use of MVM supplements to prevent CVD and cancer is primarily related to the role of inflammation and oxidative stress in the development of these diseases and that several nutrients are known to have antioxidant and anti-inflammatory effects.[101] Additionally, the inadequacy of certain nutrients (e.g., vitamin A, vitamin D) impairs normal immune function, which may increase the risk of cancer, and the inadequacy of other nutrients (e.g., potassium) is associated with elevations in blood pressure and an increased risk of cardiovascular disease.[102]

Despite the mechanistic plausibility of MVM supplements being able to reduce the risk of CVD and cancer and the popularity of these supplements, there is a dearth of evidence from long-term randomized controlled trials to support their use. Besides the present study, there has been one other large-scale randomized controlled trial that assessed the effects of a broad-spectrum MVM supplement on cancer and CVD incidence. It included 14,641 male physicians (average age of 64) and found that, compared to a placebo, a MVM supplement reduced the incidence of total cancer by 8% over a median follow-up of 11.2 years.[103] However, there was no effect on total CVD incidence.[104]

People who volunteer to participate in these types of studies are typically interested in healthy behaviors. Notably, 4% of the male physicians were current smokers, and 76% used aspirin, which supports the assumption that they were more health-conscious than the general population. This limitation was also present in the summarized study.

Virtually all nutrients have a nonlinear, inverted U-shaped association with optimum physiological function.[105] Very low nutrient levels in the diet or tissues result in poor function, and as nutrient levels increase, so does function. Optimum function can occur over a fairly wide range of nutrient levels due to individual differences, but at some point, higher nutrient levels become toxic and counterproductive.

In these studies, most of the participants were likely consuming a healthy and balanced diet, so there generally weren't any nutrient inadequacies or deficiencies present for the MVM to fix,[105] which is the general use for these products.

Another large-scale randomized controlled trial published in 2004 assigned participants to receive either a supplement containing vitamin C, vitamin E, beta-carotene, selenium, and zinc or a placebo over a median follow-up of 7.5 years.[106] The researchers found a 31% reduced incidence of total cancer in men who received the nutrient supplement compared to men who received the placebo, but there was no effect in women. There was also no effect of the nutrient supplement on CVD incidence.

The data from observational studies are mixed, but the majority of studies have found no association between MVM supplement use and CVD and cancer risk.[107][102][108]

Altogether, there is weak evidence to support the efficacy of MVM supplements for decreasing CVD and cancer risk in generally healthy people. But that doesn't necessarily mean that MVM supplements serve no purpose, it's just that their utility is reserved for certain populations. For example, MVM supplements may provide health benefits for older adults, pregnant women, people consuming a low-calorie diet for weight loss or due to poor appetite from an illness, and people consuming a strict vegan diet or a diet that excludes one or more food groups.[109]

Many healthy people who consume a balanced diet view MVM supplements as an "insurance policy" to help achieve adequate micronutrient intake. This is a fine approach, as micronutrient gaps can occur from time to time despite a balanced diet, and the long-term safety of MVM supplements doesn't seem to be a concern.[110] However, the available evidence does not demonstrate that MVM supplements reliably provide a health benefit for healthy people with adequate micronutrient intake, so the benefit-cost ratio of this approach should be considered on an individual basis. Further long-term randomized controlled trials are needed to confirm whether MVM supplements provide a health benefit to healthy people consuming a balanced diet.

#EditorsPick, #Dietitians

Can artificial sweeteners increase cancer risk?

High intakes of artificial sweeteners were associated with a 15% increased cancer risk over a median of 7.7 years. However, there were a number of caveats that precluded establishing a causal link.

Background

Artificial sweeteners have long been a source of controversy, despite their approval for use in foods and beverages by authoritative bodies such as the U.S. Food and Drug Administration and the European Food Safety Authority. Among the most cited concerns is their potential to increase cancer risk. While some evidence links these sweeteners to cancer in rodents, data on humans are scarce.

The study

This cohort study assessed the association between artificial sweetener intake and cancer risk. The authors assessed dietary intake and consumption of artificial sweeteners from 102,865 people in France twice per year between 2009 and 2021 via three nonconsecutive web-based 24-hour dietary records randomly assigned over 15 days (two weekdays and one weekend day). Baseline dietary intakes were evaluated by averaging all 24-hour dietary records during the first two years of follow-up.

The authors determined the associations based on total artificial sweetener intake (acesulfame-K, aspartame, cyclamates, saccharin, sucralose, thaumatin, neohesperidin dihydrochalcone, steviol glycosides, and salt of aspartame-acesulfame) and assessed acesulfame-K, aspartame, and sucralose individually. They included total cancer risk and risk for breast, prostate, and obesity-related cancers (colorectal, stomach, liver, mouth, pharynx, larynx, oesophageal, breast, ovarian, endometrial, and prostate cancers) as outcomes.

The authors adjusted for the following potential confounders:

- Age
- Sex (except for breast and prostate cancer analysis)
- Education level
- Physical activity
- Smoking
- BMI
- Height
- Weight gain during follow-up
- Presence of diabetes
- Family history of cancer

- Number of 24-hour dietary records completed
- Baseline intake of calories, alcohol, sodium, saturated fat, fiber, total sugar, fruits and vegetables, whole-grain foods, and dairy products

In their analysis, the authors categorized participants as "high" consumers of artificial sweeteners (those consuming above the median intake among consumers), "low" consumers (those consuming less than the median intake) and nonconsumers. The authors also categorized participants based on artificial sweeteners intake and total sugar intake (less than or at least 100 g/day) to compare the risk associated with sugar intake to that of artificial sweeteners.

The results

Compared to nonconsumers, higher consumers tended to be younger, women, smokers, less physically active, more educated, and more likely to have prevalent diabetes. They had lower intakes of energy, alcohol, saturated fats, fiber, fruit and vegetables, and whole-grain food and higher intakes of sodium, total sugar, dairy products, sugary foods and drinks, and unsweetened nonalcoholic beverages. The main artificial sweetener used by participants was aspartame (58% of artificial sweetener intake), followed by acesulfame-K (29%) and sucralose (10%). All participants' intakes of aspartame and acesulfame-K were below the *acceptable daily intakes* (ADIs) of 40 mg/kg body weight/day and 9 mg/kg body weight/day, respectively. Only 5 participants exceeded the ADI of 15 mg/kg body weight/day for sucralose. Soft drinks, table-top sweeteners, and yogurt/cottage cheese were the main contributors to total artificial sweetener intake, accounting for 53%, 29%, and 8% of intakes, respectively.

Compared to nonconsumers, high consumers had a 13% higher risk of overall cancer over a median follow-up of 7.7 years. When the authors stratified by type of sweetener, they found that aspartame and acesulfame-K were associated with a 15% and 13% higher risk for total cancer, respectively. When the authors stratified by cancer site, high consumers had a 13% higher risk for obesity-related cancers. In addition, high consumers of aspartame had a 22% higher risk for breast cancer and a 15% higher risk for obesity cancers.

Total cancer outcomes

Exposure	Measure	Non-consumers	Low consumers	High consumers
Total artificial sweeteners	Incident cases/ participants (overall % risk)	2,013/ 64,892 (3.10% risk)	744/18,986 (3.92% risk)	601/18,987 (3.17% risk)

Exposure	Measure	Non-consumers	Low consumers	High consumers
Total artificial sweeteners	Hazard ratio (95% CI) (adjusted for age and sex only)	1	1.26 (1.16 to 1.37)	1.19 (1.08 to 1.30)
Total artificial sweeteners	Hazard ratio (95% CI) (fully adjusted)	1	1.14 (1.05 to 1.25)	1.13 (1.03 to 1.25)
Aspartame	Incident cases/ participants (overall % risk)	2,309/ 74,169 (3.11% risk)	572/14,345 (3.99% risk)	477/14,351 (3.32% risk)
Aspartame	Hazard ratio(95% CI) (adjusted for age and sex only)	1	1.21 (1.11 to 1.33)	1.18 (1.07 to 1.31)
Aspartame	Hazard ratio (fully adjusted)	1	1.12 (1.02 to 1.23)	1.15 (1.03 to 1.28)
Acesulfame-K	Incident cases/ participants (overall risk)	2,096/ 67,662 (3.10% risk)	766/17,601 (4.35% risk)	496/17,602 (2.82% risk)
Acesulfame-K	Hazard ratio(adjusted for age and sex only)	1	1.22 (1.12 to 1.33)	1.19 (1.07 to 1.33)
Acesulfame-K	Hazard ratio (fully adjusted)	1	1.12 (1.03 to 1.22)	1.13 (1.01 to 1.26)
Sucralose	Incident cases/ participants (overall risk)	2,883/ 88,867 (3.24%	288/7,005 (4.11% risk)	187/6,993 (2.67% risk)

Exposure	Measure	Non-consumers	Low consumers	High consumers
		risk)		
Sucralose	Hazard ratio (adjusted for age and sex only)	1	1.20 (1.06 to 1.35)	1.00 (0.86 to 1.17)
Sucralose	Hazard ratio (fully adjusted)	1	1.03 (0.91 to 1.17)(nonsignificant)	0.96 (0.82 to 1.12) (nonsignificant)

The authors also found that high sugar intake was associated with increased cancer risk. However, there was no difference in risk between high consumers of artificial sweeteners consuming less than 100 grams of sugar per day and nonconsumers of artificial sweeteners consuming at least 100 grams of sugar per day. The highest risk for cancer was observed in participants with a high intake of artificial sweeteners and intake of at least 100 grams of sugar per day.

Note

At first glance, this study suggests that artificial sweeteners can increase cancer risk, but several caveats have to be considered:

- As this was an observational study, it cannot be used to establish whether artificial sweeteners *cause* cancer. Though the authors did adjust for potential confounders, there may have been other confounding variables that weren't adjusted for. For example, high artificial sweetener consumers might also have a high intake of fast food (people might order artificially sweetened beverages with their meals) or processed foods, which often contain artificial sweeteners. However, this study does justify future research into causality. As the authors note, the causal claim could be bolstered or negated by Mendelian randomization studies down the road.
- Another 2019 analysis from the same cohort found that artificially sweetened beverages were not associated with cancer, whereas sugary drink consumption was associated with cancer.[149]
- While the results are statistically significant, it's worth considering whether the results are *clinically* significant. That's why it's important to look at overall cancer risk for each group of participants, as opposed to relative risk. Of the 64,892 people classified as "nonconsumers," there were 2,013 incident cases of cancer (a 3.10% risk). Of the 18,986 people classified as "low consumers," there were 744 incident cases of cancer (a 3.92% risk). Of the 18,987 participants classified as "high consumers," there were 601 incident cases of cancer (a 3.17% risk).

- Low consumers had a slightly higher risk for cancer than high consumers, though this difference was not tested for statistical significance. If artificial sweeteners do increase cancer risk, one would expect high consumers to be at the highest risk.

The big picture

The March 2022 issue of Study Summaries includes a review that concluded artificial sweeteners were not genotoxic, meaning they don't cause DNA or chromosomal damage, and as such are likely not carcinogenic. However, as noted in that review, that study and several other narrative and systematic reviews assessing the genotoxicity potential of artificial sweeteners were partially funded by the American Beverage Association.

#EditorsPick, #Dietitians, #SportsNutrition

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Cognition & Memory

Iron and cognition in adolescents

This systematic review found a complex and somewhat unclear relationship between iron status and anemia and the impact of iron-containing interventions on cognition and academic performance in adolescents.

Background

Iron-deficiency anemia (IDA) is estimated to be the leading cause of *disability-adjusted life years* (DALYs) lost in adolescents. Iron-containing interventions are commonly integrated into school-based programs that are valued for their perceived improvements in academic performance, but does the evidence indicate that they work?

The study

This systematic review of 50 studies (26 cross-sectional studies and 24 experimental trials) in adolescents evaluated the association between iron status or anemia and measures of cognition or academic performance. It also assessed whether iron-containing interventions improve measures of cognition or academic performance. All of the included studies had an average participant age of 10–19, and 34% of the studies included female participants.

The cross-sectional studies included sample sizes ranging from 30 to 5,398 participants and used various different methods to evaluate nutrition and anemia status (e.g., hemoglobin levels, iron intake). The experimental trials included food-based and iron-only or iron+micronutrient supplementation interventions that lasted 1–14 months. Various types of iron were included at different doses, and sample sizes ranged from 51 to 808 participants.

Learning and cognition outcomes included IQ testing, grades, and specific cognition tests, among others. The included experimental trials were also assessed for risk of bias.

The results

The authors reported the following findings from their analysis:

- Iron status and/or anemia were associated with academic performance in most of the studies. Nearly all iron-containing interventions reported positive findings as well.
- Iron status and/or anemia were not associated with attention and concentration in most studies, although iron-containing interventions reported positive findings more often than not.
- Most of the cross-sectional and experimental studies reported no associations with or changes in

intelligence and memory/recall.

- Nearly all supplementation trials had a moderate or high risk of bias.

Note

These results should be interpreted with caution because the outcomes were evaluated with an extremely broad range of assessment methods and interventions and most trials presented a moderate or high risk of bias.

#Dietitians

Can eating more fiber reduce the risk for dementia?

In this cohort study, dietary fiber intake — especially soluble fiber intake — was associated with reduced risk for dementia.

Background

Preliminary animal research suggests that dietary fiber, especially *soluble* fiber, could have a neuroprotective effect.[181] However, this effect needed to be explored in humans.

The study

This cohort study assessed whether total dietary fiber intake and fiber type (soluble vs. insoluble) were associated with a reduced risk for dementia (primary outcome) among 3,739 adults in Japan (ages 40–64). As secondary outcomes, the authors assessed whether a history of stroke or the type of fiber-containing foods consumed (potatoes, vegetables, and fruits) modified the association between fiber intake and disabling dementia.

The participants completed 24-hour dietary recalls between 1985 and 1999 to assess dietary fiber intake and the types of fiber-containing foods consumed. The authors assessed incident disabling dementia (dementia that required care) from 1999 to 2020 and further stratified the participants with disabling dementia based on whether or not they had a history of stroke.

In their analysis, the authors adjusted for age, smoking status, alcohol consumption, total calorie intake, and fish, meat, and sodium consumption.

The results

Over a median of 19.7 years of follow-up, 670 cases of disabling dementia occurred.

Total fiber intake was linearly associated with a reduced risk for disabling dementia. Participants in the highest quartile of dietary fiber intake had a 26% lower risk of disabling dementia than those in the lowest quartile.

When the authors stratified the participants based on a history of stroke, the inverse association was only

significant among participants without a history of stroke. When they were stratified by type of dietary fiber, only soluble fiber intake was significantly associated with a reduced risk of dementia, although the inverse association between insoluble fiber intake and stroke trended towards significance.

When the authors assessed types of fiber-containing foods, potato intake was inversely associated with disabling dementia, whereas there was no association between fruit or vegetable intake and disabling dementia.

#Dietitians, #AlzheimersDisease

Neurocognitive effects of cocoa and red berry powders

This 12-week trial found that an increased intake of flavanols and/or anthocyanins did not improve summed measures of cognitive function, and only results for certain executive function tests improved.

Background

Polyphenols appear to improve cognitive function and prevent cognitive decline.[92] Can flavonols and anthocyanins from cocoa and red berries, respectively, affect biomarkers of brain health and improve cognitive performance in older adults?

The study

This 12-week randomized controlled trial involved 59 healthy participants (average age of 58; 29% male) who consumed either a cocoa powder (200 milligrams of flavanols daily), a red-berry-mixture powder (100 milligrams of anthocyanins daily), or both.

The results of various neurocognitive tests, including the Spain-Complutense Verbal Learning Test, the Stroop Task, and the Tower of London Test, were summed according to three main measures of cognitive function: memory, processing speed and attention, and working memory.

The researchers also analyzed serum biomarker levels of brain health such as *brain derived neurotrophic factor* (BDNF) and *nerve growth factor receptor* (NGF-R) and inflammation such as *interleukin-6* (IL-6). Total polyphenols in urine (normalized for urine creatinine levels) and anthropometric (body) measurements were also collected.

The results

No changes were observed in any of the summed measures of cognitive function or serum levels of BDNF and NGF-R following the increased intake of flavonols and/or anthocyanins. A few results for certain executive function tests, such as the time to start and finish the Tower of London Test, did improve following the intervention.

Creatinine-corrected urine polyphenol content increased in the cocoa powder and combination groups (accompanied by decreases in serum IL-6 levels), while the red berries group tended toward, but did not

reach, a significant increase (p=0.059).

A difference in body fat and water percentage was noted for between-group comparisons, with the cocoa powder group displaying greater body fat and lower water content, but no changes were noted following the intervention.

Note

The intricacies of these results should be interpreted with caution because systemic (as opposed to localized) blood samples were analyzed for some brain health biomarkers, the authors did not analyze the polyphenol powders to confirm that the manufacturer labels were accurate, and there were some differences in baseline measures between groups.

#Dietitians

Iron supplementation and neurocognitive development

This cross-sectional study reported poorer neurocognitive function during adolescence for participants who were nonanemic and iron supplemented at a relatively high level during ages 6–12 months, as well as those that were slightly anemic and not iron supplemented.

Background

Micronutrient intake tends to have a “sweet spot”. Iron deficiency is the world’s leading nutrient deficiency and is of particular concern during infancy because iron is an essential nutrient for normal brain development. However, overexposure to iron within 6–24 months of age may also cause harm to the immune system and microflora and compete with other trace elements for absorption. Does iron supplementation during the early months of life negatively influence neurocognition?

The study

This cross-sectional study involved 562 Chilean adolescents (average age of 16; 47% male) who participated in a randomized controlled iron supplementation trial during their infancy (ages 6–12 months). Overall, 346 participants consumed an iron-fortified formula (12.7 mg/L) or liquid vitamins with 15 milligrams of elemental iron (ferrous sulfate), and 216 consumed cow’s milk without iron or liquid vitamins without iron.

The participants completed a battery of tests to assess neurocognitive development, including the Beery-Buktenica Test of Visual-Motor Integration, the Wide Range Achievement Test-revised (arithmetic-based), the Wechsler Intelligence Scale for Children-Revised, the Trail Making Test, and the Wisconsin Card Sorting Test.

The analysis was adjusted for participant and maternal demographics, infant growth, and family socioeconomic status.

The results

Iron-supplemented participants had poorer visual-motor integration, poorer quantitative reasoning skills, and more errors on neurocognitive tasks. Greater intake of iron-fortified formulas was associated with lower arithmetic achievement.

Poorer neurocognitive development was associated with iron supplementation in adolescents who demonstrated high hemoglobin levels at 6 months, as well as adolescents who demonstrated low 6-month hemoglobin levels and did not receive supplemental iron.

Note

Infant iron status can be influenced by maternal iron status and nonnutritional factors, as well as nutritional intake, and many of these factors were not monitored in this study.

#Dietitians

Can omega-3 fatty acids boost cognitive performance in healthy adults?

Supplementation with omega-3 fatty acids did not improve cognitive performance in healthy adults, regardless of age and apolipoprotein E genotype, but had a small benefit for adults with low episodic memory at baseline.

Background

Omega-3 fatty acids are associated with lower cognitive decline and a lower risk of Alzheimer's disease in older adults.[205][206] However, the question of whether omega-3 fatty acids can improve cognitive performance in healthy adults remains unanswered, with clinical trials showing conflicting results.[207][208][209][210]

One possible explanation is that age and genetic predispositions might influence the beneficial effects of omega-3 fatty acids. For instance, carriers of the apolipoprotein E genotype (a genetic risk factor for certain neurological disorders such as dementia)[211] experience fewer benefits from omega-3 fatty acids for prevention of cognitive decline.[208] This study examined whether omega-3 fatty acids can improve cognitive performance in healthy adults when controlling for age and apolipoprotein E genotype.

The study

This 6-month randomized-controlled trial of 193 healthy adults (aged 20–80) examined whether supplementation with omega-3 fatty acids (2.5 grams per day) improves cognitive performance compared to a placebo.

The primary outcomes were visuospatial ability and working memory. The secondary outcomes were episodic memory and executive function. The researchers also investigated whether the outcomes were influenced by age or apolipoprotein E genotype.

The results

Supplementation with omega-3 fatty acids did not improve cognitive performance in any of the measured outcomes. Additionally, age and apolipoprotein E genotype did not influence the outcomes.

However, for participants who had low episodic memory scores, omega-3 fatty acids had some benefits because their scores were improved to normal levels.

Note

Similar to previous trials,[208][212] the results of this study suggest that omega-3 fatty acids do not improve cognitive performance in cognitively healthy adults but may be useful for those with low cognitive scores. However, these results should be viewed with caution because the researchers did not intend to analyze this outcome at the beginning of the study, and the differences were borderline significant.

#Dietitians, #AlzheimersDisease

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Diabetes & Blood Sugar

Sweet news about low- and zero-calorie beverages

This network meta-analysis found that, to reduce body weight and cardiometabolic risk, replacing sugar-sweetened beverages with low- or zero-calorie beverages worked better than replacing them with water.

Background

High consumption of *sugar-sweetened beverages* (SSBs) is strongly associated with an increased risk of obesity and cardiometabolic complications. Although many people use *low-calorie (and zero-calorie) sweetened beverages* (LCSBs) to replace SSBs, their use remains controversial.

The study

This network meta-analysis of assessed the effects of the following interventions on body weight and cardiometabolic risk factors:

- Substituting SSBs with LCSBs
- Substituting SSBs with water
- Substituting water with LCSBs

The inclusion criteria specified that the *randomized controlled trials* (RCTs) must be at least 2 weeks long and excluded studies that assessed sweeteners in nonbeverage form (e.g., tablets) or in fortified or nutrient-dense beverages (e.g., milk and juice). The included studies assessed participants both with and without diabetes.

The primary outcome was body weight. The authors also assessed the following secondary outcomes:

- BMI
- Body fat percentage
- Waist circumference
- HbA1C
- Fasting blood glucose
- 2-hour postprandial glucose during a 75-gram oral glucose tolerance test
- Fasting plasma insulin
- HOMA-IR

- LDL-C
- HDL-C
- Triglycerides
- Total cholesterol
- Non-HDL cholesterol
- Systolic blood pressure
- Diastolic blood pressure
- Liver fat
- Liver enzymes *alanine aminotransferase* and *aspartate aminotransferase* (ALT and AST)
- Uric acid

The authors assessed 17 RCTs with 24 trial comparisons, including 1,733 adults (75% women; average age of 33; median BMI of 31). The median follow-up period was 12 weeks, with studies ranging from 3 to 52 weeks in duration. Nine RCTs exclusively assessed participants with overweight or obesity, and 1 trial exclusively assessed patients with type 2 diabetes.

Eight RCTs (11 comparisons) reported the low-calorie or zero-calorie sweetener used: 7 comparisons used aspartame, and 1 comparison each assessed an aspartame and acesulfame potassium blend, saccharin, rebaudioside A, and sucralose.

LCSBs substituted for SSBs in 12 RCTs, water substituted for SSBs in 3 RCTs, and LCSBs substituted for water in 9 RCTs.

Eight RCTs were funded by agencies (government, not-for-profit agency, or university), 4 were funded by industry, and 5 were funded by a combination of agency and industry.

The results

Substituting SSBs with LCSBs reduced body weight (−1.06 kg), BMI (−0.32), body fat percentage (−0.6%), and liver fat. Substituting SSBs with water was not associated with any significant outcome (although the results tended to favor water for nearly all outcomes). Substituting water with LCSBs reduced body weight (−1.07 kg), increased HbA1C (+0.21%), and reduced systolic blood pressure (−2.63 mm Hg).

The certainty of evidence for body weight was moderate for substituting SSBs with LCSBs, low for substituting SSBs with water, and low for substituting water with LCSBs.

Note

The authors declared several conflicts of interest — they reported receiving support from companies such

as Loblaws Companies Limited (a Canadian food distributor), the National Honey Board, the Canadian Sugar Institute, Ocean Spray, General Mills, the International Sweeteners Association, Danone, Unilever, Kelloggs, Pepsi-Co, Sun-Maid, and Nestlé.

#Dietitians, #ConflictOfInterest

Supplementing antidiabetic drugs with micronutrients for glycemic control

This meta-analysis found that supplementing antidiabetic drugs with chromium, vitamin C, vitamin E, or coenzyme Q10 improved glycemic control in people with type 2 diabetes.

Background

Glycemic control is critical for preventing complications in people with *type 2 diabetes* (T2D).[62][63] Meta-analyses of randomized controlled trials suggest that supplementing with certain nutrients can improve some parameters of glycemic control in people with T2D.[64][65][66] However, the effect of add-on nutrient supplements (i.e., used alongside antidiabetic drugs) on glycemic control had yet to be investigated.

The study

This meta-analysis of 119 randomized controlled trials examined the effect of adding nutrient supplements to antidiabetic therapies (e.g., metformin, insulin) on glycemic control in people with T2D.

Nine nutrient supplements were analyzed:

- Vitamin D (29 studies; 400–6,000 IU/day)
- Omega-3 fatty acids (26 studies; 1–12 grams/day)
- Vitamin E (21 studies; 200–1,600 IU/day),
- Chromium (16 studies; 200–1,000 micrograms/day)
- Vitamin C (12 studies; 200–1,000 milligrams/day)
- *Coenzyme Q10* (CoQ10; 11 studies; 150–200 milligrams/day)
- Zinc (5 studies; 30–240 milligrams/day)
- Alpha-lipoic acid (3 studies; 300–800 milligrams/day)
- Selenium (2 studies; 200 micrograms/day).

The outcomes assessed were HbA1c, fasting blood glucose, and HOMA-IR.

The results

Chromium improved HbA1c (−0.39%), fasting blood glucose (−16.30 mg/dL), and HOMA-IR (−2.48). The effect of chromium was greater in participants with an HbA1c ≥ 8%, and chromium picolinate was the

most effective formulation.

Additionally, vitamin C improved HbA1c (−0.37%) and fasting blood glucose (−11.96 mg/dL); CoQ10 improved HbA1c (−0.23%) and fasting blood glucose (−8.84 mg/dL); vitamin E improved HbA1c (−0.23%) and HOMA-IR (−0.37); and omega-3 fatty acids improved HbA1c (−0.26%).

Note

There was moderate heterogeneity in the majority of the analyses, and the researchers were unable to identify the causes of heterogeneity in some of these, which reduces confidence in the findings.

#Dietitians

Astaxanthin's effect on oxidative stress and inflammation

This meta-analysis of 12 randomized controlled trials reports that astaxanthin can reduce some biomarkers of lipid peroxidation (involved in cell damage) and inflammation and may improve endogenous antioxidant enzymatic activity (which helps protect against cell damage), mostly in type 2 diabetes patients.

Background

Supplementation with astaxanthin has been shown to reduce biomarkers of oxidative stress and inflammation in animal and in vitro studies, but does this hold true for human trials?

The study

This meta-analysis of 12 *randomized controlled trials* (RCTs) followed a total of 380 participants, who took an astaxanthin supplement (4–20 milligrams/day) or a placebo, for 1–12 months. The participants were monitored for changes in biomarkers of oxidative stress and inflammation.

The results

Astaxanthin reduced blood concentrations of malondialdehyde (a biomarker of lipid peroxidation, which is involved in cell damage) and interleukin-6 (a biomarker of inflammation), despite a high or medium level of heterogeneity (i.e., variability in data) among the 6 included studies for each analysis. These reductions were most notable in participants with type 2 diabetes. There were no changes in blood C-reactive protein (6 studies), tumor necrosis factor-alpha (4 studies), or total antioxidant capacity (3 studies).

The authors reported that astaxanthin can improve antioxidant enzymatic activity (superoxide dismutase, which helps protect against cell damage) and isoprostane levels (another indicator of lipid peroxidation), although this was primarily based on a single study.[114]

Note

These improvements may be attributed to the high heterogeneity, sensitivity, and specificity of

biomarkers and assays.

Only a few biomarkers were measured in enough studies for a meaningful analysis, and many biomarkers can be very sensitive or depend on the assay or sample used. [14][15]

Malondialdehyde analysis has several limitations, including low stability and recovery and poor reproducibility and specificity.[115]

#Dietitians

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🍽 Diets & Foods

Are carbs to blame for the obesity epidemic?

When it comes to weight management, energy balance is king, not low-carbohydrate diets.

Background

The authors of a 2021 narrative review[68] argued against the energy balance model of obesity. They instead argued for the *carbohydrate-insulin model* (CIM), which asserts that a high-glycemic diet increases fat gain and that this fat gain drives a positive energy balance, perpetuating a cycle of continued excess weight gain. Additionally, the authors of the narrative review stated that the EBM doesn't consider "biological mechanisms that promote weight gain."

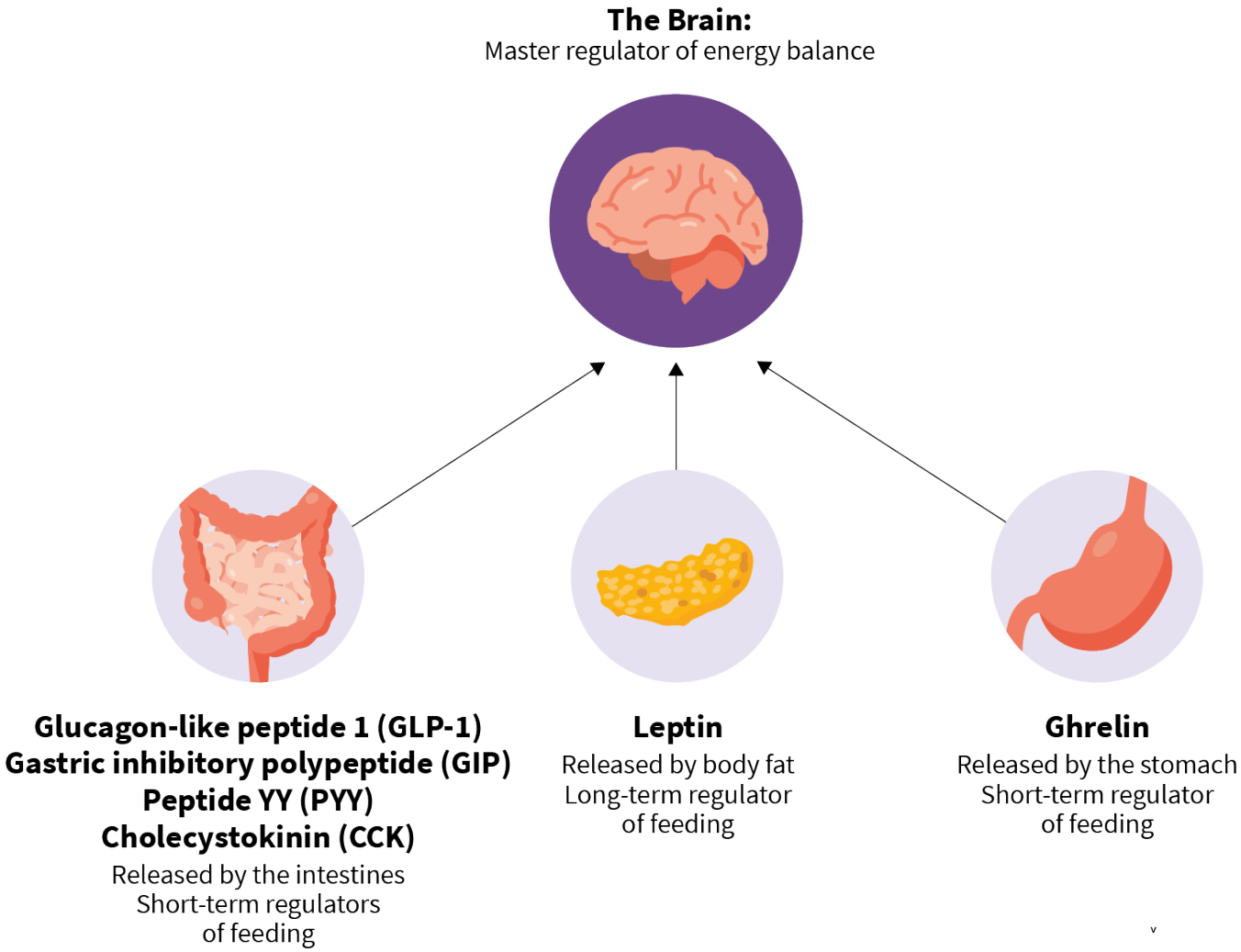
The role of carbohydrates and insulin in the etiology of obesity continues to be debated. What does the evidence say?

The study

The authors of the current narrative review responded to the aforementioned 2021 review, defending the EBM model. They described the EBM, CIM, and relevant data from studies assessing rodents, human genetics, epidemiology, and dietary and pharmacological interventions.

The results

The Energy Balance Model of Obesity: The EBM states that the brain is the main organ responsible for body weight regulation, coordinating with the endocrine, metabolic, and nervous systems. The brain modulates food intake unconsciously, responding to environmental influences and the body's energy needs. This occurs through short-term signals sent to the brain between and during meals (e.g., ghrelin, PYY, GLP-1) and long-term signals (e.g., leptin) released from adipose tissue, which tell the brain how much stored energy (i.e., body fat) is available. Thus, while *daily* energy intake and energy balance can be highly variable, regulation of energy balance is achieved over *long* durations.



In addition, macronutrient intake affects whole-body net oxidation rates of carbohydrate, fat, and protein, so that overall energy imbalances are primarily reflected as fat imbalances, regardless of the macronutrient composition of the diet. For example, if someone eats in an energy surplus, with the excess calories primarily derived from protein, the body will convert the excess protein to glucose, and fat oxidation (or "fat-burning") will decrease because protein is being used as fuel, resulting in a positive fat balance.

The authors state that the characterization of the EMB in the aforementioned narrative review as a theoretical model that "essentially disregards knowledge about the biological influences on fat storage"[68] is incorrect and is an oversimplification of the EBM.

The Carbohydrate-Insulin Model of Obesity: The CIM states that obesity results from high carbohydrate intake driving excess insulin secretion, causing adipose tissue to accumulate and "trap" fat, preventing nonadipose tissues from getting fuel. The authors of the current review noted that fat storage can occur in the absence of dietary carbohydrates or increases in insulin and that many factors beyond dietary carbohydrates determine insulin secretion.

🔍 Digging Deeper: Do you need insulin to store body fat?

As described by the authors of the current review, a core tenant of the CIM is that carbohydrates stimulate insulin secretion and that insulin promotes body fat storage. However, the provision of triglycerides intravenously promotes body fat storage, even when insulin is at fasting levels.[69][70] In addition, high insulin levels in a fasted state do not promote fat storage.[71][72] Thus, while insulin does promote body fat storage, largely by suppressing the breakdown of fat cells in adipose tissue,[73] net fat storage is determined by the energy available to store (i.e., calories in) and the energy that is oxidized (i.e., calories out).

The authors also noted that the CIM, as described in the recent narrative review, is different from its previous iterations in that "all obesogenic factors (e.g., amount of dietary protein, micronutrients, poor sleep, stress, physical inactivity, and environmental endocrine-disrupting chemicals) affect insulin secretion or adipocyte biology directly, with increased energy intake and decreased energy expenditure as necessary downstream consequences." In this way, the authors state that the current CIM is an "oversimplified version of the EBM, with a focus on glycemic load as the main driver of excess energy intake."

Evaluation of the EBM and CIM:

- Rodent studies: The authors noted that most standard laboratory rodent diets are high in carbohydrates and do not induce obesity, whereas diets with lower percent carbohydrates and higher percent fat often induce obesity. Additionally, standard laboratory rodent diets contain carbohydrates derived from corn starch, maltodextrin, and sucrose, all of which have a high glycemic index.
- Human genetics: The EBM implicates the brain as the primary organ responsible for obesity, whereas the CIM implicates adipose tissue. Other than rare mutations in the leptin gene, no genetic disorders primarily affecting fat calls or insulin have been reported to cause obesity. In contrast, genome-wide association and gene expression studies have determined that variations in adiposity between people are primarily due to differences in genes most highly expressed in the brain.
- Human epidemiological studies: Evidence does not suggest that carbohydrate intake is the main driver of the U.S. obesity epidemic. Epidemiological evidence finds that obesity risk is based on

long-term adherence to various healthful dietary patterns, with variable carbohydrate contents.

- Human diet intervention studies: The CIM predicts that long-term weight loss occurs by reducing dietary carbohydrate and glycemic load, resulting in less hunger, lower food intake, and increased energy levels.[68] However, diet intervention studies have found that low glycemic load diets do not result in greater weight loss than higher glycemic load diets. Additionally, long-term diet intervention studies comparing low-fat and low-carbohydrate diets controlling for protein intake do not report a difference in weight loss.
- Human pharmacological intervention studies: The CIM states that high insulin levels induce weight gain by inhibiting adipose tissue lipolysis, thereby trapping fat in fat cells.[68] However, inhibiting adipose lipolysis with acipimox treatment does not affect energy intake, resting energy expenditure, or body composition, and GLP-1 receptor agonists (medications used to treat obesity) acutely increase insulin secretion.

The big picture

The controversy surrounding carbohydrates, insulin, and obesity is unlikely to end anytime soon. As such, it's worth revisiting prior issues of Study Summaries that have shed light on the topic:

The September 2020 issue of Study Summaries includes a review of a secondary analysis of another randomized controlled trial that analyzed the estimated caloric requirements of participants on either a low- or high-carb diet during a weight-maintenance period. The average estimated caloric requirements were about 245 kcal/day higher in the low-carb group than in the high-carb group. However, the interindividual variability was high, and some of the methodology used in the original trial has been hotly contested.

The December 2020 issue of Study Summaries includes a review of a 4-week crossover study comparing the effects of a plant-based *low-carbohydrate diet* (LCD: 10% carbs, 50% fat, 40% protein), an animal-based LCD (10% carbs, 60% fat, and 30% protein), and a *low-fat diet* (LFD: 61% carbs, 21% fat, and 18% protein) on body composition and blood markers. All three diets resulted in weight loss, but the plant-based LCD group lost more weight than the LFD.

The January 2021 issue of Study Summaries includes a review of a meta-analysis of 38 randomized controlled trials that investigated the effects of low-carb diets, low-fat diets, or both, on weight loss and blood lipids. Low-carb dieters lost about one additional kilogram of weight overall, and this difference was most notable when the diets ranged from 6 to 12 months. Triglycerides were reduced more by low-carb diets, whereas LDL-C, HDL-C, and total cholesterol were reduced more by low-fat diets.

The same January issue of Study Summaries includes a review of a systematic review of 8 randomized controlled trials comparing saturating fat intakes and measurements of body weight, blood glucose, cholesterol, and blood pressure among adults with a BMI of at least 25 who ate either a low-carb, high-fat

diet (LCHF) or a low-fat diet (LF). Both diets resulted in significant weight reduction, improved blood glucose levels and inflammatory markers, and lowered blood pressure. The reduction in LDL cholesterol was stronger in the LF diet group, while increased HDL cholesterol and reduced triglycerides were observed in the VLCHF group.

The same January issue of Study Summaries includes a review of an 18-month study assessing the effects of a *low-carbohydrate Mediterranean diet* (LCMD) on hepatic fat content and visceral adipose tissue compared to a *low-fat diet* (LFD). The participants in the LCMD group had a greater reduction in hepatic fat content than the participants in the LFD group. After adjusting for changes in visceral adipose tissue, the LCMD group also experienced greater improvements in blood lipids, blood pressure, and cardiovascular risk score.

The March 2021 issue of Study Summaries includes a review of a crossover study in which participants followed a *low-carb diet* (LCD: 10% carbs, 75% fat) and a *low-fat diet* (LFD: 75% carbs, 10% fat) for two weeks each. The two diets led to similar weight loss (1–2 kg / 2.2–4.4 lb, over two weeks). However, the low-fat diet led to a greater reduction in fat mass, whereas the low-carb diet led to a greater reduction in fat-free mass.

The same March issue of Study Summaries includes a review of a meta-analysis of 18 randomized controlled trials that investigated the effects of a ketogenic diet compared to a low-fat control diet. The ketogenic diet reduced body weight, BMI, fat mass, fat-free mass, waist circumference and visceral fat, lean body mass, and body fat percentage, compared to a low-fat diet. Variability between studies was found for body weight, fat mass, and BMI. BMI was not reduced in studies that included only women.

The September 2021 issue of Study Summaries included a review of a meta-analysis of randomized controlled trials assessing the relative effectiveness of *low-fat/high-carb* (LFHC) and *low-carb/high-fat* (LCHF) diets on weight loss and cardiovascular risk factors. Compared to LFHC diets, LCHF diets resulted in a greater weight loss (−1.01 kg) and a greater increase in HDL-C (+7.7 mg/dL). However, LCHF diets resulted in a smaller decrease in total cholesterol and LDL-C (−24.4 and −22.8 mg/dL, respectively).

The December 2021 issue of Study Summaries includes a review of a 6-month, nonrandomized controlled trial in which participants consumed either a *low-carb diet* (LCD) or a *low-fat diet* (LFD). Compared to baseline, both diets improved triglycerides, HDL-C, diastolic blood pressure, fasting blood glucose, and waist circumference. The only significant difference between groups was for triglycerides, which showed greater reductions with the LFD.

The February 2022 issue of Study Summaries includes a review of a 6-month randomized controlled trial that randomized people with type 2 diabetes to follow a *low-carb, high-protein diet* (LCHP: 14% carbohydrates, 28% protein, 58% fat) or a *low-fat diet* (LFD: 53% carbohydrates, 17% protein, 30% fat). Body weight decreased in the LCHP group compared to the LF diet (−4.1 vs. −1.0 kg), and markers of glycemic control improved to a greater extent in the LCHP group compared to the LF diet.

The March 2022 issue of Study Summaries includes a review of a meta-analysis of 61 randomized controlled trials comparing the effects of *low-carb weight-reducing* (LCWR) diets with *balanced-carbohydrate weight-reducing* (BCWR) diets on body weight and cardiovascular risk factors among 6,925 participants with obesity. Participants without T2D experienced greater weight loss (−1.07 kg) in the low-carbohydrate diet group over 3 to 8.5 months, compared to the balanced-carbohydrate diet group. Similarly, there was greater weight loss (−0.93 kg) in the low-carbohydrate diet group over 1 to 2 years. Participants with T2D experienced greater weight loss (−1.26 kg) in the low-carbohydrate group over 3 to 6 months, compared to the balanced-carbohydrate diet group. However, at 1 to 2 years, there was no difference in weight loss between groups.

#EditorsPick, #Dietitians, #Obesity, #Type2Diabetes

Ultraprocessed food intake and mortality

This meta-analysis of prospective studies reported an increased risk of mortality associated with higher overall intakes of ultraprocessed food, sugar-sweetened beverages, artificially sweetened beverages, and processed/red meat.

Background

Ultra processed food (UPF) intake has been associated with overeating, noncommunicable disease, and mortality, but the NOVA system for classifying UPFs is often criticized for overly broad categorizations.

The NOVA system for food categorization in a nutshell

The NOVA (not an acronym) classification categorizes foods into four groups differing in terms of the degree of processing:

1. Unprocessed or minimally processed foods: foods that can be eaten with little to no modification, although removing inedible parts, pasteurization, and drying is fine.
2. Processed culinary ingredients: food products derived from plants and animals but not meant to be consumed by themselves, like oil, butter, sugar, and salt. These are used to enhance or season unprocessed foods.
3. Processed foods: foods made by combining processed culinary ingredients with unprocessed foods. Examples include cheese, canned fish, fruits in syrup, etc.
4. Ultra-processed foods: edible combinations made mostly of substances derived from food

(flour, sugar, oil) and additives (minerals, preservatives) with little, if any, intact unprocessed food. Examples include soft drinks, snacks, and frozen meals.

How does the intake of subgroups of UPFs influence the risk of mortality?

The study

This meta-analysis included 40 prospective cohort studies, involving a total of 5,750,133 adult participants, that evaluated the association between UPF intake and risk of mortality.

The NOVA system was used to classify foods according to their extent of processing (e.g., none/minimal, culinary ingredients, combinations of the latter two categories, few whole/natural food components and additives).

The relative risk for all-cause mortality was compared between the highest vs. lowest intake of subgroups, including overall UPFs (5 studies), processed/red meat (22 studies), sugar-sweetened beverages (9 studies), artificially sweetened beverages (6 studies), and breakfast cereals (10 studies). Most of the included studies adjusted for age and sex, but not lifestyle or socioeconomic factors.

The results

Higher UPF, sugar-sweetened beverage, artificially sweetened beverage, and processed/red meat intakes were associated with an increased risk of mortality (by 29%, 11%, 14%, and 15%, respectively). A higher intake of breakfast cereals was associated with a 15% lower risk of mortality.

Note

Breakfast cereals are still considered to be UPFs but are often consumed in the mornings. A 2020 meta-analysis reported that eating breakfast is associated with a 25% lower risk of mortality.[129]

Check out this Study Deep Dive article, which gives more detail about UPFs and how they may influence eating habits and health.

#Dietitians

Associations between a vegetarian diet and bowel health

Vegetarians in this U.S. cohort consumed a relatively low amount of fiber and showed no differences in bowel health compared to nonvegetarians. However, some of the data are considered unreliable due to the small sample size in the vegetarian cohort.

Background

Western populations fail to consume the recommended amount of fiber of 25 to 30 grams per day. However, vegetarians eat an abundance of plant foods and presumably consume fiber at or above the recommended amount. High-fiber diets also promote bowel health and result in increased stool frequency. Is the vegetarian diet associated with less constipation and differences in defecating function than a nonvegetarian diet?

The study

This cross-sectional study of 9,531 omnivores and 212 self-identified vegetarians from the U.S. National Health and Nutrition Examination Survey (NHANES) explored the differences in bowel health among these two populations. Bowel health was measured using bowel movement frequency, the Bristol Stool Form Scale, and the Fecal Incontinence Severity Index.

The results

The vegetarians consumed fewer calories and lower moisture in food and beverages but had a higher fiber intake than the omnivores. Fiber intake among the vegetarian group was still relatively low (21 grams/day).

There were no differences in measures of bowel health between the vegetarian and omnivore groups.

Note

The researchers noted that they adhered to the National Center for Health Statistics Data Presentation Standards for Proportions,[286] and as such, the measures for constipation, bowel movement frequency (<3 times per week, ≥15–21 times per week, and ≥21 times per week), gas leakage (once per week and 1 to 3 times per month), and fecal incontinence among the vegetarians in this cohort should be considered unreliable due to the small sample size.

#Dietitians

Low-carbohydrate diets and mortality risk in Asian populations

In middle-aged and older Asian adults, adherence to a low-carbohydrate diet was not associated with mortality risk. However, adherence to plant-based low-carbohydrate diets was positively associated and adherence to meat-based low-carbohydrate diets was negatively associated with mortality risk.

Background

There is a lack of research that examines the links between long-term adherence to a *low-carbohydrate diet* (LCD) and mortality and also accounta for the quality and source of the carbohydrates.

The study

In this retrospective cohort study, the researchers used data from the Guangzhou Biobank Cohort Study

(GBCS)[335] to investigate the links between LCDs, as well as different types of LCDs (meat-based and plant-based), and the risk of all-cause, cancer, and *cardiovascular disease* (CVD) mortality in Asian populations. A total of 20,206 participants (ages ≥50) were included in the analyses.

The researchers used data from food frequency questionnaires to calculate the following diet scores:

- Overall LCD score: Calculated according to the percentages of energy from carbohydrate, fat, and protein
- Meat-based LCD score: Calculated according to the percentages of energy from low-quality carbohydrates (refined grains, added sugar, fruit juice, potatoes, and other starchy vegetables), animal protein, and saturated fat.
- Plant-based LCD score: Calculated according to the percentages of energy from high-quality carbohydrates (whole grains, whole fruits, legumes, and nonstarchy vegetables), plant protein, and unsaturated fat.

The researchers adjusted the analyses to account for the potential effect of confounding or mediating variables, including sex, age, socioeconomic factors, lifestyle factors, BMI, systolic blood pressure, total cholesterol, and fasting glucose.

The results

During an average duration of 15 years, 4,624 deaths occurred, including 1,534 from cancer, 1,783 from CVD, and 1,307 from other causes.

In the fully adjusted analyses, the overall LCD score was not associated with all-cause or cause-specific mortality. The highest (compared to the lowest) quartile of plant-based LCD scores was associated with 16% and 39% higher risks of all-cause and CVD mortality, respectively. The highest (compared to the lowest) quartile of meat-based LCD scores was associated with 11% and 19% lower risks of all-cause and CVD mortality, respectively.

The results were similar when the analyses were restricted only to participants with diabetes.

#Dietitians

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Editor's Picks

Taking protein or amino acids postexercise might reduce inflammation and oxidative stress

This systematic review found that supplementation with protein or amino acids reduced postexercise inflammation or oxidative stress in some (but not most) studies. This inconsistency may be due to study heterogeneity, insufficient sensitivity (biomarker assessment), or insufficient power (study controls and analysis).

Background

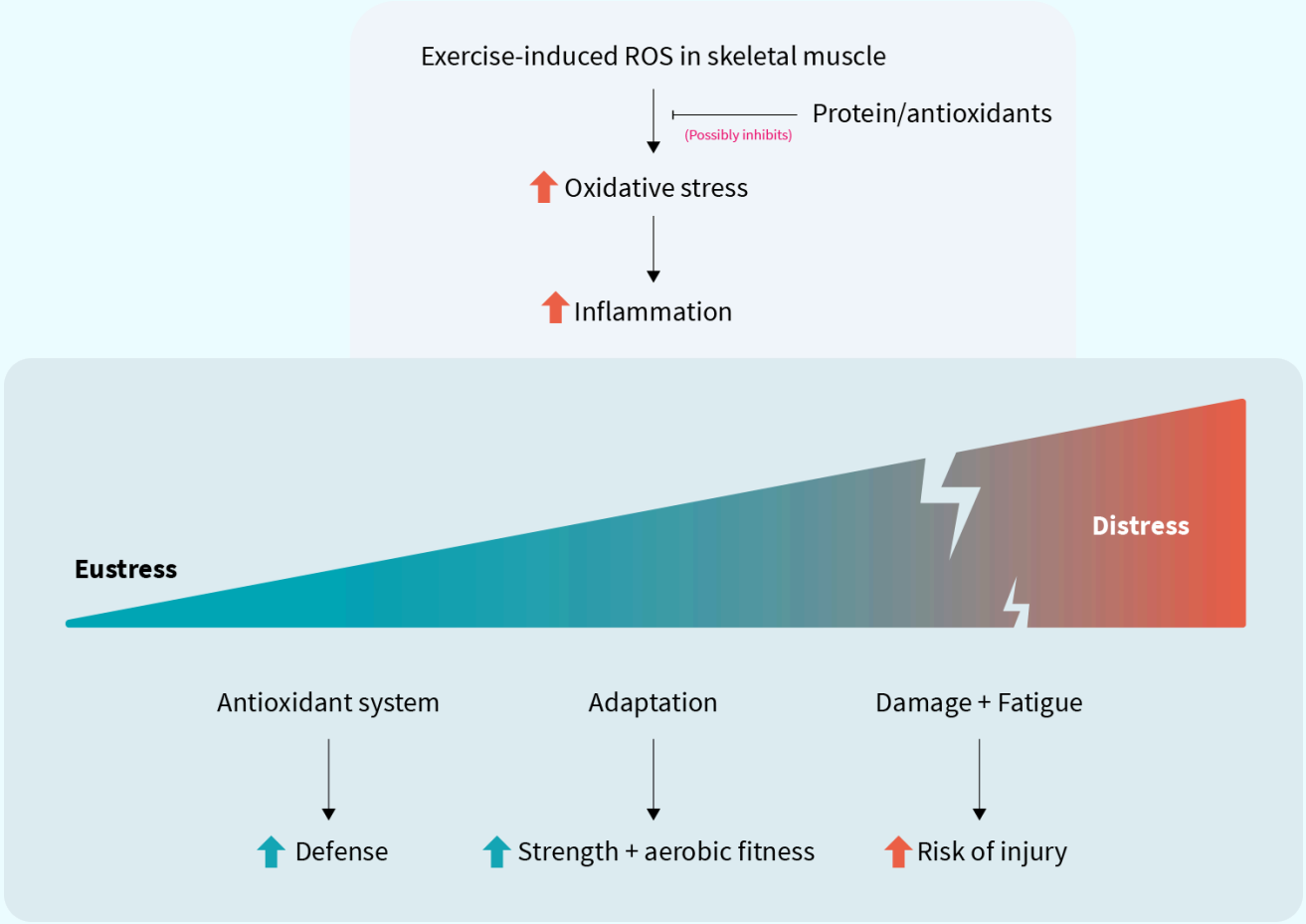
Inflammation and *reactive oxygen species* (ROS) are necessary and important modes of signaling for muscle adaptation and regeneration, but they can also cause damage if left unchecked. Proper protein intake is crucial for recovery from exercise, and some animal studies suggest that protein has antioxidant and anti-inflammatory effects. Can it affect postexercise inflammation and oxidative stress in humans?

Digging Deeper: The balancing act of ROS and inflammatory signaling in muscle adaptation

Skeletal muscle generates ROS at rest, primarily from mitochondrial inefficiencies during energy metabolism. The neural and physical stress of muscle contraction during exercise, as well as the increased energy and oxygen demand, increase ROS production substantially, primarily from *reduced nicotinamide adenine dinucleotide phosphate* (NADPH) oxidase, an enzyme that mediates cell signaling and regulation of gene expression through the production of ROS.[6] Increased ROS levels alter the potential for the transfer of electrons between molecules (often referred to as redox potential) in muscles and can modify redox-sensitive proteins. If modified, redox-sensitive signaling pathways (e.g., nuclear factor erythroid 2-related factor 2, or nrf2) can activate various physiological responses/adaptations through regulation of gene expression (e.g., mitochondrial biogenesis via antioxidant response element activation).[7] Ideally, the exercise stress is enough to trigger an adaptive response (i.e., oxidative eustress) that promotes physiological changes, such as increasing mitochondria numbers to improve aerobic capacity, to prepare the body's response to another period of exercise stress in the future without purportedly causing too much damage that may prevent proper recovery. This damage could lead to overtraining and oxidative distress,

although there are likely other factors involved.[8][9][10]

At the same time, the increase in ROS and regulation of gene expression can signal the immune response of inflammation. While some factors may exert pro- or anti-inflammatory action, they generally signal muscle stress and damage and recruit a scavenger and recovery response to eliminate damaged cells and repair tissues.[11][12] ROS and inflammation can interact in a vicious cycle, depending on other stressors beyond exercise (e.g., smoking, disease, and aging), but within tolerable stress levels, ROS and inflammation serve as important signals for adaptation.



The study

This systematic review of 34 randomized controlled trials involved healthy adult participants (99% male, average age of 24) who underwent postexercise interventions consisting of whole protein (18 studies on whey, milk, etc.) or supplemental amino acid (16 studies on mixed amino acids, glutamine, taurine, etc.). The control interventions were flavored water, a carbohydrate beverage, or a sugar pill.

Study sample sizes ranged from 8 to 40 participants. Nineteen of the studies recruited trained athletes, 9 recruited recreationally active participants, and 6 recruited untrained participants.

Postexercise (less than 96 hours) markers of inflammation and oxidative stress included tissue sample levels of cytokines (e.g., interleukin-6, tumor necrosis factor-alpha), C-reactive protein, 8-hydroxydeoxyguanosine (an indicator of DNA damage), and total antioxidant capacity, among others.

The results

Most studies (20) did not demonstrate changes in postexercise levels of inflammatory or oxidative stress markers when compared to controls. Five studies on whole protein and 9 studies on supplemental amino acid interventions reported either anti-inflammatory or antioxidant effects in some markers when compared to controls.

Note

These results should be interpreted with caution for the following reasons:

- The study designs were very inconsistent, with varying doses, durations, whole protein or amino acid sources, and population characteristics.
- The intervention and diet were not always properly controlled, which could indirectly influence biomarkers of inflammation and oxidative stress.[13]
- Only a few biomarkers were measured in each study, and many can be very sensitive or dependent on the specific assay or sample used.[14][15]
- Several studies did not include these measurements as primary outcomes and were likely not sufficiently powered to detect differences.

The big picture

Protein's purported antioxidant effects are partially explained by its ability to enhance the availability of glutathione, a cofactor involved in the endogenous antioxidant response. It has also been shown to dampen inflammatory signaling, but the reports fueling these purported effects are primarily from animal and cell studies.[16][17] One human study that reported an antioxidant benefit involved a special carbohydrate and whey protein cake. In this case, not only does the combination with carbohydrate make it difficult to determine whether benefits were derived from the protein, carbohydrate, or both, but the participants also underwent "exhaustive cycling."[18] There may be more nuance to this relationship, such as the existence of an effect only following excess high-intensity exercise (or overtraining) that may trigger a high level of oxidative stress and oxidative distress.

There is also some controversy regarding whether antioxidant supplementation may interfere with redox signaling and blunt exercise-induced adaptation and recovery. A well-designed 11-week RCT from 2014 reported that supplementation with the antioxidants vitamins C and E decreased markers of exercise-induced cellular adaptation despite no difference in performance measures when compared to placebo.[19] A meta-analysis from 2020 reported that vitamin C and/or E supplementation that lasted more than 4 weeks did not influence aerobic or resistance training-induced adaptations in physiological

function.[20] A systematic review from 2022 reported that antioxidant supplementation before or during exercise can delay fatigue, reduce muscle damage, and decrease recovery time, [21] while a Cochrane systematic review from 2020 reported that antioxidant supplementation does not result in a clinically relevant reductions of muscle soreness.[22]

While novel, more precise tools are being developed to allow for a greater understanding of redox signaling and intricate cell communication, it appears that more research is needed to understand the subtlety in the relationship between exercise-induced ROS, adaptation, and protein supplementation. Since most of the underlying mechanisms involved in these relationships have been explored in animal models (some have yet to be proven) and studies are limited by various aspects of intervention (e.g., exercise duration, type, intensity), sample type (i.e., systemic vs. localized), measurement methods, and sensitivity (e.g., differences in hydration are not always monitored but can influence concentrations of analytes), the specifics are still being teased out.[7] [11][15] Alternatively, the null result may very well suggest that exercise-induced oxidative stress and inflammation are an important stimulus for muscle adaptation.

#EditorsPick, #SportsNutrition

Can a Mediterranean diet decrease liver fat without decreasing body weight?

In this 12-week randomized controlled trial, an ad libitum low-fat diet and Mediterranean diet similarly decreased liver fat and insulin resistance in adults with nonalcoholic fatty liver disease.

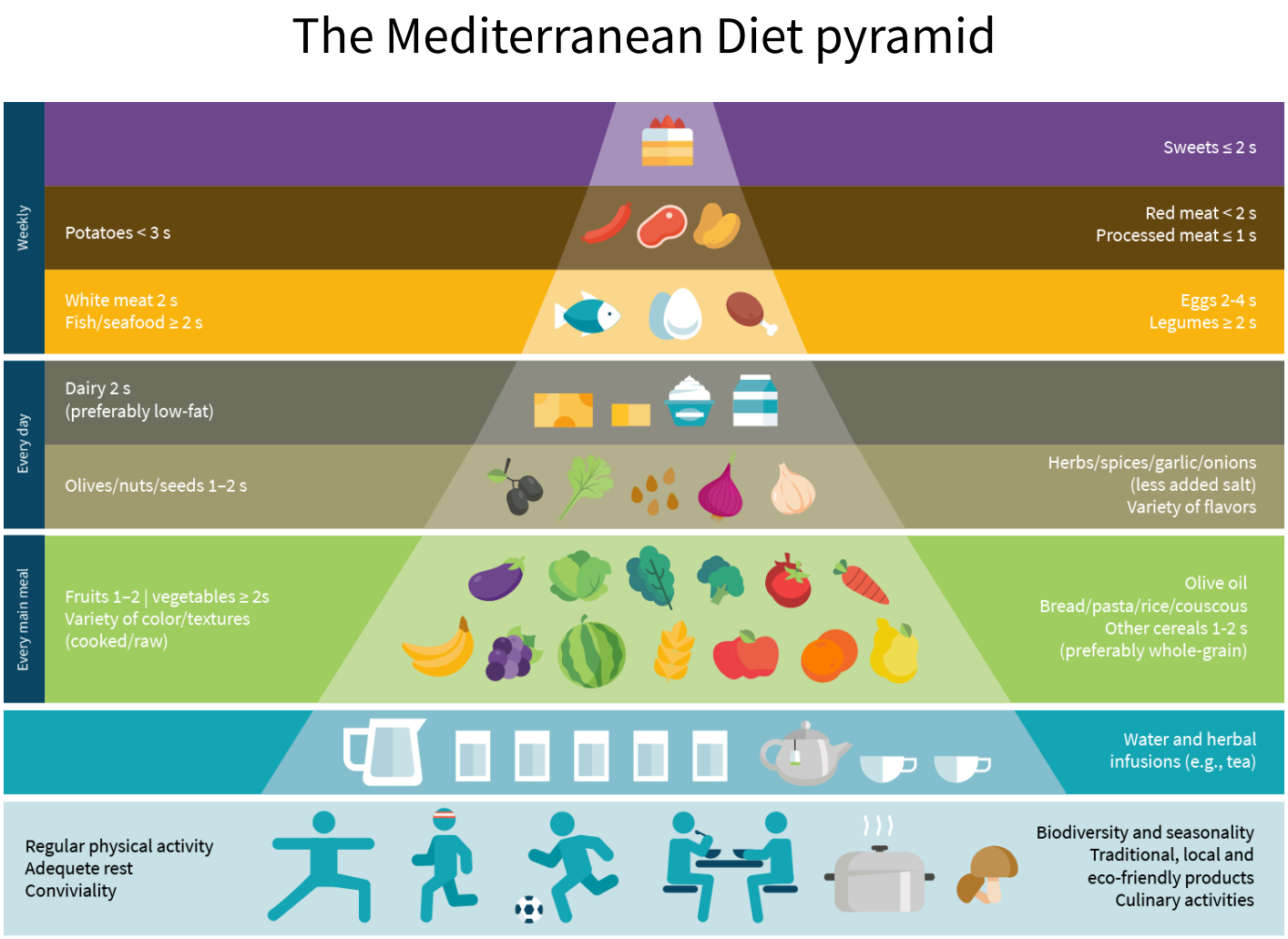
Background

Nonalcoholic fatty liver disease (NAFLD) is the most common cause of liver disease worldwide and affects about 25% of adults.[228] Diet and lifestyle interventions aimed at reducing body weight are the cornerstones of NAFLD treatment, as there are no approved medications for the condition. However, most people are unable to maintain substantial weight loss in the long term, which necessitates alternative treatment strategies. A *Mediterranean diet* (MedDiet) has demonstrated the potential to improve features of NAFLD without significant changes in body weight.[229][230]

The study

In this 12-week randomized controlled trial, 42 participants (average age of 52) with NAFLD and insulin resistance (43% of the participants had type 2 diabetes) were assigned to consume either a MedDiet or a *low-fat diet* (LFD). The LFD was based on the Australian Dietary Guidelines, which equated to about 30% of total energy from fat, 50% from carbohydrate, and 20% from protein. The MedDiet was based on a traditional Cretan diet, which equated to about 45% of energy from fat (more than 50% of which was monounsaturated fat), 35% from carbohydrate, and 20% from protein. There were no energy restrictions placed on either diet. Dietary adherence was assessed in face-to-face interviews using three-day food diaries at baseline, week 6, and week 12.

The primary outcome was liver fat measured by magnetic resonance spectroscopy. The secondary outcomes were *homeostatic model assessment for insulin resistance* (HOMA-IR), visceral fat (measured using bioelectrical impedance analysis), liver stiffness (measured using Fibroscan), markers of liver damage (*alanine aminotransferase* ALT, aspartate aminotransferase, *gamma-glutamyl transferase* GGT, and alkaline phosphatase), blood pressure, blood lipids, and *high-sensitivity C-reactive protein* (a marker of inflammation).



Adapted from Bach-Faig et al., *Public Health Nutr.*, 2011.PMID:22166184

The results

Compared to baseline, there was a 17% reduction in liver fat in the LFD group and a borderline significant 8% reduction in liver fat in the MedDiet group. With respect to secondary outcomes, visceral fat decreased in both groups compared to baseline, with no difference between groups. There was a −1.0 point reduction in HOMA-IR in the LFD group and a *borderline significant* −0.5 point reduction in the MedDiet group, compared to baseline. Compared to the MedDiet group, ALT and GGT decreased in the LFD group. There were no significant changes in body weight in either group, which may have been due to the small

sample size, though body weight decreased by −3.5% in the LFD group, while body weight did not change in the MedDiet group.

Note

The secondary outcomes should be considered exploratory because the researchers did not adjust for multiple comparisons despite the inclusion of numerous outcomes (which increases the risk of false-positive results), and the sample size was small.

At baseline, visceral fat and fasting plasma glucose were significantly higher in the LFD group than in the MedDiet group.

The big picture

On the surface, the results of this trial suggest that a healthy LFD and a MedDiet are similarly effective for reducing liver fat and insulin resistance in adults with NAFLD. However, the results are more intriguing than they may seem. Clinically meaningful reductions in liver fat occurred in both groups without intentional caloric restriction (i.e., the diets were consumed *ad libitum*). Moreover, there was a clinically meaningful reduction in liver fat in the MedDiet group without corresponding changes in body weight.

Weight loss generally reduces liver fat, so a hypocaloric diet alone or in conjunction with increased physical activity to produce a weight loss of at least 3–5% of body weight is recommended for people with NAFLD.[231] That said, it's unsurprising that liver fat decreased in the LFD group, considering there was an average body weight reduction of about 3.5%. In contrast, it is somewhat surprising that there was a clinically meaningful reduction in liver fat in the MedDiet group because there was no change in body weight.

In agreement with the findings of this study, other evidence suggests that a MedDiet reduces liver fat and improves cardiometabolic risk factors independent of changes in body weight. In a 6-week crossover trial published in 2013, participants with NAFLD consumed a MedDiet and a LFD.[229] There was a nonsignificant decrease in body weight with both diets (MedDiet: −1.0 kg vs. LFD: −2.4 kg). However, the decrease in liver fat was greater with the MedDiet than with the LFD (−39% vs. −7%), and insulin sensitivity improved with the MedDiet compared to baseline, while it did not change with the LFD.

In a randomized trial published in 2018, participants with NAFLD were assigned to either a MedDiet or a LFD for 12 weeks.[230] Similar to the above findings, there were notable reductions in liver fat (MedDiet: −32.4% vs. LFD: −25.0%) with nonsignificant changes in body weight (MedDiet: −2.1 kg vs. LFD: −1.6 kg), but the changes in liver fat were not significantly different between groups.

In these studies, most of the participants assigned to the MedDiet underwent a few significant dietary changes relative to their usual diet:

- Their monounsaturated fat intake increased.

- Their polyunsaturated fat intake increased, namely, omega-3 polyunsaturated fatty acids.
- Their saturated fat intake decreased.
- Their added sugar intake decreased.

Two randomized controlled trials have demonstrated that a diet high in monounsaturated fat substantially decreases liver fat in people with prediabetes or type 2 diabetes without changing body weight, compared to a high-fiber diet.[232][233] In addition, saturated fat seems to promote increases in liver fat, compared to polyunsaturated fat (mainly omega-6 polyunsaturated fatty acids),[234][235][236] and supplementing with omega-3 polyunsaturated fatty acids has been shown to reduce liver fat.[237] Lastly, a high intake of simple sugars, namely fructose, can increase liver fat independent of changes in body weight,[238][239] and restricting simple sugar intake effectively reduces liver fat.[240][241][242][243]

The most effective way to decrease liver fat is by consuming a hypocaloric diet and achieving a weight loss of at least 5% of body weight. However, evidence from mechanistic studies, observational studies, and randomized controlled trials demonstrate that the MedDiet and its individual components (e.g., olive oil, fatty fish, nuts, vegetables) have beneficial effects on features of NAFLD.[244] Therefore, transitioning from a Western diet rich in saturated fat and refined carbohydrates to a MedDiet has the potential to produce clinically meaningful reductions in liver fat without significant changes in body weight.

#Dietitians, #EditorsPick, #LiverDisease

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Fat Loss

Are small changes the key to unlocking weight maintenance?

In this 3-year randomized controlled trial, small changes to diet and physical activity slightly decreased body weight over 3–15 months compared with the control, but there was no difference in body weight between groups at 18–36 months.

Background

Modest weight gain (0.5–1.0 kilograms per year; kg) in adults who are overweight or obese is associated with an increased risk of certain cancers,[130] all-cause mortality,[131] and deterioration of health-related quality of life.[132] It's estimated that a reduction of about 100–150 kcal/day is required to prevent positive energy balance (i.e., taking in more calories than the body can burn) in most adults.[133] Could an approach focused on small changes to diet and physical activity improve long-term weight management?

The study

This 3-year randomized controlled trial examined whether small changes in physical activity and diet could prevent weight gain in 320 participants (average age of 53) who were overweight or obese.

In phase I, the participants were assigned to either maintain their usual lifestyle (the control) or use the *small change approach* (SCA), which consisted of 17 group-based sessions and 9 individual counseling sessions (20 hours of contact total). The participants assigned to SCA were asked to increase their daily step count by 2,000, reduce their daily calorie intake by 100 kcal, and maintain these goals for the duration of the 2-year intervention. The participants in SCA also set weekly goals and developed a plan to maintain their small change goals. Additionally, the participants in SCA submitted dietary and physical activity logs and their SCA plan each week. Phase II was a 1-year passive follow-up period.

The primary outcome was change in body weight, which was assessed at baseline and 3, 6, 9, 12, 15, 18, 24, 30, and 36 months.

The results

Body weight decreased 1.0 to 2.0 kg in SCA at 3, 6, 12, and 15 months, compared with the control group, but was no different between groups at 18, 24, 30, or 36 months.

Among participants who were overweight, weight gain was 2.4 kg and 2.2 kg less in SCA than in the control at 24 and 36 months, respectively. Among participants with obesity, body weight decreased in SCA compared with the control during the first year, but there was no difference between groups at 24 or 36 months.

#Dietitians

Do subnormal testosterone levels normalize after bariatric surgery in male adolescents?

This ancillary study found that in the 5 years after bariatric surgery and weight loss in male adolescents with severe obesity, total and free testosterone concentrations increased markedly.

Background

Obesity in both male adolescents and adults is negatively associated with testosterone concentrations. Importantly, research suggests that testosterone concentrations improve markedly following bariatric surgery in adult men with obesity. Therefore, it is possible that a similar improvement may be observed in male adolescents with obesity. This study explored this possibility.

The study

This was an ancillary study based on data from the (Teen-LABS) study,[249] a prospective cohort study that enrolled adolescents with severe obesity who were undergoing bariatric surgery.

In the ancillary study, the researchers examined the changes in a number of hormones in 34 male participants (ages 14–20) from the Teen-LABS study over a period of up to 5 years after bariatric surgery.

The hormones measured were total testosterone, free testosterone, estradiol, *sex hormone-binding globulin* (SHBG), *luteinizing hormone* (LH), and *follicle-stimulating hormone* (FSH).

The results

On average, the study participants lost one-third of their body weight after bariatric surgery. Maximum weight loss was achieved by year 1, with a slight regain noted between years 2 and 3.

Total testosterone increased from 6.7 nmol/L (below the normal range) to 17.6 nmol/L (within the normal range) at 2 years and to 13.8 nmol/L (within the normal range) at 5 years. Before surgery, 79% of the participants had subnormal total testosterone levels. At 2 and 5 years after surgery, only 15% and 22%, respectively, of the participants had subnormal total testosterone levels.

Similarly, free testosterone increased from 0.17 nmol/L (below the normal range) to 0.34 nmol/L (within the normal range) at 2 years and to 0.27 nmol/L (within the normal range) at 5 years. Before surgery, 73% of the participants had subnormal free testosterone levels. At 2 and 5 years after surgery, only 20% and 33%, respectively, of the participants had subnormal free testosterone levels.

#Dietitians, #Obesity

The effect of a short-term low-fiber diet on body mass

In this noncontrolled trial, healthy men consumed their usual diet for 7 days and then decreased their fiber intake by 23 grams per day for 4 days. The low-fiber diet decreased body mass by 0.58 kilograms.

Background

Body mass is frequently manipulated by athletes involved in weight-sensitive sports (e.g., combat sports, weightlifting) in an attempt to gain a competitive advantage over their opponents. For example, reducing body mass allows athletes to compete in lower weight categories against opponents with short limb lengths and lower power-to-body-mass ratios. Acute alterations in dietary fiber intake can reduce body mass by reducing the mass of undigested fiber, bacteria, and water retained in the intestines. However, a study had yet to quantify the extent to which low-fiber diets can reduce body mass in the short term.

The study

In this 12-day noncontrolled trial, 19 healthy, physically active men (average age of 32) consumed their habitual diet (HAB; about 30 grams of fiber per day) for 7 consecutive days and then switched to a low-fiber diet (LOW; < 10 grams of fiber per day) that was matched for energy, macronutrient, fluid, and sodium content for 4 consecutive days. Daily exercise load was also matched between conditions.

The primary outcomes were body mass (measured daily upon waking and after first urination using a digital scale provided by the research staff) and dietary intake (measured using the remote food photography method). The secondary outcomes were appetite (measured using a 100-point visual analog scale), stool type (measured using the Bristol Stool Scale Form), and stool frequency.

The results

Body mass was similar on days 1–3 of HAB and LOW. However, body mass was decreased in LOW compared to HAB on days 4 and 5. On average, body mass decreased by 0.58 kilograms (0.74%) during LOW. Thus, it takes about three days for detectable changes in body mass to occur when eating a low-fiber diet.

Stool frequency decreased from twice per day during HAB to once per day during LOW. Additionally, stool hardness increased on days 3 and 4 of LOW compared to HAB. Subjective hunger increased and fullness decreased in LOW compared to HAB.

Note

A limitation of this study was that meals were not provided to the participants during LOW. Although there were no reported differences in energy, macronutrient, sodium, or fluid consumption between conditions, there may have still been measurement errors by the participants that influenced body mass changes.

Also, because only men were included, the results are not necessarily generalizable to women, who may have slower gastrointestinal motility.[252]

#SportsNutrition

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Gut Health

Vitamin D supplementation for people with IBS

In this meta-analysis, vitamin D supplementation improved the severity of irritable bowel syndrome symptoms, but only when trials with moderate or high risk of bias were included in the analysis.

Background

According to observational research, there is a high prevalence of vitamin D deficiency in individuals with *irritable bowel syndrome* (IBS). However, it's unclear whether supplementation with vitamin D can improve the severity of IBS symptoms.

The study

This meta-analysis of 8 randomized controlled trials examined the effects of supplementation with vitamin D, compared to placebo, on IBS symptom severity (8 trials) and quality of life (4 trials) in 685 total participants with IBS.

The trials were conducted in Iran, Egypt, and the United Kingdom. The average age of the participants ranged from 16 to 41 years. In 4 trials, vitamin D was taken as a bolus dose of 50,000 IU twice per week, once per week, or every 2 weeks. In the other 4 trials, vitamin D was taken daily, with the dose ranging from 2,000 to 4,000 IU.

The results

In the main analyses, vitamin D supplementation improved IBS symptom severity to a small degree but did not affect quality of life.

In a subgroup analysis that excluded 1 trial published in a predatory journal, the effect of vitamin D on IBS symptom severity remained statistically significant. However, when only trials with a low risk of bias were included in the analysis, the effect became statistically insignificant.

Note

Predatory journals are journals that typically charge the authors publication fees without providing robust peer review or editorial services.[334]

#Dietitians

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Healthy Aging & Longevity

Exercise, mitochondria, adipose tissue, and aging

This cross-sectional study found that lifelong high-volume exercise training can ameliorate losses in the mitochondrial function of adipose tissue that occur with aging.

Background

Physiological function and metabolism gradually degrade as people age. Age influences mitochondria, which are the powerhouses of cells, and white adipose tissue, which is a key organ in energy balance and whose metabolism is mediated by mitochondrial function. This influence is particularly interesting because exercise training can improve mitochondrial health. Can lifelong exercise prevent age-associated losses in the mitochondrial function of adipose tissue?

The study

This cross-sectional study recruited 20 healthy and untrained men (10 with an average age of 26 and 10 with an average age of 67) and 12 older, healthy, and lifelong-trained men (average age of 69). The latter group was further divided into moderately trained (6 participants) and highly trained (6 participants) according to the exercise endurance test results.

The lifelong-trained participants self-reported that they performed ≥ 2 hours of endurance exercise training per week starting from late adolescence. Participant health status was verified by a medical doctor's review of electrocardiography results and blood glucose, lipoprotein, and C-reactive protein measures within normal reference ranges.

Exercise performance was evaluated by an incremental exercise test using a bicycle ergometer. Body composition was measured by DXA. On a separate day, fasting blood samples and biopsies of abdominal *subcutaneous white adipose tissue* (sWAT) and muscle tissue were obtained to measure markers of oxidative capacity (e.g., adiponectin, tumor necrosis factor-alpha, hydrogen peroxide) and mitochondrial health (e.g., respiratory capacity, turnover).

The results

Overall, mitochondrial respiratory capacity was lower in sWAT from older participants, compared to younger participants. However, mitochondrial respiratory capacity (attributed to higher mitochondrial content rather than improved efficiency) and markers of oxidative capacity were higher in sWAT from lifelong *highly* trained participants than all other groups.

#Dietitians, #SportsNutrition

Fruits, vegetables, nutrients, and arthritis

This cross-sectional study reports that an increased intake of micronutrients, fruits, and green vegetables is associated with a decreased risk of arthritis and osteoarthritis in older participants.

Background

Arthritis is associated with *cardiovascular disease* (CVD). A reduced risk of CVD is associated with fruit and vegetable intake, a healthy diet, and both intake and blood concentrations of antioxidants. [111][112][113] Is greater fruit, vegetable, and micronutrient intake also associated with a reduced arthritis risk?

The study

This cross-sectional study involved 33,966 participants (average age of 64; 50% male) who completed the Korea National Health and Nutrition Examination Survey between 2009 and 2019.

Diagnosis of arthritis, *osteoarthritis* (OA), or rheumatoid arthritis by a physician was self-reported. Covariates, such as demographics and anthropometrics (body measurements), and comorbidities (e.g., hypertension and depression) were obtained from medical checkups.

The participants estimated their daily intake of fruits, green vegetables, and other vegetables with a food frequency questionnaire and were divided into three groups by consumption: low, moderate, and high. Nutrient intake was estimated from a 24-hour recall.

The researchers analyzed urinary cotinine (a metabolite of nicotine) to verify smoking status (smoking is strongly associated with arthritis) and used the Framingham risk equation (based, by sex, on cholesterol concentrations, blood pressure, age, and smoking) to estimate the 10-year risk of CVD.

The results

The nearly 25% of participants who had arthritis or OA were more likely to be female, older, unemployed, and drinkers; participate in less physical activity; consume fewer micronutrients; and have poorer levels of cardiometabolic health markers.

Participants who consumed two times the amount of vitamins B_1 and B_2, polyunsaturated fats, and omega-3s daily showed a 7% lower risk of arthritis and OA (following adjustment for confounders).

Participants with arthritis were 28% and 26% more likely to consume a low amount of fruits and green vegetables, respectively; participants with OA were 30% more likely to consume a low amount of fruit.

Compared with lower CVD risk, a higher risk of CVD was associated with a 26% and 24% increased prevalence of arthritis and OA, respectively,.

Note

These results should be interpreted with caution due to the observational nature of the study, the use of

self-reported data, and the large number of variables involved in the analysis.

#Dietitians

Polygenic risk scores, fruit and vegetable intake, and cognitive decline

This cohort study found that <5 fruit and vegetable servings per day is associated with a 33–37% greater risk for dementia diagnosis. The increase in risk may be enhanced in the context of polygenic predisposition to Alzheimer's disease, schizophrenia, and general cognitive changes.

Background

Polygenic risk scores (PGS) are used to summarize the genetic predisposition for a certain trait or health condition. Greater *fruit and vegetable* (FV) intake has been associated with a reduced risk of cognitive decline. Can PGSs for cognitive decline and daily FV intake be combined to better evaluate the risk of dementia diagnosis?

The study

This cohort study involved 6,784 participants (average age of 65; 46% male) from the English Longitudinal Study of Aging during an average follow-up period of 10 years.

The PGS for Alzheimer's disease, schizophrenia, and general cognition were calculated using summary statistics from genome-wide association studies. The diagnosis of dementia was determined by self-reported physician diagnosis or from IQCODE (Informant Questionnaire on Cognitive Decline) assessment.[184]

FV intake was estimated by asking participants how many small glasses of fruit juice, tablespoons of fruits and/or vegetables, or how much salad (using a cereal bowl as the standard for measurement) was eaten. The data were categorized into a binary variable (i.e., ≥5 or <5 FV servings per day) based on the World Health Organization's recommendations to consume ≥5 servings of FVs per day.

Sex and genetic ancestry (including APOE-ε4, a strong genetic risk factor for Alzheimer's disease)[185] were included as covariates in the analyses.

The results

Overall, a total of 175 participants (4%) were diagnosed with dementia. The consumption of <5 FV servings/day was associated with a 33–37% greater risk for dementia diagnosis (depending on the genetic predisposition). A higher PGS for Alzheimer's disease was associated with a 24% greater risk of dementia diagnosis and a 47% greater risk of Alzheimer's disease diagnosis.

A multiplicative interaction (a combined effect that is larger than the product of the individual effects) was observed between greater PGS for schizophrenia and intake of <5 FV servings/day, resulting in a 66% increased risk of Alzheimer's disease diagnosis.

A higher PGS for general cognition was associated with a reduced risk (20%) for non-Alzheimer's disease diagnosis. There was also an additive interaction between PGS for general cognition and <5 FV servings/day in association with Alzheimer's disease diagnosis.

Note

These results should be interpreted with caution for several reasons:

- They could be subject to the multiple comparisons problem (i.e., with the many analyses conducted, so many variables were involved in the PGS, dietary assessment and covariates that the chance of finding an association by chance is high).
- The diagnostic accuracy of the IQCODE tool for dementia diagnosis is still debated.[184]
- The method of dietary assessment is rather different from the commonly used tools (i.e., the accuracy of estimated serving sizes is debatable; how does a tablespoon of intake equate to servings?), and it was only employed for baseline daily intake and only for the previous day, not an average day.
- The PGS are based on the availability of certain data from genome-wide studies that are often conducted on a certain demographic and thus may not be representative of the general population.

#Dietitians, #AlzheimersDisease

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Herbal Supplements

Pomegranate-rind and cocoa-seed extracts for increasing testosterone

A proprietary blend of extracts from pomegranate rind and cocoa seeds increased total and free testosterone levels in healthy young men.

Background

Limited evidence from preclinical research suggests that extracts from the rind of *Punica granatum L.* (commonly known as pomegranate) and the seeds of *Theobroma cacao L.* (commonly known as cocoa) may increase the production of steroid hormones. Can supplementation with Tesnor™ (a proprietary blend containing pomegranate-rind and cocoa-seed extracts in a 4:1 ratio) increase testosterone levels in healthy young men?

The study

In this 56-day randomized control trial, 119 healthy men ages 21–35 who were not performing resistance training were assigned to one of three groups:

1. Low dose: The participants took capsules containing 200 milligrams (mg) of Tesnor after breakfast.
2. High dose: The participants took capsules containing 400 milligrams of Tesnor after breakfast.
3. Placebo: The participants took capsules containing a placebo after breakfast.

The participants were asked to maintain their regular diets, refrain from consuming any other nutritional supplements or energy drinks, and perform 40 minutes of aerobic exercise per day, 4 days per week, during the study.

The primary outcomes were the serum levels of total testosterone and free testosterone. The secondary outcomes were the serum levels of the hormones dihydrotestosterone, cortisol, luteinizing hormone, and estradiol. Handgrip strength and mid–upper arm circumference were also measured. Blood pressure, pulse rate, respiratory rate, temperature (taken orally), and a number of urinary and blood clinical parameters were assessed to determine the safety of the product.

The results

After 56 days, total testosterone levels increased more with high-dose Tesnor (+18.9%) than with placebo (+2.4%). Free-testosterone levels increased more with both high-dose (+25.3%) and low-dose (+13.7%) Tesnor than with placebo (+3.2%). Compared with placebo, luteinizing hormone levels increased only in the high-dose group.

Handgrip strength increased more with both high-dose and low-dose Tesnor than placebo, while mid–upper arm circumference increased more than placebo with high-dose Tesnor only.

There were no differences in any of the safety parameters.

Note

The trial was exploratory, so the findings should be considered preliminary. It's also worth noting that the study was funded by Laila Nutraceuticals, the manufacturer of Tesnor.

#Dietitians

Ginger and liver health

This meta-analysis of animal studies and qualitative review of human trials found some evidence that ginger supplementation can improve markers associated with liver health.

Background

Ginger has anti-inflammatory and antioxidant properties and can improve blood lipids. Is it beneficial for fatty liver?

The study

This systematic review and meta-analysis of 17 animal studies assessed the effects of ginger supplementation on the following outcomes:

- *Alanine aminotransferase* (ALT, a liver enzyme; lower levels are optimal)
- *Aspartate aminotransferase* (AST, a liver enzyme; lower levels are optimal)
- Catalase (an enzyme with antioxidant properties; higher levels are optimal)
- Free fatty acids
- HDL-C
- LDL-C
- Malondialdehyde (a marker of oxidative stress; lower levels are optimal)
- Superoxide dismutase (an enzyme with antioxidant properties; higher levels are optimal)
- Total cholesterol
- Triglycerides

In addition, the authors qualitatively analyzed 3 studies conducted on humans.

The results

In the quantitative analysis of animal studies, ginger improved *liver* levels of the following:

- Cholesterol (−5.60 mg/g)
- Triglycerides (−4.08 mg/g)

Ginger also improved *serum* levels of the following:

- ALT (−2.85 U/L)
- AST (−0.98 U/L)
- Catalase (+3.35 nmol/mg),
- Fasting blood sugar (−2.53 mg/dL)
- HDL-C (+1.27 mg/dL)
- LDL-C (−3.94 mg/dL)
- Malondialdehyde (−3.16 nmol/L)
- Superoxide dismutase (+3.01 U/mg),
- Triglycerides (−4.98 mg/dL)
- Total cholesterol (−3.35 mg/dL)

The qualitative analysis of 3 clinical trials in humans found the following:

- In a 2016 randomized controlled trial, 44 patients with *nonalcoholic fatty liver disease* (NAFLD) consumed 2 grams per day of ginger or a placebo for 12 weeks. Ginger reduced serum ALT and gamma-glutamyl transferase levels (another marker of liver health) compared to placebo. There was no effect of ginger on liver fibrosis or AST.[122]
- In a 2020 randomized controlled trial, 46 patients with NAFLD were randomized to take 1.5 grams of ginger per day or a placebo for 12 weeks. Serum levels of ALT, total cholesterol, LDL-C, fasting blood sugar, HOMA-IR, C-reactive protein, and fetuin-A were lower in the ginger group than the placebo group. There were no differences between the two groups in body weight, fasting insulin, HDL-C, triglycerides, gamma-glutamyl transferase, AST, adiponectin, TNF-α, total antioxidant capacity, hepatic steatosis, or blood pressure.[123]
- In a 2021 randomized controlled trial, 46 active men were randomized to i) take 3 grams per day of ginger and perform *high-intensity interval training* (HIIT), ii) take 3 grams of ginger without performing HIIT, iii) perform HIIT without taking ginger, or iv) take neither ginger nor perform HIIT for 4 weeks. The group that took ginger and performed HIIT had greater improvements in HOMA-

IR, ALT, AST, blood glucose, insulin, body weight, waist circumference, and BMI than the other groups[124]

#Dietitians, #LiverDisease

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Immunity & Infectious Disease

Vitamin D reduces flu risk

A meta-analysis of 10 randomized controlled trials reports that supplementation with vitamin D reduces the risk of flu by 22%.

Background

Vitamin D deficiency has been associated with an increased incidence of respiratory tract infections and influenza, but supplementation studies have been inconsistent.

The study

This meta-analysis of 10 randomized controlled trials included 4,859 participants (ages 3 months to 82 years) who took a vitamin D supplement (500–6,800 IU per day of oral cholecalciferol; 400 IU/day for infants and young children) or a placebo for 1–18 months. The participants were monitored for flu infection.

The results

Supplementation with vitamin D reduced the risk of flu infection by 22%, and heterogeneity (variability in data) among the included studies was low. There was no evidence of a risk of publication bias, and sensitivity analyses suggest a robust result.

#Dietitians

Is zinc or vitamins C or D linked to COVID-19 outcomes?

In this meta-analysis, supplementation with vitamin D, but not vitamin C or zinc, was associated with a reduction in intubation rate in individuals with COVID-19.

Background

Some observational studies have found links between low serum levels of some micronutrients (including vitamin C, vitamin D, and zinc) and worse COVID-19 outcomes. However, it's unclear whether supplementation with these individual micronutrients can improve clinical outcomes in individuals with COVID-19.

The study

This meta-analysis of 26 studies (10 randomized controlled trials and 16 observational studies) examined the links between individual supplementation with vitamin C, vitamin D, or zinc and clinical outcomes in a total of 5,633 individuals with COVID-19. Micronutrient supplementation was compared to standard care. The primary outcome was mortality, and the secondary outcomes were intubation rate and length of

hospital stay.

Vitamin C supplementation was examined in 9 studies involving 1,488 individuals. The studies were conducted in China, the United States, Iran, Saudi Arabia, Pakistan, and Turkey. Vitamin C was given intravenously in 7 studies at dosages ranging from 50 milligrams to 24 grams per day and orally in 2 studies in dosages of 1 or 8 grams per day. The treatment duration ranged from 4 to 18 days.

Vitamin D supplementation was examined in 13 studies involving 3,497 individuals. The studies were conducted in Spain, France, India, Italy, Brazil, the United States, and Turkey. Vitamin D was taken before COVID-19 diagnosis in 4 studies, after COVID-19 diagnosis in 8 studies, and both before and after COVID-19 diagnosis in 1 study. The dose and treatment duration were highly variable across studies.

Zinc supplementation was examined in 5 studies involving 738 individuals. The studies were conducted in the United States, Australia, Egypt, and Saudi Arabia. Zinc was given orally in 4 studies as sulfate or gluconate in dosages ranging from 7 to 50 milligrams of elemental zinc per day and intravenously as chloride in 1 study at 0.5 milligrams per kilogram of body weight per day. The treatment duration ranged from 7 to 15 days.

The results

None of the 3 micronutrients were associated with changes in mortality or the length of hospital stay. Vitamin D, but not vitamin C or zinc, was associated with a lower intubation rate.

Of the 26 studies, 23 had a low risk of bias, and 3 had a high risk of bias.

#Dietitians

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Infants, Children & Teenagers

Omega–3s improved maternal health and birth outcomes

This meta-analysis found that supplementation with omega–3s during pregnancy increased gestation by 1.4 days and birth weight by 49 grams. It also reduced the risks of preeclampsia (–16%), preterm delivery (–14%), and early preterm delivery (–23%).

Background

Some evidence suggests that supplementation with omega–3 fatty acids during pregnancy may have beneficial effects on both maternal health and birth outcomes. What does the totality of the available clinical evidence say?

The study

This meta-analysis of 59 randomized and quasi-randomized controlled trials examined the effects of supplementation during pregnancy with omega–3s (i.e., docosahexaenoic acid and/or eicosapentaenoic acid and/or alpha-linolenic acid; aka DHA, EPA, and ALA), compared to placebo or no intervention, on a number of maternal health and birth outcomes.

The primary outcomes were the following:

- Incidence of pregnancy-induced hypertension (11 trials)
- Incidence of preeclampsia (24 trials)
- Gestational duration (46 trials)
- Incidence of preterm delivery (<37 weeks; 27 trials)
- Incidence of early preterm delivery (<34 weeks; 12 trials)
- Newborn birth weight (37 trials)
- Low newborn birth weight (14 trials)
- Newborn length (31 trials)
- Newborn head circumference (26 comparisons)

The secondary outcomes were the following:

- Risk of admission to the neonatal intensive care unit (13 trials)
- Incidence of cesarean delivery (29 trials)

- Prenatal death (12 trials)
- Infant death (10 trials)

The results

Supplementation with omega−3s reduced the risk of preeclampsia by 16%, increased gestational duration by 1.4 days, increased newborn birth weight by 49 grams, and reduced the risk of preterm and early preterm delivery by 14% and 23%, respectively.

The risk of bias was low in 29 trials, moderate in 19 trials, and high in 11 trials.

#Dietitians

Sugar and sleep in school children – is there a relationship?

Children who often consume sugar-sweetened beverages were more likely to sleep less than children with a low sugar-sweetened beverages intake, but only on school days. This association was not found on weekends.

Background

Sugar-sweetened beverages (SSB) may interfere with children's sleep patterns (e.g., sleep duration and sleep debt), and such sleep alterations are associated with lower cognitive performance[214][215] and a higher risk of obesity.[216] A 2018 cross-sectional study of 5,873 children ages 9–11 found that frequent consumption of SSB was associated with lower sleep duration,[217] and the participants often did not meet the sleep duration of 9–12 hours per night recommended by the American Academy of Sleep Medicine.[218]

However, the 2018 study did not account for school days or weekends and did not investigate sleep debt — an alternative measure of sleep quality.[219][220][221][222] The current study examined the association between children's SSB intake and sleep quality while accounting for school days and weekends.

The study

This cross-sectional study of 2,628 Taiwanese children (ages 6–12) investigated the association between the frequency of SSB intake and sleep quality (assessed in terms of sleep duration and sleep debt). The researchers extracted the frequency of SSB intake from food frequency questionnaires and divided the cohort into low and high SSB intake groups.

Sleep duration was derived from 3-day physical activity logs. Sleep debt was defined and calculated as the difference in sleep duration on weekends and school days.[219][220][221][222]

The researchers also controlled for age, sex, and demographic variables and investigated the effect of caffeine content and BMI as confounding factors.

The results

On average, the children slept for 8.8 hours on school days and 9.7 hours on weekends, yielding a sleep debt of 0.9 hours. With increasing age, sleep duration on school days (but not on weekends) further decreased (from 9.4 hours to 8.3 hours at 6 and 12 years of age, respectively), while sleep debt steadily increased (from 0.2 hours to 1.3 hours at 6 and 12 years of age, respectively).

For SSB consumption, children in the high intake group slept less than those in the low intake group, but only on school days. In contrast, weekend sleep duration was not significantly different. Consequently, children in the high SSB intake group also experienced greater sleep debt than those in the low intake group.

These effects remained even after adjusting for sex, age, and demographic variables. Also, sleep duration was not influenced by BMI or the caffeine contents of the SSB.

Note

This study has two important limitations. First, due to the cross-sectional design, the study cannot infer a causal relationship between the frequency of SSB intake and sleep duration. Second, the current study measured only the frequency, but not the surplus energy intake, of children's SSB consumption, similar to previous cross-sectional studies.[217]

#Dietitians, #SleepImpairment

Is high-dose vitamin D supplementation safe in young children?

High-dose vitamin D supplementation in children (ages 0–6) was not associated with an increased risk of adverse events.

Background

According to the European Food Safety Authority, the tolerable upper intake levels of vitamin D are 1,000 IU/day for infants aged 0–6 months, 1,400 IU/day for infants aged 6–12 months, and 2,000 IU/day for children aged 1–10 years.[336] That said, there is a lack of evidence from meta-analyses on the safety of high-dose vitamin D supplementation in early childhood.

The study

This meta-analysis of 21 randomized controlled trials examined the associations between high-dose vitamin D supplementation (>1000 IU/day), compared to low-dose vitamin D supplementation (≤400 IU/day) or a placebo, and the risk of adverse events in a total of 7,358 children aged 0–6 years.

The types of adverse events examined were serious adverse events (death or hospitalization) and hypercalcemia (abnormally high blood levels of calcium). The daily dose of vitamin D ranged from 1,200 to 10,000 IU, whereas bolus doses ranged from 30,000 IU/week to 600,000 IU (given as a single dose). Most

studies listed a clinical diagnosis or vitamin D deficiency as inclusion criteria.

The results

No association was detected between high-dose vitamin D supplementation and the risk of serious adverse events or hypercalcemia.

#Dietitians

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Liver Health

Vitamin C intake, liver function, and glucose metabolism

This cohort study found a linear association between i) dietary vitamin C intake and ii) liver function and glucose metabolism.

Background

Nonalcoholic fatty liver disease (NAFLD) is characterized by the infiltration of liver cells with fat and is associated with cardiometabolic disease, oxidative stress, and inflammation.[176][177] Beyond its role in tissue repair, collagen formation, and other processes, vitamin C is an antioxidant with a suggested role in the regulation of hepatic and circulating lipid homeostasis; can it improve liver function?

The study

This cohort study included data from 8,307 participants (average age of 50; 47% male) from the 2009 China Health and Nutrition Survey.

Dietary vitamin C intake was estimated from 3-day 24-hour dietary questionnaires. The participants were divided into quartiles based on their dietary vitamin C intakes. Fasting blood plasma biomarkers of liver function and glucose and lipid metabolism were measured.

The analyses were adjusted for dietary vitamin C intake, age, gender, BMI, residence (i.e., urban vs. rural), and smoking status.

The results

Overall, about 25% of participants consumed inadequate levels of vitamin C (i.e., less than the estimated average requirement of 85 milligrams per day).

Higher vitamin C intake was associated with lower concentrations of plasma ferritin (an independent indicator of tissue damage and fibrosis in NAFLD)[178] and HbA1c (biomarker of glucose metabolism) and higher albumin (an indicator of a healthy liver).

Interestingly, higher vitamin C intake was also positively associated with the percentage of male participants and urban residence. No changes in lipid metabolism were found.

Note

These results should be interpreted with caution because of the observational nature of the study, the reliance on self-reported data, and the lack of plasma vitamin C concentration monitoring.

#Dietitians

ALT and metabolic associated fatty liver disease in an Australian cohort

Elevated alkaline phosphatase and metabolic associated fatty liver disease were present in 13% and 37%, respectively, of this Australian cohort. Participants with elevated alanine aminotransferase were 3.57 times more likely to have metabolic associated fatty liver disease than those without elevated alanine aminotransferase.

Background

Metabolic associated fatty liver disease (MAFLD), also known as *nonalcoholic fatty liver disease* (NAFLD), is a condition in which the liver accumulates excessive fat due to reasons other than alcohol use. Elevated *alanine aminotransferase* (ALT) levels can indicate fatty or cirrhotic liver and often occur among individuals with MAFLD, obesity, or metabolic syndrome.

The study

This cross-sectional study assessed the prevalence of ALT elevation and MAFLD among 4,747 Australian adults in 2012. As secondary outcomes, the authors also identified factors independently associated with elevated ALT and assessed the proportion of participants with MAFLD who were at risk of advanced fibrosis.

The authors performed liver function tests and assessed BMI, waist circumference, blood pressure, blood lipids, oral glucose tolerance tests, and HbA1C. MAFLD was defined as hepatic steatosis (determined using the Fatty Liver Index) alongside a BMI ≥25, the presence of *type 2 diabetes* (T2D), or at least two metabolic risk factors.

The BARD score (BMI ≥ 28 = 1 point, AST/ALT ratio of ≥0.8 = 2 points, type 2 diabetes = 1 point) was used to identify participants with MAFLD who were at risk of advanced fibrosis (a score of ≥2 is associated with advanced fibrosis).

The results

Elevated ALT was present in 13% of the total participants, 22% of participants with diabetes, 18% of those with obesity, and 17% of those with metabolic syndrome. Female gender, higher diastolic blood pressure, elevated triglycerides, T2D, a sedentary lifestyle, and a high waist circumference were all independently associated with elevated ALT.

MAFLD was present in 37% of the cohort. Male gender, older age, T2D, low HDL-C, high diastolic blood pressure, a sedentary lifestyle, and not completing any postsecondary education were all independently associated with MAFLD.

Participants with elevated ALT were 3.57 times more likely to have MAFLD than those without elevated ALT. Of the participants with MAFLD, 61% had a BARD score ≥2.

#Dietitians, #LiverDisease

Do dietary patterns modify the risk for diabetes among people with NAFLD?

In this cohort study, a high intake of vegetables, eggs, soy, and coarse cereals reduced the risk of type 2 diabetes among people with nonalcoholic fatty liver disease.

Background

Nonalcoholic fatty liver disease (NAFLD) is a risk factor for *type 2 diabetes* (T2D). However, it's unclear whether dietary patterns can modulate this effect.

The study

This prospective cohort study of 24,602 participants in China assessed whether dietary patterns could modify the risk for T2D among patients with NAFD. As a secondary outcome, the authors assessed the effect based on BMI (<25 or ≥25).

NAFLD was diagnosed using liver ultrasonography. Dietary intake (including alcohol intake, to differentiate NAFLD from alcoholic fatty liver disease) was assessed using a food frequency questionnaire. Incident T2D was assessed via fasting blood samples. The authors controlled for the following confounding variables:

- Age
- BMI
- Drinking status
- Education level
- Employment status
- Energy intake
- Household income
- Hyperlipidemia
- Hypertension
- Physical activity
- Sex
- Smoking status
- Waist circumference
- Family history of cardiovascular disease, hypertension, and diabetes
- Dietary pattern other than the intake pattern assessed[ξ]

The authors classified the participants based on whether they were above or below the median intake of three dietary patterns:

- Animal foods (animal organs/blood, meat, processed meat products, and preserved eggs)
- Fruit/sweet foods (fruits, cakes, and ice cream)
- Vegetables/eggs/other plant foods (vegetables, eggs, soy, and coarse cereals)

The results

Over an average follow-up period of 3.8 years, 787 (3.2%) participants developed type 2 diabetes. After adjusting for confounders, compared to participants without NAFLD, patients with NAFLD had a 3x greater risk of developing T2D.

After adjusting for confounders (other than intake of vegetables/eggs/other plant foods), participants with NAFLD and a low intake of vegetables/eggs/other plant foods had a 4x greater risk of T2D than participants without NAFLD. In contrast, participants with NAFLD and an above-the-median intake of vegetables had a 2–3x greater risk for T2D. There were no associations between intake of fruit/sweet foods or animal foods and T2D risk.

When the authors further stratified the participants by BMI (<25 or ≥25), high vegetable intake reduced the risk for T2D for participants with NAFLD in both BMI categories.

Note

[ξ]Adjustment of each dietary pattern for other dietary patterns:

- In the vegetable/egg/other plant food analysis, the researchers adjusted for fruits/sweet foods and animal foods.
- In the fruits/sweet foods analysis, they adjusted for vegetable/egg/other plant foods.
- In the animal food analysis, they adjusted for vegetable/egg/other plant foods and fruit/sweet food intake.

#Dietitians, #LiverDisease

L-ornithine L-aspartate for hepatic encephalopathy

Patients with overt hepatic encephalopathy (a liver-related disorder of the nervous system) who received L-ornithine L-aspartate alongside standard treatment demonstrated greater improvements than patients who received standard treatment alone.

Background

Overt hepatic encephalopathy (OHE) is a brain impairment caused by the liver's failure to remove

ammonia and other toxins. People with OHE have a wide range of symptoms such as personality changes, lethargy, confusion, and coma.[250]

L-ornithine L-aspartate (LOLA) is often used alongside other agents such as lactulose and rifaximin to reduce ammonia levels in these individuals. This trial compared the effects of intravenous LOLA to a placebo in 140 hospitalized patients with cirrhosis and grade III-IV OHE.

The study

The 140 patients in this randomized controlled trial were randomized to receive intravenous LOLA or a placebo, with both groups also receiving lactulose and rifaximin. LOLA was provided as a continuous intravenous infusion at a dosage of 30 grams daily for five days. Both groups received rifaximin through a nasogastric tube and lactulose either orally or through a nasogastric tube. All patients also received general treatment for cirrhosis with OHE. After five days, patients who did not demonstrate an improvement received standard-of-care treatment and were counseled for a liver transplant.

The primary outcome was an improvement in OHE, defined as an improvement by at least two grades of OHE severity. The secondary outcomes were changes in blood ammonia and serum cytokines, rates of mortality and recovery, and the length of hospital stay.

The results

The LOLA group experienced a higher rate of improvement in OHE (92.5% vs. 66%), greater reductions in ammonia, IL-6, and TNF-α, a shorter time to recovery (2.7 vs. 3 days), and a lower 28-day mortality (16.4% vs. 41.8%) than the placebo group. Both groups experienced similar reductions in the inflammatory markers IL-1, IL-10, and endotoxins. The length of hospital stay was also similar in both groups.

#Dietitians

Methionine metabolites and NAFLD

Elevated levels of methionine metabolites (S-adenosylhomocysteine and homocysteine) and a low S-adenosylmethionine/S-adenosylhomocysteine ratio were associated with a higher odds of nonalcoholic fatty liver disease and more severe hepatic steatosis in a Chinese cohort.

Background

Methionine metabolites such as *S-adenosylmethionine* (S-Adenosyl Methionine), *S-adenosylhomocysteine* (SAH), and *homocysteine* (Hcy) are associated with cardiometabolic risk factors, but are they associated with *nonalcoholic fatty liver disease* (NAFLD)?

The study

This cross-sectional study of 2,814 participants (ages 40–75) in China assessed the association between methionine metabolites and NAFLD. The investigators assessed serum methionine metabolites via fasting

blood samples and the presence of NAFLD via an abdominal ultrasound and a food frequency questionnaire (to exclude participants with alcoholic fatty liver disease). The authors graded the participants' severity of hepatic steatosis as "absent", "mild", "moderate", or "severe."

The authors also adjusted for the following confounders:

- Age
- Alkaline phosphatase (ALP, a liver enzyme)
- Aspartate aminotransferase/alanine aminotransferase ratio (AST/AST; ratio of two liver enzymes)
- BMI
- Drinking status
- Gender
- HDL-C
- High-sensitivity C-reactive protein
- LDL-C
- HOMA-IR
- Physical activity
- Smoking status
- Total cholesterol
- Triglycerides
- Trunk fat ratio
- Uric acid
- Waist-to-hip ratio
- History of hypertension, diabetes, dyslipidemia, and heart disease

The results

Overall, 1,446 participants (51.4%) had NAFLD. The odds of NAFLD increased with increasing SAH and Hcy levels, whereas there was no association between SAM and odds of NAFLD. In addition, serum SAH, HCY, and a low SAM/SAH ratio were correlated with the severity of hepatic steatosis.

#Dietitians, #LiverDisease

N-acetylcysteine for acute liver failure

This meta-analysis found that N-acetylcysteine improved transplant-free survival and reduced the length of hospital stay in patients with non-acetaminophen-induced acute liver failure.

Background

Acute liver failure is a rare and life-threatening condition, which accounted for 3.3% of liver transplants in adults in 2017.[333] *N-acetylcysteine* (NAC) is often used for acetaminophen-induced acute liver failure. However, the evidence to date on NAC for *non-acetaminophen-induced acute liver failure* (NALF) is unclear.

The study

This meta-analysis assessed whether NAC improved overall mortality for patients with NALF. As secondary outcomes, the authors assessed transplant-free survival, length of hospital stay, and occurrence of adverse events.

The inclusion criteria specified that studies be prospective, compare NAC to a control group, and have a length of follow-up between 3 weeks and 6 months. The authors excluded liver failure due to alcohol. They ultimately included 5 prospective studies assessing 672 total patients (334 receiving NAC and 338 as controls). The most common cause of NALF was viral hepatitis, followed by drug-induced liver injury, indeterminate cause, and autoimmune hepatitis.

Despite the inclusion criteria specifying that studies be prospective, 3 of the studies were randomized double-blinded trials that randomized patients to receive NAC or dextrose (a placebo) via IV. The other 2 studies compared outcomes from patients who received NAC via IV to retrospective data from patients who did not receive NAC.

The results

Overall survival was not significantly improved with NAC, although there was a nonsignificant trend favoring NAC (70.1% survived in the NAC group vs. 59.8% in the control group). However, NAC improved transplant-free survival (51% vs. 28.1%) and reduced patient length of hospital stay. There were no differences between groups in the number of adverse events.

#Dietitians

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Comparing low- and high-carbohydrate diets for physical performance

This study had physically active people eat a high-carbohydrate diet for 3 weeks and then switch to a low-carbohydrate diet for 3 weeks. Aerobic performance was better with the high-carbohydrate diet.

Background

High-carbohydrate (HC) diets are frequently recommended for athletes, particularly during more sustained (e.g., >1 hour) aerobic activities.[135] However, there has been a growing body of research examining whether *low-carbohydrate* (LC) diets, by increasing the ability to metabolize fat for energy, can support physical performance to a similar degree. In general, studies have found reductions in exercise performance as a result of an LC diet,[136] but more research is needed.

The study

This nonrandomized crossover trial examined the effects of an LC diet and an HC diet on physical performance and body composition among 18 physically active adults (mean age of 29, mean body mass index of 21.8).

The participants were assigned to an HC diet (75–80% of calories from carbohydrates, 15% from protein, and 5–10% from fat) for 3 weeks, followed by an LC diet (5–7% of calories from carbohydrates, 15% from protein, and 80% from fat) for 3 weeks, with a 3-week washout period between diets. For the HC diet, the focus was on eating complex carbohydrates (e.g., brown rice and potatoes) and avoiding sugar. For the LC diet, fish, meat, nuts, vegetables, and dairy products were the focus.

The outcomes examined included body composition, aerobic performance, and self-reported dietary intake. Aerobic performance was tested using a cycle ergometer, performed until exhaustion.

The results

Compared with the LC diet, the HC diet resulted in higher peak aerobic performance (measured in watts, which represents the amount of power produced; HC: 251 watts, LC: 240 W) and a longer time to exhaustion (HC: 14.5 minutes, LC: 14.1 minutes).

Carbohydrate intake was higher (HC: 74%, LC: 7%) and kilocalorie (kcal) intake was lower (HC: 1,739 kcal, LC: 1,939 kcal) during the HC diet. On the LC diet, fat (HC: 68.5%, LC: 13.6%) and protein intake (HC: 13.6%, LC: 22.1%) were higher.

Note

One weakness with this study is its lack of randomization. Normally, crossover trials assign the order of

interventions to participants randomly. This study did not, instead assigning all participants to follow the HC diet first. This introduces the possibility of "order effects". For example, the participants could have performed worse on the aerobic test during the LC diet period because they had already done the test and found it boring.

#SportsNutrition

Low-carbohydrate diets for weight loss in people with obesity

Low-carbohydrate diets reduced body weight and BMI more than non-carbohydrate-restricted diets in participants with obesity, but the differences between the dietary approaches waned over time.

Background

Although previous meta-analyses have confirmed the effectiveness of low-carbohydrate diets for weight loss, many of these meta-analyses included trials in people without obesity. Moreover, the results of some of the meta-analyses were driven largely by short-term trials, without separate analyses for longer-term trials. This meta-analysis aimed to overcome those limitations.

The study

This meta-analysis of 25 randomized controlled trials (with a minimum duration of 12 weeks) examined the effects of low-carbohydrate diets, compared to non-carbohydrate-restricted diets, on body weight and BMI in participants with obesity.

The secondary outcomes were blood lipids and systolic blood pressure. All outcomes were assessed at 3–4, 6–8, 10–14, and 18–30 months.

The diets were defined as follows:

- Low-carbohydrate diets: <45% of total calories from carbohydrates or <130 grams of carbohydrates daily
- Non-carbohydrate-restricted diets: 45–60% of total calories from carbohydrates

The results

Low-carbohydrate diets reduced body weight by around 2.6 kilograms more than non-carbohydrate-restricted diets at 3–4 and 6–8 months. However, no differences between the dietary approaches were observed at 10–14 and 18–30 months. Similarly, low-carbohydrate diets reduced BMI by 1.7 more than non-carbohydrate-restricted diets at 3–4 months, but not at 6–8, 10–14, or 18–30 months.

For the secondary outcomes, compared to non-carbohydrate-restricted diets, low-carbohydrate diets improved HDL-C at 10–14 and 18–30 months and triglycerides at 3–4, 10–14, and 18–30 months.

The quality of the evidence was high for body weight at 3-4, 6–8, and 10–14 months and BMI at 3-4

months; moderate for body weight at 18-30 months and BMI at 6–8 and 10–14 months; and low for BMI at 18–30 months.

#Dietitians

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Men's Health & Testosterone

Bisphenol A and semen quality – how much BPA is safe for men?

This systematic review determined a tolerable daily intake for bisphenol A (3 nanograms per kilogram of body weight) that can be safely consumed to avoid declines in semen quality. To reach this level of bisphenol A exposure, the average man would have to consume about 100 canned beverages per day.

Background

Bisphenol A (BPA) is a component of plastic and epoxy manufacturing and is found in the lining of many consumer products, such as cans. Because BPA is also an estrogen analogue, it may cause a variety of health problems. For instance, BPA is thought to interfere with men's reproductive health — a claim based on animal[179] and observational evidence.[180]

However, it's not yet clear how much BPA can be safely consumed before health problems start to occur. This study aimed to define a *tolerable daily intake* (TDI) level of BPA that can be safely consumed without interfering with men's reproductive health.

The study

This systematic review of 26 animal and 16 cohort studies investigated the association between BPA exposure and declines in semen quality as part of a risk assessment to determine a TDI for BPA. The researchers focused on the effects of gestational BPA exposure (i.e., BPA exposure during pregnancy) in animal studies.

The results

The researchers found convincing evidence of lower semen quality after gestational BPA exposure in animal studies. This finding was supported by human cohort studies showing an association between BPA exposure and declines in semen quality.

Based on their systematic analysis, the researchers proposed a TDI of 3 nanograms of BPA per kilogram of body weight (ng/kg), which corresponds to a TDI of 500–600 ng of BPA for the average person.

Note

The estimated TDI values for BPA vary widely in the literature. Although the EFSA proposed 4,000 ng/kg in 2015, they revised their estimate to 0.04 ng/kg in 2021 – a reduction of 100,000 times! Also, BPA intake can vary widely depending on the type of canned products consumed, making it difficult to determine one's personal BPA exposure.

#Dietitians

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💪 Muscle Gain & Exercise

Do genetics modulate caffeine's performance-enhancing effects?

Participants with the gene encoding for "fast" caffeine metabolism demonstrated a greater effect of caffeine on peak power output than those with the gene encoding for "slow" or "ultraslow" caffeine metabolism.

Background

Caffeine has ergogenic (performance-enhancing) effects at doses of 3–6 milligrams per kilogram of body mass (mg/kg) when taken approximately 60 minutes before exercise. However, there is considerable variability between individuals in its effects, partly due to genetics.

The CYP1A2 gene determines the rate of caffeine metabolism — people with an AA genotype are "fast" metabolizers, whereas those with AC and CC genotypes are "slow" and "ultraslow" caffeine metabolizers, respectively. Can CYP1A2 genotype modulate caffeine's ergogenic effects?

The study

This crossover randomized controlled trial assessed the effects of CYP1A2 polymorphism on caffeine's ergogenic potential. Sixteen men (average age of 22), with at least one year of resistance training experience and a low habitual caffeine intake (<100 mg/day) were randomized to supplement with 6 mg/kg of caffeine or a placebo approximately 60 minutes before an all-out 30-second cycling test. The placebo and caffeine conditions were separated by 7 days, and both the participants and investigators were blinded to the treatment condition.

The authors assessed fatigue index and peak, average, and minimum power outputs during the cycling tests. The participants provided blood samples for assessment of CYP1A2 genotype — 10 participants had AA, 5 had AC, and 1 had CC (the authors grouped the AC and CC participants together in their analysis).

The results

The participants with the AA genotype improved their peak power output following caffeine, compared to placebo, but the participants with the AC/CC genotypes did not. However, there were no differences between genotypes in caffeine's effect on average power output, minimum power output, or fatigue index.

Note

Although individuals with the AA genotype might experience a greater ergogenic effect following caffeine supplementation than those with AC or CC genotypes, the evidence is mixed. A recent systematic review of 14 studies reported differences between genotypes in only 4 studies, all of which favored the AA genotype.[116]

As previously reviewed in *Study Summaries*, the CYP1A2 genotype can affect more than just performance outcomes. Some evidence suggests that higher caffeine intakes increase the risk of insulin resistance,[117] heart attacks,[118], and high blood pressure[119][120] in intermediate and slow but not rapid caffeine metabolizers.[121]

#Dietitians, #SportsNutrition

Can creatine improve sprinting performance?

This randomized-controlled trial found that creatine had a small but notable effect on repeated sprinting performance. During the last 5 seconds of the last sprint, creatine improved speed and power output by a few percent compared to placebo.

Background

Creatine supplementation reduces fatigue during repeated high-intensity exercise.[204] However, most studies tested durations of 30 seconds, which are not common in sports, and used cycling instead of running-based sprint tests. This study examined whether creatine can improve repeated sprinting exercises during shorter sprint periods.

The study

This randomized controlled trial in 16 healthy, physically active men (average age of 26) examined whether oral creatine supplementation can improve sports performance during repeated sprint tests compared to a placebo. At baseline, all participants received placebo supplementation for 5 days and then performed repeated sprint tests (six repetitions of 10 seconds each on a nonmotorized treadmill). Afterward, the subjects received either a placebo or creatine (75 milligrams per kilogram of body weight daily) for 5 days and repeated the sprint test protocol.

During the six sprints, the researchers measured the mean and maximum power output and running speed. They also measured maximal oxygen uptake (VO_2max) to assess the possible effects of creatine on aerobic metabolism.

The results

Creatine slightly improved mean speed and power output in the last 5 seconds of the last sprint by a few percent. This effect was not observed in the placebo group. Otherwise, no differences between creatine and placebo were found for sprinting performance. Also, no differences in VO_2max were found, indicating that creatine had no effect on aerobic performance.

Note

The creatine group experienced a small but notable increase in body mass index, which was not observed in the placebo group. Because the researchers did not measure body composition, it remains unclear whether the weight gain was due to water retention or muscle gain. If creatine led to improved recovery

after the first sprinting test, the results could equally be explained by the muscle gain, not the creatine itself. Future studies should account for changes in body composition when testing the effects of creatine on exercise performance.

#SportsNutrition

The effect of maltodextrin-based mouth rinsing on exercise performance

This meta-analysis of 34 randomized controlled trials reported that maltodextrin-based mouth rinses may improve exercise performance.

Background

A robust body of evidence demonstrates that ingesting carbohydrates during endurance exercise enhances performance, [256] but it can also cause gastrointestinal discomfort, which may negatively affect performance. A potential alternative is a carbohydrate mouth rinse, but the evidence is mixed on whether they enhance exercise performance. These differences may stem from the type of exercise and the rinsing protocol.

The study

This meta-analysis of 34 randomized controlled trials examined the effect of a maltodextrin-based oral rinse on exercise performance in 444 participants (380 men and 64 women). The duration of rinsing ranged from 5 to 40 seconds, but the majority of participants rinsed for 5–10 seconds. Also, the carbohydrate concentration of the rinse ranged from 5 to 12%, but most studies used 6.4%. The most common exercise protocol was a cycling time trial, followed by resistance training, and sprinting. Other exercise protocols included a time-to-exhaustion cycling test and running test, a running time trial, and isometric contractions. Subgroup analyses were performed based on the concentration of the mouth rinse, the duration of mouth rinsing, the exercise protocol, and whether the participants fasted before using the mouth rinse.

The results

There was a small increase in exercise performance with maltodextrin-based mouth rinses compared with the placebo. According to the subgroup analyses, rinsing for 10 seconds was most effective, and a carbohydrate concentration of 6–6.5% was more effective than 8–18%.

Note

Due to the wide variability in the mouth rinse and exercise protocol between studies, the results should be interpreted with caution.

#SportsNutrition

The effect of vitamin C and E supplementation on recovery from exercise

This meta-analysis found that a combination of vitamins C and E reduced some markers of oxidative stress and inflammation immediately after exercise but not 24–96 hours after exercise. Supplementation also reduced creatine kinase levels at 48 hours after exercise.

Background

High-intensity exercise transiently increases oxidative stress, inflammation, and muscle damage, which manifests as delayed onset muscle soreness, reduced functionality, and impaired physical performance.[260][261] Vitamins C and E have antioxidant properties, so they have the potential to mediate levels of oxidative stress and inflammation after exercise and reduce adverse effects, like excessive delayed onset muscle soreness, that often deter people from sticking to an exercise program.

The study

This meta-analysis of 18 randomized controlled trials (published between 1994 and 2019) investigated the effect of combined supplementation with vitamins C and E on oxidative stress, inflammatory markers, muscle damage, muscle soreness, and muscle strength in 322 participants. The dose of vitamin C ranged from 200 to 2,000 milligrams (mg), and the dose of vitamin E ranged from 259 to 1,400 IU for a period of 14–42 days before the exercise protocol. The majority of studies (58%) used an aerobic exercise protocol.

The outcomes were assessed immediately postexercise and up to 96 hours postexercise. Markers of oxidative stress included malondialdehyde, thiobarbituric acid reactive substances, F2-isoprostanes, and hydrogen peroxides. Markers of inflammation included *interleukin* (IL)-1Ra, IL-6, and C-reactive protein. Markers of muscle damage included creatine kinase and lactate dehydrogenase.

The results

Immediately after exercise, there was a moderate reduction in oxidative stress and IL-6 and a large reduction in cortisol with vitamin supplementation compared to placebo. Additionally, there was a large reduction in creatine kinase levels at 48 hours postexercise with vitamin supplementation compared to placebo.

Note

The studies included mostly men, so some caution is needed in extending these findings to women. Additionally, the findings were largely based on “very low” quality of evidence. Another limitation is that subgroup analyses were not performed to determine whether the effects of vitamin C and E supplementation differed based on the type of exercise performed (i.e., aerobic versus anaerobic exercise), the dose and duration of supplementation, and the training status of the participants (i.e., athletes versus untrained individuals).

Although vitamin C and E supplementation may improve recovery from exercise, it may also blunt the physiological adaptations evoked by exercise. Therefore, the best time to consider vitamin C and E supplementation is when recovery and peak performance are more important (e.g., during the

competitive season) than physiological adaptations (e.g., during the off-season).

#SportsNutrition

Does probiotic supplementation improve aerobic exercise performance?

This meta-analysis of 12 randomized controlled trials found that probiotic supplementation had a small positive effect on aerobic exercise performance.

Background

Probiotics are live microorganisms that confer health benefits when administered in adequate amounts. The most common strains belong to the *Bifidobacterium* or *Lactobacillus* genera. Probiotic supplementation may improve aerobic exercise performance by enhancing intestinal barrier function and preventing gastrointestinal side effects during exercise or by increasing carbohydrate metabolism.[284][285] However, the evidence is mixed on whether probiotic supplementation improves aerobic exercise performance.

The study

This meta-analysis of 12 randomized controlled trials investigated the effect of probiotic supplementation on aerobic-metabolism-predominant exercise (i.e., continuous exercise that lasted ≥ 5 minutes) in 232 trained participants (i.e., people who performed ≥ 8 hours of exercise or ≥ 5 workouts per week). Seven studies used a single-strain probiotic, and 5 studies used a multistrain probiotic. The intervention duration varied from 3 weeks to 14 weeks. The time of supplementation also varied between studies. For example, two studies had the participants ingest the supplement after the first meal of the day, 2 studies had the participants ingest the supplement during any meal, and 2 studies had the participants ingest the supplement after exercise and before sleeping.

The results

There was a small improvement in aerobic exercise performance with probiotic supplementation. Greater effects were reported with higher supplementation doses, single-strain probiotics, time-to-exhaustion tests (as opposed to VO_2max tests), and in studies ≤ 4 weeks long. The duration of exercise didn't meaningfully influence the effect of probiotic supplementation.

Note

The effects of probiotics are strain specific, and a wide variety of strains were included in this study. Therefore, although some single-strain probiotic supplements may improve aerobic exercise performance, it's unclear which strain is the most effective.

#SportsNutrition

Can chronic L-arginine supplementation improve exercise performance?

This crossover trial compared the effects of short-term and long-term L-arginine supplementation on exercise performance. In both cases, L-arginine had no effects.

Background

Although arginine is marketed for athletic performance, acute (short-term) supplementation in healthy adults has unreliable effects on *nitric oxide* (NO) production[304][305][306] and athletic performance.[307]

Chronic (long-term) supplementation with L-arginine could be more effective, but previous studies have showed inconsistent results.[308][309][310][311] One possible explanation is that the studies used different doses and durations of L-arginine supplementation. However, a direct comparison of the acute and chronic effects of L-arginine supplementation was needed.

The study

This randomized controlled crossover trial in 16 healthy young men (average age of 23) compared the effects of acute and chronic L-arginine supplementation on sports performance.

In the acute trials, the participants took either 5 grams of L-arginine or a placebo prior to a cycling performance test. In the chronic trials, the participants took L-arginine (5 grams daily) for 2 weeks and then performed the same cycling performance test as in the acute group. The acute and chronic phases were separated by a washout period of 2 weeks.

To test whether L-arginine could attenuate the exercise-induced increase in ammonia, the researchers measured plasma ammonia concentrations at baseline and after the sports performance test.

The results

Acute and chronic L-arginine supplementation had no effects on blood ammonia levels or exercise performance.

Note

This study was funded by a Japanese supplement company.

#SportsNutrition, #ConflictofInterest

Can cold or heat therapy reduce muscle soreness?

Of the cold and warm therapies assessed in this network analysis, heat pack therapy was most effective at reducing muscle soreness 24 and 48 hours after exercise. Cryotherapy was most effective at reducing muscle soreness >48 hours after exercise.

Background

Delayed onset muscle soreness (DOMS) is muscle soreness in the hours or days following physical activity and can negatively affect exercise adherence and subsequent performance. Although many people use

cold-based or heat-based therapies after exercise to prevent DOMS, the effectiveness of these interventions is unclear.

The study

This network analysis of randomized controlled trials compared the effectiveness of cold and heat therapies for DOMS.

Fifty-nine studies assessing 1,367 patients were included. The inclusion criteria specified that the participants received cold or heat therapy within 1 hour after exercise, and studies that repeated the intervention on subsequent days were included. Studies that used multiple recovery modalities in addition to cold or heat therapies were excluded. DOMS was assessed at baseline (preexercise) and at 24, 48, and >48 hours postexercise.

The following 10 interventions were examined:

- Contrast water therapy
- Phase change material
- Cryotherapy
- Cold water immersion
- Hot/warm water immersion
- Cold pack therapy
- Hot pack therapy
- Ice massage
- Ultrasound
- Passive recovery (a control condition)

The results

Hot pack therapy was the most effective treatment for reducing DOMS at 24 hours after exercise, followed by contrast water therapy, followed by cryotherapy. Hot pack therapy was also the most effective at reducing DOMS at 48 hours, followed by cryotherapy, followed by phase change materials. Cryotherapy was the most effective at reducing DOMS >48 hours after exercise, followed by phase change materials, followed by contrast water therapy.

The authors reported evidence for possible publication bias.

Note

Heat pack therapy involves applying heat wraps to a target muscle for several hours after exercise and

may reduce DOMS via increased blood flow and enhanced calcium influx through voltage-gated calcium channels.[338]

Contrast water therapy involves alternating between cold and warm water immersion. It may facilitate recovery via alternating between vasoconstriction and vasodilation, enhancement of blood flow, reductions in inflammation, or improved range of motion.[339]

Cryotherapy involves short exposure to extremely cold air and may reduce tissue swelling and inflammation.[340]

Phase change materials are clothing materials that absorb heat energy, resulting in a cooling effect, and may reduce DOMS via similar mechanisms as cryotherapy.[341]

#SportsNutrition

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Undenatured type II collagen for improving knee joint flexibility

Supplementation with undenatured type II collagen made from chicken sternum cartilage improved knee joint flexibility in participants with activity-related knee joint discomfort.

Background

Individuals with activity-related knee joint discomfort may have impaired knee joint flexibility. Because *undenatured type II collagen* (UC-II®; a patented type of undenatured collagen made from chicken sternum cartilage) has previously been reported to improve knee mobility both in individuals with osteoarthritis and in healthy individuals,[224][225] it may improve knee joint flexibility in people with activity-related knee joint discomfort.

The study

In this 24-week randomized controlled trial, 96 healthy men and women (ages 20–55), who reported knee-joint discomfort during or immediately after physical activity and while performing a standardized single-leg step-down test, took capsules containing either 40 milligrams of UC-II® (providing ≥3% undenatured type II collagen) or a placebo.

The outcomes were knee flexion and knee extension *range of motion* (ROM) measured with a digital goniometer. Knee flexion ROM was measured every 4 weeks (i.e., at baseline and weeks 4, 8, 12, 16, 20, and 24), and knee extension was measured every 12 weeks (i.e., at baseline and weeks 12 and 24).

The results

At the end of the study, knee flexion ROM improved more with UC-II® (+3.2°) compared with the placebo (+0.2°). The differences between groups were statistically significant from week 8 onwards. Knee extension ROM improved with UC-II® (+2.2°) but not with the placebo (+1.3°; statistically nonsignificant). However, a statistically significant difference between groups was not detected.

#Dietitians

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Skin, Hair & Aesthetics

The effects of dairy and glycemic content on acne

This systematic review found convincing evidence that a low glycemic diet can reduce acne. However, for dairy, the evidence was less clear; dairy was associated with acne only in Western populations, but not in other ethnic groups.

Background

The associations between acne and specific foods (such as dairy and sweets) have proven controversial,[87][88][89] mostly because studies involving diet are difficult to conduct. However, new evidence investigating the association between specific dietary factors and acne has been accumulating in recent years. Hence, a systematic review was warranted.

The study

This systematic review of 28 observational and 6 interventional studies examined the association between dairy and glycemic content and acne development. The researchers defined glycemic content in terms of glycemic index, glycemic load, and overall carbohydrate intake. They also investigated whether sex, ethnicity, and cultural dietary habits play a role in the relationship between diet and acne.

The results

There was a clear association between glycemic content and acne development, which was independent of sex, ethnicity, and cultural habits. This association was also backed up by 6 interventional studies showing improvements in acne when participants switched to a diet low in glycemic content.

For dairy, however, the results were mixed, and only observational (but not interventional) studies were available. Dairy intake was associated with acne in Western populations, but not in other ethnic groups.

Note

Because most identified studies focused on young men and women in their teens and twenties, the results of this study are limited to this age group. Also, most of the participants in observational studies were women, whereas most subjects in interventional studies were men. This is problematic, given the known differences in hormones and sex-specific effects of diet on acne.

#Dietitians

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Vegan & Vegetarian

Cardiometabolic health in omnivores and vegetarians

This cross-sectional study found that vegetarians may exhibit better arterial stiffness (especially in men) and some better cardiometabolic biomarkers than omnivores, but diet quality and its association with health outcomes depends on many other complex variables.

Background

Arterial stiffness is an indicator of vascular aging and risk of hypertension and is a strong predictor of cardiovascular mortality.[125] Dietary patterns that emphasize whole plant foods, such as the DASH or Mediterranean diet, are inversely associated with arterial stiffness and cardiometabolic health biomarkers.[126] Do omnivores and vegetarians differ in arterial stiffness and other cardiometabolic health biomarkers?

The study

This cross-sectional study involved 42 healthy participants (average age of 35 years old; 21% male), of which 22 were omnivores and 20 were vegetarians (by self-report).

Arterial stiffness, blood pressure, fasting cardiometabolic and inflammatory biomarkers (lipoproteins and high-sensitivity C-reactive protein), and anthropometrics (body measurements) were measured. For analysis, omnivores were matched with vegetarians based on BMI .

The results

Arterial stiffness, blood pressure, and cardiometabolic health biomarkers did not differ between omnivores and vegetarians, except that omnivores had higher HDL-C levels. Arterial stiffness and triglyceride/HDL-C ratio (a predictor of coronary disease risk)[127] suggested a decrease for vegetarians, but this difference did not reach statistical significance.

In a subgroup analysis based on sex, male vegetarians had lower arterial stiffness than male omnivores. Omnivores had a higher BMI and hip circumference than vegetarians.

Note

These results should be interpreted with caution because eating patterns were based on self-reports and were not verified by any means (e.g., dietary assessment), the sample was rather small (especially for subgroup analyses), and dietary nutrient intake was not monitored. There is much more nuance to the associations between dietary patterns and health outcomes than this study was able to address.

Plant-based diets are often promoted for healthier outcomes, but this dietary distinction can still include

highly processed, less healthy foods and an overall lower-quality diet that is associated with poorer health outcomes. To properly guide consumers toward a diet that promotes healthier outcomes, attention should be focused on the healthy aspects of plant-based diets, such as richness in fiber, micronutrients, and phytochemicals that come mostly from whole foods.[128]

#Dietitians

Do low-protein vegetarian diets improve renal function in chronic kidney disease?

This scoping review found no convincing evidence that a low-protein vegetarian diet improves renal function more effectively than a conventional low-protein diet in the context of chronic kidney disease.

Background

Protein restriction is recommended for patients with *chronic kidney disease* (CKD) to sustain renal function and reduce the risk of renal failure.[245] Additionally, the source of dietary protein may be relevant for CKD management. For instance, vegetarian diets (no fish or meat) could have beneficial effects in maintenance of renal function[246] (e.g., by reducing uremic toxins.[247]) However, the risks and benefits of a vegetarian diet for CKD treatment remain unclear.

The study

This scoping review of 4 studies — 2 crossover, 1 cross-sectional, and 1 *randomized controlled trial* (RCT) — examined the effects of a vegetarian diet on renal function in 324 adults with CKD who were not on dialysis.

The RCT was the study with the most participants (207 adults) and the one conducted for the longest time (15 months). In the RCT, a low-protein (0.3 grams of protein per kilogram of body weight or 0.3 g/kg) vegetarian diet supplemented with essential amino acids was compared to a conventional low-protein diet (0.6 g/kg).[248]

The results

Of the 4 studies, only the RCT showed beneficial effects of a low-protein vegetarian diet (supplemented with ketoanalogues) compared to a conventional low-protein diet. The RCT found that only 11% in the vegetarian group reached renal failure compared to 30% in the control group.[248]

Note

Because protein content and amino acid supplementation differed between the control and treatment group, the results of the RCT cannot be attributed only to the vegetarian diet or type of protein source.

#Dietitians, #ChronicKidneyDisease

The vegan metabolome: Is it different? And does different mean better?

In this cross-sectional study, vegans showed marked differences in metabolite profiles compared to omnivores. In most cases, metabolite concentrations were lower in vegans than omnivores, including certain disease risk factors.

Background

Vegan diets are associated with many positive health outcomes, such as a lower risk of diabetes[287][288] and cardiovascular disease.[289][290] However, the biological mechanisms behind these health benefits remain elusive. It's possible that a vegan diet may positively influence the metabolome, which is the complete set and interactions of metabolites (small molecules produced during metabolic processes) in the body. For example, vegans may have lower levels of lipid metabolites.[291] This study explored whether eating a vegan diet changes the abundance of plasma metabolites compared to an omnivorous diet.

The study

This cross-sectional study examined whether eating a plant-based diet influences plasma metabolic profiles compared to an omnivorous diet (defined as consuming at least 28 grams of red meat per day). The 96 healthy adult (average of 61) participants were part of the Adventist Health Study-2 cohort, a large cohort established in 2002–2007 that is well suited to studying the relationship between plant-based dietary patterns and health and disease risk.

To identify plasma metabolites in participant blood samples, the researchers used liquid chromatography (a method that physically separates molecules in complex solutions) coupled with mass spectrometry (an analytical instrument that detects the presence and concentration of hundreds of metabolites).

The results

The researchers identified 930 metabolites and 93 metabolite subclasses such as lipids, amino acids, carbohydrates, nucleotides (building blocks of DNA), and xenobiotics (chemical substances foreign to animal cells such as drugs or pesticides).

Of the 930 analyzed metabolites, 586 (63%) showed a different abundance in vegans than in omnivores. Of these 586 differential metabolites, 164 (28%) were higher and 422 (72%) were lower in vegans. The metabolites showing the greatest changes were lipids, amino acids, and xenobiotics.

Of the 93 metabolite subclasses, 50 subclasses were changed in vegans relative to omnivores. Most notably, vegans had higher ketone, vitamin A, and inositol metabolism and lower drug, xanthine, and fatty acid metabolism.

The researchers noted that many of these metabolites and metabolite subclasses may be involved in inflammation, insulin dysregulation, and cardiometabolic phenotypes (the observable characteristics of an organism). However, the causal effects of these metabolite changes on health outcomes remain unknown.

Note

There are two limitations worth mentioning. First, the vegans differed from the omnivores in many ways other than diet. Most notably, the vegans had a lower BMI, a lower intake of calories and saturated fats, and a higher consumption of fruits, vegetables, whole grains, and dietary fiber than the omnivores. As such, these confounders could have influenced the results.

Second, the results of this cross-sectional study cannot infer a causal relationship between certain metabolite changes and health outcomes. In other words, it remains unclear whether the observed metabolite changes directly lead to improved health outcomes. Larger and longer cohort studies are needed to further investigate this hypothesis.

#Dietitians

What's in your cheese alternative?

This cross-sectional study assessed the nutritional content of nondairy plant-based cheese alternatives available in the United States. Very few products were fortified with calcium, vitamin D, and/or vitamin B_{12}, and most were poor sources of protein.

Background

Nondairy plant-based cheeses have been increasing in popularity due to concerns related to health (e.g., lactose intolerance), the environment, and animal welfare.

Dairy cheese is considered a decent source of protein and calcium. When people choose a nondairy plant-based cheese alternative, they often expect a product with not only similar taste and texture, but also similar nutritional content. How does nondairy plant-based cheese stack up against dairy cheese in terms of nutritional content?

The study

This cross-sectional study evaluated the nutritional content of 245 nondairy plant-based cheese alternatives (representing 35 brands) available in the United States using either the nutritional facts label on the retail package or data collected from the manufacturer's website.

The cheese alternatives were based on coconut oil (106 products), cashews and coconut oil (61 products), cashews (35 products), oats (16 products), almonds (7 products), soy (6 products), palm fruit oil (5 products), and other blends (9 products). The nutritional value of the products was determined by whether they were fortified with calcium, vitamin D, and/or vitamin B_{12}, as well as the amount of calories, total fat, saturated fat, protein, and sodium that they provided per serving.

The results

Overall, cashew-based products tended to provide the most protein and the least amount of sodium per

serving, while coconut-based products tended to provide the most saturated fat and sodium per serving.

Of the 245 products:

- Only 19 (7.8%) were fortified with calcium, 1 (0.4%) was fortified with vitamin D, and 14 (5.7%) were fortified with vitamin B_{12}.
- Only 3 products (1.2%) provided at least 5 grams of protein per serving, and 183 (75%) provided ≤ 2.5 grams of protein per serving.
- 15 products (6.1%) provided ≤ 115 milligrams (mg) of sodium per serving, while 31 (13.1%) provided ≥ 230 mg of sodium per serving.
- 14 products (5.7%) provided ≤ 1 gram of saturated fat per serving, while 57 (23.3%) provided ≥ 4 grams of saturated fat per serving.
- 4 products (1.6%) provided ≤ 4 grams of total fat per serving, and 81 (33.1%) provided ≤ 100 calories per serving.

Note

Because this study only analyzed products available in the United States, the results may not apply to the nutritional content of nondairy plant-based cheese alternatives in other countries.

#Dietitians

Do vegetarians have better cardiovascular health than nonvegetarians?

In this cross-sectional study, vegetarians had better cardiovascular health metrics than omnivores (with the exception of diet). In contrast, diet scores were lower in vegetarians, probably due to their lack of fish consumption.

Background

Vegetarian diets have potentially beneficial effects on *cardiovascular* (CV) health.[330] However, most studies did not account for metabolic profiles and lifestyle habits such as diet, smoking, and physical activity. This study asked whether vegetarian diets are associated with CV health while also taking into account metabolic profiles and lifestyle habits.

The study

This cross-sectional study in 1,896 healthy Taiwanese adults (ages 46–66) investigated whether a vegetarian diet (i.e., eating no meat or fish) is associated with better CV health.

The researchers used the ideal CV health metric to measure CV health via seven CV risk factors: diet, smoking, blood pressure, physical activity, fasting glucose, total cholesterol, and BMI.[331] The results were adjusted for age, gender, education level, and family income.

The results

Overall, vegetarians had better CV health than omnivores with respect to five risk factors: smoking, blood pressure, fasting glucose, total cholesterol, and BMI. However, vegetarians had a lower healthy diet score than omnivores, probably due to a lack of fish consumption. Physical activity was similar between both groups. These results remained consistent after adjusting for confounding factors.

Note

Because fish was one of the components of the healthy diet score, it is not surprising that the vegetarians in this study (defined as not eating fish or meat) had a lower score than omnivores. Future studies using the ideal CV health metric might need to modify the score for vegetarians (e.g., by replacing fish with other omega-3 fatty acid sources such as walnuts or flaxseeds).

#Dietitians

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