Carbohydrates

Glycemic Index, Glycemic Load, and Blood Pressure: A Systematic Review And Meta-Analysis Of Randomized Controlled Trials

Evans CE, Greenwood DC, Threapleton DE, Gale CP, Cleghorn CL, Burley VJ. *Am J Clin Nutr.* 2017 May;105(5):1176–1190. doi: 10.3945/ajcn.116.143685. Epub 2017 Apr 12. Article Link

Significance: This review of healthy individuals indicated that a lower glycemic diet may lead to important reductions in blood pressure. However, many of the trials included in the analysis reported important sources of bias.

High blood pressure is a strong risk factor for cardiovascular disease. The aim of this study was to determine the associations of dietary glycemic index (GI) and glycemic load (GL) with systolic blood pressure (SBP) and diastolic blood pressure (DBP) in healthy individuals. A systematic review and meta-analysis of randomized controlled trials (RCTs) was carried out. Databases were searched for eligible RCTs in 2 phases. MEDLINE, Embase, CAB Abstracts, BIOSIS, ISI Web of Science, and the Cochrane Library were searched from January 1990 to December 2009. An updated search was undertaken with the use of MEDLINE and Embase from January 2010 to September 2016. Trials were included if they reported author-defined high- and low-GI or -GL diets and blood pressure, were of ≥6 wk duration, and comprised healthy participants without chronic conditions. Data were extracted and analyzed with the use of Stata statistical software. Pooled estimates and 95% CIs were calculated with the use of weighted mean differences and random-effects models. Results: Data were extracted from 14 trials comprising 1097 participants. Thirteen trials provided information on differences in GI between control and intervention arms. A median reduction in GI of 10 units reduced the overall pooled estimates for SBP and DBP by 1.1 mm Hg (95% CI: -0.3, 2.5 mm Hg; P = 0.11) and 1.3 mm Hg (95% CI: 0.2 mm Hg, 2.3; P = 0.02), respectively. Nine trials reported information on differences in GL between arms. A median reduction in GL of 28 units reduced the overall pooled estimates for SBP and DBP by 2.0 mm Hg (95% CI: 0.2, 3.8 mm Hg; P = 0.03) and 1.4 mm Hg (95% CI: 0.1, 2.6 mm Hg; P = 0.03), respectively. Conclusions: This trial was registered at PROSPERO as CRD42016049026.

Widespread Sucralose Exposure in a Randomized Clinical Trial in Healthy Young Adults

Sylvetsky AC, Walter PJ, Garraffo HM, Robien K, Rother KI. *Am J Clin Nutr.* 2017 Apr;105(4):820–823. doi: 10.3945/ajcn.116.144402. Article Link

Significance: Instructions to avoid LCSs in RCTs are not effective and nondietary sources (e.g., personal care products) may be important contributors to overall exposure.

Low-calorie sweeteners (LCSs) are found in many foods and beverages, but consumers may not realize their presence, and their role in appetite, weight, and health is controversial. Although consumption limits based on toxicologic safety are well established, the threshold required to exert clinically relevant metabolic effects is unknown. This study aimed to determine whether individuals who do not report consumption of LCSs can be correctly characterized as "unexposed" and to investigate whether instructions to avoid LCSs are effective in minimizing exposure. Eighteen healthy 18- to 35-y-old "nonconsumers" (<1 food or beverage with LCSs/mo) enrolled in a 2-wk trial designed to evaluate the effects of LCSs on the gut microbiota. The trial consisted of 3 visits. At baseline, participants were counseled extensively about avoiding LCSs. After the run-in, participants were randomly assigned to consume diet soda containing sucralose or carbonated water (control) 3 times/d for 1 wk. Food diaries were maintained throughout the study, and a spot urine sample was collected at each visit. At baseline, 8 participants had sucralose in their urine (29.9-239.0 ng/mL; mean ± SD: 111.4 ± 91.5 ng/mL). After the run-in, sucralose was found in 8 individuals (2 of whom did not have detectable sucralose at baseline) and ranged from 25.0 to 1062.0 ng/mL (mean ± SD: 191.7 ± 354.2 ng/mL). Only 1 participant reported consumption of an LCS-containing food before her visit. After the intervention, sucralose was detected in 3 individuals randomly assigned to receive carbonated water (26-121 ng/mL; mean ± SD: 60.7 ± 52.4 ng/mL).

Despite the selection of healthy volunteers with minimal reported LCS consumption, more than one-third were exposed to sucralose at baseline and/or before randomization, and nearly half were exposed after assignment to the control. This shows that instructions to avoid LCSs are not effective and that nondietary sources (e.g., personal care products) may be important contributors to overall exposure.

Dietary Patterns

Dietary Protein and Bone Health: A Systematic Review and Meta-Analysis From the National Osteoporosis Foundation

Shams-White MM, Chung M, Du M, Fu Z, Insogna KL, Karlsen MC, et al.
Am J Clin Nutr. 2017 Apr 12. pii: ajcn145110. doi: 10.3945/ajcn.116.145110. Article Link

Significance: Current evidence shows no adverse effects of higher protein intakes. Although there were positive trends on BMD at most bone sites, only the lumbar spine showed moderate evidence to support benefits of higher protein intake.

Considerable attention has recently focused on dietary protein's role in the mature skeleton, prompted partly by an interest in nonpharmacologic approaches to maintain skeletal health in adult life. The aim was to conduct a systematic review and meta-analysis evaluating the effects of dietary protein intake alone and with calcium with or without vitamin D (Ca±D) on bone health measures in adults. Searches across 5 databases were conducted through October 2016 including randomized controlled trials (RCTs) and prospective cohort studies examining 1) the effects of "high versus low" protein intake or 2) dietary protein's synergistic effect with Ca±D intake on bone health outcomes. Two investigators independently conducted abstract and full-text screenings, data extractions, and risk of bias (ROB) assessments. Strength of evidence was rated by group consensus. Random-effects meta-analyses for outcomes with ≥4 RCTs were performed. Sixteen RCTs and 20 prospective cohort studies were included in the systematic review. Overall ROB was medium. Moderate evidence suggested that higher protein intake may have a protective effect on lumbar spine (LS) bone mineral density (BMD) compared with lower protein intake (net percentage change: 0.52%; 95% CI: 0.06%, 0.97%, I2: 0%; n = 5) but no effect on total hip (TH), femoral neck (FN), or total body BMD or bone biomarkers. Limited evidence did not support an effect of protein with Ca±D on LS BMD, TH BMD, or forearm fractures; there was insufficient evidence for FN BMD and overall fractures.

Very-Long-Chain ω-3 Fatty Acid Supplements and Adipose Tissue Functions: A Randomized Controlled Trial

Hames KC, Morgan-Bathke M, Harteneck DA, Zhou L, Port JD, Lanza IR, et al. *Am J Clin Nutr.* 2017 Apr 19. pii: ajcn148114. doi: 10.3945/ajcn.116.148114. Article Link

Significance: High-dose ω-3 supplementation for 6 months, had no beneficial effects on insulin-mediated suppression of lipolysis or adipose tissue inflammation in insulin-resistant, overweight and obese adults.

Increased omega-3 (n-3) fatty acid consumption is reported to benefit patients with metabolic syndrome, possibly due to improved adipose tissue function. Researchers tested the effects of high-dose, very-long-chain ω-3 fatty acids on adipose tissue inflammation and insulin regulation of lipolysis. A double-blind, placebo-controlled study compared 6 mo of 3.9 g eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA)/d (4.2 g total ω-3/d; n = 12) with a placebo (4.2 g oleate/d; n = 9) in insulin-resistant adults. In the ω-3 group, the EPA and DHA contributions to plasma free fatty acids increased (P = 0.0003 and P = 0.003, respectively), as did the EPA and DHA content in adipose tissue (P < 0.0001 and P < 0.0001, respectively). Despite increases in adipose and plasma EPA and DHA in the ω-3 group, there were no significant changes in the IC50(palmitate)f (19 ± 2 compared with 24 ± 3 µIU/mL), adipose macrophages (total: 31 ± 2/100 adipocytes compared with 33 ± 2/100 adipocytes; CD14+: 13 ± 2/100 adipocytes compared with 14 ± 2/100 adipocytes; CD206+: 28 ± 2/100 adipocytes compared with 29 ± 3/100 adipocytes), crown-like structures (1 ± 0/10 images compared with 1 ± 0/10 images), or senescent cells (4% ± 1% compared with 4% ± 1%). There were no changes in these outcomes in the placebo group. Six months of high-dose ω-3 supplementation raised plasma and adipose ω-3 fatty acid concentrations but had no beneficial effects on adipose tissue lipolysis or inflammation in insulin-resistant adults.

Dietary Patterns and Type 2 Diabetes: A Systematic Literature Review and Meta-Analysis of Prospective Studies

Jannasch F, Kröger J, Schulze MB. *J Nutr.* 2017 Apr 19. pii: jn242552. doi: 10.3945/jn.116.242552. Article Link

Significance: Authors summarized evidence from prospective studies that examined associations of dietary patterns with type 2 diabetes by considering different methodologic approaches. The meta-analysis suggests that diets according to the Mediterranean diet, DASH, and AHEI have a strong potential for preventing diabetes, although they differ in some particular components.

Different methodologic approaches for constructing dietary patterns and differences in their composition limit conclusions on healthful patterns for diabetes prevention. The literature search (MEDLINE and Web of Science) identified prospective studies (cohorts or trials) that associated dietary patterns with diabetes incidence in nondiabetic and apparently healthy participants. Authors summarized evidence by meta-analyses and distinguished different methodologic approaches. The search resulted in 48 articles comprising 16 cohorts. Adherence to the Mediterranean diet (RR for comparing extreme quantiles: 0.87; 95% CI: 0.82, 0.93), Dietary Approaches to Stop Hypertension (DASH) (RR: 0.81; 95% CI: 0.72, 0.92), and Alternative Healthy Eating Index (AHEI) (RR: 0.79; 95% CI: 0.69, 0.90) was associated with significant risk reductions of incident diabetes. Patterns from exploratory factor and principal component analyses characterized by red and processed meat, refined grains, high-fat dairy, eggs, and fried products ("mainly unhealthy") were positively associated with diabetes (RR: 1.44; 95% CI: 1.27, 1.62), whereas patterns characterized by vegetables, legumes, fruits, poultry, and fish ("mainly healthy") were inversely associated with diabetes (RR: 0.84; 95% CI: 0.77, 0.91).

Modeling Tool for Calculating Dietary Iron Bioavailability in Iron-Sufficient Adults

Fairweather-Tait SJ, Jennings A, Harvey LJ, Berry R, Walton J, Dainty JR. *Am J Clin Nutr.* 2017 Apr 5. pii: ajcn147389. doi: 10.3945/ajcn.116.147389. Article Link

Significance: With this new tool to predict dietary iron bioavailability, risk managers and public health professionals have a flexible and transparent basis on which to base dietary recommendations.

Values for dietary iron bioavailability are required for setting dietary reference values. These are estimated from predictive algorithms, nonheme iron absorption from meals, and models of iron intake, serum ferritin concentration, and iron requirements. Iron intake and serum ferritin, a quantitative marker of body iron stores, from 2 nationally representative studies of adults in the United Kingdom and Ireland and a trial in elderly people in Norfolk, United Kingdom, were used to develop a model to predict dietary iron absorption at different serum ferritin concentrations. The model predicted that at serum ferritin concentrations of 15, 30, and 60 mg/L, mean dietary iron absorption would be 22.3%, 16.3%, and 11.6%, respectively, in men; 27.2%, 17.2%, and 10.6%, respectively, in premenopausal women; and 18.4%, 12.7%, and 10.5%, respectively, in postmenopausal women. An interactive program for calculating dietary iron absorption at any concentration of serum ferritin is presented. Differences in iron status are partly explained by age but also by diet, with meat being a key determinant. The effect of the diet is more marked at lower serum ferritin concentrations. The model can be applied to any adult population in whom representative, good-quality data on iron intake and iron status have been collected.

Caffeine, Coffee, and Appetite Control: A Review

Schubert MM, Irwin C, Seay RF, Clarke HE, Allegro D, Desbrow B. *Int J Food Sci Nutr.* 2017 Apr 27:1–12. doi: 10.1080/09637486.2017.1320537. Article Link

Significance: Longer controlled studies are needed as the influence of covariates such as genetics of caffeine metabolism and bitter taste phenotype remain unknown.

Coffee and caffeine consumption has global popularity. However, evidence for the potential of these dietary constituents to influence energy intake, gut physiology, and appetite perceptions remains unclear. The purpose of this review was to examine the evidence regarding coffee and caffeine's influence on energy intake and appetite control. The literature was examined for studies that assessed the effects of caffeine and coffee on energy intake, gastric emptying, appetite-related hormones, and perceptual measures of appetite. The literature review indicated that coffee administered 3–4.5 h before a meal had minimal influence on food and macronutrient intake, while caffeine ingested 0.5–4 h before a meal may suppress acute energy intake. Evidence regarding the influence of caffeine and coffee on gastric emptying, appetite hormones, and appetite perceptions was equivocal.

From the ILSI North America Future Leader Recipient Julia Finkelstein of Cornell University

Vitamin B12 Status in Pregnant Women and Their Infants in South India

Finkelstein JL, Kurpad AV, Thomas T, Srinivasan K, Duggan C. *Eur J Clin Nutr.* 2017 Apr 12 [Epub ahead of print]. doi: 10.1038/ejcn.2017.29. Article Link

Significance: Impaired maternal vitamin B12 status throughout pregnancy predicted higher risk of vitamin B12 deficiency in infants, after adjusting for vitamin B12 supplementation.

Vitamin B12 deficiency during pregnancy has been associated with increased risk of adverse perinatal outcomes. However, few studies have investigated the burden and determinants of vitamin B12 status in young infants. This study was conducted to determine the associations between maternal and infant vitamin B12 status. After adjusting for vitamin B12 supplementation, higher vitamin B12 concentrations in each trimester were associated with increased infant vitamin B12 concentrations and lower risk of vitamin B12 deficiency in infants ($P<0.05$). After adjusting for vitamin B12 supplementation, infants born to women with vitamin B12 deficiency had a twofold greater risk of vitamin B12 deficiency ($P<0.01$). Higher maternal folate concentrations also predicted lower risk of vitamin B12 deficiency in infants ($P<0.05$). Impaired maternal vitamin B12 status, which combined both circulating and functional biomarkers, was the single best predictor of infant vitamin B12 status. Future interventions are needed to improve vitamin B12 status periconceptionally, and to ensure optimal vitamin B12 status and health outcomes in pregnant women and their children.

Scientific Integrity

Conflict of Interest and the Role of the Food Industry in Nutrition Research

Mozaffarian D. *JAMA.* 2017 May 2;317(17):1755–1756. doi: 10.1001/jama.2017.3456. Article Link

Significance: Given the scale of nutritional challenges worldwide, the scope of industry's expertise and reach, the diversity across companies and their employees, and the potential to create products that are healthier and more profitable, the food industry is a necessary partner for important research and translational solutions to help address the global nutrition crisis.

Fostering Research Integrity

National Academies of Science, Engineering, and Medicine. *Fostering Research Integrity.* Washington, DC: National Academies Press; 2017. Report Link

Significance: The integrity of knowledge that emerges from research is based on individual and collective adherence to core values of objectivity, honesty, openness, fairness, accountability, and stewardship. Integrity in science means that the organizations in which research is conducted encourage those involved to exemplify these values in every step of the research process. Understanding the dynamics that support – or distort – practices that uphold the integrity of research by all participants ensures that the research enterprise advances knowledge.

Research Integrity—Have We Made Progress?

Lancet. 2017;389(10081):1771. doi: 10.1016/S0140-6736(17)31201-1. Article Link

Significance: The ILSI North America efforts related to Scientific Integrity will be presented at the upcoming World Congress on Research Integrity. This editorial briefly describes the current landscape of research integrity initiatives and progress in the scientific community.