Nutrition Briefs

February 2015

Cardiovascular Disease

Dietary Intake of Saturated Fat Is Not Associated with Risk of Coronary Events or Mortality in Patients with Established Coronary Artery Disease

N.G. Puaschitz, E. Strand, T.M. Norekva, J. Dierkes, L. Dahl, G. Frodah, et al.

> **Significance:** Dietary intake of saturated fatty acids and incident coronary events or mortality was not associated with established coronary artery disease.

This study investigated the associations between self-reported dietary saturated fatty acid (SFA) intake and risk of subsequent coronary events and mortality in patients with coronary artery disease (CAD). Patients who participated in the Western Norway B-Vitamin Intervention Trial (n=2412) and completed a 169-item semiquantitative food-frequency questionnaire after coronary angiography were included. After a median follow-up of 4.8 y, a total of 292 (12%) patients experienced at least one major coronary event during follow-up. High intake of SFAs was associated with a number of risk factors at baseline. However, there were no significant associations between SFA intake and risk of coronary events [age- and sex-adjusted HR (95% CI) was 0.85 (0.61, 1.18) for the upper vs. lower SFA quartile] or any secondary endpoint. Estimates were not appreciably changed after multivariate adjustments.

Nut Consumption and Risk of Mortality in the Physicians' Health Study

T.T. Hshieh, A.B. Petrone, J.M. Gaziano, L. Djoussé

> **Significance:** Nut consumption was inversely associated with the risk of all-cause and cardiovascular disease mortality in US male physicians.

This prospective cohort study in 20,742 male physicians tested the hypothesis that nut consumption is inversely associated with the risk of all-cause mortality. Results showed that during a mean follow-up of 9.6 y, there were 2732 deaths. The mean (±SD) age at baseline was 66.6 ± 9.3 y. Median nut consumption was 1 serving/wk. Multivariable-adjusted HRs (95% CIs) were 1.0 (reference), 0.92 (0.83, 1.01), 0.85 (0.76, 0.96), 0.86 (0.75, 0.98), and 0.74 (0.63, 0.87) for nut consumption of never or <1 serving/mo, 1–3 servings/mo, 1 serving/wk, 2–4 servings/wk, and ≥5 servings/wk, respectively (P-linear trend < 0.0001), after adjustment for age, BMI, alcohol use, smoking, exercise, prevalent diabetes and hypertension, and intakes of energy, saturated fat, fruit and vegetables, and red

meat. In a secondary analysis, results were consistent for cardiovascular disease mortality but only suggestive and non–statistically significant for coronary artery disease and cancer mortality.

Food Allergy

Randomized Trial of Peanut Consumption in Infants at Risk for Peanut Allergy

G. Du Toit, G. Roberts, P.H. Sayre, H.T. Bahnson, S. Radulovic, A.F. Santos, et al. for the LEAP Study Team

> **Significance:** The early introduction of peanuts significantly decreased the frequency of the development of peanut allergy among children at high risk for this allergy and modulated immune responses to peanuts.

This study evaluated strategies of peanut consumption and avoidance to determine which strategy is most effective in preventing the development of peanut allergy (PA) in 640 infants at high risk for the allergy. Participants with severe eczema, egg allergy, or both were randomly assigned to consume or avoid peanuts until 60 months of age. Participants, who were ≥4 months but <11 months of age at randomization, were assigned to separate study cohorts on the basis of preexisting sensitivity to peanut extract. The primary outcome, which was assessed independently in each cohort, was the proportion of participants with PA at 60 months of age. Among the 530 infants in the intention-to-treat population who initially had negative results on the skin-prick test, the prevalence of PA at 60 months of age was 13.7% in the avoidance group (AG) and 1.9% in the consumption group (CG) (P<0.001). Among the 98 participants in the intention-to-treat population who initially had positive test results, the prevalence of PA was 35.3% in the AG and 10.6% in the CG (P=0.004). There was no significant between-group difference in the incidence of serious adverse events. Increases in levels of peanut-specific IgG4 antibody occurred predominantly in the CG; a greater percentage of participants in the AG had elevated titers of peanut-specific IgE antibody. A larger wheal on the skin-prick test and a lower ratio of peanut-specific IgG4:IgE were associated with PA.

Diabetes

The Interactive Effect of Improvement of Vitamin D Status and VDR Foki Variants on Oxidative Stress in Type 2 Diabetic Subjects: A Randomized Controlled Trial

S. Shab-Bidar, T.R. Neyestani, A. Djazayery

> **Significance:** Improvement of vitamin D status via daily intake of vitamin D3-fortified doogh ameliorates oxidative stress biomarkers in type 2 diabetic subjects and the interactive effect of FokI genotypes cannot be ruled out.

This study evaluated the effects of improvement of vitamin D status on biomarkers of oxidative stress (OS) in type 2 diabetic (T2D) subjects and whether

vitamin D receptor (VDR)-FokI polymorphisms could modulate the response to vitamin D3 intake. Subjects with T2D were allocated to one of two groups to receive either plain doogh (PD; containing 150 mg calcium and no vitamin D/250 ml, n=50) or vitamin D3-fortified doogh (FD; containing 500 IU/250 ml, n=50) twice a day for 12 weeks. After 12 weeks, serum 25-hydroxyvitamin D increased significantly in FD (from 38.5±202.2 to 72.0±23.5, P<0.001) as compared with PD (from 38.8±22.8 to 33.4±22.8, P=0.28). Comparisons between FD and PD revealed significant differences in changes of serum malondialdehyde (−0.54±0.82 µmol/l vs +0.17±1 µmol/l, P<0.001), glutathione (+8.4±40.1 ng/l vs −13.1±29.4 ng/l, P=0.002) and total antioxidant capacity (+0.14±0.43 mmol/l vs +0.02±0.45 mmol/l bovine serum albumin equivalent, P=0.03). Although there was no significant association between FokI genotypes and OS biomarkers, ff variant subgroup showed the weakest response to vitamin D.

Sucralose Enhances GLP-1 Release and Lowers Blood Glucose in the Presence of Carbohydrate in Healthy Subjects But Not in Patients With Type 2 Diabetes

S. Temizkan, O. Deyneli, M. Yasar, M. Arpa, M. Gunes, D. Yazici, et al.

European Journal of Clinical Nutrition, Vol. 69, No. 2; pp. 162–166, 2015

doi: 10.1038/ejcn.2014.208

Link to full text: Click here

> **Significance:** Sucralose enhances glucagon-like peptide-1 release and lowers blood glucose in the presence of carbohydrate in healthy subjects but not in newly diagnosed type 2 diabetic patients.

The effect of artificial sweeteners (aspartame and sucralose) on blood glucose, insulin, c-peptide and glucagon-like peptide-1 (GLP-1) levels was investigated in 8 newly diagnosed drug-naive type 2 diabetic patients and 8 healthy subjects who underwent 75 g oral glucose tolerance test (OGTT). The OGTTs were performed at three settings on different days, where subjects were given 72 mg of aspartame and 24 mg of sucralose in 200 ml of water or 200 ml of water alone 15 min before OGTT in a single-blinded randomized order. In healthy subjects, the total area under the curve (AUC) of glucose was significantly lower in the sucralose setting than in the water setting (P=0.002). There was no difference between the aspartame setting and the water setting (P=0.53). Total AUC of insulin and c-peptide was similar in aspartame, sucralose and water settings. Total AUC of GLP-1 was significantly higher in the sucralose setting than in the water setting (P=0.04). Total AUC values of glucose, insulin, c-peptide and GLP-1 were not statistically different in three settings in type 2 diabetic patients.

Blood Pressure Lowering in Type 2 Diabetes: A Systematic Review and Meta-analysis

C.A. Emdin, K. Rahimi, B. Neal, T. Callender, V. Perkovic, A. Patel

Journal of the American Medical Association, Vol. 313, No. 6; pp. 603–615, 2015

doi: 10.1001/jama.2014.18574

Link to full text: Click here

> **Significance:** Among patients with type 2 diabetes, blood pressure lowering was associated with improved mortality and other clinical outcomes with lower relative risks observed among those with baseline blood pressure of ≥140 mm Hg.

The associations between blood pressure (BP) lowering treatment and vascular disease in type 2 diabetes were determined. MEDLINE was searched for large-scale randomized controlled trials of BP–lowering treatment including patients with diabetes. Forty trials judged to be of low risk of bias (100,354 participants) were included. Each 10–mm Hg lower systolic BP was associated with a significantly lower risk of mortality (RR, 0.87; 95% CI, 0.78-0.96); absolute risk reduction (ARR) in events/1000 patient-years (3.16; 95% CI, 0.90-5.22), cardiovascular events (RR, 0.89 [95% CI, 0.83-0.95]; ARR, 3.90 [95% CI, 1.57-6.06]), coronary heart disease (RR, 0.88 [95% CI, 0.80-0.98]; ARR, 1.81 [95% CI, 0.35-3.11]), stroke (RR, 0.73 [95% CI, 0.64-0.83]; ARR, 4.06 [95% CI, 2.53-5.40]), albuminuria (RR, 0.83 [95% CI, 0.79-0.87]; ARR, 9.33 [95% CI, 7.13-11.37]), and retinopathy (RR, 0.87 [95% CI, 0.76-0.99]; ARR, 2.23 [95% CI, 0.15-4.04]). When trials were stratified by mean baseline systolic BP at > or < 140 mm Hg, RRs for outcomes other than stroke, retinopathy, and renal failure were lower in studies with greater baseline systolic BP (P interaction <0.1). The associations between BP-lowering treatments and outcomes were not significantly different, except for stroke and heart failure.

Chocolate Consumption and Risk of Diabetes Mellitus in the Physicians' Health Study

C. Matsumoto, A.B. Petrone, H.D. Sesso, J.M. Gaziano, L. Djoussé

Link to full text: Click here

> **Significance:** This study supports an inverse relation of chocolate intake with incident type 2 diabetes.

This prospective study tested the hypothesis that chocolate consumption is inversely associated with incident type 2 diabetes (DM) in the Physicians' Health Study. Data on 18,235 participants who were free of DM at baseline were analyzed. The mean (±SD) age at baseline was 66.3 ± 9.2 y. During a mean follow up of 9.2 y, 1123 men (6.2%) developed DM. For self-reported chocolate consumption of none, 1–3 servings/mo, 1 serving/wk, and ≥2 servings/wk, multivariable-adjusted HRs (95% CIs) of DM adjusted for lifestyle, clinical, and dietary risk factors including total energy intake were 1.00 (referent), 0.93 (0.79, 1.09), 0.86 (0.72, 1.04), and 0.83 (0.69, 0.99), respectively (P-trend = 0.047). In secondary analyses, the inverse association of chocolate consumption and risk of DM was slightly stronger in subjects without a history of cardiovascular disease or heart failure (P-trend = 0.023). In addition, both age and BMI modified the chocolate-DM relation (P < 0.05 each).

Flavonoids

Effect of Black Tea Intake on Blood Cholesterol Concentrations in Individuals with Mild Hypercholesterolemia: A Diet-Controlled Randomized Trial

R. Troup, J.H. Hayes, S.K. Raatz, B. Thyagarajan, W. Khaliq, D.R. Jacobs Jr., et al.

Link to full text: Click here

> **Significance:** The intake of 5 cups of black tea per day did not alter the lipid profile of borderline hypercholesterolemic subjects significantly.

This diet-controlled clinical trial estimates the effect of black tea flavonoid consumption on cholesterol concentrations in 57 borderline hypercholesterolemic individuals (total cholesterol concentrations between 190 and 260 mg/dL. A double-blind, randomized crossover trial was conducted in which participants consumed a controlled low-flavonoid diet plus 5 cups of black tea or tea-like placebo/day during two 4-week treatment periods. Differences among those treated with tea vs placebo were 3.43 mg/dL (95% CI −7.08 to 13.94) for total cholesterol, −1.02 mg/dL (95% CI −11.34 to 9.30) for LDL-cholesterol, 0.58 mg/dL (95% CI −2.98 to 4.14) for HDL-cholesterol, 15.22 mg/dL (95% CI −40.91 to 71.35) for triglycerides, and −0.39 mg/dL (95% CI −11.16 to 10.38) for LDL-plus HDL-cholesterol fraction. The LDL-cholesterol to HDL-cholesterol ratio decreased by −0.1 units (95% CI −0.41 to 0.21). No results were statistically or clinically significant.

Sodium

Sandwiches Are Major Contributors of Sodium in the Diets of American Adults: Results from What We Eat in America, National Health and Nutrition Examination Survey 2009-2010

Link to full text: Click here

> **Significance:** Due to sandwiches' frequent consumption and considerable contributions to sodium intake, substituting lower-sodium for higher-sodium ingredients in sandwiches could significantly influence sodium intakes.

Efforts to sharpen the focus of sodium reduction strategies include identification of major food group contributors of sodium intake. Although sandwiches are a staple of the American diet, previous examinations of their contribution to sodium intake captured only a small subset of sandwiches. One day of dietary intake data from 5,762 adults aged ≥20 years of age in What We Eat in America, NHANES 2009-2010 was analyzed. Sandwiches were defined in a manner that more accurately reflected their frequency of consumption. On any given day, 49% of American adults ate sandwiches. A significantly higher percentage of men than women reported sandwiches (54% vs 44%, respectively; P<0.001), and sandwiches accounted for higher percentages of men's total energy and sodium intakes. Compared with individuals who did not report a sandwich on the intake day, sandwich reporters had significantly higher energy and sodium intakes; however, sodium density of the diet did not vary by sandwich reporting status.

Sodium Content in Major Brands of US Packaged Foods, 2009

Link to full text: Click here

> **Significance:** The sodium content in packaged foods sold in major US grocery stores varied widely, and a large proportion of top-selling products exceeded limits, indicating the potential for reduction.

This study aimed to assess the sodium content in commercially packaged food products sold in US grocery stores in 2009. A database was created using sales

and nutrition data from commercial sources of nearly 8000 packaged food products. The sales-weighted mean and distribution of sodium content (mg/serving, mg/100 g, and mg/kcal) of foods within food groups that contribute the most dietary sodium to the US diet was estimated. The proportion of products within each category that exceed the FDA's limits for sodium in foods that use a "healthy" label claim and 1150 mg/serving or 50% of the maximum daily intake recommended in the 2010 Dietary Guidelines for Americans were also estimated. Products in the meat mixed dishes category had the highest mean and median sodium contents/serving (966 and 970 mg, respectively). Products in the salad dressing and vegetable oils category had the highest mean and median concentrations/100 g (1072 and 1067 mg, respectively). Sodium density was highest in the soup category (18.4 mg/kcal). More than half of the products sold in 11 of the 20 food categories analyzed exceeded the FDA limits for products with a "healthy" label claim. In 4 categories, >10% of the products sold exceeded 1150 mg/serving.
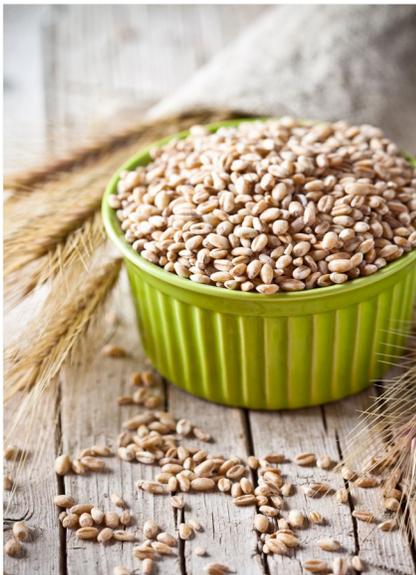
Carbohydrates

Increased Whole Grain Consumption Does Not Affect Blood Biochemistry, Body Composition, or Gut Microbiology in Healthy, Low-Habitual Whole Grain Consumers

A. Ampatzoglou, K.K. Atwal, C.M. Maidens, C.L. Williams, A.B. Ross, F. Thielecke, et al.

Link to full text: Click here

> **Significance:** A combination of dietary advice and provision of commercially available food items enabled subjects with a low-moderate habitual consumption of whole grains to substantially increase their whole grain intake, but there was little effect on other variables examined.

The impact of increasing whole grain (WG) consumption to at least 80 g/d on overall dietary intake, body composition, blood pressure (BP), blood lipids, blood glucose, gastrointestinal microbiology, and gastrointestinal symptoms was assessed in 33 healthy, middle-aged adults with habitual WG intake <24 g/d. Subjects consumed diets high in WG (>80 g/d) or low in WG [<16 g/d, refined-grain (RG) diet] in a crossover study with 6-wk intervention periods separated by a 4-wk washout. Adherence was achieved by specific dietary advice and provision of a range of cereal food products. The 3DFDs, diet compliance diaries, and plasma alkylresorcinols were used to verify compliance. During the WG intervention, consumption increased from 28 g/d to 168 g/d (P<0.001), accompanied by an increase in plasma alkylresorcinols (P<0.001) and total fiber intake (P<0.001), without any effect on energy or other macronutrients. Although there were no effects on studied variables, there were trends toward increased 24-h fecal weight and reduction in body weight and BMI during the WG intervention compared with the RG period.

Whole-Grain Wheat Consumption Reduces Inflammation in a Randomized Controlled Trial on Overweight and Obese Subjects With Unhealthy Dietary and Lifestyle Behaviors: Role of Polyphenols Bound to Cereal Dietary Fiber

P. Vitaglione, I. Mennella, R. Ferracane, A.A. Rivellese, R. Giacco, D. Ercolini, et al.

> **Significance:** Whole grain wheat consumption significantly increased excreted ferulic acid and circulating serum dihydroferulic acid.

This placebo-controlled, parallel-group randomized trial assessed circulating concentration, excretion, and the physiologic role of whole grain (WG) wheat polyphenols in 80 healthy overweight/obese subjects with suboptimal dietary and lifestyle behaviors. Participants replaced precise portions of refined wheat (RW) with a fixed amount of selected WG wheat or RW products for 8 wk. WG consumption for 4–8 wk determined a 4-fold increase in serum dihydroferulic acid (DHFA) and a 2-fold increase in fecal ferulic acid (FA) compared with RW consumption. Similarly, urinary FA at 8 wk doubled the baseline concentration only in WG subjects. Concomitant reduction in plasma tumor necrosis factor-α (TNF-α) after 8 wk and increased interleukin (IL)-10 only after 4 wk with WG compared with RW ($P=0.04$) was observed. No significant change in plasma metabolic disease markers over the study period was observed, but a trend toward lower plasma plasminogen activator inhibitor 1 with higher excretion of FA and DHFA in the WG group was found. Fecal FA was associated with baseline low Bifidobacteriales and Bacteroidetes abundances, whereas after WG consumption, it correlated with increased Bacteroidetes and Firmicutes but reduced Clostridium. TNF-α reduction correlated with increased Bacteroides and Lactobacillus.

Blood Pressure

Estimated Dietary Acid Load Is Not Associated with Blood Pressure or Hypertension Incidence in Men Who Are Approximately 70 Years Old

D. Luis, X. Huang, U. Riserus, P. Sjögren, B. Lindholm, J. Arnlöv, et al.

> **Significance:** An association between dietary acid load and blood pressure was not found cross-sectionally and after 7 y in community-based older Swedish men of similar age.

This study determined whether dietary acid load is associated with blood pressure or the incidence of hypertension in 673 older men not receiving antihypertensive medication, taking into account each individual's kidney function. Of the 673 men, 378 were re-examined after 7 y. Dietary acid load was estimated at baseline by potential renal acid load (PRAL) and net endogenous acid production (NEAP), based on nutrient intake assessed by 7-d food records at baseline. Median estimated PRAL and NEAP were 3.3 and 40.7 mEq/d, respectively. In cross-section, PRAL was not associated with ambulatory blood pressure monitoring (ABPM) measurements (all $P > 0.05$, except for the 24-h diastolic BP). During follow-up, PRAL did not predict ABPM changes (all $P > 0.05$). When individuals with baseline hypertension (ABPM ≥ 130/80 mm Hg) or nondippers (with nighttime-to-daytime systolic BP ratio > 0.9) were excluded, PRAL was not a predictor of incident cases. Kidney function did not modify these null relations. Similar findings were obtained with the use of NEAP as the exposure.

Sugar-Sweetened beverages

Soft Drink Consumption Is Positively Associated with Increased Waist Circumference and 10-Year Incidence of Abdominal Obesity in Spanish Adults

A.N. Funtikova, I. Subirana, S.F. Gomez, M. Fitó, R. Elosua, A.A. Benítez-Arciniega, et al.

Journal of Nutrition, Vol. 145, No. 2; pp. 328–334, 2015

doi: 10.3945/jn.114.205229

Link to full text: Click here

> **Significance:** Adults' consumption of soft drinks was associated with increased waist circumference and odds of 10-y incidence of abdominal obesity.

The relation between consumption of nonalcoholic caloric beverages, including soft drinks, fruit juice, whole milk, and skim and low-fat milk, and changes in waist circumference (WC) and odds of 10-y incidence of abdominal obesity was examined in this prospective, population-based study of 2181 Spanish men and women who were followed from 2000 to 2009. Results showed that a 100 kcal increase in soft drink consumption was associated with a 1.1 cm increase in WC (P=0.018). Substitution of 100 kcal of soft drinks with 100 kcal of whole milk or 100 kcal of juice was associated with a 1.3 cm (95% CI: 0.3, 2.4) and 1.1 cm (95% CI: 0.03, 2.2) decrease in WC, respectively. Increasing consumption of soft drinks from baseline to follow-up led to WC gain compared with maintaining non-consumption. Greater soft drink consumption was positively associated (P=0.029) with increased odds of 10-y incidence of abdominal obesity.

Omega-3 Fish Oil

The Effects of Long-Chain Omega-3 Fish Oils and Multivitamins on Cognitive and Cardiovascular Function: A Randomized, Controlled Clinical Trial

M.P. Pase, N. Grima, R. Cockerell, C. Stough, A. Scholey, A. Sali, et al.

Journal of the American College of Nutrition, Vol. 34, No. 1; pp. 21–31, 2015

doi: 10.1080/07315724.2014.880660

Link to full text: Click here

> **Significance:** Fish oil decreased aortic pulse pressure and augmentation pressure.

This randomized, placebo-controlled, double-blind study investigated the effects of fish oil, with and without the addition of a multivitamin, on cognitive and cardiovascular function in 160 healthy adults aged 50–70 years. Subjects were randomized to receive either 3 g of fish oil (240 mg eicosapentaenoic acid [EPA] + 240 mg docosahexaenoic acid [DHA]) with a multivitamin, 6 g of fish oil (480 mg EPA + 480 mg DHA) with a multivitamin, or 6 g of fish oil without a multivitamin or a placebo. Cognitive performance, brachial blood pressure, and aortic (central) blood pressure were measured at baseline, 6 weeks, and 16 weeks. Results showed that treatment allocation had no effect on the primary cognitive outcomes at endpoint. Absolute increases in the red blood cell omega-3/6 ratio were associated with improvements in spatial working memory. The group receiving 6 g fish oil without the multivitamin displayed a significant decrease in aortic pulse pressure and aortic augmentation pressure, two measures of aortic blood pressure and aortic stiffness.