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North America

Nutrition Briefs

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Cardiovascular Disease

The Effect of a Low-Fat Spread With Added Plant Sterols on Vascular Function Markers: Results of the Investigating Vascular Function Effects of Plant Sterols (INVEST) Study

R.T. Ras, D. Fuchs, W.P. Koppenol, U. Garczarek, A. Greyling, C. Keicher, et al.

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Link to full text: [Click here](#)

Significance: The intake of a low-fat spread with added plant sterols neither improved nor worsened flow mediated dilation or other vascular function markers in hypercholesterolemic men and women.

This double-blind, randomized, placebo-controlled, parallel design study examined the effects of a low-fat spread with added plant sterols (PSs) on brachial artery endothelial function (as measured by flow-mediated dilation [FMD]), arterial stiffness, blood pressure, serum lipids, and plasma PS concentrations. The authors hypothesized that PSs would not worsen FMD but would rather modestly improve FMD. After a 4-wk run-in period, 240 hypercholesterolemic but otherwise healthy men and women consumed 20 g/d of low-fat spread without (control) or with added PSs (3 g/d) during 12 wk; 232 participants completed the study. PS intake did not affect FMD (+0.01 percentage points; 95% CI: -0.73, 0.75) compared with control. Measures of arterial stiffness and blood pressure were also not significantly changed compared with control. After PS intervention, LDL-cholesterol significantly decreased on average by 0.26 mmol/L (95% CI: -0.40, -0.12) or 6.7% compared with control. Plasma sitosterol and campesterol concentrations significantly increased in the PS group up to on average 11.5 $\mu\text{mol/L}$ and 13.9 $\mu\text{mol/L}$ (expressed as geometric means), respectively.

Emerging Risk Factors as Markers for Carotid Intima Media Thickness Scores

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Significance: Aerobic fitness and dietary intake of fiber, fish, magnesium, and zinc are inversely associated with carotid IMT scores, while systolic blood pressure, fasting glucose, body composition, and total cholesterol/HDL ratio have a direct relationship with mean carotid IMT.

This prospective, cross-sectional analysis of 592 subjects aimed to determine which lifestyle factors were associated with mean carotid intima media thickness

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(IMT), a safe and reliable predictor of future cardiovascular disease (CVD) risk. Measures were made of body composition, anthropometric measures, fitness, diet (measured with a 3-day food diary), laboratory results, and mean carotid IMT. Multivariate analyses showed that higher mean IMT values were associated with increasing age ($p < 0.0001$), male gender ($p = 0.0002$), higher systolic blood pressure (BP; $p = 0.0008$), higher BMI ($p = 0.0005$), and lower intake of zinc ($p = 0.0001$). Bivariate analyses (controlling for age and gender, with and without statin use), showed that higher mean IMT scores were statistically associated with higher diastolic BP ($p = 0.007$), higher total cholesterol/HDL ratio ($p < 0.0001$), higher triglyceride/HDL ratio ($p = 0.0001$), lower aerobic capacity measures ($p = 0.0007$), higher body fat percentage and waist circumference ($p < 0.0001$), higher fasting glucose level ($p = 0.028$), and lower intake of magnesium ($p = 0.019$), fish ($p = 0.007$), and fiber ($p = 0.02$).

Diabetes

Low Circulating 25-Hydroxyvitamin D Concentrations Are Associated with Defects in Insulin Action and Insulin Secretion in Persons with Prediabetes

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Significance: Nondiabetics with prediabetes and low circulating 25(OH)D concentrations are the most insulin resistant and have impaired β -cell function, attributes that put them at enhanced risk of type 2 diabetes.

This cross-sectional study determined whether low circulating 25-hydroxyvitamin D [25(OH)D] concentrations are associated with defects in insulin action and insulin secretion in persons with prediabetes (PreDM). Nondiabetic subjects were stratified ($n=488$) on PreDM or normal fasting glucose (NFG) and a 25(OH)D concentration ≤ 20 ng/mL (deficient) or >20 ng/mL (sufficient). Insulin resistance (IR) by steady state plasma glucose (SSPG) concentration and homeostasis model assessment of insulin resistance (HOMA-IR) and insulin secretion by HOMA of β -cell function (HOMA- β) were determined. IR and secretion measures in PreDM and NFG groups; 25(OH)D-deficient and 25(OH)D-sufficient groups; and PreDM-deficient, PreDM-sufficient, NFG-deficient, and NFG-sufficient subgroups were compared, adjusting for covariates. In the PreDM group, mean SSPG concentration and HOMA-IR were higher and mean HOMA- β was lower than in the NFG group ($P < 0.001$ for all comparisons). In the 25(OH)D-deficient group, mean SSPG concentration was higher ($P < 0.001$), but neither mean HOMA-IR nor HOMA- β was significantly different from that in the 25(OH)D-sufficient group. In the PreDM-deficient subgroup, mean (95% CI) SSPG concentration was higher ($P < 0.01$) than in the PreDM-sufficient, NFG-deficient, and NFG-sufficient subgroups [192 (177–207) mg/dL vs. 166 (155–177) mg/dL, 148 (138–159) mg/dL, and 136 (127–144) mg/dL, respectively].

A High-Glycemic Index, Low-Fiber Breakfast Affects the Postprandial Plasma Glucose, Insulin, and Ghrelin Responses of Patients with Type 2 Diabetes in a Randomized Clinical Trial

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Link to full text: [Click here](#)

Significance: Plasma glucose, insulin, and ghrelin responses were least favorable when patients with type 2 diabetes consumed a breakfast with a high GI and low fiber.

This randomized 4-intervention crossover investigated the effect of 4 breakfasts with a different glycemic index (GI) and amount of fiber on postprandial plasma glucose, insulin, and appetite in 14 patients with type 2 diabetes [7 men; ages 65.8 ± 5.2 y; glycated hemoglobin: $6.6 \pm 0.9\%$; BMI: 27.2 ± 3.1]. The breakfasts were as follows: a high GI ($60.4 \pm 0.1\%$) and high fiber (6.0 ± 0.3 g) (HGI-HF), a high GI ($60.9 \pm 1.7\%$) and low fiber (2.5 ± 0.4 g) (HGI-LF), a low GI ($37.7 \pm 0.1\%$) and high fiber (6.2 ± 0.3 g) (LGI-HF), and a low GI ($39.8 \pm 1.3\%$) and low fiber (2.0 ± 0.1 g) (LGI-LF). The area under the curve (AUC) [mean (95% CI)] for plasma glucose (mmol/L \times min) was higher after patients consumed the HGI-LF breakfast [9.62 (8.39, 10.84)] than after the LGI-HF breakfast [8.95 (7.71, 10.18)] ($P \leq 0.05$). Insulin AUC (μ IU/mL \times min) after patients consumed the HGI-LF meal [65.72 (38.24, 93.19)] was higher than after the HGI-HF meal [57.24 (32.44, 82.04)] ($P \leq 0.05$). The other observed difference was higher insulin AUC after the consumption of the LGI-LF breakfast [61.54 (36.61, 86.48)] compared with the AUC after the LGI-HF breakfast [54.16 (31.43, 76.88)] ($P \leq 0.05$). Plasma ghrelin decreased in comparison with baseline only after patients consumed the LGI-HF and LGI-LF breakfasts.

Purified Anthocyanin Supplementation Reduces Dyslipidemia, Enhances Antioxidant Capacity, and Prevents Insulin Resistance in Diabetic Patients

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Significance: Anthocyanin supplementation exerts beneficial metabolic effects in subjects with type 2 diabetes by improving dyslipidemia, enhancing antioxidant capacity, and preventing insulin resistance.

This randomized, placebo-controlled, double-blind trial investigated the effects of purified anthocyanins on dyslipidemia, oxidative status, and insulin sensitivity in 58 patients with type 2 diabetes. Patients were given 160 mg of anthocyanins twice daily or placebo ($n = 29$ /group) for 24 wk. Anthocyanin supplementation significantly decreased serum LDL-cholesterol (by 7.9%), triglycerides (by 23.0%), apolipoprotein (apo) B-48 (by 16.5%), and apo C-III (by 11.0%) and increased HDL-cholesterol (by 19.4%) compared with placebo. In addition, patients in the anthocyanin group showed higher total radical-trapping antioxidant parameter and ferric ion reducing antioxidant power values than did patients in the placebo group. Serum concentrations of 8-iso-prostaglandin F₂ α , 13-hydroxyoctadecadienoic acid, and carbonylated proteins in patients in the anthocyanin group were significantly less than in patients in the placebo group (23.4%, 25.8% and 20%, respectively). Furthermore, supplementation with anthocyanin lowered fasting plasma glucose (by 8.5%) and homeostasis model assessment for insulin resistance index (by 13%), and elevated serum adiponectin (by 23.4%) and β -hydroxybutyrate (by 42.4%) concentrations significantly compared with placebo supplementation.



The Association Between a Biomarker Score for Fruit and Vegetable Intake and Incident Type 2 Diabetes: The EPIC-Norfolk Study

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Link to full text: [Click here](#)

Significance: A combination of biomarkers representing the intake of a mixed fruit and vegetable diet was strongly inversely associated with incident diabetes.

This study aimed to examine the prospective association between a composite score comprised of three biomarkers of mixed fruit and vegetable (FV) intake in 318 incident diabetics (cases) and 926 free-living controls. Subjects aged 40–79 years at baseline (1993–1997) completed a 7-day prospective food diary and had plasma vitamin C and carotenoid measures. A composite biomarker score (CB-score) comprising the sum of plasma vitamin C, beta-carotene and lutein was derived. A strong inverse association was found between the CB-score and incident diabetes. The ORs (95% CI) of diabetes comparing quartiles Q2, Q3 and Q4 of the CB-score with Q1 (reference category) were 0.70 (0.49, 1.00), 0.34 (0.23, 0.52) and 0.19 (0.12, 0.32), respectively, and 0.49 (0.40, 0.58) per s.d. change in CB-score in a model adjusted for demographic and lifestyle factors. The association was marginally attenuated after additionally adjusting for body mass index and waist circumference (0.60 (0.49 and 0.74) per s.d. change in CB-score).



Consumption of Fatty Foods and Incident Type 2 Diabetes in Populations From Eight European Countries

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Significance: Fatty foods were generally not associated with type 2 diabetes, apart from weak positive association for margarine.

This case control study, nested within 8 countries with 12,403 incident type 2 diabetes (T2D) cases and a subcohort of 16,835 people, assessed whether the intake of vegetable oil, butter, margarine, nuts and seeds, and cakes and cookies is related to incident T2D. Diet was assessed at baseline (1991–1999) by country-specific questionnaires. Country-specific hazard ratios (HRs) across four categories of fatty foods (nonconsumers and tertiles among consumers) were combined with random-effects meta-analysis. After adjustment not including BMI, nonconsumers of butter, nuts and seeds and cakes and cookies were at higher T2D risk compared with the middle tertile of consumption. Among consumers, cakes and cookies were inversely related to T2D (HRs across increasing tertiles 1.14, 1.00 and 0.92, respectively; P-trend <0.0001). All these associations attenuated upon adjustment for BMI, except the higher risk of nonconsumers of cakes and cookies (HR 1.57). Higher consumption of margarine became positively associated after BMI adjustment (HRs across increasing consumption tertiles: 0.93, 1.00 and 1.12; P-trend 0.03). Within consumers, vegetable oil, butter and nuts and seeds were unrelated to T2D.

The Effect of a High-Egg Diet on Cardiovascular Risk Factors in People With Type 2 Diabetes: The Diabetes and Egg (DIABEGG) Study—A 3-Mo Randomized Controlled Trial

N.R. Fuller, I.D. Caterson, A. Sainsbury, G. Denyer, M. Fong, J. Gerofi, et al.

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Significance: A high-egg diet can be included safely as part of the dietary management of patients with type 2 diabetes, and it may provide greater satiety.

This randomized controlled study aimed to determine whether a high-egg diet (2 eggs/d for 6 d/wk) compared with a low-egg diet (<2 eggs/wk) affected circulating lipid profiles, particularly HDL-cholesterol, in 140 overweight or obese people with prediabetes or type 2 diabetes (T2D). Subjects were randomly assigned to one of the 2 diets as part of a 3-mo weight maintenance study. Results found no significant difference in the change in HDL-cholesterol from screening to 3 mo between groups; the mean difference (95% CI) between high- and low-egg groups was +0.02 mmol/L (−0.03, 0.08 mmol/L; $P = 0.38$). No between-group differences were shown for total cholesterol, LDL-cholesterol, triglycerides, or glycemic control. Both groups were matched for protein intake, but the high-egg group reported less hunger and greater satiety postbreakfast. Polyunsaturated fatty acid (PUFA) and monounsaturated fatty acid (MUFA) intakes significantly increased from baseline in both groups. High egg consumption did not have an adverse effect on the lipid profile of people with T2D in the context of increased MUFA and PUFA consumption.

Sugar-Sweetened Beverages

Changing Beverage Consumption Patterns Have Resulted in Fewer Liquid Calories in the Diets of US Children: National Health and Nutrition Examination Survey 2001-2010

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Journal of the Academy of Nutrition and Dietetics, Vol. 115, No. 4; pp. 559–566.e4, 2015

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Link to full text: [Click here](#)

Significance: Changing beverage consumption patterns reflect positive trends in the form of reduced intake of sugar-sweetened beverages, whole milk, and total calories from beverages in US children.

This study described recent trends in consumption of all commonly consumed beverages among US children aged 2 to 19 years. Twenty-four-hour dietary recalls from 18,541 participants in the 2001-2010 NHANES were used to assess beverage intake, including sugar-sweetened beverages (SSBs), milks, 100% juices, low-/no-calorie beverages, alcohol-containing beverages; and plain water (during 2005-2010 only). Weighted mean intakes (percent total energy and total ounces) and consumption prevalence were estimated. Results found that between 2001-2002 and 2009-2010, total daily beverage consumption (excluding water) decreased from 24.4% to 21.1% energy (32.0 to 27.9 oz). Significant decreases ($P < 0.05$) occurred in sugar-sweetened sodas (13.5% to 10.2% energy), whole milk (2.7% to 1.6% energy), fruit juices with sugar added (2.3% to 2.1% energy), and fruit-flavored drinks (1.6% to 0.8% energy). Significant increases



occurred for sweetened coffees/teas, energy drinks, sport drinks, and unsweetened juices though the contribution of each to total energy intake remained <1%. Low-/no-calorie drink consumption also increased, rising from 0.2 to 1.3 oz/day.

Mothers' Child-Feeding Practices Are Associated with Children's Sugar-Sweetened Beverage Intake

S. Park, R. Li, L. Birch

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Significance: The odds of daily sugar-sweetened beverage intake were lower among children whose mothers set limits on sweets/junk foods regardless of the child's weight but were higher among underweight/normal-weight children whose mothers restricted the child's favorite food intake.

This study examined the association between mothers' child-feeding practices and sugar-sweetened beverage (SSB) intake among 1350 6-y-old children. Data from the Year 6 Follow-up of the Infant Feeding Practices Study II were evaluated. The outcome variable was child's SSB intake. The exposure variables were 4 child-feeding practices of mothers: setting limits on sweets or junk foods, regulating their child's favorite food intake to prevent overconsumption, pressuring their child to eat enough, and pressuring their child to "clean the plate." The consumption of SSBs ≥ 1 time/d was observed among 17.1% of underweight/normal-weight children and in 23.2% of overweight/obese children. Adjusted ORs (aORs) of consuming SSBs ≥ 1 time/d (vs. no SSB consumption) were significantly lower in children whose mothers reported setting limits on sweets/junk foods (aOR: 0.29; 95% CI: 0.15, 0.58 for underweight/normal-weight children; aOR: 0.16; 95% CI: 0.03, 0.79 for overweight/obese children). SSB intake was higher among underweight/normal-weight children whose mothers reported trying to keep the child from eating too much of their favorite foods (aOR: 2.03; 95% CI: 1.25, 3.29). Mothers' tendency to pressure their children to consume more food or to "clean the plate" was not associated with child's SSB intake.



Caffeine

Urine Excretion of Caffeine and Select Caffeine Metabolites Is Common in the US Population and Associated with Caffeine Intake

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Link to full text: [Click here](#)

Significance: Excretion of caffeine and its metabolites in urine is common in the US population.

This study described urine caffeine and caffeine metabolite concentrations ($n = 2466$) and excretion rates ($n = 2261$) in the US population ≥ 6 y by age, sex, race-ethnicity, and caffeine intake (from foods, beverages, and dietary supplements). Caffeine and 14 of its metabolites were measured in spot urine samples from the NHANES 2009–2010 by use of LC-tandem mass spectrometry. Results found that caffeine and its metabolites were detectable in the urine of most persons, generally at concentrations ≥ 1 $\mu\text{mol/L}$. Median concentrations (95% CI) ranged from 0.560 (0.497, 0.620) $\mu\text{mol/L}$ to 58.6 (48.6, 67.2) $\mu\text{mol/L}$;

median excretion rates from 0.423 (0.385, 0.468) nmol/min to 46.0 (40.7, 50.2) nmol/min. Urine concentrations and excretion rates for 9 analytes had moderate correlations with caffeine intake (Spearman $\rho = 0.55\text{--}0.68$, $P < 0.0001$); the remaining analytes had low correlations ($\rho = 0.15\text{--}0.33$, $P < 0.0001$). Larger differences in geometric mean concentrations and excretion rates between the highest vs. lowest quartiles of caffeine intake for the 9 compounds than the rest were observed. Consistent with dietary caffeine intake, urine concentrations and excretion rates for most compounds were significantly higher in men than women, non-Hispanic whites than Hispanics and non-Hispanic blacks, and highest in persons aged 40–59 y.

Blood Pressure

Flaxseed Consumption May Reduce Blood Pressure: A Systematic Review and Meta-Analysis of Controlled Trials

S. Khaledi, C. Irwin, M. Schubert

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Link to full text: [Click here](#)

Significance: Consumption of flaxseed may lower blood pressure slightly but it may be greater when it is consumed as a whole seed and for a duration of >12 wk.

The effect of flaxseed consumption on blood pressure and the influence of baseline blood pressure, type of flaxseed supplementation, and duration of flaxseed supplementation on blood pressure were explored. PubMed, CINAHL, and Cochrane Library were searched through July 2014 for studies in which humans supplemented their habitual diet with flaxseed or its extracts (i.e., oil, lignans, fiber) for ≥ 2 wk. A total of 11 studies (14 trials) were included in the analysis. Random-effects meta-analyses were conducted for the mean difference in blood pressure. Results indicated that flaxseed supplementation reduced systolic blood pressure (-1.77 mm Hg; 95% CI: -3.45 , -0.09 mm Hg; $P = 0.04$) and diastolic blood pressure (-1.58 mm Hg; 95% CI: -2.64 , -0.52 mm Hg; $P = 0.003$). These results were not influenced by categorization of participants into higher baseline blood pressure (≥ 130 mm Hg). An improvement in diastolic blood pressure was observed in subgroup analysis for consuming whole flaxseed (-1.93 mm Hg; 95% CI: -3.65 , -0.21 mm Hg; $P < 0.05$) and duration of consumption ≥ 12 wk (-2.17 mm Hg; 95% CI: -3.44 , -0.89 mm Hg; $P < 0.05$).

Fiber

Dietary Fiber Intake and Risk of Ischemic and Hemorrhagic Stroke in the UK Women's Cohort Study

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Link to full text: [Click here](#)

Significance: Greater total fiber and fiber from cereals are associated with a lower stroke risk, and associations were more consistent with ischemic stroke.

This study examined the association of fiber intake with a reduced stroke risk and in different stroke types (i.e., total, ischemic or hemorrhagic stroke). A total of 27,373 disease-free women were followed up for 14.4 years. Diet was assessed



with a 217-item food frequency questionnaire and stroke cases were identified using English Hospital Episode Statistics and mortality records. A total of 135 hemorrhagic and 184 ischemic stroke cases were identified in addition to 138 cases where the stroke type was unknown or not recorded. Greater intake of total fiber, higher fiber density and greater soluble fiber, insoluble fiber and fiber from cereals were associated with a significantly lower risk for total stroke. For total stroke, the hazard ratio per 6 g/day total fiber intake was 0.89 (95% CI: 0.81–0.99). Different findings were observed for hemorrhagic and ischemic stroke in healthy-weight or overweight women. Total fiber, insoluble fiber and cereal fiber were inversely associated with hemorrhagic stroke risk in overweight/obese participants, and in healthy-weight women greater cereal fiber was associated with a lower ischemic stroke risk. In non-hypertensive women, higher fiber density was associated with lower ischemic stroke risk.

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