ILSI North America

Nutrition Briefs

June 2015

Cardiovascular Disease

Cranberry Juice Consumption Lowers Markers of Cardiometabolic Risk, Including Blood Pressure and Circulating C-Reactive Protein, Triglyceride, and Glucose Concentrations in Adults

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Link to full text: Click here

Significance: Low-calorie cranberry juice can improve several risk factors of CVD in adults, including circulating triglycerides, C-reactive protein, and glucose, insulin resistance, and diastolic blood pressure.

This 8-wk, double-blind, placebo-controlled, parallel-arm study determined the potential of low-calorie cranberry juice (LCCJ) to lower cardiometabolic risk in 30 women and 26 men. Twice daily volunteers consumed 240 mL of LCCJ or a flavor/color/energy–matched placebo beverage, containing 173 or 62 mg of phenolic compounds and 6.5 or 7.5 g of total sugar/240-mL serving, respectively. Fasting serum triglycerides (TGs) were lower after consuming LCCJ and demonstrated a treatment × baseline interaction such that the participants with higher baseline TG concentrations were more likely to experience a larger treatment effect (1.15±0.04 mmol/L vs. 1.25±0.04 mmol/L, respectively; P= =0.027). Serum C-reactive protein was lower for individuals consuming LCCJ than for individuals consuming the placebo beverage [ln transformed values of 0.522±0.115 ln(mg/L) vs. 0.997±0.120 ln(mg/L), P=0.0054, respectively, and equivalent to 1.69 mg/L vs. 2.71 mg/L back-transformed]. LCCJ lowered diastolic blood pressure compared with the placebo beverage (69.2±0.8 mm Hg for LCCJ vs. 71.6±0.8 mm Hg for placebo; P=0.048). Fasting plasma glucose was lower (P=0.03) in the LCCJ group (5.32±0.03 mmol/L) than in the placebo group (5.42±0.03 mmol/L), and LCCJ had a beneficial effect on homeostasis model assessment of insulin resistance for participants with high baseline values (P=0.035).

Genetically High Plasma Vitamin C, Intake of Fruit and Vegetables, and Risk of Ischemic Heart Disease and All-Cause Mortality: A Mendelian Randomization Study

C.J. Kobylecki, S. Afzal, G.D. Smith, B.G. Nordestgaard

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Significance: High intake of fruit and vegetables was associated with low risk of ischemic heart disease and all-cause mortality.

This study tested the hypothesis that genetically high concentrations of plasma

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vitamin C, such as with high intake of fruit and vegetables, are associated with low risk of ischemic heart disease (IHD) and all-cause mortality. A Mendelian randomization approach was used and genotyped for solute carrier family 23 member 1 (SLC23A1) rs33972313 in the sodium-dependent vitamin C transporter 1 in 97,203 white individuals of whom 10,123 subjects had IHD, and 8477 subjects died. Plasma vitamin C was measured in 3512 individuals; dietary information on 83,256 individuals was included. The SLC23A1 rs33972313 G allele was associated with 11% higher plasma vitamin C. The multivariable adjusted HRs for highest compared with lowest fruit and vegetable intakes were 0.87 (95% CI: 0.78, 0.97; P=0.01) for IHD and 0.80 (95% CI: 0.73, 0.88; P<0.001) for all-cause mortality. Corresponding HRs for rs33972313 GG (93%) compared with AA plus AG (7%) genotypes were 0.95 (95% CI: 0.88, 1.02; P=0.21) and 0.96 (0.88, 1.03; P=0.29), respectively. In an instrumental variable analysis, the OR for genetically determined 25% higher plasma vitamin C concentrations was 0.90 (95% CI: 0.75, 1.08; P=0.27) for IHD and 0.88 (0.72, 1.08; P=0.22) for all-cause mortality.

A Dose-Response Study of Consuming High-Fructose Corn Syrup–Sweetened Beverages on Lipid/Lipoprotein Risk Factors for Cardiovascular Disease in Young Adults

K.L. Stanhope, V. Medici, A.A. Bremer, V. Lee, H.D. Lam, M.V. Nunez, et al.

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Significance: Consuming beverages containing 10%, 17.5%, or 25% energy requirements from high-fructose corn syrup produced dose-dependent increases in circulating lipid/lipoprotein risk factors for CVD and uric acid within 2 wk.

The dose-response effects of consuming beverages sweetened with high-fructose corn syrup (HFCS) at zero, low, medium, and high proportions of energy requirements (Ereq) on circulating lipid/lipoprotein risk factors for CVD and uric acid was determined in a parallel-arm, nonrandomized, double-blinded intervention study. Subjects consumed beverages sweetened with HFCS at 0% (aspartame sweetened, n=23), 10% (n=18), 17.5% (n=16), or 25% (n=28) of Ereq during 13 outpatient days and during 3.5 inpatient days of intervention testing at the research center. Consuming beverages containing 10%, 17.5%, or 25% Ereq from HFCS produced significant linear dose-response increases of lipid/lipoprotein risk factors for CVD and uric acid: postprandial triglyceride (0%: 0±4; 10%: 22±8; 17.5%: 25±5: 25%: 37±5 mg/dL, mean of Δ±SE, P<0.0001 effect of HFCS-dose), fasting LDL-cholesterol (0%: −1.0±3.1; 10%: 7.4±3.2; 17.5%: 8.2±3.1; 25%: 15.9±3.1 mg/dL, P<0.0001), and 24-h mean uric acid concentrations (0%: −0.13±0.07; 10%: 0.15±0.06; 17.5%: 0.30±0.07; 25%: 0.59±0.09 mg/dL, P<0.0001). Compared with beverages containing 0% HFCS, all 3 doses of HFCS-containing beverages increased concentrations of postprandial triglyceride, and the 2 higher doses increased fasting and/or postprandial concentrations of non–HDL cholesterol, LDL-cholesterol, apolipoprotein B, apolipoprotein CIII, and uric acid.

Diabetes

Decrease in Glycemic Index Associated with Improved Glycemic Control among Latinos with Type 2 Diabetes

M.L. Wang, L. Gellar, B.H. Nathanson, L. Pbert, Y. Ma, I. Ockene, et al.

Academy of Nutrition and Dietetics, Vol. 115, No. 6; pp. 898–906, 2015
DOI: 10.1016/j.jand.2014.10.012
Link to full text: Click here

Significance: Lowering glycemic index is associated with improvements in certain metabolic risk factors among Latinos with diabetes.

This study examined long-term longitudinal associations between changes in glycemic index (GI) and glycemic load (GL) with glycemic and metabolic control among 238 low-income Latino adults (87.7% Puerto Rican) with diabetes. Subjects were from the Latinos en Control trial, which was a randomized clinical trial targeting diabetes self-management among Latinos with type 2 diabetes. Participants were randomized to a group-based behavioral intervention or usual care and followed through 12 months. GI and GL were analyzed using data from three 24-hour dietary recalls conducted at baseline, 4 months, and 12 months. Increases in GI from baseline to 12 months were associated with increased logarithm of HbA1c levels (β=0.003; P=0.034) and waist circumference (β=0.12; P=0.026) over time, but not with fasting glucose, blood lipids, or BMI. There was modest evidence to support small, positive associations between GL and HbA1c levels and waist circumference.

Urinary Excretion of Select Dietary Polyphenol Metabolites Is Associated with a Lower Risk of Type 2 Diabetes in Proximate but Not Remote Follow-Up in a Prospective Investigation in 2 Cohorts of US Women

Q. Sun, N.M. Wedick, S.S. Tworoger, A. Pan, M.K. Townsend, A. Cassidy, et al.

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Link to full text: Click here

Significance: Specific flavonoid subclasses, including flavanones and flavonols, as well as caffeic acid, are associated with a lower type 2 diabetes risk in relatively short-term follow-up but not during longer follow-up.

Urinary excretion of select flavonoid and phenolic acid metabolites, as biomarkers of intake, in relation to type 2 diabetes (T2D) risk was examined in 1111 T2D case-control pairs selected from the Nurses' Health Study (NHS) and NHSII. Eight polyphenol metabolites (naringenin, hesperetin, quercetin, isorhamnetin, catechin, epicatechin, caffeic acid, and ferulic acid) were quantified in spot urine samples by liquid chromatography/mass spectrometry. Higher urinary excretion of hesperetin was associated with a lower T2D risk after multivariate adjustment: the OR comparing top vs. bottom quartiles was 0.68 (95% CI: 0.49, 0.96), although a linear trend was lacking (P=0.30). The other measured polyphenols were not significantly associated with T2D risk after multivariate adjustment. However, during the early follow-up period [≤4.6 y (median) since urine sample collection], markers of flavanone intakes (naringenin and hesperetin) and flavonol intakes (quercetin and isorhamnetin) were significantly associated with a lower T2D risk. The ORs (95% CIs) comparing extreme quartiles were 0.61 (0.39, 0.98; P-trend: 0.03) for total flavanones and 0.55 (0.33, 0.92; P-trend: 0.04) for total flavonols (P-interaction with follow-up length: ≤0.04). An inverse association was also observed for caffeic acid during early follow-up only: the OR was 0.52 (95% CI: 0.32, 0.84; P-trend: 0.03). None of these markers was associated with T2D risk during later follow-up.

Follow-up of Glycemic Control and Cardiovascular Outcomes in Type 2 Diabetes

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New England Journal of Medicine, Vol. 372, No. 23; pp. 2197–2206, 2015

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Link to full text: Click here

Significance: Patients with type 2 diabetes who had been randomly assigned to intensive glucose control for 5.6 years had 8.6 fewer major cardiovascular events per 1000 person-years than those assigned to standard therapy, but no improvement was seen in the rate of overall survival.

This study is an extension of the Veterans Affairs Diabetes Trial which found that intensive glucose lowering, as compared with standard therapy, did not significantly reduce the rate of major cardiovascular events among 1791 military veterans (median follow-up, 5.6 years). Results found that the difference in glycated hemoglobin levels between the intensive-therapy group and the standard-therapy group averaged 1.5 percentage points during the trial (median level, 6.9% vs. 8.4%) and declined to 0.2 to 0.3 percentage points by 3 years after the trial ended. Over a median follow-up of 9.8 years, the intensive-therapy group had a significantly lower risk of the primary outcome than did the standard-therapy group (HR=0.83; 95% CI, 0.70 to 0.99; P=0.04), with an absolute reduction in risk of 8.6 major cardiovascular events per 1000 person-years, but did not have reduced cardiovascular mortality (HR=0.88; 95% CI, 0.64 to 1.20; P=0.42). No reduction in total mortality was evident (HR in the intensive-therapy group, 1.05; 95% CI, 0.89 to 1.25; P=0.54; median follow-up, 11.8 years).

Amino Acids, Lipid Metabolites, and Ferritin as Potential Mediators Linking Red Meat Consumption to Type 2 Diabetes

C. Wittenbecher, K. Mühlenbruch, J. Kröger, S. Jacobs, O. Kuxhaus, A. Floegel, et al.

American Journal of Clinical Nutrition, Vol. 101, No. 6; pp. 1241–1250, 2015

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Link to full text: Click here

Significance: High ferritin, low glycine, and altered hepatic-derived lipid concentrations in the circulation were associated with total red meat consumption and, independent of red meat, with diabetes risk.

This study aimed to identify blood metabolites that possibly relate red meat consumption to the occurrence of type 2 diabetes using the prospective European Prospective Investigation into Cancer and Nutrition–Potsdam cohort (n=27,548) and applying a nested case-cohort design (n=2681, including 688 incident diabetes cases). Total red meat consumption was defined as energy-standardized summed intake of unprocessed and processed red meats. Concentrations of 14 amino acids, 17 acylcarnitines, 81 glycerophospholipids, 14 sphingomyelins, and ferritin were determined in serum samples from baseline. After adjustment for covariates, total red meat consumption was directly related to diabetes risk [HR for 2 SD (11 g/MJ): 1.26; 95% CI: 1.01, 1.57]. Six biomarkers (ferritin, glycine, diacyl phosphatidylcholines 36:4 and 38:4, lysophosphatidylcholine 17:0, and hydroxy-sphingomyelin 14:1) were associated with red meat consumption and diabetes risk. The red meat–associated diabetes risk was significantly attenuated after simultaneous adjustment for these

biomarkers [biomarker-adjusted HR for 2 SD (11 g/MJ): 1.09; 95% CI: 0.86, 1.38]. The proportion of diabetes risk explainable by respective biomarkers was 69% (IQR: 49%, 106%).

Flavonoids

A New Database Facilitates Characterization of Flavonoid Intake, Sources, and Positive Associations with Diet Quality among US Adults

R.S. Sebastian, C.W. Enns, J.D. Goldman, C.L. Martin, L.C. Steinfeldt, T. Murayi, et al.

Journal of Nutrition, Vol. 145, No. 6; pp. 1239–1248, 2015

DOI: 10.3945/jn.115.213025

Link to full text: Click here

Significance: Diet quality, as measured by the Healthy Eating Index, is positively associated with flavonoid intake.

Using a newly released database of flavonoid values, this study sought to describe intake and sources of total flavonoids and 6 flavonoid classes and identify associations between flavonoid intake and the Healthy Eating Index (HEI) 2010. One day of 24-h dietary recall data from adults aged ≥20 y (n=5420) collected in What We Eat in America (WWEIA), NHANES 2007–2008, were analyzed. Flavonoid intakes were calculated using the USDA Flavonoid Values for Survey Foods and Beverages 2007–2008. Mean intake of flavonoids was 251 mg/d, with flavan-3-ols accounting for 81% of intake. Non-Hispanic whites had significantly higher (P<0.001) intakes of total flavonoids (275 mg/d) than non-Hispanic blacks (176 mg/d) and Hispanics (139 mg/d). Tea was the primary source (80%) of flavonoid intake. Regardless of whether the flavonoid contribution of tea was included, total HEI score and component scores for total fruit, whole fruit, total vegetables, greens and beans, seafood and plant proteins, refined grains, and empty calories increased (P<0.001) across flavonoid intake quartiles.

Recommendations on Reporting Requirements for Flavonoids in Research

D.A. Balentine, J.T. Dwyer, J.W. Erdman Jr., M.G. Ferruzzi, P.C. Gaine, J.M. Harnly, et al.

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Link to full text: Click here

Significance: These guidelines, which are supported by the Technical Committee on Flavonoids of ILSI North America, will foster broader scientific collaborations between industry, academia, and the public sector and help facilitate the translation of research into practice.

There is a need for guidelines that facilitate the design and reporting of flavonoid research. With a focus on clinical studies, this article: 1) outlines limitations commonly encountered in the field of flavonoid research, including the inconsistent use of nomenclature, inappropriate analytic methods, inconsistent use of existing flavonoid databases, and the lack of full consideration in the design of test materials for intervention trials, and 2) provides guidance for future studies with a focus on clinical intervention trials. Adoption of this guidance will facilitate more accurate and interpretable research that will support the development of dietary recommendations regarding the intake of flavonoids.

Metabolic Syndrome

Dietary Patterns Are Associated with Metabolic Risk Factors in South Asians Living in the United States

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Significance: The animal protein and the fried snacks, sweets, and high-fat dairy patterns were associated with adverse metabolic risk factors in South Asians in the U.S., whereas the fruits, vegetables, nuts, and legumes pattern was linked with a decreased prevalence of hypertension and metabolic syndrome.

This study aimed to determine prevalent dietary patterns for South Asians in the U.S. (aged 40–84 y without known CVD) and their associations with risk factors for metabolic syndrome (MetS). Subjects were enrolled in a community-based cohort (Mediators of Atherosclerosis in South Asians Living in America). Results found that 892 participants were included (47% women). Three major dietary patterns were identified: animal protein; fried snacks, sweets, and high-fat dairy; and fruits, vegetables, nuts, and legumes. These were analyzed by tertile of factor score. The highest vs. the lowest tertile of the fried snacks, sweets, and high-fat dairy pattern was associated with higher homeostasis model assessment of insulin resistance (HOMA-IR) (β: 1.88 mmol/L · uIU/L) and lower HDL-cholesterol (β: −4.48 mg/dL) in a model adjusted for age, sex, study site, and caloric intake ($P<0.05$). The animal protein pattern was associated with higher BMI (β: 0.73 m/kg2), waist circumference (β: 0.84 cm), total cholesterol (β: 8.16 mg/dL), and LDL-cholesterol (β: 5.69 mg/dL) (all $P<0.05$). The fruits, vegetables, nuts, and legumes pattern was associated with lower odds of hypertension (OR: 0.63) and MetS (OR: 0.53), and lower HOMA-IR (β: 1.95 mmol/L · uIU/L) ($P<0.05$).

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ILSI North America carries out its mission by sponsoring research programs, professional and educational programs and workshops, seminars, and publications, as well as providing a neutral forum for government, academic, and industry scientists to discuss and resolve scientific issues of common concern for the well-being of the general public. ILSI North America's programs are supported primarily by its industry membership.

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