

Cardiovascular Disease

The Relationship Between Diet and Subclinical Atherosclerosis: Results from the Asklepios Study

L.I. Hoebeeck, E.R. Rietzschel, M. Langlois, M. DeBuyzere, D. DeBacquer, G. DeBacker, et al.

European Journal of Clinical Nutrition, Vol. 65, No. 5; pp. 606–613, 2011

Link to full text: <http://www.nature.com/ejcn/journal/v65/n5/full/ejcn2010286a.html>

Significance: Better adherence to the Flemish food-based dietary guidelines is associated with a better cardiovascular risk profile and less inflammation, mainly among men.

This study investigated whether adherence to the food-based dietary guidelines (FBDGs) is associated with reduced femoral/carotid atherosclerosis and/or inflammation in 2524 healthy men and women aged 35–55 years. Subjects were extensively phenotyped, including echographic assessment of (carotid and femoral) atherosclerosis. A dietary index consisting of three subscores (dietary quality, diversity and equilibrium) was calculated to measure adherence to the Flemish FBDG, using data from a semi-quantitative food-frequency questionnaire. Women had better overall dietary scores than men (69 vs. 59%). Participants with higher dietary scores showed better age-adjusted cardiovascular risk profiles (lower waist/hip ratio, blood pressure, non-HDL-cholesterol, blood triglycerides and homocysteine), although most of these associations were only significant in men. Higher dietary scores were also inversely associated with inflammation makers. Associations between diet and atherosclerosis were only found for femoral atherosclerosis and significance disappeared after adjustment for confounders.

Effects of Cranberry Juice Consumption on Vascular Function in Patients with Coronary Artery Disease

M.M. Dohadwala, M. Holbrook, N.M. Hamburg, S.M. Shenouda, W.B. Chung, M. Titas, et al.

American Journal of Clinical Nutrition, Vol. 93, No. 5; pp. 934-940, 2011

Link to full text: <http://www.ajcn.org/content/93/5/934.full>

Significance: Chronic cranberry juice consumption reduced carotid femoral pulse wave velocity—a clinically relevant measure of arterial stiffness.

The effects of cranberry juice (CBJ) on vascular function in subjects with coronary artery disease were examined in this chronic placebo-controlled crossover study (n=44). Subjects with coronary heart disease consumed a research preparation of double-strength CBJ (54% juice, 835mg total polyphenols, and 94mg anthocyanins) or a matched placebo beverage (480 mL/d) for 4 wk each with a 2-wk rest period between beverages. Mean (\pm SD) carotid-femoral pulse wave velocity, a measure of central aortic stiffness, decreased after CBJ (8.3 ± 2.3 to 7.8 ± 2.2 m/s) in contrast with an increase after placebo (8.0 ± 2.0 to 8.4 ± 2.8 m/s) ($P=0.003$). Brachial artery flow-mediated dilation, digital pulse amplitude tonometry, blood pressure, and carotid-radial pulse wave velocity did not change. In the

uncontrolled pilot study (n=15), improved brachial artery flow-mediated dilation ($7.7\pm 2.9\%$ to $8.7\pm 3.1\%$, $P=0.01$) and digital pulse amplitude tonometry ratio (0.10 ± 0.12 to 0.23 ± 0.16 , $P=0.001$) 4 h after consumption of a single 480-mL portion of CBJ was observed.

Effect of 3 y of Folic Acid Supplementation on the Progression of Carotid Intima-Media Thickness and Carotid Arterial Stiffness in Older Adults

J. Durga, M.L. Bots, E.G. Schouten, D.E. Grobbee, F.J. Kok, P. Verhoef
American Journal of Clinical Nutrition, Vol. 93, No. 5; pp. 941-949, 2011
Link to full text: <http://www.ajcn.org/content/93/5/941.full>

Significance: Despite a considerable increase in folate concentrations and a reduction in total homocysteine concentrations, 3-y folic acid supplementation did not slow down atherosclerotic progression or arterial stiffening.

This randomized, double-blind, placebo-controlled study determined whether folic acid supplementation reduces the progression of atherosclerosis as measured by common carotid intima-media thickness (CIMT) in 819 men and postmenopausal women aged 50–70 y with a total homocysteine concentration ≥ 13 $\mu\text{mol/L}$ at screening. Participants received either 800 μg folic acid or placebo daily for 3 y. Compared with placebo, serum folate increased by 577% and plasma total homocysteine concentrations decreased by 26% after 3 y of folic acid supplementation. The mean (\pm SE) rate of change in CIMT was 1.9 ± 0.9 $\mu\text{m/y}$ in the folic acid arm and 1.3 ± 0.8 $\mu\text{m/y}$ in the placebo arm (mean difference: 0.7 $\mu\text{m/y}$; 95% CI: $-1.8, 3.1$ $\mu\text{m/y}$; $P=0.59$). No difference was observed between the rates of change in distensibility in the folic acid arm ($-0.53 \pm 0.06 \times 10^{-3}$ kPa^{-1}) and in the placebo arm ($-0.62 \pm 0.06 \times 10^{-3}$ kPa^{-1}).

Type 2 Diabetes

Intake of Antioxidants and Risk of Type 2 Diabetes in a Cohort of Male Smokers

M.K. Kataja-Tuomola, J.P. Kontto, S. Männistö, D. Albanes, J. Virtamo
European Journal of Clinical Nutrition, Vol. 65, No. 5; pp. 590–597, 2011
Link to full text: <http://www.nature.com/ejcn/journal/v65/n5/full/ejcn2010283a.html>

Significance: Dietary antioxidants were not associated with a decreased risk of incident diabetes in middle-aged male smokers.

The association of dietary antioxidants with incident type 2 diabetes was investigated in the α -Tocopherol, β -Carotene Cancer Prevention Study. The study cohort included 29,133 male smokers aged 50–69 years. During a median follow-up of 10.2 years, 660 incident cases of diabetes were observed among the 25,505 men with a completed baseline food frequency questionnaire. Dietary α -tocopherol, β -tocopherol and β -tocotrienol were positively associated with the risk of diabetes when adjusted for age and supplementation (RR=1.17 (95% CI, 0.91–1.51) P for trend 0.02; RR=1.31 (95% CI, 1.02–1.68) P for trend 0.01; RR=1.28 (95% CI, 1.00–1.63) P for trend 0.01, respectively), but the association disappeared after multivariate adjustment (RR=0.92 (95% CI, 0.71–1.19) P

for trend 0.97; RR=1.06 (95% CI, 0.82–1.36) *P* for trend 0.48; RR=1.04 (95% CI, 0.80–1.35) *P* for trend 0.46, respectively). Other tocopherols and tocotrienols as well as vitamin C, carotenoids, flavonols and flavones had no association with risk of diabetes.

Hypertension

Sodium Intake Is Associated with Carotid Artery Structure Alterations and Plasma Matrix Metalloproteinase-9 Upregulation in Hypertensive Adults

M.C.S. Ferreira-Sae, J.A.A. Cipolli, M.E. Cornélio, J.R. Matos-Souza, M.N. Fernandes, R. Schreiber, et al.

Journal of Nutrition, Vol. 141, No. 5; pp. 877-882, 2011

Link to full text: <http://jn.nutrition.org/content/141/5/877.full>

Significance: Sodium intake is associated with carotid alterations in hypertensive adults independently of systemic hemodynamic variables.

This cross-sectional study investigated whether sodium intake is related to carotid structure and hemodynamics and to plasma matrix metalloproteinase (MMP) activity in 134 hypertensive adults. In 42 patients, plasma MMP-2 and MMP-9 activities were also analyzed. The mean daily sodium intake (DSI) was 5.52±0.29 g/d. Univariate analysis showed that DSI correlated with common carotid artery systolic and diastolic diameter ($r = 0.36$ and 0.34 ; both $P < 0.001$), peak and mean circumferential tension ($r = 0.44$ and 0.39 ; both $P < 0.001$), Young's Elastic Modulus ($r = 0.40$; $P < 0.001$), intima-media thickness ($r = 0.19$; $P < 0.05$), and internal carotid artery resistive index ($r = 0.20$; $P < 0.05$). Multivariate analyses revealed that only artery diameter, circumferential wall tension, and Young's Elastic Modulus were independently associated with DSI. Conversely, plasma MMP-9 activity was associated with DSI ($r = 0.53$; $P < 0.001$), common carotid systolic diameter ($r = 0.33$; $P = 0.05$) and Young's Elastic Modulus ($r = 0.38$; $P < 0.01$).

Fatal and Nonfatal Outcomes, Incidence of Hypertension, and Blood Pressure Changes in Relation to Urinary Sodium Excretion

K. Stolarz-Skrzypek, T. Kuznetsova, L. Thijs, V. Tikhonoff, J. Seidlerová, T. Richart, et al. for the European Project on Genes in Hypertension (EPOGH) Investigators

Journal of the American Medical Association, Vol. 305, No. 17; pp. 1777-1785, 2011

Link to full text: <http://jama.ama-assn.org/content/305/17/1777.full>

Significance: Lower sodium excretion was associated with higher CVD mortality.

This prospective population study involving 3681 participants without cardiovascular disease (CVD) assessed whether 24-hour urinary sodium excretion predicts blood pressure (BP) and health outcomes. Among the participants followed for a median 7.9 years, CVD deaths decreased across increasing tertiles of 24-hour sodium excretion, from 50 deaths in the low (mean, 107 mmol), 24 in the medium (mean, 168 mmol), and 10 in the high excretion group (mean, 260 mmol; $P < .001$), resulting in respective death rates of 4.1% (95% CI, 3.5%-4.7%), 1.9%

(95% CI, 1.5%-2.3%), and 0.8% (95% CI, 0.5%-1.1%). In multivariable-adjusted analyses, this inverse association retained significance (P=.02): the HR in the low tertile was 1.56 (95% CI, 1.02-2.36; P=.04). Among 2096 participants followed for 6.5 years, the risk of hypertension did not increase across increasing tertiles. Incident hypertension was 187 (27.0%; HR, 1.00; 95% CI, 0.87-1.16) in the low, 190 (26.6%; HR, 1.02; 95% CI, 0.89-1.16) in the medium, and 175 (25.4%; HR, 0.98; 95% CI, 0.86-1.12) in the high sodium excretion group. In 1499 participants followed for 6.1 years, systolic blood pressure (SBP) increased by 0.37 mmHg/year (P<.001), whereas sodium excretion did not change. However, in multivariable-adjusted analyses, a 100-mmol increase in sodium excretion was associated with 1.71 mmHg increase in SBP (P<.001) but no change in diastolic BP.

Carbohydrates

Prediction of Postprandial Glycemia and Insulinemia in Lean, Young, Healthy Adults: Glycemic Load Compared with Carbohydrate Content Alone

J. Bao, F. Atkinson, P. Petocz, W.C. Willett, J.C. Brand-Miller

American Journal of Clinical Nutrition, Vol. 93, No. 5; pp. 984-996, 2011

Link to full text: <http://www.ajcn.org/content/93/5/984.full>

Significance: Dietary glycemic load is physiologically valid and superior to carbohydrate content alone when estimating postprandial glycemia and insulin demand in healthy individuals.

This study assessed the degree of association between calculated glycemic load (GL) and observed glucose and insulin responses in healthy subjects consuming isoenergetic portions of single foods and mixed meals. In study 1, healthy subjects consumed 1000-kJ portions of 121 single foods in 10 food categories. In study 2, healthy subjects consumed 2000-kJ servings of 13 mixed meals. Foods and meals varied widely in macronutrient content, fiber, and GL. Glycemia and insulinemia were quantified as area under the curve relative to a reference food (= 100). Among the single foods, GL was a more powerful predictor of postprandial glycemia and insulinemia than was the available carbohydrate content, explaining 85% and 59% of the observed variation, respectively (P<0.001). Similarly, for mixed meals, GL was also the strongest predictor of postprandial glucose and insulin responses, explaining 58% (P=0.003) and 46% (P=0.01) of the variation, respectively. Carbohydrate content alone predicted the glucose and insulin responses to single foods (P<0.001) but not to mixed meals.

Metabolic Syndrome

Exchanging Saturated Fatty Acids for (n-6) Polyunsaturated Fatty Acids in a Mixed Meal May Decrease Postprandial Lipemia and Markers of Inflammation and Endothelial Activity in Overweight Men

C.J. Masson, R.P. Mensink

Journal of Nutrition, Vol. 141, No. 5; pp. 816-821, 2011

Link to full text: <http://jn.nutrition.org/content/141/5/816.full>

Significance: Exchanging SFA from butterfat for (n-6) PUFA in a mixed meal may decrease postprandial lipemia and concentrations of IL-6, TNF α , sTNFr-I and -II, and sVCAM-1 in overweight men.

This crossover design study examined the acute effects of a meal rich in saturated fatty acids (SFA) compared with those of a meal rich in (n-6) polyunsaturated fatty acids (PUFA) on postprandial responses in 13 overweight men who are at risk of developing metabolic syndrome and its comorbidities. The effects of 50g butter on lipemia and markers for inflammation and endothelial activity were compared with those of 50g sunflower oil during an 8-h postprandial mixed meal tolerance test. Postprandial changes in serum triglyceride were comparable between the meals, except for a reduction in the incremental area under the curve ($P=0.046$) in the late postprandial phase after (n-6) PUFA ($125\pm 96 \text{ mmol}\cdot\text{min}\cdot\text{L}^{-1}$) compared with SFA ($148\pm 98 \text{ mmol}\cdot\text{min}\cdot\text{L}^{-1}$). Compared with the SFA meal, the (n-6) PUFA meal decreased plasma IL-6 ($P=0.003$), TNF α ($P=0.005$), soluble TNF receptors I and II (sTNFr; $P=0.024$ and $P<0.001$, respectively), and soluble vascular cell adhesion molecule-1 (sVCAM-1; $P=0.030$) concentrations.

Serum Antioxidant Status Is Associated with Metabolic Syndrome among U.S. Adults in Recent National Surveys

M.A. Beydoun, M.R. Shroff, X. Chen, H.A. Beydoun, Y. Wang, A.B. Zonderman

Journal of Nutrition, Vol. 141, No. 5; pp. 903-913, 2011

Link to full text: <http://jn.nutrition.org/content/141/5/903.full>

Significance: Future intervention studies of dietary and lifestyle change must be conducted to assess the utility of modifying serum antioxidant concentrations, given their suboptimal levels among U.S. adults with MetS.

The association between serum antioxidant status and metabolic syndrome (MetS) was examined using NHANES 2001–2006 cross-sectional data among adults aged 20–85 y ($n = 3008\text{--}9099$). MetS was defined with the NCEP ATP III and by elevated HOMA-IR, CRP and hyperuricemia. Serum antioxidants included retinol, retinyl esters, carotenoids, and vitamin E, and vitamin C. Prevalence of MetS was 32.0% among men and 29.5% among women. Adults with MetS had consistently lower serum carotenoid concentrations compared with those without MetS, even after controlling for total cholesterol and triglyceride among other potential confounders. Vitamin E had no significant relationship with MetS in the multivariate model, whereas retinol+retinyl esters were inversely related to MetS among men only. The latter were also inversely related to elevated CRP and positively associated with hyperuricemia. Vitamin C exhibited a similar pattern to serum carotenoids with an inverse linear association with MetS (binary), HOMA-IR, and hyperuricemia.