



ILSI

North America

# Nutrition Briefs

May 2016

## Diabetes

### High Dietary Acid Load Score Is Associated With Increased Risk of Type 2 Diabetes in Japanese Men: The Japan Public Health Center-Based Prospective Study

S. Akter, K. Kurotani, I. Kashino, A. Goto, T. Mizoue, M. Noda, et al. for the Japan Public Health Center-based Prospective Study Group

*Journal of Nutrition*, Vol. 146, No. 5; pp. 1076–1083, 2016

doi: 10.3945/jn.115.225177

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

**Significance:** A high dietary acid load score is associated with an increased risk of type 2 diabetes in Japanese men.

The association between dietary acid load and type 2 diabetes (T2D) was examined prospectively in Japanese adults (27,809 men and 36,851 women, aged 45–75 y) with no previous history of T2D. Potential renal acid load (PRAL) and net endogenous acid production (NEAP) scores were derived from the nutrient intake. A total of 1191 cases of newly diagnosed T2D were reported. PRAL score was positively associated with T2D in men; the multivariable-adjusted ORs (95% CIs) for the lowest through the highest quartiles of PRAL were 1.00, 1.09 (0.87, 1.36), 1.10 (0.88, 1.37), and 1.25 (1.01, 1.55) (P-trend = 0.047). Further adjustment for dietary intake strengthened the association. NEAP score was not associated with the risk of T2D (P-trend = 0.20). In stratified analyses, the positive association between PRAL and T2D was confined to younger men (age <50 y; P-trend = 0.046). There was no association between dietary acid load score and T2D in women.

### Serum n-6 Polyunsaturated Fatty Acids, $\Delta$ 5- And $\Delta$ 6-Desaturase Activities, and Risk of Incident Type 2 Diabetes in Men: the Kuopio Ischaemic Heart Disease Risk Factor Study

T. Yary, S. Voutilainen, T-P. Tuomainen, A. Ruusunen, T. Nurmi, J.K. Virtanen

*American Journal of Clinical Nutrition*, Vol. 103, No. 5; pp. 1337–1343, 2016

doi: 10.3945/ajcn.115.128629

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

**Significance:** A higher serum zinc concentration modified the association of  $\gamma$ -linolenic acid on the risk of type 2 diabetes.

The associations of serum n-6 ( $\omega$ -6) polyunsaturated fatty acids (PUFAs) and activities of enzymes involved in PUFA metabolism,  $\Delta$ 5 desaturase (D5D) and  $\Delta$ 6 desaturase (D6D), with type 2 diabetes (T2D) risk were investigated to determine whether serum zinc concentrations could modify these associations. The study included 2189 men from the prospective Kuopio Ischaemic Heart Disease Risk Factor Study, aged 42–60 y and free of T2D at baseline. During the average

## Contact Us

ILSI North America  
1156 15th Street, NW  
Suite 200  
Washington, DC 20005

Tel: 202.659.0074  
Fax: 202.659.3859  
ilsina@ilsina.org

ilsina.org



follow-up of 19.3 y, 417 men developed T2D. Those with higher estimated D5D activity (extreme-quartile HR: 0.55; 95% CI: 0.41, 0.74; P-trend < 0.001) and higher concentrations of total n-6 PUFAs (HR: 0.54; 95% CI: 0.41, 0.73; P-trend < 0.001), linoleic acid (LA; HR: 0.52; 95% CI: 0.39, 0.70; P-trend < 0.001), and arachidonic acid (AA; HR: 0.62; 95% CI: 0.46, 0.85; P-trend = 0.007) had a lower risk and those with higher concentrations of  $\gamma$ -linolenic acid (GLA; HR: 1.28; 95% CI: 0.98, 1.68; P = 0.021) and dihomo- $\gamma$ -linolenic acid (DGLA; HR: 1.38; 95% CI: 1.04, 1.84; P-trend = 0.005) and higher D6D activity had a higher (HR: 1.50; 95% CI: 1.14, 1.97; P-trend < 0.001) multivariate-adjusted risk of T2D. Zinc mainly modified the association with GLA on T2D risk, with a higher risk observed among those with serum zinc concentrations above the median (P-interaction = 0.04). Higher serum total n-6 PUFA, LA, and AA concentrations and estimated D5D activity were associated with a lower risk of incident T2D, and higher GLA and DGLA concentrations and estimated D6D activity were associated with a higher risk.

## Obesity

### Is Obesity Associated With Altered Energy Expenditure?

*I.P. Carneiro, S.A. Elliott, M. Siervo, R. Padwal, S. Bertoli, A. Battezzati, et al.*

*Advances in Nutrition*, Vol. 7, No. 3; pp. 476–487, 2016

doi: 10.3945/an.115.008755

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



**Significance:** The current evidence does not support the hypothesis that obesity is sustained by lower daily energy expenditure or resting energy expenditure.

This review critically appraised studies that compared measures of energy expenditure (EE) and its components (resting EE (REE), activity EE (AEE), and diet-induced thermogenesis (DIT)), in obese and nonobese adults to elucidate whether obesity is associated with altered EE. Contrary to popular belief, research has shown that obese individuals have higher absolute REE and total EE. When body composition is taken into account, these differences between obese and nonobese individuals disappear, suggesting that EE in obese individuals is not altered. However, an important question is whether AEE is lower in obese individuals because of a decrease in overall physical activity or because of less energy expended while performing physical activity. AEE and DIT could be reduced in obese individuals, mostly because of low physical activity and higher intake of fat.

## Cardiovascular Disease

### Urinary Potassium Excretion and Risk of Cardiovascular Events

*L.M. Kieneker, R.T. Gansevoort, R.A. de Boer, F.P. Brouwers, E.J.M. Feskens, J.M. Geleijnse, et al. for The PREVEND Study Group*

*American Journal of Clinical Nutrition*, Vol. 103, No. 5; pp. 1204–1212, 2016

doi: 10.3945/ajcn.115.106773

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

**Significance:** Urinary potassium excretion was not independently associated with a lower risk of cardiovascular events.

This study examined the association between urinary potassium excretion and risk of blood pressure–related cardiovascular outcomes in 7795 subjects free of cardiovascular events at baseline in the Prevention of Renal and Vascular End-stage Disease study. Potassium excretion was measured in two 24-h urine specimens at the start of the study and midway through follow-up. Baseline median urinary potassium excretion was 70 mmol/24 h (IQR: 56–84 mmol/24 h). During a median follow-up of 10.5 y (IQR: 9.9–10.8 y), a total of 641 CVD, 465 ischemic heart disease (IHD), 172 stroke, and 265 new-onset heart failure (HF) events occurred. After adjustment for age and sex, inverse associations were observed between potassium excretion and risk [HR per each 26-mmol/24-h (1-g/d) increase; 95% CI] of CVD (0.87; 0.78, 0.97) and IHD (0.86; 0.75, 0.97), as well as nonsignificant inverse associations for risk of stroke (0.85; 0.68, 1.06) and HF (0.94; 0.80, 1.10). After further adjustment for urinary sodium and magnesium excretion and other covariates, urinary potassium excretion was not statistically significantly associated with risk (multivariable-adjusted HR per 1-g/d increment; 95% CI) of CVD (0.96; 0.85, 1.09), IHD (0.90; 0.81, 1.04), stroke (1.09; 0.86, 1.39), or HF (0.99; 0.83, 1.18).

### Mediterranean Diet and Cardiovascular Risk: Beyond Traditional Risk Factors

J. Delgado-Lista, P. Perez-Martinez, A. Garcia-Rios, A.I. Perez-Caballero, F. Perez-Jimenez, J. Lopez-Miranda

*Critical Reviews in Food Science and Nutrition*, Vol. 56, No. 5; pp. 788–801, 2016

doi: 10.1080/10408398.2012.726660

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

**Significance:** This article reviews the current evidence about the effects that the MedDiet dietary pattern exerts on alternative factors, including postprandial lipemia or coagulation, among others, and provides a short review on future directions.

A strict adherence to the Mediterranean Diet (MedDiet) has repeatedly been linked to a low risk of cardiovascular disease in several situations. Initially, the mechanisms considered as possible causes of this were based on the effects of this dietary pattern on the so-called traditional risk factors (especially lipids and blood pressure). However, the high relative reduction in the prevalence of cardiovascular morbidity and mortality were not proportional to the limited findings about regulation of those traditional risk factors. In addition to several studies confirming the above effects, current research on the MedDiet is being focused on defining its effects on non-traditional risk factors, such as endothelial function, inflammation, oxidative stress, or on controlling the conditions which predispose people to cardiovascular events, such as obesity, metabolic syndrome or type 2 diabetes mellitus.

### Blood Pressure

#### Nitrate-Rich Vegetables Increase Plasma Nitrate and Nitrite Concentrations and Lower Blood Pressure in Healthy Adults

K.L. Jonvik, J. Nyakayiru, P.J.M. Pinckaers, J.M.G. Senden, L.J.C. van Loon, L.B. Verdijk

*Journal of Nutrition*, Vol. 146, No. 5; pp. 986–993, 2016

doi: 10.3945/jn.116.229807

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



**Significance:** Ingestion of nitrate-rich beetroot juice, rocket salad beverage, and spinach beverage effectively increases plasma nitrate and nitrite concentrations and lowers blood pressure to a greater extent than sodium nitrate.

This semirandomized crossover design study assessed the impact of ingesting different nitrate-rich vegetables on subsequent plasma nitrate and nitrite concentrations and resting blood pressure in 18 healthy normotensive individuals. Subjects ingested 4 different beverages, each containing 800 mg (~12.9 mmol) nitrate: sodium nitrate (NaNO<sub>3</sub>), concentrated beetroot juice, a rocket salad beverage, and a spinach beverage. Plasma nitrate and nitrite concentrations and blood pressure were determined before and up to 300 min after beverage ingestion. Plasma nitrate and nitrite concentrations increased significantly after ingestion of all 4 beverages. Mean peak plasma nitrate concentrations were similar for all treatments (NaNO<sub>3</sub>: 583±29 µmol/L; beetroot juice: 597±23 µmol/L; rocket salad beverage: 584±24 µmol/L; spinach beverage: 584±23 µmol/L). Mean peak plasma nitrite concentrations were different between treatments (NaNO<sub>3</sub>: 580±58 nmol/L; beetroot juice: 557±57 nmol/L; rocket salad beverage: 643±63 nmol/L; spinach beverage: 980±160 nmol/L; P=0.016). When compared with baseline, systolic blood pressure declined 150 min after ingestion of beetroot juice (from 118±2 to 113±2 mm Hg; P < 0.001) and rocket salad beverage (from 122±3 to 116±2 mm Hg; P=0.007) and 300 min after ingestion of spinach beverage (from 118±2 to 111±3 mm Hg; P < 0.001), but did not change with NaNO<sub>3</sub>. Diastolic blood pressure declined 150 min after ingestion of all beverages and remained lower at 300 min after ingestion of rocket salad and spinach beverages.



## Protein Quality

### Research Approaches and Methods for Evaluating the Protein Quality of Human Foods Proposed by an FAO Expert Working Group in 2014

W.T.K. Lee, R. Weisell, J. Albert, D. Tomé, A.V. Kurpad, R. Uauy

*Journal of Nutrition*, Vol. 146, No. 5; pp. 929–932, 2016

doi: 10.3945/jn.115.222109

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

**Significance:** The Digestible Indispensable Amino Acid Score is a conceptually preferable method compared with the Protein Digestibility Corrected Amino Acid Score for protein and amino acid quality evaluation.

The Protein Digestibility Corrected Amino Acid Score (PDCAAS) has been adopted for assessing protein quality in human foods since 1991, and the shortcomings of using the PDCAAS have been recognized since its adoption. The 2011 FAO Expert Consultation recognized that the Digestible Indispensable Amino Acid Score (DIAAS) was superior to the PDCAAS for determining protein quality. However, there were insufficient human data on amino acid digestibility before adopting the DIAAS. More human data were needed before DIAAS could be implemented. In 2014, FAO convened an expert working group to propose and agree on research protocols using both human-based assays and animal models to study ileal amino acid digestibility (metabolic availability) of human foods. The working group identified 5 research protocols for further research and development. A robust database of protein digestibility of foods commonly consumed worldwide, including those consumed in low-income countries, is needed for an informed decision on adopting the DIAAS. A review on the impacts of using the DIAAS on public health policies is necessary. It would be advantageous to have a



global coordinating effort to advance research and data collection. Collaboration with international and national agriculture institutes is desirable.

## Special Report

### The 2015 Dietary Guidelines Advisory Committee Scientific Report: Development and Major Conclusions

*B.E. Millen, S. Abrams, L. Adams-Campbell, C.A.M. Anderson, J.T. Brenna, W.W. Campbell, et al.*

*Advances in Nutrition*, Vol. 7, No. 3; pp. 438–444, 2016

doi: 10.3945/an.116.012120

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

**Significance:** This report summarizes the methods, major conclusions, and recommendations of the Scientific Report of the 2015 US Dietary Guidelines Advisory Committee.

The Dietary Guidelines for Americans (DGA) is published every 5 years jointly by the Department of Health and Human Services (HHS) and the USDA and provides a framework for US-based food and nutrition programs, health promotion and disease prevention initiatives, and research priorities. The DGA Committee developed a conceptual model and formulated questions to examine nutritional risk and determinants and impact of dietary patterns in relation to numerous health outcomes among individuals aged  $\geq 2$  y. As detailed in the report, an expansive, transparent, and comprehensive process was used to address each question, with multiple opportunities for public input included. Consensus was reached on all DGAC's findings, including each conclusion and recommendation, and the entire report. The report was organized around the following 5 themes: 1) food and nutrient intakes and health: current status and trends; 2) dietary patterns, foods and nutrients, and health outcomes; 3) diet and physical activity behavior change; 4) food and physical activity environments; and 5) food sustainability and food safety. Sodium, saturated fat and added sugars were also addressed and physical activity recommendations from recent expert reports were endorsed.

## Infant Formula

### Arachidonic Acid Needed in Infant Formula When Docosahexaenoic Acid Is Present

*J.T. Brenna*

*Nutrition Reviews*, Vol. 74, No. 5; pp. 329–336, 2016

doi: 10.1093/nutrit/nuw007

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

**Significance:** This review highlights basic and clinical research relevant to arachidonic acid requirements as an adjunct to docosahexaenoic acid in infancy.

Recently, the European Food Safety Authority asserted that arachidonic acid (ARA) is an optional nutrient for the term infant even when docosahexaenoic acid (DHA) is present. ARA is a major structural central nervous system component, where it rapidly accumulates perinatally and is required for signaling. Tracer studies show that ARA-fed infants derive about half of their total body ARA from dietary preformed ARA. Clinically, of the 3 cohorts of term infants studied with designs isolating the effects of ARA (DHA-only vs DHA+ARA),



none considered ARA-specific outcomes such as vascular or immune function; the study with the highest ARA level showed significant neurocognitive benefit. All breastfed term infants of adequately nourished mothers consume both DHA and ARA. The burden of proof to substantially deviate from the composition of breastmilk is greater than that available from inherently empirical human randomized controlled trial evidence. Infant formulas with DHA but without ARA risk harm from suppression of ARA-mediated metabolism manifest among the many unstudied functions of ARA.

## About Us

*The North American branch of the International Life Sciences Institute (ILSI North America) is a public, non-profit scientific foundation that advances the understanding and application of science related to the nutritional quality and safety of the food supply.*

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.



1156 15th Street, NW  
Suite 200  
Washington, DC 20005

Tel: 202.659.0074  
Fax: 202.659.3859  
ilsina@ilsi.org

ilsina.org

