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# Nutrition Briefs

North America

December 2016/January 2017

## Dietary Patterns and Intake

### Prepregnancy Dietary Patterns Are Associated With Blood Lipid Level Changes During Pregnancy: A Prospective Cohort Study in Rio de Janeiro, Brazil

Eshriqui I, Franco-Sena AB, Farias DR, Freitas-Vilela AA, Cunha DB, Barros EG, et al. *J Acad Nutr Diet*. 2017 Jan 24 [Epub ahead of print]. doi: 10.1016/j.jand.2016.12.007. [Article Link](#)

**Significance:** Prepregnancy dietary patterns were associated with gestational blood lipid levels; that is, higher scores for the Fast Food and Candies pattern were associated with higher triglyceride and slower HDL-C rates of change during pregnancy, whereas higher scores for the Vegetables and Dairy dietary patterns were associated with faster HDL-C rates of change over gestational weeks.

**Background:** Physiologic adaptations lead to an increase in blood lipid levels during pregnancy, yet little is known about the influence of prepregnancy dietary patterns. **Aim:** To identify whether prepregnancy dietary patterns that explain the consumption of fiber, energy, and saturated fat are associated with blood lipid levels throughout pregnancy. **Design:** Prospective cohort study, with data collection at gestational weeks 5 to 13, 20 to 26, and 30 to 36. A food frequency questionnaire was administered at baseline (gestational week 5 to 13). **Participants/Setting:** women with singleton pregnancy (N=299) aged 20 to 40 years, without infectious/chronic disease (except obesity) were enrolled in the study. One hundred ninety-nine women were included in the final analysis. The study took place at a prenatal service of a public health care center in Rio de Janeiro, Brazil, during the period from 2009 to 2012. **Main Outcome Measures:** total cholesterol, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol, and triglyceride levels, measured at all trimesters. **Results:** Fast Food and Candies; Vegetables and Dairy; and Beans, Bread, and Fat patterns were derived. Our Fast Food and Candies pattern was positively associated with triglyceride level ( $\beta=4.961$ , 95% CI 0.945 to 8.977;  $P=0.015$ ). In the HDL-C rate of change prediction, significant interactions were observed between both the Fast Food and Candies and Vegetables and Dairy patterns and gestational week ( $\beta=-.053$ , 95% CI -0.101 to -0.004;  $P=0.035$  and  $\beta=.055$ , 95% CI -0.002 to 0.112;  $P=0.060$ , respectively). The Beans, Bread, and Fat pattern was not associated with blood lipid levels.

### A Systematic Review of the Effects of Plant Compared With Animal Protein Sources on Features of Metabolic Syndrome

Chalvon-Demersay T, Azzout-Marniche D, Arfsten J, Egli L, Gaudichon C, Karagounis LG, et al. *J Nutr*. 2017 Jan 25 [Epub ahead of print]. doi: 10.3945/jn.116.239574. [Article Link](#)

**Significance:** This systematic review provides some evidence that the intake of soy protein associated with isoflavones may prevent the onset of risk factors associated with cardiovascular disease, i.e., hypercholesterolemia and hypertension, in humans.

The aim of the systematic review was to compare the impact of plant- and animal-sourced dietary proteins on several features of metabolic syndrome in humans. The PubMed database was searched for both chronic and acute interventional studies, as well as observational studies, in healthy humans or those with metabolic dysfunctions, in which the impact of animal and plant protein intake was compared while using the following variables: cholesterolemia and triglyceridemia, blood pressure, glucose homeostasis, and body composition. Based on data extraction, we observed that soy protein consumption (with isoflavones), but not soy protein alone (without isoflavones) or other plant proteins (pea and lupine proteins, wheat gluten), leads to a 3% greater decrease in both total and LDL



## 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](mailto:ilsina@ilsina.org) | [ilsina.org](http://ilsina.org)



cholesterol compared with animal-sourced protein ingestion, especially in individuals with high fasting cholesterol concentrations. This observation was made when animal proteins were provided as a whole diet rather than given supplementally. Some observational studies reported an inverse association between plant protein intake and systolic and diastolic blood pressure, but this was not confirmed by intervention studies. Moreover, plant protein (wheat gluten, soy protein) intake as part of a mixed meal resulted in a lower postprandial insulin response than did whey.

### A Metabolomic Study of Biomarkers of Meat and Fish Intake

Cheung W, Keski-Rahkonen P, Assi N, Ferrari P, Freisling H, Rinaldi S, et al. *Am J Clin Nutr*. 2017 Jan 25 [Epub ahead of print]. doi: 10.3945/ajcn.116.146639. [Article Link](#)

**Significance:** The meat and fish biomarkers identified in this work may be used to study associations between meat and fish intake and disease risk in epidemiologic studies.

A metabolomic approach was applied to search for biomarkers of meat and fish intake in a dietary intervention study and in free-living subjects from the European Prospective Investigation into Cancer and Nutrition (EPIC) study. In the dietary intervention study, 4 groups of 10 subjects consumed increasing quantities of chicken, red meat, processed meat, and fish over 3 successive weeks. Twenty-four-hour urine samples were collected during each period and analyzed by high-resolution liquid chromatography-mass spectrometry. Signals characteristic of meat or fish intake were replicated in 50 EPIC subjects for whom a 24-h urine sample and 24-h dietary recall were available and who were selected for their exclusive intake or no intake of any of the 4 same foods. A total of 249 mass spectrometric features showed a positive dose-dependent response to meat or fish intake in the intervention study. Eighteen of these features best predicted intake of the 4 food groups in the EPIC urine samples on the basis of partial receiver operator curve analyses with permutation testing (areas under the curve ranging between 0.61 and 1.0). Of these signals, 8 metabolites were identified.

### Low-Calorie Sweeteners

#### Consumption of Low-Calorie Sweeteners Among Children and Adults in the United States

Sylvetsky AC, Jin Y, Clark EJ, Welsh JA, Rother KI, Talegawkar SA. *J Acad Nutr Diet*. 2017 Jan 6 [Epub ahead of print]. doi: 10.1016/j.jand.2016.11.004. [Article Link](#)

**Significance:** This study reports that LCS consumption is highly prevalent in the United States, among both children and adults.

The aim of this study was to describe LCS consumption in the United States and to characterize consumption by sociodemographic subgroups, source, frequency, eating occasion, and location. This was a cross-sectional study using National Health and Nutrition Examination Survey data from 2009 to 2012. The prevalence of LCS consumption was assessed using two 24-hour dietary recalls, while the frequency (number of times per day), occasion (meal vs snack vs alone), and location of LCS consumption (at home vs away from home) was assessed using data from the one, in-person, 24-hour dietary recall. Subjects included National Health and Nutrition Examination Survey participants (2 years old or older) either in 2009-2010 (n=9,047) or in 2011-2012 (n=7,939). After excluding participants with implausible energy intake (n=44), the final sample size was 16,942. The primary outcome was the proportion of individuals consuming one or more foods, beverages, or packets containing LCSs during at least one of their two dietary recalls. Some findings were that 25.1% of children and 41.4% adults reported consuming LCSs. Most LCS consumers reported use once daily (80% of children, 56% of adults) and frequency of consumption increased with body weight in adults.



### Obesity

#### A Review of the Carbohydrate-Insulin Model of Obesity

Hall KD. *Eur J Clin Nutr*. 2017 Jan 11 [Epub ahead of print]. doi: 10.1038/ejcn.2016.260. [Article Link](#)

**Significance:** This review describes the current state of the carbohydrate-insulin model and the implications of its recent experimental tests. Result of this review indicate that important aspects of carbohydrate-insulin model have been experimentally falsified suggesting that the model is too simplistic.

The carbohydrate-insulin model of obesity theorizes that diets high in carbohydrate are particularly fattening due to their propensity to elevate insulin secretion. Insulin directs the partitioning of energy toward storage as fat in adipose tissue and

away from oxidation by metabolically active tissues and purportedly results in a perceived state of cellular internal starvation. In response, hunger and appetite increases and metabolism is suppressed, thereby promoting the positive energy balance associated with the development of obesity. Several logical consequences of this carbohydrate-insulin model of obesity were recently investigated in a pair of carefully controlled inpatient feeding studies whose results failed to support key model predictions.

## Blood Pressure

### Effects of Free Sugars on Blood Pressure and Lipids: A Systematic Review and Meta-Analysis of Nutritional Isoenergetic Intervention Trials

Fattore E, Botta F, Agostoni C, Bosetti C. *Am J Clin Nutr*. 2017 Jan;105(1):42–56. doi: 10.3945/ajcn.116.139253. [Article Link](#)

**Significance:** In this review short- or moderate-term isoenergetic intervention trials, the substitution of free sugars for complex carbohydrates had no effect on blood pressure or body weight and an unclear effect on blood lipid profile. Further independent trials are required to assess whether the reduction of free sugars improves cardiovascular disease risk factors.



This review assessed the evidence of the effects of free sugars compared with complex carbohydrates on selected cardiovascular disease risk factors. The authors conducted a systematic review and meta-analysis of intervention trials to compare diets that provide a given amount of energy from free sugars with a control diet that provides the same amount of energy from complex carbohydrates. The primary outcomes were: blood pressure, total cholesterol, low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol, triacylglycerols, apolipoproteins A-I and B, or very low-density lipoprotein cholesterol. Body weight was also recorded but was not a primary outcome of the studies. In all, 28 studies involving 510 volunteers were included. When free sugars were substituted for complex carbohydrates, no significant increases were detected in systolic or diastolic blood pressure, and no heterogeneity was observed. There were significant increases in HDL cholesterol, LDL cholesterol, and triacylglycerols, although for LDL cholesterol and triacylglycerols there was significant heterogeneity between studies and evidence of publication bias. After adjustment for missing studies, these increases lost significance.

## Flavonoids

### The Role of Metabolism (and the Microbiome) in Defining the Clinical Efficacy of Dietary Flavonoids

Cassidy A, Minihane AM. *Am J Clin Nutr*. 2017 Jan;105(1):10–22. doi: 10.3945/ajcn.116.136051. [Article Link](#)

**Significance:** This article identifies research areas that need to be addressed to further understand important determinants of flavonoid bioavailability and metabolism and to advance the knowledge base that is required to move toward the development of dietary guidelines and recommendations for flavonoids and flavonoid-rich foods.

At a population level, there is growing evidence of the beneficial effects of dietary flavonoids on health. However, there is extensive heterogeneity in the response to increased intake, which is likely mediated via wide interindividual variability in flavonoid absorption and metabolism. Flavonoids are extensively metabolized by phase I and phase II metabolism (which occur predominantly in the gastrointestinal tract and liver) and colonic microbial metabolism. A number of factors, including age, sex, and genotype, may affect these metabolic processes. In addition, food composition and flavonoid source are likely to affect bioavailability, and emerging data suggest a critical role for the microbiome. This review focuses on the current knowledge for the main subclasses of flavonoids, including anthocyanins, flavonols, flavan-3-ols, and flavanones, for which there is growing evidence from prospective studies of beneficial effects on health.

## Diabetes

### Sugar-Sweetened Beverage But Not Diet Soda Consumption Is Positively Associated With Progression of Insulin Resistance and Prediabetes

Ma J, Jacques PF, Meigs JB, Fox CS, Rogers GT, Smith CE, et al. *J Nutr*. 2016 Dec;146(12):2544–2550. [Article Link](#)

**Significance:** The findings indicate that regular SSB intake, but not diet soda intake, is associated with a greater increase in insulin resistance and a higher risk of developing prediabetes in a group of middle-aged adults.

The objective of the study was to test the hypothesis that the consumption of sugar-sweetened beverages (SSBs), rather than diet soda, is associated with long-term progression of insulin resistance and the development of prediabetes. The researchers analyzed the prospective association between cumulative mean consumption of SSBs or diet soda and incident prediabetes ( $n = 1685$ ) identified across a median of 14 y of follow-up in participants [mean  $\pm$  SD age:  $51.9 \pm 9.2$  y; 59.6% women; mean  $\pm$  SD body mass index (BMI;  $\text{kg}/\text{m}^2$ ):  $26.3 \pm 4.4$ ] of the Framingham Offspring cohort. The prospective association between beverage consumption and change in homeostasis model assessment of insulin resistance (HOMA-IR;  $n = 2076$ ) over  $\sim 7$  y was also analyzed. The cumulative mean consumption of SSBs and diet soda was estimated by using food-frequency questionnaires. Multivariable Cox proportional hazards models and linear regression models were implemented to estimate the HRs of incident prediabetes and change in HOMA-IR, respectively. The researchers observed that SSB intake was positively associated with incident prediabetes ( $P$ -trend  $< 0.001$ ); the highest SSB consumers ( $>3$  servings/wk; median: 6 servings/wk) had a 46% higher risk of developing prediabetes than did the SSB nonconsumers (HR: 1.46; 95% CI: 1.16, 1.83). Higher SSB intake was also associated with a greater increase in HOMA-IR ( $P$ -trend = 0.006).



## Scientific Integrity

### Discrepancy Between Financial Disclosures of Authors of Clinical Practice Guidelines and Reports By Industry

Andreatos N, Zacharioudakis IM, Zervou FN, Muhammed M, Mylonakis E. *Medicine (Baltimore)*. 2017 Jan;96(2):e5711. doi: 10.1097/MD.0000000000005711. [Article Link](#)

**Significance:** These findings indicate that the current process of disclosing COIs may be suboptimal and a proactive approach should be adopted in order to minimize COI reporting discrepancies.

There is a substantial effort to increase the accuracy of conflicts of interest (COI) reporting, and reduce the influence of COI between physicians and industry, especially as it relates to clinical practice guidelines. The authors used the newly implemented Open Payments dataset to evaluate the accuracy of COI disclosures of authors of clinical practice guidelines that were either newly published or revised within 2014 and were included in the National Guideline Clearinghouse (NGC) website (maintained by the U.S. Department of Health and Human Services). Authors were considered as having inaccurate COI disclosure if they had not reported all companies from which they had received funds  $> \$5000$  in the 12 months preceding the guideline's publication. The authors identified 223 guidelines that were either newly published (109/223; 48.9%) or revised (114/223; 51.1%) within 2014 and were included in the NGC website. Among the 1329 guideline authors with available Open Payments data, 523 received  $> \$5000$  from at least 1 healthcare-associated entity. However, only 56 out of the 523 authors (10.7%) were found to have accurate COI disclosure. The percentage of authors with accurate COI disclosure in revised guidelines was significantly lower than in newly published guidelines (6.8% vs 14.3%;  $P < 0.01$ ) and was also found to differ between specialties. Furthermore, authors were less likely to inaccurately disclose "research payments" (37/49, 75.5%) compared to "general payments" (488/559, 87.3%,  $P = 0.02$ ) as well as "other/associated research funding" (430/506, 85.0%,  $P = 0.08$ ). No statistically significant association was detected between funding amount and disclosure accuracy.