



ILSI

# Nutrition Briefs

North America February 2018

## Lipids

### A High-Fat Compared with a High-Carbohydrate Breakfast Enhances 24-Hour Fat Oxidation in Older Adults

Bush NC, Resuehr HES, Goree LL, Locher JL, Bray MS, Soleymani T, Gower BA. *J Nutr.* 2018 Feb 1.  
doi: 10.1093/jn/nxx040. [Article Link](#)

**Significance:** In healthy sedentary adults, consuming a high-fat, lower-carbohydrate breakfast may be more metabolically favorable than a low-fat, high-carbohydrate breakfast.

**Background:** The ability to oxidize fat is associated with a lower risk of chronic metabolic disease. Preclinical data in mice showed that a high-fat “breakfast” increased 24-h fat oxidation relative to a high-carbohydrate breakfast. **Objectives:** The objectives of this study were to determine whether the timing of macronutrient intake in humans affects daily fuel utilization and to examine associations between fuel utilization and metabolic indexes. **Methods:** Participants were 29 healthy sedentary men and women (aged 55-75 y) with a body mass index (kg/m<sup>2</sup>) between 25 and 35. Participants were randomly assigned to receive either a high-fat breakfast (FB; 35% carbohydrate, 20% protein, 45% fat; n = 13) or a high-carbohydrate breakfast (CB; 60% carbohydrate, 20% protein, 20% fat; n = 16) for 4 wk while consuming a “neutral” lunch and dinner. Twenty-four-hour and postprandial respiratory quotients (RQs) were measured by whole-room indirect calorimetry. Insulin and glucose measures including insulin sensitivity were determined by an oral-glucose-tolerance test. Measures were taken at baseline and after the 4-wk intervention. Group-by-time interactions were determined by 2-factor repeated-measures mixed-model ANOVA. Pearson’s correlation analyses were used to determine associations of 24-h RQs with metabolic measures after the intervention. **Results:** There was a significant group-by-time interaction for change in the 24-h RQ [FB (mean ± SD): 0.88 ± 0.02 to 0.86 ± 0.02; CB: 0.88 ± 0.02 for both; P < 0.05], breakfast RQ (FB: 0.88 ± 0.03 to 0.86 ± 0.03; CB: 0.89 ± 0.02 to 0.90 ± 0.02; P < 0.01), and lunch RQ (FB: 0.089 ± 0.03 to 0.85 ± 0.03; CB: 0.89 ± 0.03 for both; P < 0.01). In the CB group at follow-up, 24-h RQ was positively associated with fasting glucose (r = 0.66, P < 0.05), glucose area under the curve (AUC) (r = 0.51, P < 0.05), and insulin AUC (r = 0.52, P < 0.05) and inversely associated with insulin sensitivity (r = -0.51, P < 0.05). **Conclusions:** The macronutrient composition of breakfast affects substrate utilization throughout the day in older adults. The consumption of a high-fat, lower-carbohydrate breakfast may reduce the risk of metabolic disease. This trial was registered at [www.clinicaltrials.gov](http://www.clinicaltrials.gov) as NCT03164200.



## Protein

### Arginine Metabolism Is Altered in Adults with A-β + Ketosis-Prone Diabetes

Mulukutla SN1, Hsu JW2, Gaba R1, Bohren KM2, Guthikonda A1, Iyer D et al. *J Nutr.* 2018 Feb 1.  
doi: 10.1093/jn/nxx032. [Article Link](#)

**Significance:** Defects in arginine metabolism may underlie the inappropriate insulin response observed in KPD patients. The insulin secretory response can be restored with exogenous arginine supplementation.

**Background:** A-β + ketosis-prone diabetes (KPD) is a subset of type 2 diabetes in which patients have severe but reversible β cell dysfunction of unknown etiology. Plasma metabolomic analysis indicates that abnormal arginine metabolism may be involved. **Objective:** The objective of this study was to determine the relation between gut microbiome and arginine metabolism and the relation between arginine availability and β cell function in KPD patients compared with control participants. **Methods:** Kinetics of arginine and related metabolites were measured with stable isotope tracers, and insulin secretory responses to arginine and glucose were determined under euglycemic and hyperglycemic conditions in 6 KPD patients and 6 age-, gender-, and body

## Contact Us

ILSI North America, 740 15th Street, NW, Suite 600, Washington, DC 20005  
Tel: 202.659.0074 | Fax: 202.659.3859 | [ilsina@ilsa.org](mailto:ilsina@ilsa.org) | [ilsa.org](http://ilsa.org)



mass index-matched control participants. Glucose potentiation of arginine-induced insulin secretion was performed in a different set of 6 KPD and 3 control participants. *Results:* Arginine availability was higher in KPD patients during euglycemia [ $53.5 \pm 4.3$  (mean  $\pm$  SEM) compared with  $40.3 \pm 2.4 \mu\text{mol} \cdot \text{kg lean body mass (LBM)}^{-1} \cdot \text{h}^{-1}$ ,  $P = 0.03$ ] but declined more in response to hyperglycemia ( $\Delta 10.15 \pm 2.6$  compared with  $\Delta 3.20 \pm 1.3 \mu\text{mol} \cdot \text{kg LBM}^{-1} \cdot \text{h}^{-1}$ ,  $P = 0.041$ ). During hyperglycemia, ornithine flux was not different between groups but after an arginine bolus, plasma ornithine AUC trended higher in KPD patients ( $3360 \pm 294$  compared with  $2584 \pm 259 \text{ min} \cdot \mu\text{mol} \cdot \text{L}^{-1}$ ,  $P = 0.08$ ). In both euglycemia and hyperglycemia, the first-phase insulin responses to glucose stimulation were lower in KPD patients (euglycemic insulin AUC  $282 \pm 108$  compared with  $926 \pm 257 \text{ min} \cdot \mu\text{U} \cdot \text{mL}^{-1}$ ,  $P = 0.02$ ; hyperglycemic insulin AUC  $358 \pm 79$  compared with  $866 \pm 292 \text{ min} \cdot \mu\text{U} \cdot \text{mL}^{-1}$ ,  $P = 0.05$ ), but exogenous arginine restored first-phase insulin secretion in KPD patients to the level of control participants. *Conclusion:* Compared with control participants, KPD patients have increased arginine availability in the euglycemic state, indicating a higher requirement. This is compromised during hyperglycemia, with an inadequate supply of arginine to sustain metabolic functions such as insulin secretion. Exogenous arginine administration restores a normal insulin secretory response.

## Dietary Patterns

### Association Between Diet Quality Scores and Risk of Hip Fracture in Postmenopausal Women and Men Aged 50 Years and Older

Fung TT, Meyer HE, Willett WC, Feskanich D. *J Acad Nutr Diet.* 2018 Feb 1. doi: 10.1016/j.jand.2017.11.022.

[Article Link](#)



**Significance:** This prospective analysis found that diet quality, as measured by the Alternate Healthy Eating Index-2010 (AHEI-2010), is inversely associated with hip fracture in women younger than age 75, but not in men or older women.

*Background:* Although a number of studies showed a lower risk of hip fractures with high-quality diets, few of them were conducted in the United States. *Objective:* This prospective analysis examined the association between several diet quality indexes and risk of hip fractures in US men and women. *Design:* This is a prospective cohort study. *Participants/Setting:* The participants were 74,446 postmenopausal women from the Nurses' Health Study and 36,602 men aged 50 years and older from the Health Professionals Follow-Up Study in the United States. *Main Outcome Measure:* Hip fractures were self-reported on biennial questionnaires between 1980-2012 in women, and between 1986-2012 in men. *Statistical Analysis:* Diet was assessed every 4 years with a validated food frequency questionnaire. Relative risks were computed for hip fracture by quintiles of the Alternate Mediterranean Diet score (aMed), the Alternate Healthy Eating Index-2010 (AHEI-2010), and the Dietary Approaches to Stop Hypertension score using Cox proportional hazards models, adjusting for potential confounders. *Results:* Two thousand one hundred forty-three incident hip fractures in women and 603 in men were reported during follow-up. A significant inverse trend was observed with the cumulative

AHEI-2010 score in women (relative risk comparing extreme quintiles 0.87, 95% CI 0.75 to 1.00;  $P$  for trend=0.02). There was also a suggestion of an inverse association with the Dietary Approaches to Stop Hypertension score ( $P$  for trend=0.03). In addition, significant inverse trends were observed between all three diet quality scores and hip fractures in women younger than age 75 years but not older women. There was no clear association between diet quality indexes and hip fracture in men. *Conclusions:* Higher AHEI-2010 scores were associated with a lower risk of hip fractures in US women. The inverse associations with diet quality may be more apparent among those younger than age 75 years.

### Low Diet Quality and the Risk of Stroke Mortality: The Multiethnic Cohort Study

Aigner A, Becher H, Jacobs S, Wilkens LR, Boushey CJ, Le Marchand L et al. *Eur J Clin Nutr.* 2018 Feb 9. doi: 10.1038/s41430-018-0103-4. [Article Link](#)

**Significance:** The Healthy Eating Index-2010 (HEI-2010) was the strongest of four diet-quality indices in predicting stroke mortality.

*Background/Objectives:* Several diets, e.g., those low in fruits/vegetables, high in sodium, and red/processed meat, have been related to a higher stroke risk. We investigated stroke mortality associated with a priori diet-quality indices in the Multiethnic Cohort study. *Subjects/Methods:* Based on 172,043 observations including 3548 stroke deaths, we investigated the Healthy Eating Index-2010 (HEI-2010), the Alternative HEI-2010, the alternate Mediterranean diet score, and the Dietary Approaches to Stop Hypertension index in relation to stroke mortality. Using Cox regression, we estimated adjusted population attributable risks (PAR) and hazard ratios (HR) for tertiles of the indices while adjusting for relevant confounders. *Results:* The associations between all diet-quality indices and stroke mortality were consistent in direction; a low-quality diet was associated with a greater

risk of stroke death, but the HEI-2010 was the strongest predictor. The PAR for stroke death based on HEI-2010 was 7.9% (95%-CI: 3.7-12.2%), indicating the preventable percentage of deaths if the total population had the same diet quality as those in the highest tertile for this diet-quality index. The lowest as compared to the highest tertile of the HEI-2010 was associated with a 1.23-fold (95%-CI: 1.13-1.34) risk. The PARs for low and medium adherence to the indices were similar by sex and follow-up time, but varied by ethnicity, with the highest PAR in Whites (15.4%) and no association in Latinos. *Conclusions:* Findings for four diet-quality indices, in particular the HEI-2010, indicated that diet quality acts as an independent risk factor for stroke mortality. Promotion of a high diet quality could have a substantial impact on the prevention of stroke deaths.

### Higher Mediterranean Diet Quality Scores and Lower Body Mass Index Are Associated with a Less-Oxidized Plasma Glutathione and Cysteine Redox Status in Adults

Bettermann EL, Hartman TJ, Easley KA, Ferranti EP, Jones DP, Quyyumi AA et al. *J Nutr.* 2018 Feb 1;148(2):245–253. doi: 10.1093/jn/nxx045. [Article Link](#)

**Significance:** Mediterranean Diet Score, but not other indices of diet quality, is inversely associated with plasma redox status in healthy working adults.

*Background:* Both systemic redox status and diet quality are associated with risk outcomes in chronic disease. It is not known, however, the extent to which diet quality influences plasma thiol/disulfide redox status. *Objective:* The purpose of this study was to investigate the influence of diet, as measured by diet quality scores and other dietary factors, on systemic thiol/disulfide redox status. *Methods:* We performed a cross-sectional study of 685 working men and women (ages  $\geq 18$  y) in Atlanta, GA. Diet was assessed by 3 diet quality scores: the Alternative Healthy Eating Index (AHEI), Dietary Approaches to Stop Hypertension (DASH), and the Mediterranean Diet Score (MDS). We measured concentrations of plasma glutathione (GSH), cysteine, their associated oxidized forms [glutathione disulfide (GSSG) and cystine (CySS), respectively], and their redox potentials (EhGSSG and EhCySS) to determine thiol/disulfide redox status. Linear regression modeling was performed to assess relations between diet and plasma redox after adjustment for age, body mass index (BMI), sex, race, and history of chronic disease. *Results:* MDS was positively associated with plasma GSH ( $\beta = 0.02$ ; 95% CI: 0.003, 0.03) and total GSH (GSH + GSSG) ( $\beta = 0.02$ ; 95% CI: 0.003, 0.03), and inversely associated with the CySS:GSH ratio ( $\beta = -0.02$ ; 95% CI: -0.04, -0.004). There were significant independent associations between individual MDS components (dairy, vegetables, fish, and monounsaturated fat intake) and varying plasma redox indexes ( $P < 0.05$ ). AHEI and DASH diet quality indexes and other diet factors of interest were not significantly correlated with plasma thiol and disulfide redox measures. *Conclusion:* Adherence to the Mediterranean diet was significantly associated with a favorable plasma thiol/disulfide redox profile, independent of BMI, in a generally healthy working adult population. Although longitudinal studies are warranted, these findings contribute to the feasibility of targeting a Mediterranean diet to improve plasma redox status.

## Diet Assessment

### Feasibility and Acceptability of Dietary Intake Assessment Via 24-Hour Recall and Food Frequency Questionnaire among Women with Low Socioeconomic Status

DeBiaise MA, Bowen DJ, Quatromoni PA, Quinn E, Quintiliani LM. *J Acad Nutr Diet.* 2018 Feb;118(2):301–307. doi: 10.1016/j.jand.2017.08.011. [Article Link](#)

**Significance:** Among underserved female populations, 24-hr recalls and FFQ are considered generally acceptable forms of self-reported dietary assessment.

*Background:* Comprehensive evaluation of dietary interventions depends on effective and efficient measurement to quantify behavior change. To date, little is known regarding which self-reported measure of dietary intake is most feasible and acceptable for use in evaluation of the effectiveness of diet intervention studies among underserved populations. *Objective:* This research focused on evaluating feasibility and acceptability of two self-report measures of diet. *Design:* Cross-sectional. *Participants/Setting:* Two interviewer-administered 24-hour recalls and a 110-item food frequency questionnaire (FFQ) were administered to both English- and Spanish-speaking participants ( $n=36$ ) by native English- and Spanish-speaking research assistants. On completion of both dietary assessments, participants were interviewed regarding their preference of measure. *Main Outcome Measures:* Feasibility for completion of the dietary assessment measures was determined for contacts and retention. Acceptability of the measures was determined through responses to open- and closed-ended questions. *Results:* During the 5-month trial, 36 participants were enrolled; 29 completed both intake measures, and 26 completed both measures and the interview. Participants were mainly Hispanic/Latina (72%), with a mean age of 37.0 ( $\pm 7.6$ ) years. Feasibility targets were met for contacts (1.9, 1.6, 1.8 contact attempts to complete each diet assessment measure with a target of  $\leq 2$ ) and for retention with 89% and 91% completing two 24-hour recalls and the FFQ, respectively. Participants indicated both diet assessment methods were generally acceptable; both positive and negative comments were received for use of the FFQ. *Conclusion:* Dietary assessment with the use of 24-hour recalls or an FFQ can be feasible and acceptable among women with low socioeconomic status, although care should be taken to address cultural appropriateness in the selection of the measurement method.

## Eating Behavior

### Nutrition Facts Panels: Who Uses Them, What Do They Use, and How Does Use Relate to Dietary Intake?

Christoph MJ, Larson N, Laska MN, Neumark-Sztainer D. *J Acad Nutr Diet*. 2018 Feb;118(2):217–228. [Article Link](#)

**Significance:** This cross-sectional study of young adults found that one-third of participants used Nutrition Facts labels “frequently.” Users were more likely to be women, and health- or -weight-motivated.

*Background:* Nutrition labels are a low-cost tool with the potential to encourage healthy eating habits. *Objective:* To investigate correlates of frequent Nutrition Facts label use, describe the types of label information most often used, and measure how label use relates to dietary intake in young adults. *Design:* Cross-sectional population-based study of young adults participating in Project Eating and Activity in Teens and Young Adults-IV. *Participants/Setting:* Surveys and food frequency questionnaires were completed during 2015-2016 by young adults (N=1,817; weighted sample=49% women) aged 25 to 36 years. *Main Outcome Measures:* Nutrition Facts label use, frequency of using specific information on labels, and dietary intake. *Statistical Analyses Performed:* Relative risks and adjusted means were used to examine how demographic, behavior, and weight-related factors were associated with Nutrition Facts panel use, and how label use related to dietary outcomes. Associations with P values <0.05 were considered statistically significant. *Results:* Approximately one-third (31.4%) of participants used Nutrition Facts labels “frequently.” Use was significantly higher for women; for participants with high education and income; among those who prepared food regularly; among those who were physically active; among those with a weight status classified as overweight; and among those who were trying to lose, gain, or maintain weight. Label components used most often included sugars (74.1%), total calories (72.9%), serving size (67.9%), and the ingredient list (65.8%). Nutrition Facts label users consumed significantly more fruits, vegetables, and whole grains and fewer sugar-sweetened beverages, compared with nonusers. Nutrition Facts label users ate significantly more frequently at sit-down restaurants but less frequently at fast-food restaurants compared with nonusers. *Conclusions:* Although Nutrition Facts label use was associated with markers of better dietary quality in a population-based sample of young adults, only one-third of participants used labels frequently. Methods to improve label use should be studied, particularly through leveraging weight- or health-related goals (eg, interest in making healthier food choices), and meeting consumer preferences concerning label content.

## Bioactives

### Blueberry Supplementation Influences the Gut Microbiota, Inflammation, and Insulin Resistance in High-Fat-Diet-Fed Rats

Lee S, Keirse KI, Kirkland R, Grunewald ZI, Fischer JG, de La Serre CB. *J Nutr*. 2018 Feb 1;148(2):209–219.

[Article Link](#)

**Significance:** Blueberry supplementation ameliorated high-fat diet-induced inflammation and insulin resistance, and led to compositional changes in the gut microbiota in a rat model of obesity.

*Background:* Gut microbiota dysbiosis has been linked to obesity-associated chronic inflammation. Microbiota manipulation may therefore affect obesity-related comorbidities. Blueberries are rich in anthocyanins, which have anti-inflammatory properties and may alter the gut microbiota. *Objective:* We hypothesized that blueberry supplementation would alter the gut microbiota, reduce systemic inflammation, and improve insulin resistance in high-fat (HF)-diet-fed rats. *Methods:* Twenty-four male Wistar rats (260-270 g; n = 8/group) were fed low-fat (LF; 10% fat), HF (45% fat), or HF with 10% by weight blueberry powder (HF\_BB) diets for 8 wk. LF rats were fed ad libitum, whereas HF and HF\_BB rats were pair-fed with diets matched for fiber and sugar contents. Glucose tolerance, microbiota composition (16S ribosomal RNA sequencing), intestinal integrity [villus height, gene expression of mucin 2 (Muc2) and  $\beta$ -defensin 2 (Defb2)], and inflammation (gene expression of proinflammatory cytokines) were assessed. *Results:* Blueberry altered microbiota composition with an increase in Gammaproteobacteria abundance (P < 0.001) compared with LF and HF rats. HF feeding led to an ~15% decrease in ileal villus height compared with LF rats (P < 0.05), which was restored by blueberry supplementation. Ileal gene expression of Muc2 was ~150% higher in HF\_BB rats compared with HF rats (P < 0.05), with expression in the LF group not being different from that in either the HF or HF\_BB groups. Tumor necrosis factor  $\alpha$  (Tnfa) and interleukin 1 $\beta$  (Il1b) gene expression in visceral fat was increased by HF feeding when compared with the LF group (by 300% and 500%, respectively; P < 0.05) and normalized by blueberry supplementation. Finally, blueberry improved markers of insulin sensitivity. Hepatic insulin receptor substrate 1 (IRS1) phosphorylation at serine 307:IRS1 ratio was ~35% higher in HF rats compared with LF rats (P < 0.05) and HF\_BB rats. *Conclusion:* In HF-diet-fed male rats, blueberry supplementation led to compositional changes in the gut microbiota associated with improvements in systemic inflammation and insulin signaling.



## Clinical Evidence on Dietary Supplementation with Chia Seed (*Salvia hispanica* L.): A Systematic Review and Meta-Analysis

Teoh SL, Lai NM, Vanichkulpitak P, Vuksan V, Ho H, Chaiyakunapruk N. *Nutr Rev*. 2018 Feb 14. doi: 10.1093/nutrit/nux071. [Article Link](#)

**Significance:** A systematic review of PubMed and Embase databases found that high-quality evidence regarding the health benefits of chia seed, a popular dietary supplement, is lacking

*Context:* Chia seed is a popular dietary supplement, taken mainly for its high content of alpha-linolenic acid, vegetable protein, and dietary fiber, yet information about its clinical effects is lacking. *Objective:* This review aims to summarize the clinical evidence regarding the use of chia seed for a wide variety of health conditions. *Data Sources:* A number of databases, including PubMed and Embase, were searched systematically. *Study Selection:* Randomized controlled trials that assessed the clinical effects of chia seed consumption in human participants were included. The quality of trials was assessed using the Cochrane Risk of Bias Tool. *Data Extraction:* Data on study design, blinding status, characteristics of participants, chia seed intervention, comparator, clinical assessment, duration of intake, interval of assessment, and study funding status were extracted. Meta-analysis was performed. *Results:* Twelve trials were included. Participants included healthy persons, athletes, diabetic patients, and individuals with metabolic syndrome. Pooling of results showed no significant differences except for the following findings of subgroup analysis at higher doses of chia seed: (1) lower postprandial blood glucose level (mean difference [MD] of -33.95 incremental area under the curve [iAUC] [mmol/L × 2h] [95%CI, -61.85, -6.05] and -51.60 iAUC [mmol/L × 2h] [95%CI, -79.64, -23.56] at medium doses and high doses, respectively); (2) lower high-density lipoprotein in serum (MD of -0.10 mmol/L [95%CI, -0.20, -0.01]); and (3) lower diastolic blood pressure (MD of -7.14 mmHg [95%CI, -11.08, -3.19]). The quality of all evidence assessed using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach was low or very low. All trials employed only surrogate markers as outcomes. *Conclusions:* Future trials with improved methodological quality, well-described clinical events, and validated surrogate markers as outcomes are needed to support the potential health benefits of chia seed consumption.



## Micronutrients

### Redefining Hypertension - Assessing the New Blood-Pressure Guidelines

Bakris G, Sorrentino M. *N Engl J Med*. 2018 Feb 8;378(6):497–499. doi: 10.1056/NEJMp1716193. [Article Link](#)

**Significance:** This perspective highlights areas of controversy surrounding the new Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults, issued by the American College of Cardiology (ACC) and the American Heart Association (AHA).

### Vitamin D Supplementation for Improvement of Chronic Low-Grade Inflammation in Patients with Type 2 Diabetes: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

Mousa A, Naderpoor N, Teede H, Scragg R, de Courten B. *Nutr Rev*. 2018 Feb 27. doi: 10.1093/nutrit/nux077. [Article Link](#)

**Significance:** This systematic review and meta-analysis of 20 RCTs found that supplementation with vitamin D reduces several markers of inflammation in patients with type 2 diabetes.

*Background:* Vitamin D has been proposed to have anti-inflammatory properties; however, the effect of vitamin D supplementation on inflammation in type 2 diabetes has not been established. *Objective:* The aim of this systematic review and meta-analysis was to examine the effect of vitamin D supplementation on inflammatory markers in patients with type 2 diabetes and to identify relevant gaps in knowledge. *Data Sources:* MEDLINE, CINAHL, Embase, and EBM Reviews were searched systematically from inception to January 25, 2017. *Study Selection:* Randomized controlled trials (RCTs) investigating the effects of vitamin D supplementation (any form, route, and duration, and with any cosupplementation) compared with placebo or usual care on inflammatory markers in patients with type 2 diabetes were selected. *Data Extraction:* Study and sample characteristics and aggregate outcome data were extracted, risk of bias was determined, and quality of evidence was assessed using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) approach. *Results:* Twenty-eight RCTs were included, 20 of which had data available for pooling. In meta-analyses of 20 RCTs (n = 1270 participants), vitamin D-supplemented groups had lower levels of C-reactive protein (standardized mean difference [SMD] -0.23; 95%CI, -0.37 to -0.09; P = 0.002) and tumor necrosis factor  $\alpha$  (SMD -0.49; 95%CI, -0.84 to -0.15; P = 0.005), a lower erythrocyte sedimentation rate (SMD -0.47; 95%CI,

-0.89 to -0.05;  $P=0.03$ ), and higher levels of leptin (SMD 0.42; 95%CI, 0.04-0.81;  $P=0.03$ ) compared with control groups. No differences were observed for adiponectin, interleukin 6, or E-selectin (all  $P>0.05$ ). In meta-regression and subgroup analyses, age, sex, body mass index, duration of diabetes, baseline vitamin D status, and dose and duration of supplementation did not alter the results. **Conclusions:** This meta-analysis provides level 1 evidence that vitamin D supplementation may reduce chronic low-grade inflammation in patients with type 2 diabetes.

### Exploring the Association Between Serum 25-Hydroxyvitamin D and Serum Lipids—More Than Confounding?

Jorde R, Grimnes G. *Eur J Clin Nutr.* 2018 Feb 12. doi: 10.1038/s41430-018-0088-z. [Article Link](#)

**Significance:** This study suggests that the relationship between serum 25(OH)D levels and circulating triglycerides, LDL and total cholesterol can be explained by known confounding factors. Causation for the relationship between serum 25(OH)D and HDL-cholesterol remains unknown.

**Background/Objectives:** In observational, but not interventional, studies there are strong associations between serum 25-hydroxyvitamin D (25(OH)D) and serum lipids. The purpose of the present study was to examine potential causes of this association. **Subjects/Methods:** A total of 17,411 subjects participating in the seventh survey of the Tromsø Study were included in the cross-sectional study; 5384 subjects who participated in both the sixth and seventh survey were included in the longitudinal study; 2365 subjects who participated in both the fourth and seventh survey were included in the genetic study; and 479 subjects with impaired glucose tolerance were included in the vitamin D binding protein (DBP) analyses. **Results:** For serum 25(OH)D, there were strong and positive associations with LDL-, HDL-, and total-cholesterol, and a negative association with triglycerides that remained after adjustment for gender, age, BMI, diet, supplements, and lifestyle factors. These associations were seen in winter as well as summer. Except for serum cholesterol, change of season for blood sampling did not affect lipid levels. However, when analyzing separately, subjects with low or no intake of vitamin D supplements, fish oil and fat fish, only the association between 25(OH)D and HDL-cholesterol remained significant. Serum DBP or single-nucleotide polymorphisms related to 25(OH)D had no relation to lipid levels. **Conclusions:** The associations between 25(OH)D and lipids (except for HDL-cholesterol) can be explained by known confounding factors. However, for HDL-cholesterol, the cause of the association with 25(OH)D still remains unknown.

## Obesity

### Birth Order and Number of Siblings and their Association with Overweight and Obesity: A Systematic Review and Meta-Analysis

Meller FO, Loret de Mola C, Assunção MCF, Schäfer AA, Dahly DL, Barros FC. *Nutr Rev.* 2018 Feb 1;76(2):117-124. doi: 10.1093/nutrit/nux060. [Article Link](#)

**Significance:** This meta-analysis of 14 studies found significant associations between birth order, number of siblings, and risk of overweight/obesity.

**Context:** The effect of both birth order and number of siblings on overweight and/or obesity has not been determined. Birth order and sibsize have been mathematically coupled to overweight and/or obesity, but thus far their respective effects have been estimated separately. **Objective:** The aim of this systematic review was to evaluate the effects of both birth order and number of siblings on the risk of overweight/obesity. **Data Sources:** The electronic databases MEDLINE, Social Science, SocINDEX, PsycINFO, CINAHL Plus, and Academic Search Complete were searched systematically. **Study Selection:** Titles and abstracts of 1698 records were examined. After 1504 records were excluded, 2 authors independently assessed the full text of all remaining papers ( $n=194$ ); disagreements were resolved by discussion. **Data Extraction:** A standardized form for assessment of study quality and evidence synthesis was used to extract data from the included studies. **Results:** Twenty studies were included in the systematic review, 14 of which were included in the meta-analysis. Meta-analyses showed that lower (vs higher) birth order and smaller (vs greater) number of siblings were associated with overweight and/or obesity, with ORs of 1.47 (95%CI, 1.12-1.93) and 1.46 (95%CI, 1.17-1.84), respectively. However, among the 9 studies that attempted to separate the effects of birth order and number of siblings in the same analysis, a higher risk of overweight/obesity was consistently found among individuals without siblings than among those with 1 or more siblings, rather than among firstborns more generally. **Conclusion:** The results show that both lower birth order and lower number of siblings are associated with risk of overweight/obesity, which suggests that only children are at a slightly increased risk of overweight/obesity.



---

## Metabolic Syndrome

### Body Fat Percentage Cutoffs for Risk of Cardiometabolic Abnormalities in the Chinese Adult Population: A Nationwide Study

Jia A, Xu S, Ming J, Xing Y, Guo J, Zhao M et al. *Eur J Clin Nutr.* 2018 Feb 6. doi: 10.1038/s41430-018-0107-0.

[Article Link](#)

**Significance:** This study identifies optimal cutoffs of % body fat, as measured by foot-to-foot bioelectrical impedance, for predicting the risk of metabolic disorders and cardiovascular risk in Chinese adults.

**Background/Objectives:** The direct assessment of body fat (BF) by using simple methods might be an alternative index of obesity. We aim to investigate the optimal cutoffs of the %BF relating to metabolic disorders and cardiovascular risks in China. **Subjects/Methods:** The data were from the 2007-2008 China National Diabetes and Metabolic Disorders Study. Participants with age of 20-75 years and with a BF measurement record were included. The %BF was measured using a foot-to-foot bioelectrical impedance analysis. Receiver operating characteristic curve was used to decide the optimal %BF cutoffs for predicting the risk of diabetes, hypertension, metabolic syndrome (MetS), and 10-year cardiovascular events (estimated by Framingham risk score (FRS)). **Results:** A total of 23,769 participants were enrolled with the mean age of 44.88 years, the male percentage of 40.59%, and the mean %BF of 25.22%. The mean %BFs of subjects who had diabetes, hypertension, metabolic syndrome, and FRS  $\geq$  10% were higher than those without diabetes, hypertension, metabolic syndrome, and FRS  $\geq$  10%, respectively. In men, the optimal %BF cutoffs for these four endpoints were 24.50%, 24.90%, 24.21%, and 22.10%, respectively. In women, they were 35.69%, 32.50%, 32.60%, and 32.31%, respectively. On the basis of the weights of these endpoints, the pooled optimal %BF cutoff was 23.67% and 32.88% in men and women, respectively. **Conclusions:** We suggest the optimal foot-to-foot BIA-measured %BF cutoffs for predicting risk of cardiometabolic abnormalities to be 24% and 33% in Chinese men and women, respectively.

---