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# Nutrition Briefs

March 2016

## Diabetes

### Association Between Alcohol Consumption and the Risk of Incident Type 2 Diabetes: A Systematic Review and Dose-Response Meta-Analysis

X-H. Li, F-F. Yu, Y-H. Zhou, J. He

*American Journal of Clinical Nutrition*, Vol. 103, No. 3; pp. 818–829, 2016

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

**Significance:** Light and moderate alcohol consumption was associated with a lower risk of type 2 diabetes, whereas heavy alcohol consumption was not related to the risk of diabetes.

This study explored and summarized the evidence on the strength of the association between alcohol consumption and the subsequent risk of type 2 diabetes (T2D) by using a dose-response meta-analytic approach. PubMed, Embase, and Cochrane Library databases were searched for prospective observational studies. Analyses were based on 706,716 individuals (275,711 men and 431,005 women) from 26 studies with 31,621 T2D cases. A nonlinear relation was detected between alcohol consumption and risk of T2D, which was identified in all cohorts (P-trend < 0.001, P-nonlinearity < 0.001), in men (P-trend < 0.001, P-nonlinearity < 0.001), and in women (P-trend < 0.001, P-nonlinearity < 0.001). Compared with the minimal category of alcohol consumption, light (RR: 0.83; 95% CI: 0.73, 0.95) and moderate (RR: 0.74; 95% CI: 0.67, 0.82) alcohol consumption were associated with a lower risk of T2D. Heavy alcohol consumption had little or no effect on subsequent T2D risk. The summary RR ratio (RRR; male to female) of the comparison between moderate alcohol consumption and the minimal alcohol categories for T2D was significantly higher, and the pooled RRR (current smoker to never smoker) of light alcohol consumption was significantly reduced.

## Obesity

### Protein Concentration in Milk Formula, Growth, and Later Risk of Obesity: A Systematic Review

B. Patro-Gołąb, B.M. Zalewski, S.M.P. Kouwenhoven, J. Karaś, B. Koletzko, J.B. van Goudoever, et al.

*Journal of Nutrition*, Vol. 146, No. 3; pp. 551–564, 2016

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

**Significance:** The current evidence is insufficient for assessing the effects of reducing the protein concentration in infant formulas on long-term outcomes.

This systematic review investigated current evidence on the effects of infant formulas and follow-on formulas with different protein concentrations on infants'

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and children's growth, body composition, and later risk of overweight and obesity. MEDLINE, Embase, and the Cochrane Library were searched for randomized controlled trials (RCTs). Eligible studies included children aged 0–3 y and were fed cow milk–based infant formulas with variations in protein concentration. Control groups received lower-protein cow milk–based formulas. Twelve RCTs met the inclusion criteria. Different formula protein concentrations did not affect linear growth other than a transient effect on mean length at 3 mo observed in a meta-analysis of 4 studies (mean difference, – 0.27 cm; 95% CI: –0.52, –0.02). Lower mean weight and weight z scores obtained from the infants fed lower-protein formulas were observed only from 6 to 12 mo of age. Data from one large RCT showed that consumption of a lower-protein infant formula may reduce BMI at 12 mo of age and later (12 mo, 24 mo, and 6y) and the risk of obesity at 6 y.

## Blood Pressure

### Consumption of Fish Oil Providing Amounts of Eicosapentaenoic Acid and Docosahexaenoic Acid That Can Be Obtained From the Diet Reduces Blood Pressure in Adults with Systolic Hypertension: A Retrospective Analysis

A.M. Minihane, C.K. Armah, E.A. Miles, J.M. Madden, A.B. Clark, M.J. Caslake, et al.

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**Significance:** In adults with isolated systolic hypertension, daily doses of EPA+DHA as low as 0.7 g show clinically meaningful reductions in blood pressure, which, at a population level, could be associated with lower cardiovascular disease risk.

This double-blind, placebo-controlled randomized controlled trial examined the impact of recommended eicosapentaenoic acid (EPA; 20:5n–3) and docosahexaenoic acid (DHA; 22:6n–3) intakes achievable through diet on systolic and diastolic blood pressure (BP) and microvascular function in adults in the United Kingdom. Healthy men and women (n = 312) consumed a control oil or fish oil (FO) providing 0.7 or 1.8 g EPA+DHA/d, in random order, each for 8 wk. Fasting BP and microvascular function were assessed and plasma collected for the quantification of markers of vascular function. Participants were retrospectively genotyped for the endothelial nitric oxide synthase (eNOS) rs1799983 variant. No effects of n–3 fatty acid treatment or any treatment × eNOS genotype interactions were evident in the group as a whole for any of the clinical or biochemical outcomes. Assessment of response according to hypertension status at baseline indicated a significant (P = 0.046) FO-induced reduction (mean: 5 mm Hg) in systolic BP, specifically in those with isolated systolic hypertension (n = 31).

## Hydration Status

### A Randomized Trial to Assess the Potential of Different Beverages to Affect Hydration Status: Development of a Beverage Hydration Index

R.J. Maughan, P. Watson, P.A.A. Cordery, N.P. Walsh, S.J. Oliver, A. Dolci, et al.

*American Journal of Clinical Nutrition*, Vol. 103, No. 3; pp. 717–723, 2016

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**Significance:** The beverage hydration index may be a useful measure to identify the short-term hydration potential of different beverages when ingested in a euhydrated state.

This study investigated the effects of 13 different commonly consumed drinks on urine output and fluid balance when ingested in a euhydrated state, with a view to establishing a beverage hydration index (BHI). Each subject ( $n=72$ , euhydrated and fasted male subjects) ingested 1 L still water or 1 of 3 other commercially available beverages over a period of 30 min. Urine output was then collected for the subsequent 4 h. The BHI was corrected for the water content of drinks and was calculated as the amount of water retained at 2 h after ingestion relative to that observed after the ingestion of still water. Mean total urine masses over 4 h were smaller than the still-water control ( $1337 \pm 330$  g) after an oral rehydration solution (ORS) ( $1038 \pm 333$  g,  $P < 0.001$ ), full-fat milk ( $1052 \pm 267$  g,  $P < 0.001$ ), and skimmed milk ( $1049 \pm 334$  g,  $P < 0.001$ ). Cumulative urine output at 4 h after ingestion of cola, diet cola, hot tea, iced tea, coffee, lager, orange juice, sparkling water, and a sports drink were not different from the response to water ingestion. The mean BHI at 2 h was  $1.54 \pm 0.74$  for the ORS,  $1.50 \pm 0.58$  for full-fat milk, and  $1.58 \pm 0.60$  for skimmed milk.

## Sleep

### Higher-Protein Diets Improve Indexes of Sleep in Energy-Restricted Overweight and Obese Adults: Results From 2 Randomized Controlled Trials

J. Zhou, J.E. Kim, C.L.H. Armstrong, N. Chen, W.W. Campbell

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**Significance:** The consumption of a greater proportion of energy from protein while dieting may improve sleep in overweight and obese adults.

The effect of protein intake during dietary energy restriction on indexes of sleep was assessed in overweight and obese adults in 2 randomized, controlled feeding studies. For study 1, 14 participants consumed energy-restricted diets (a 750-kcal/d deficit) with either beef and pork (BP;  $n=5$ ) or soy and legume (SL;  $n=9$ ) for 3 consecutive 4-wk periods with 10% (control), 20%, or 30% of total energy from protein (random order). At baseline and the end of each period, the global sleep score (GSS) was assessed with the Pittsburgh Sleep Quality Index (PSQI) questionnaire. For study 2, 44 participants consumed a 3-wk baseline energy-balance diet with 0.8 g protein/kg baseline body mass $-1/d-1$ . Then, study 2 subjects consumed either a normal-protein [NP (control);  $n=23$ ] or a high-protein (HP;  $n=21$ ) (0.8 compared with 1.5 g/kg $-1/d-1$ , respectively) energy-restricted diet (a 750-kcal/d deficit) for 16 wk. In study 1, a higher protein quantity improved GSSs independent of the protein source. The GSS was higher when 10% compared with 20% protein was consumed, with 30% protein intermediate. In study 2, at baseline, the GSS was not different between NP and HP groups. Over time, the GSS was unchanged for the NP group and improved for the HP group. After week 16, GSSs for NP and HP groups were  $5.9 \pm 0.5$  and  $4.0 \pm 0.6$  au, respectively ( $P < 0.01$ ).

## Inflammation

### Fruit Polyphenols: A Review of Anti-inflammatory Effects in Humans

S.V. Joseph, I. Edirisinghe, B.M. Burton-Freeman

*Critical Reviews in Food Science and Nutrition*, Vol. 56, No. 3; pp. 419–444, 2016

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**Significance:** This article presents a comprehensive overview of human clinical trials investigating the acute and chronic (feeding) effect of polyphenols from commonly consumed fruits or their derived products on inflammation.

Underlying etiological factors in the development of obesity-related chronic diseases are long-term imbalances of oxidative and inflammatory stress leading to tissue dysfunction, damage, and ultimately failure. Poor dietary quality contributes significantly to the oxidative and inflammatory status of an individual. Various dietary approaches can mitigate or prevent the occurrence of these risk-conferring imbalances brought about by modern lifestyle. Plant-derived polyphenolic compounds are well known for their antioxidant properties. Recent evidence indicates these compounds may confer anti-inflammatory and/or inflammatory response stabilizing activities, which would have important implications in health maintenance and disease risk reduction. Commonly consumed fruits, such as grapes, berries, and oranges/orange juice, contain polyphenolic compounds that have been studied for their effects on inflammation, but the nature and extent of their effects in humans remain unclear.

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