

Nutrition Briefs

Dietary Patterns

A Posteriori Dietary Patterns and Their Association with Systemic Low-Grade Inflammation in Adults: A Systematic Review and Meta-Analysis

Norde MM, Collese TS, Giovannucci E, Rogero MM. *Nutr Rev.* 2021 Feb 11;79(3):331-350. doi: 10.1093/nutrit/nuaa010. [Article link](#)

Significance: This systematic review and meta-analysis found that the Western dietary pattern characterized by high intake of red and processed meat and low intake of vegetables is positively associated with inflammation. Substitution of a Westernized diet for a healthy diet may lower inflammation.



Context: A posteriori dietary patterns are promising ways of uncovering potential public health strategies for the prevention of systemic, low-grade, inflammation-related, chronic noncommunicable diseases. **Objective:** To investigate and summarize the current evidence on the association between a posteriori dietary patterns and systemic, low-grade inflammation in adults. **Data Sources:** MEDLINE, EMBASE, Web of Science, and LILACS were searched. **Data Extraction:** Data screening, extraction, and quality assessment were performed independently by 2 investigators. Meta-analysis with random effects was conducted. Differences and similarities between reduced rank regression-derived dietary patterns were assessed. **Results:** Healthy dietary patterns are inversely, and the Western dietary pattern is positively associated with inflammation ($r = -0.13$, 95% confidence interval -0.20 to -0.06 ; and $r = 0.11$, 95% confidence interval, 0.09 - 0.12 , respectively). Reduced rank regression-derived anti-inflammatory dietary patterns are consistently characterized by high intake of fresh fruits and inflammatory dietary patterns are consistently characterized by high intake of red and processed meat

and low intake of vegetables. **Conclusion:** Favoring the substitution of a Westernized diet for a healthy diet may lower inflammation, which might improve the prevention of some chronic noncommunicable diseases.

Protein

Effects of Total Red Meat Intake on Glycemic Control and Inflammatory Biomarkers: A Meta-Analysis of Randomized Controlled Trials

O'Connor LE, Kim JE, Clark CM, Zhu W, Campbell WW. *Adv Nutr.* 2021 Feb 1;12(1):115-127. doi: 10.1093/advances/nmaa096. [Article link](#)

Significance: Red meat consumption, for up to 16 weeks, does not appear to affect changes in biomarkers of glycemic control or inflammation for adults currently free of, but at risk for, cardiometabolic disease.

Our objective was to conduct a systematic review and meta-analysis to assess the effects of total red meat (TRM) intake on glycemic control and inflammatory biomarkers using randomized controlled trials of individuals free from cardiometabolic disease. We hypothesized that higher TRM intake would negatively influence glycemic control and inflammation based on positive correlations between TRM and diabetes. We found 24 eligible articles (median duration, 8 weeks) from 1172 articles searched in PubMed, Cochrane, and CINAHL up to August 2019 that included 1) diet periods differing in TRM; 2) participants aged ≥ 19 years; 3) included either men or women who were not pregnant/lactating; 4) no diagnosed cardiometabolic disease; and 5) data on fasting glucose, insulin, HOMA-IR, glycated hemoglobin (HbA1c), C-reactive protein (CRP), or cytokines. We used 1) a repeated-measures ANOVA to assess pre to post diet period changes; 2) random-effects meta-analyses to compare pre to post changes between diet periods with \geq vs. < 0.5 servings (35g)/day of TRM; and

3) meta-regressions for dose-response relationships. We grouped diet periods to explore heterogeneity sources, including risk of bias, using the National Heart, Lung, and Blood Institute's Quality Assessment of Controlled Interventions Studies. Glucose, insulin, and HOMA-IR values decreased, while HbA1c and CRP values did not change during TRM or alternative diet periods. There was no difference in change values between diet periods with \geq vs. <0.5 servings/day of TRM [weighted mean differences (95% CIs): glucose, 0.040 mmol/L (-0.049, 0.129); insulin, -0.710 pmol/L (-6.582, 5.162); HOMA-IR, 0.110 (-0.072, 0.293); CRP, 2.424 nmol/L (-1.460, 6.309)] and no dose-response relationships ($P > 0.2$). Risk of bias (85% of studies were fair to good) did not influence results. Total red meat consumption, for up to 16 weeks, does not affect changes in biomarkers of glycemic control or inflammation for adults free of, but at risk for, cardiometabolic disease.

Lipids

Common Genetic Variations Involved in the Inter-Individual Variability of Circulating Cholesterol Concentrations in Response to Diets: A Narrative Review of Recent Evidence

Abdullah MMH, Vazquez-Vidal I, Baer DJ, House JD, Jones PJH, Desmarchelier C. *Nutrients*. 2021 Feb 22; 13(2):695. doi: 10.3390/nu13020695. [Article link](#)

Significance: This review found that some single-nucleotide polymorphisms are consistently associated with differing circulating cholesterol concentrations in response to dietary interventions. These results could help clinicians provide patients with more personalized dietary advice.

 This research was supported by the IAFNS [Lipids Committee](#).

The number of nutrigenetic studies dedicated to the identification of single nucleotide polymorphisms (SNPs) modulating blood lipid profiles in response to dietary interventions has increased considerably over the last decade. However, the robustness of the evidence-based science supporting the area remains to be evaluated. The objective of this review was to present recent findings concerning the effects of interactions between SNPs in genes involved in cholesterol metabolism and transport, and dietary intakes or interventions on circulating cholesterol concentrations, which are causally involved in cardiovascular diseases and established biomarkers of cardiovascular health. We identified recent studies (2014–2020) that reported significant SNP–diet interactions in 14 cholesterol-related genes (*NPC1L1*, *ABCA1*, *ABCG5*, *ABCG8*, *APOA1*, *APOA2*, *APOA5*, *APOB*, *APOE*, *CETP*, *CYP7A1*, *DHCR7*, *LPL*, and *LIPC*), and which replicated associations observed in previous studies. Some studies have also shown that combinations of SNPs could explain a higher proportion of variability in response to dietary interventions. Although some findings still need replication, including in larger and more diverse study populations, there is good evidence that some SNPs are consistently associated with differing circulating cholesterol concentrations in response to dietary interventions. These results could help clinicians provide patients with more personalized dietary recommendations, in order to lower their risk for cardiovascular disease.

Carbohydrates

Glycemic Index, Glycemic Load, and Cardiovascular Disease and Mortality

Jenkins DJA, Dehghan M, Mente A, Bangdiwala SI, Rangarajan S, Srichaikul K, et al. *N Engl J Med*. 2021 Feb 24. doi: 10.1056/NEJMoa2007123. [Article link](#)

Significance: This study of over 137,800 adults from a large, geographically diverse population found that a diet with a high glycemic index was associated with an increased risk of cardiovascular disease and death.

Background: Most data regarding the association between the glycemic index and cardiovascular disease come from high-income Western populations, with little information from non-Western countries with low or middle incomes. To fill this gap, data are needed from a large, geographically diverse population. **Methods:** This analysis includes 137,851 participants between the ages of 35 and 70 years living on five continents, with a median follow-up of 9.5 years. We used country-specific food-frequency questionnaires to determine dietary intake and estimated the glycemic index and glycemic load on the basis of the consumption of seven categories of carbohydrate foods. We calculated hazard ratios using multi-variable Cox frailty models. The primary outcome was a composite of a major cardiovascular event (cardiovascular death, nonfatal myocardial infarction, stroke, and heart failure) or death from any cause. **Results:** In the study population, 8780 deaths and 8252 major cardiovascular events occurred during the follow-up period. After performing extensive adjustments comparing the lowest and highest glycemic-index quintiles, we found that a diet with a high glycemic index was associated with an increased risk of a major cardiovascular event or death, both among participants with preexisting cardiovascular disease (hazard ratio, 1.51; 95% confidence interval [CI], 1.25 to 1.82) and among those without such disease (hazard ratio, 1.21; 95% CI, 1.11 to 1.34). Among the components of the primary outcome, a high glycemic index was also associated with

an increased risk of death from cardiovascular causes. The results with respect to glycemic load were similar to the findings regarding the glycemic index among the participants with cardiovascular disease at baseline, but the association was not significant among those without preexisting cardiovascular disease. **Conclusions:** In this study, a diet with a high glycemic index was associated with an increased risk of cardiovascular disease and death.

Low-Calorie Sweeteners

Sucralose and Cardiometabolic Health: Current Understanding from Receptors to Clinical Investigations

Risdon S, Battault S, Romo-Romo A, Roustit M, Briand L, Meyer G, et al. *Adv Nutr.* 2021 Feb 12:nmaa185. doi: 10.1093/advances/nmaa185. [Article link](#)

Significance: This review summarizes the preclinical and clinical data from current research detailing the effects of sucralose on systems controlling food intake, glucose homeostasis and gut microbiota.

The excess consumption of added sugar is consistently found to be associated with weight gain, and a higher risk of type 2 diabetes mellitus, coronary heart disease, and stroke. In an effort to reduce the risk of cardiometabolic disease, sugar is frequently replaced by low- and null-calorie sweeteners (LCSs). Alarming, though, emerging evidence indicates that the consumption of LCSs is associated with an increase in cardiovascular mortality risk that is amplified in those who are overweight or obese. Sucralose, a null-caloric high-intensity sweetener, is the most commonly used LCS worldwide, which is regularly consumed by healthy individuals and patients with metabolic disease. To explore a potential causal role for sucralose in increased cardiovascular risk, this present review summarizes the preclinical and clinical data from current research detailing the effects of sucralose on systems controlling food intake, glucose homeostasis, and gut microbiota.

Bioactives

A Systematic Review of Phytochemicals in Oat and Buckwheat

Raguindin PF, Adam Itodo O, Stoyanov J, Dejanovic GM, Gamba M, Asllanaj E, et al. *Food Chem.* 2021 Feb 15;338:127982. doi: 10.1016/j.foodchem.2020.127982.

[Article link](#)

Significance: This systematic review evaluates the profile and quantity of bioactive compounds present in oat and buckwheat. The findings from this study highlight the need for harmonization of separation and extraction methods in future studies in this area.



Consumption of oat and buckwheat have been associated with various health benefits that may be attributed to their nutritional composition. We performed a systematic review to evaluate the profile and quantity of bioactive compounds present in oat and buckwheat. Among 154 studies included in final analysis, 113 and 178 bioactive compounds were reported in oat and buckwheat, respectively. Total phytosterols, tocopherols, flavonoids and rutin content were generally higher in buckwheat, β -glucans were significantly higher in oat, while avenanthramides and saponins were characteristically present in oat. The majority of studies included in current review were published before 2010s. The heterogeneous methodological procedures used across the studies precluded our possibility to meta-analyse the evidence and raises the need for harmonization of separation and extraction methods in future studies. Our findings should further stimulate the exploration of metabolites related to identified phytochemicals and their roles in human health.

Sodium

Sodium Intake, Health Implications, and the Role of Population-Level Strategies

Aljuraiban GS, Jose AP, Gupta P, Shridhar K, Prabhakaran D. *Nutr Rev.* 2021 Feb 11;79(3):351-359. doi: 10.1093/nutrit/nuaa042. [Article link](#)

Significance: This review focuses on current available evidence on regional sodium intake levels, health implications of sodium intake and population-level strategies implemented worldwide. The authors suggest that moving forward, due consideration should be given to improving the quality of research, reducing bias in publications and reviewing evidence more critically.

Evidence to date suggests that high sodium intake affects health adversely, yet the role of a population-level strategy to reduce sodium intake is often contested. This review focuses on current available evidence on regional sodium intake levels, health implications of sodium intake, and population-level strategies implemented worldwide. The limitations in evidence,

the difficulties in implementing population-wide strategies to reduce sodium intake, and the need for such strategies are critically reviewed. Evidence clearly shows that sodium has an adverse effect on blood pressure, cardiovascular disease, and mortality. However, whether reduced sodium intake benefits all individuals or only hypertensive individuals is still unclear. Methodological issues and publication bias in current evidence are other matters of concern in sodium-related research. While it is essential to continue working toward the World Health Organization's target of 30% reduction in sodium intake, due consideration should be given to improving the quality of research, reducing bias in publications, and reviewing evidence more critically.

Gut Microbiome

The Effect of Enteral Stimulation on the Immune Response of the Intestinal Mucosa and Its Application in Nutritional Support

Quiroz-Olguín G, Gutiérrez-Salmeán G, Posadas-Calleja JG, Padilla-Rubio MF, Serralde-Zúñiga AE. *Eur J Clin Nutr.* 2021 Feb 19. doi: 10.1038/s41430-021-00877-7. [Article link](#)

Significance: Enteral stimulation, a balance between the commensal microbiota and pathogenic microorganisms as well as adequate nutritional status are required for optimal intestinal immune function. This review highlights the role and importance of enteral stimulation by gut-associated lymphoid tissue-mediated immune response.

The intestine plays a fundamental role as a regulator of the mucosal immune response, mostly through the production and secretion of secretory Immunoglobulin A (sIgA) by the gut-associated lymphoid tissue (GALT). Enteral stimulation, a balance between the commensal microbiota and pathogenic microorganisms, in addition to an adequate nutritional status is required for the optimal immune function of the intestine. Fasting subjects or those supported only with parenteral nutrition, show a progressive anatomical and physiological deterioration of the GALT, triggering a series of alterations resulting in a decrease in the intestinal immune response, modification in the type of microbiota, and changes that lead to or aggravate malnutrition. Patients with malnutrition present an increase in the rate of nosocomial infections, hospital length of stay, and mortality. An adequate nutritional assessment at hospital admission and avoiding long periods of fasting are paramount to prevent these unfavorable outcomes. Herein, we present a mini-state of the art review on the role and importance of enteral stimulation by GALT-mediated immune response.