

February 2022

Nutrition



Dietary Patterns

Systematic Review and Meta-Analysis on the Effect of Portion Size and Ingestive Frequency on Energy Intake and Body Weight among Adults in Randomized Controlled Feeding Trials

Kelly A Higgins, Joshua L Hudson, Anna M R Hayes, Ethan Braun, Eunjin Cheon, Sam C Couture, Nilupa S Gunaratna, et. al. *Advances in Nutrition*, Vol. 13, Issue 1, January 2022, Pages 248–268, doi.org/10.1093/advances/nmab112. [Article link](#)



Significance: A meta-analysis of 22 RCT studies reported an association of higher caloric intake with larger food portion sizes and increased ingestive events. There was sufficient data to support relationships of these factors to body weight.

Energy intake is the product of portion size (PS)—the energy content of an ingestive event—and ingestive frequency (IF)—the number of ingestive events per unit time. An uncompensated alteration in either PS or IF would result in a change in energy intake and body weight if maintained over time. The objective of this meta-analysis was to assess the independent effects of PS and IF on energy intake and body weight among healthy adults in randomized controlled trials (RCTs). A total of 9708 articles were identified in PubMed, Web of Science, Cochrane, and CINAHL databases. The articles were divided

among 10 researchers; each article was screened for eligibility by 2–3 independent reviewers. Exclusion criteria included: populations <19 y and >65 y, unhealthy populations (i.e., participants with an acute or chronic disease), assessments <24 h and <4 wk in duration for trials investigating energy intake or body weight, respectively. Controlled feeding trials (i.e., fixed energy intake) that manipulated IF and PS in the same study intervention (IF/PS) were evaluated separately and for the body weight outcome only. Twenty-two studies (IF = 4, PS = 14, IF/PS = 4) met the inclusion criteria. There was an insufficient number of studies to assess the effect of IF, PS, or IF/PS on body weight. There was heterogeneity in the effect sizes among all comparisons ($I^2 \geq 75\%$). Consuming larger portion sizes was associated with higher daily energy intake [295 kcal (202, 388), $n = 24$; weighted mean differences (WMD) (95% CI), $n =$ comparisons], and increased frequency of ingestive events was associated with higher energy intake [203 kcal (76, 330), $n = 10$]. Results from RCTs support that larger PS and greater IF are both associated with higher energy consumption. However, there is insufficient information to determine chronic effects on body weight.

Effects of Dietary Patterns on Biomarkers of Inflammation and Immune Responses: A Systematic Review and Meta-Analysis of Randomized Controlled Trials.

Liselot Koelman, Caue Egea Rodrigues, Krasimira Aleksandrova. *Advances in Nutrition*, Volume 13, Issue 1, 2022, January, Pages 101–115, doi.org/10.1093/advances/nmabo86. [Article link](#)

Significance: A systematic review and meta-analysis of dietary patterns on biomarkers of inflammation and immune response reported the Mediterranean diet pattern affected the most reductions of inflammatory biomarkers such as IL-6, IL-1 β and C-reactive protein. No substantial effects were found for the DASH, Vegetarian or Vegan dietary patterns. In future, large-scale multifactorial intervention studies allowing for direct dietary patterns comparison of effects on multiple inflammatory and immune-related pathways are needed.

Altered immune cell phenotype and chronic inflammation are key features shared by various chronic diseases. Evidence from nutritional interventions aimed at alleviating inflammation could be a promising approach for the prevention of adverse health outcomes. We therefore aimed to conduct a systematic review and meta-analysis of

randomized controlled trials (RCTs) to summarize the recent evidence on the effects of dietary patterns on inflammatory and immune-related biomarkers in humans. PubMed, Medline, and Web of Science databases were searched for publications up to October 2020. In total, 22 RCTs were included in the meta-analysis conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. The Mediterranean diet appeared as the dietary pattern that showed the most prominent reductions of inflammatory biomarkers such as IL-6 [mean difference (MD): -1.07 pg/mL (95% CI: -1.94, -0.20); I₂: 96%], IL-1 β [MD: -0.46 pg/mL (95% CI: -0.66, -0.25); I₂: 0%], and C-reactive protein [MD: -1.00 mg/L (95% CI: -2.02, 0.01); I₂: 100%]. No substantial effects were observed for the additional dietary patterns studied in intervention research, including the Dietary Adherence to Stop Hypertension diet, and the vegetarian or vegan diets. Future large-scale multifactorial intervention studies are warranted to allow direct comparison of various dietary patterns in relation to a range of biomarkers reflecting multiple inflammatory and immune-related pathways.

Raw and Cooked Vegetable Consumption and Risk of Cardiovascular Disease: A Study of 400,000 Adults in UK Biobank

Qi Feng, Jean H. Kim, Wemimo Omiyale, Jelena Bešević, Megan Conroy, Margaret May, Zuyao Yang, et. al. *Front. Nutr.*, 21 February 2022. doi.org/10.3389/fnut.2022.831470. [Article link](#)

Significance: Raw and cooked vegetable intake may impact health risks differently. A 12-year observational study of adult participants from the UK Biobank reported inverse association of raw vegetable intake to both CVD incidence and CVD mortality, while cooked vegetable intake was not. More definitive research is warranted to better understand vegetable intakes and health as well as residual confounder effects.

Objectives: Higher levels of vegetable consumption have been associated with a lower risk of cardiovascular disease (CVD), but the independent effect of raw and cooked vegetable consumption remains unclear. **Methods:** From the UK Biobank cohort, 399,586 participants without prior CVD were included in the analysis. Raw and cooked vegetable intakes were measured with a validated dietary questionnaire at baseline. Multivariable Cox regression was used to estimate the associations between vegetable intake and CVD incidence and mortality, adjusted for socioeconomic status, health status, and lifestyle factors. The potential effect of residual confounding was assessed by calculating the percentage reduction in the likelihood ratio (LR) statistics after adjustment for the confounders. **Results:** The mean age was 56 years and 55% were women. Mean intakes of raw and cooked vegetables were 2.3 and 2.8 tablespoons/day, respectively. During 12 years of follow-up, 18,052 major CVD events and 4,406 CVD deaths occurred. Raw vegetable intake was inversely associated with both CVD incidence (adjusted hazard ratio (HR) [95% CI] for the highest vs. lowest intake: 0.89 [0.83–0.95]) and CVD mortality (0.85 [0.74–0.97]), while cooked vegetable intake was not (1.00 [0.91–1.09] and 0.96 [0.80–1.13], respectively). Adjustment for potential confounders reduced the LR statistics for the associations of raw vegetables with CVD incidence and mortality by 82 and 87%, respectively. **Conclusions:** Higher intakes of raw, but not cooked, vegetables were associated with lower CVD risk. Residual confounding is likely to account for much, if not all, of the observed associations. This study suggests the need to reappraise the evidence on the burden of CVD disease attributable to low vegetable intake in the high-income populations.

Carbohydrates

Importance of Carbohydrate Quality: What does it Mean and How to Measure it?

Vanessa Campos, Luc Tappy, Lia Bally, John L Sievenpiper, Kim-Anne Lê. *The Journal of Nutrition*, nxaco39, doi.org/10.1093/jn/nxaco39.18 February 2022. [Article link](#)

Significance: Data point out that food form or processing level can modulate both the energy efficiency and the cardiometabolic risk associated with specific carbohydrates.

Dietary carbohydrates are our main source of energy. Traditionally, they are classified based on the polymer length between simple and complex carbohydrates, which does not necessarily reflect their impact on health. Simple sugars, such as fructose, glucose, and lactose, despite having a similar energy efficiency and caloric content have very distinct metabolic effects, leading to increased risk for various chronic diseases when consumed in excess. In addition, beyond the absolute amount of carbohydrate consumed, recent data point out that the food form or processing level can modulate both the energy efficiency and the cardiometabolic risk associated with specific carbohydrates. In order to account for both of these aspects – the quality of carbohydrates as well as its food form – several metrics can be proposed to help identify carbohydrate-rich food sources and distinguish between those that would favor the development of chronic diseases, of those that may contribute to prevent these. This review summarizes the findings presented during the American Society of Nutrition Satellite symposium on ‘Carbohydrates Quality,’ where these different aspects were presented.

Protein

Recent Updates on Lentil and Quinoa Protein-Based Dairy Protein Alternatives: Nutrition, Technologies, and Challenges

Mohammad Alrosan, Thuan-Chew Tan, Azhar Mat Easa, Sana Gammoh, Muhammad H Alu'datt. *Food Chem.* 2022 Feb 10;383:132386. doi: 10.1016/j.foodchem.2022. [Article link](#)

Significance: Interest in lentils and quinoa proteins as alternatives to dairy-based protein, has elevated the need for more research on functional properties, nutritional values, and protein digestibility. Techniques such as fermentation and germination to reduce anti-nutrient activity, along with protein complexation to enhance functionality will be helpful in food applications.

Due to its high nutritional value and increasing consumption trends, plant-based proteins were used in a variety of dietary products, either in their entirety or as partial substitutions. There is indeed a growing need to produce plant-based proteins as alternatives to dairy-based proteins that have good functional properties, high nutritional values, and high protein digestibility. Among the plant-based proteins, both lentil and quinoa proteins received a lot of attention in recent years as dairy-based protein alternatives. To ensure plant-based proteins a success in food applications, food industries and researchers need to have a comprehensive scientific understanding of these proteins. The demand for proteins is highly dependent on several factors, mainly functional properties, nutritional values, and protein digestibility. Fermentation and protein complexation are recognised to be suitable techniques in enhancing the functional properties, nutritional values, and protein digestibility of these plant-based proteins, making them potential alternatives for dairy-based proteins.



Low- and No-Calorie Sweeteners

Low- and No-Calorie Sweetener Intakes in the Brazilian Population Estimated Using Added Sugar Substitution Modelling

Danika Martyn, Maryse Darch, Seth Floyd, Karen Ngo, Shafagh Fallah. *Food Addit Contam Part A.* 2022 Feb;39(2):215-228. doi: 10.1080/19440049.2021.2010812. [Article link](#)

Significance: Two exposure models were tested against six sugar substitutes to estimate final added sugar intakes after replacing 50% of added sugar intakes by either >10% total energy with each LNCS considering sucrose sweetness equivalence or by added sugar content in foods and beverages with each LNCS. Both models predicted sugar intakes would fall below JECFA ADI for five of the six LNCS in the population (10 years and older). Further studies are needed to evaluate intakes for younger populations.

This research examined the intakes of six low- and no-calorie sweeteners (LNCS) (acesulfame-K, aspartame, cyclamate, saccharin, steviol glycosides, and sucralose) by the Brazilian population using an added sugar substitution approach. Detailed exposure modelling requires the use of proprietary concentration data, which can be difficult to obtain. Two exposure models were conducted using nationally representative food consumption data. The first model ('per person') estimated added sugar intakes on an individual person basis, replacing 50% of added sugar intakes >10% total energy with each LNCS considering sucrose sweetness equivalence. The second model ('per food') replaced 50% of the added sugar content in foods and beverages with each LNCS, incorporating sucrose sweetness equivalence and Brazilian tonnage data. Both models predicted that intakes would be below the JECFA ADI for five of the six LNCS in all population groups examined (≥ 10 years) for average and heavy consumers. For cyclamate, exceedance of the ADI was determined for all age groups amongst heavy consumers in the 'per person' model, while estimated intakes in the 'per food' model were below or reached the ADI for the cohort. Additional research is needed for younger age groups to confirm whether these findings are applicable to the entire Brazilian population.

Cognitive Health

Impact of Alpha-linolenic Acid, the Vegetable Omega-3 Fatty Acid, on Cardiovascular Disease and Cognition.

Alex Sala-Vila, Jennifer Fleming, Penny Kris-Etherton, Emilio Ros. *Advances in Nutrition*, nmac016, doi: org/10.1093/advances/nmac016. 16 February 2022. [Article link](#)

Significance: Evidence that ALA plays a role in cognition is preliminary. Early data suggest a potential trend in counteracting cognitive decline. However, more studies are needed before recommendations can be made for ALA 's role in reducing chronic diseases.

Diet is one of the modifiable risk factors for cognitive decline. However, studies on dietary protein intake and cognitive decline have remained limited and inconclusive. **Objectives:** In this study, we aimed to investigate the associations between long-term dietary protein intake and subsequent subjective cognitive decline (SCD). **Methods:** We included 49,493 women from the Nurses' Health Study (NHS) (1984–2006) and 27,842 men from the Health Professionals Follow-up Study (HPFS) (1986–2002). For the NHS, average dietary intake was calculated from 7 repeated semi-quantitative FFQs (SFFQs), and SCD was assessed in 2012 and 2014. For the HPFS, average dietary intake was calculated from 5 repeated SFFQs, and SCD was assessed in 2008 and 2012. Poisson regression was used to examine the associations between dietary protein, amino acids, and various protein food sources with subsequent SCD. **Results:** Higher protein intake compared with total carbohydrates was associated with lower odds of SCD. When substituting 5% energy from protein for the equivalent percentage of energy from total carbohydrates, the pooled multivariable-adjusted ORs (95% CIs) were 0.89 (0.85, 0.94) for total protein, 0.89 (0.84, 0.94) for animal protein, and 0.74 (0.62, 0.88) for plant protein. When substituting 5% of energy from animal protein with plant protein, the OR was 0.84 (95% CI: 0.72, 0.97). For protein food sources, higher intakes of beans/legumes, fish, and lean poultry were significantly associated with lower odds of SCD, but higher intake of hotdogs was associated with higher odds of SCD. **Conclusions:** Higher protein intake was associated with lower odds of SCD when compared isocalorically with carbohydrate. Plant protein sources were also associated with lower odds when compared with animal protein sources. Our findings suggest that adequate protein intake, and choices of protein sources could play a role in the maintenance of cognition and should be studied further.

Lipids

Egg Consumption and Risks of All-Cause and Cause-Specific Mortality: A Dose–Response Meta-Analysis of Prospective Cohort Studies

Peng-Fei Yang, Chun-Rui Wang, Fa-Bao Hao, Yang Peng, Jing-Jing Wu, Wei-Ping Sun, Jie-Jun Hu, Guo-Chao Zhong. *Nutrition Reviews*, nuac002, doi.org/10.1093/nutrit/nuac002. 18 February 2022. [Article link](#)

Significance: Early data from nineteen prospective studies found an association between amount of egg intake and risks of death from all causes, cardiovascular disease, and cancer in a nonlinear dose-response pattern. More studies are needed to confirm the findings.

Current dietary guidelines recommend eggs as a part of a healthy diet. However, whether egg consumption is associated with risk of mortality remains controversial. Moreover, the dose-response association of egg consumption with risk of mortality has not been determined. **Objective:** To determine the potential dose-response association of egg consumption with risk of mortality in the general population. **Data Sources:** The PubMed and Embase databases were searched for publications meeting eligibility criteria through November 2021. **Data Extraction:** Required data were extracted by 1 reviewer and then checked for accuracy by another reviewer. A random-effects dose-response meta-regression model was used to calculate the pooled risk estimates. A restricted cubic spline model was used to test nonlinearity. The certainty of evidence was assessed using the GRADE system. **Data Analysis:** Nineteen prospective cohort studies, involving 1 737 893 participants, were included. The pooled hazard ratios for an increase of 1 egg/d were 1.08 (95%CI, 1.01–1.15) for all-cause mortality, 1.07 (95%CI, 0.97–1.18) for cardiovascular disease–caused mortality, and 1.16 (95%CI, 1.04–1.30) for cancer-caused mortality. The certainty of evidence for these observations was rated as very low. Nonlinear dose-response associations were found for egg consumption and all-cause, cardiovascular disease–caused, and cancer-caused mortality. Moreover, the positive association between egg consumption and all-cause mortality was more pronounced in studies with adjustment for blood cholesterol-related covariates than those without (Pinteraction = 0.011). **Conclusions:** Greater amount of egg consumption confers higher risks of death from all causes, cardiovascular disease, and cancer in a nonlinear dose-response pattern. These findings should be treated with caution and need to be confirmed by future studies.



Sodium

Compendium of Sodium Reduction Strategies in Foods: A Scoping Review.

Aubrey N. Dunteman, Elle N. McKenzie, Ying Yang, Youngsoo Lee, Soo-Yeun Lee. *Compr Rev Food Sci Food Saf.* 24 February 2022. doi.org/10.1111/1541-4337.12915. [Article link](#)

Significance: The aim of this scoping review was to establish what sodium reduction strategies are effective in maintaining acceptable sensory qualities for various food industry applications.



This paper was supported by IAFNS [Sodium Committee](#).

In response to health concerns generated by increased sodium intake, many new approaches have been studied to reduce the sodium content in processed food. It has been suggested that reducing sodium in the food supply may be the most appropriate solution. The aim of this scoping review was to establish what sodium reduction strategies are effective in maintaining acceptable sensory qualities for various food industry applications. Studies that evaluate and report on the effectiveness of a sodium reduction strategy relevant to food and included outcomes detailing how the strategies were received by human subjects using sensory data are included, as well as book chapters, literature reviews, and patents focusing on sodium reduction strategies. Only those published in English and since 1970 were included. Literature was obtained through Scopus, PubMed, EBSCOhost, and ScienceDirect databases, whereas patents were obtained through US Patent Trademark Office, Google Patents, and PATENTSCOPE databases. Two-hundred and seventy-seven primary studies, 27 literature reviews, 10 book chapters, and 143 patents were selected for inclusion. Data extracted included details such as analytical methods, broad and specific treatment categories, significant outcomes, and limitations among other material. Sodium reduction methods were categorized as either salt removal, salt replacement, flavor modification, functional modification, or physical modification. Although salt removal and salt replacement were the majority of included studies, future research would benefit from combining methods from other categories while investigating the impact on sensory characteristics, technological aspects, and consumer perception of the strategy.

Dietary Sodium Intake and Sodium Load is Associated with Arterial Stiffness in Children and Young Adults.

Tammy M Brady, Gilbert Horst, Lawrence J Appel, Philip R Khoury, Elaine M Urbina. *J Hypertens.* 2022 Feb 1;40(2):292-299. doi: 10.1097/HJH.0000000000003007. [Article link](#)

Significance: A study in youth, 1-24 years, found an association between increased sodium intake and load and elevated arterial stiffness, a preclinical measure of CVD. For the pediatric population, emphasizing the need for healthy dietary choices to reduce accelerated vascular aging is important.

Objective: The aim of this study was to examine the association of sodium intake (g/day) and sodium load (Na-L; mg/kcal/day) on arterial stiffness in youth. **Methods:** A cross-sectional analysis of 723 youth enrolled in a study evaluating the cardiovascular effects of obesity and type 2 diabetes mellitus (T2DM). Three measures of arterial stiffness were evaluated: brachial distensibility (BrachD), carotid-femoral pulse wave velocity (PWVcf) and augmentation index (AIx). Three-day diet histories yielded mean daily sodium and calorie intake. Youth were divided into Na-L tertiles: Low (≤ 1.67 mg/kcal per day); Medium (1.68--1.98 mg/kcal per day) and High (> 1.98 mg/kcal per day). General linear models adjusting for demographics, % body fat, T2DM and SBP z-score evaluated the independent association of Na-L with arterial stiffness. **Results:** Mean age was 17.9 years (10-24 years), 35% male, 59% nonwhite and 31% T2DM. Mean (\pm standard deviation) dietary intake was calories = 2074 (± 797) kcal/day; Na = 3.793 (± 1567) g/day; Na-L = 1.86 (± 0.753) mg/kcal per day. With higher levels of dietary Na intake and Na-L, measures of arterial stiffness worsened: BrachD decreased (Na intake: beta = -0.09, P = 0.003; Na-L: beta = -0.28, P < 0.0001), PWVcf increased (Na intake: beta = 0.07, P = 0.007; Na-L: beta = 0.21, P < 0.0001) but AIx did not change (Na intake: beta = -0.4, P = 0.2; Na-L: beta = 0.89, P = 0.11). In multivariable analysis, High Na-L was independently associated with BrachD, PWVcf and AIx (P < 0.05 for all), with age modifying the association of High Na-L with PWVcf and AIx. **Conclusion:** Sodium intake and load are associated with arterial stiffness, a preclinical measure of CVD, among a paediatric population. Paediatricians should stress healthy dietary choices to reduce accelerated vascular ageing.

Emerging Research Areas

Scientific Rigor: Reproducibility

A Guide for Authors and Readers of the American Society for Nutrition Journals on the Proper Use of P Values and Strategies that Promote Transparency and Improve Research Reproducibility

John D Sorkin, Mark Manary, Paul AM Smeets, Amanda J MacFarlane, Arne Astrup, Ronald L Pigeon. *Am J Clin*

Significance: Improper use and reporting of *P* values in statistics, in addition to lack of transparency in recording study design and conduct, contribute to study irreproducibility. This article provides guidance on use of *P* values consistent with the scientific method, and how to increase transparency and reproducibility in the conduct and analysis of research.

Two questions regarding the scientific literature have become grist for public discussion: 1) what place should *P* values have in reporting the results of studies? 2) How should the perceived difficulty in replicating the results reported in published studies be addressed? We consider these questions to be 2 sides of the same coin; failing to address them can lead to an incomplete or incorrect message being sent to the reader. If *P* values (which are derived from the estimate of the effect size and a measure of the precision of the estimate of the effect) are used improperly, for example reporting only significant findings, or reporting *P* values without account for multiple comparisons, or failing to indicate the number of tests performed, the scientific record can be biased. Moreover, if there is a lack of transparency in the conduct of a study and reporting of study results, it will not be possible to repeat a study in a manner that allows inferences from the original study to be reproduced or to design and conduct a different experiment whose aim is to confirm the original study's findings. The goal of this article is to discuss how *P* values can be used in a manner that is consistent with the scientific method, and to increase transparency and reproducibility in the conduct and analysis of nutrition research.

Sleep/Obesity Research

Effect of Sleep Extension on Objectively Assessed Energy Intake Among Adults with Overweight in Real-life Settings A Randomized Clinical Trial

Esra Tasali, Kristen Wroblewski, Eva Kahn, Jennifer Kilkus, Dale A. Schoeller. *JAMA Intern Med.* doi:10.1001/jamainternmed.2021.8098. February 7, 2022. [Article link](#)

Significance: A RCT study of overweight subjects found an inverse correlation between sleep duration and energy intake ($r = -0.41$; 95%CI, -0.59 to -0.20 ; $P < .001$). Extending sleep by an average of 1.5 hours significantly reduced energy intake in the sleep extended group compared to control group (-270 kcal/d; 95%CI, -393 to -147 kcal/d; $P < .001$). Maintaining healthy sleep duration may help in obesity prevention.

Importance: Short sleep duration has been recognized as a risk factor for obesity. Whether extending sleep duration may mitigate this risk remains unknown. **Objective:** To determine the effects of a sleep extension intervention on objectively assessed energy intake, energy expenditure, and body weight in real-life settings among adults with overweight who habitually curtailed their sleep duration. **Design, Setting and Participants:** This single-center, randomized clinical trial was conducted from November 1, 2014, to October 30, 2020. Participants were adults aged 21 to 40 years with a body mass index (calculated as weight in kilograms divided by height in meters squared) between 25.0 and 29.9 and had habitual sleep duration of less than 6.5 hours per night. Data were analyzed according to the intention-to-treat principle. **Interventions:** After a 2-week habitual sleep period at baseline, participants were randomized to either an individualized sleep hygiene counseling session that was intended to extend their bedtime to 8.5 hours (sleep extension group) or to continue their habitual sleep (control group). All participants were instructed to continue daily routine activities at home without any prescribed diet or physical activity. **Main Outcomes and Measures:** The primary outcome was change in energy intake from baseline, which was objectively assessed as the sum of total energy expenditure and change in body energy stores. Total energy expenditure was measured by the doubly labeled water method. Change in body energy stores was computed using regression of daily home weights and body composition changes from dual-energy x-ray absorptiometry. Sleep duration was monitored by actigraphy. Changes from baseline were compared between the 2 groups using intention-to-treat analysis. **Results:** Data from 80 randomized participants (mean [SD] age, 29.8 [5.1] years; 41 men [51.3%]) were analyzed. Sleep duration was increased by approximately 1.2 hours per night (95%CI, 1.0 to 1.4 hours; $P < .001$) in the sleep extension group vs the control group. The sleep extension group had a significant decrease in energy intake compared with the control group (-270 kcal/d; 95%CI, -393 to -147 kcal/d; $P < .001$). The change in sleep duration was inversely correlated with the change in energy intake ($r = -0.41$; 95%CI, -0.59 to -0.20 ; $P < .001$). No significant treatment effect in total energy expenditure was found, resulting in weight reduction in the sleep extension group vs the control group. **Conclusions and Relevance:** This trial found that sleep extension reduced energy intake and resulted in a negative energy balance in real-life settings among adults with overweight who habitually curtailed their sleep duration. Improving and maintaining healthy sleep duration over longer periods could be part of obesity prevention and weight loss programs.

Climate Change and Healthy Food System Sustainability

Circularity in Animal Production Requires a Change in the EAT-Lancet Diet in Europe

Benjamin van Selm, Anita Frehner, Imke J. M. de Boer, Ollie van Hal, Renske Hijbeek, Martin K. van Ittersum,

Elise F. Talsma, et. al. Nature Food. Vol. 3, January 2022, p66–73. [Article link](#)

Significance: Are recommendations to reduce animal protein intake compatible with the adoption of food circuitry systems? A study using resource-allocation model compared the circularity in animal production on the supply of animal-source nutrients in Europe with the nutritional requirements of the EAT-Lancet reference diet. The study found compatibility in total animal-source proteins but not specific animal-source foods and feeding low-cost biomass (LCB) to animals can potentially decrease GHG emissions (31%) and land use (42%). Further evaluation of the feasible substitutability between animal-source foods is necessary to define potential roles of animal products in circular human diets.

It is not known whether dietary guidelines proposing a limited intake of animal protein are compatible with the adoption of circular food systems. Using a resource-allocation model, we compared the effects of circularity on the supply of animal-source nutrients in Europe with the nutritional requirements of the EAT-Lancet reference diet. We found the two to be compatible in terms of total animal-source proteins but not specific animal-source foods; in particular, the EAT-Lancet guidelines recommend larger quantities of poultry meat over beef and pork, while a circular food system produces mainly milk, dairy-beef and pork. Compared with the EAT-Lancet reference diet, greenhouse gas emissions were reduced by up to 31% and arable land use reduced by up to 42%. Careful consideration of the feasible substitutability between animal-source foods is needed to define potential roles of animal products in circular human diets.

Engage with IAFNS

- **Low- and No-Calorie Sweeteners Stakeholder Exchange** March 9, 2022, 2:00-5:00 pm, ET, Washington, DC. Invitation-only.
 - IAFNS has organized a Stakeholder Exchange. Representatives from organizations including Health Canada, the American Diabetes Association, the Academy of Nutrition and Dietetics, Center for Science in the Public Interest, Calorie Control Council, American Beverage Association, the International Food Information Council, and others, will share research, perspectives, and positions with the aim to inform priorities and consider collaborations. For more information, click [here](#).
- **Back to Basics: Understanding Terms and Methods in the Gut Microbiome Space** March 16, 11:00-12:00 pm ET.
 - As nutrition researchers and healthcare practitioners across many specialties are, and will continue to be, required to respond to questions about gut microbiome, nutrition, and health it is of value to ensure a foundational understanding. For more information, click [here](#).
- **Beyond the Headlines: Communicating the Science of Caffeine.** March 21, 2022. 1:00-2:30pm ET.
 - 85% of Americans say they consume caffeine every day, but conflicting headlines on caffeine often produce more questions than answers. This webinar is designed for practitioners who seek to enhance their understanding of the science of caffeine and how to communicate evidence-based messaging to consumers. For more information, click [here](#).
- **Understanding Gut Microbiota, COVID-19, and Nutrition: Interactions, Interventions, and Unknowns.** April 21, 2022. 10:00-11:00 am ET.
 - It is well-established that the gut microbiota plays a role in regulating the immune system, including modifying the response to viral infections. In fact, research indicates that the severity of COVID-19 is related in part to the composition of the gut microbiota. How can diet and nutrition support the microbiota-dependent immunoregulatory functions? What do we really know today, and what is under investigation? For more information, click [here](#).