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## Dietary Patterns

### Mediterranean Diet Adherence, Gut Microbiota and Parkinson's Disease: A Systematic Review

Bibi Aliya Seelarbokus, Elisa Menozzi, Anthony H V Schapira, Anastasia Z Kalea, Jane Macnaughtan. *Nutrients*. 2024 Jul 9;16(14):2181. doi: 10.3390/nu16142181. [Article link](#)

**Background:** There is mounting evidence to suggest that high adherence to the Mediterranean diet (MedDiet) may reduce the risk of age-related diseases, including Parkinson's disease (PD). However, evidence for the role of the MedDiet in the relief of motor and non-motor symptoms in patients with PD remains limited and inconclusive. We provide a systematic review of the effects of the MedDiet on the clinical features of PD using data from randomised controlled trials (RCT) and prospective observational studies. **Methods:** We searched MEDLINE, EMCare, EMBASE, Scopus and PubMed from inception until June 2023. Reference lists and the grey literature were also searched. Human studies with no restriction on language or publication date, examining associations between MedDiet adherence and the symptoms of PD, were included. We employed standard methodological procedures for data extraction and evidence synthesis and used the Quality Criteria Checklist for assessing the studies included. **Results:** Four studies from three unique cohorts, including two observational studies (n = 1213) and one RCT (n = 70), met the inclusion criteria. Despite the short study duration reported in all included reports, high MedDiet adherence was associated with changes in the gut microbiota (e.g., increased abundance of short-chain fatty acids producers). These outcomes correlated with a significant improvement in several non-motor symptoms including cognitive dysfunction, dyspepsia and constipation. However, there were no significant changes in diarrhoea, gastrointestinal reflux, abdominal pain and motor symptoms. **Conclusion:** High MedDiet adherence may be associated with significant improvement in global cognition and several gastrointestinal symptoms, possibly associated to changes in gut microbiota composition. Further studies are warranted to clarify potential cause-and-effect relationships and to elucidate MedDiet impact on motor symptoms.

### Improving Nutrition Science Begins with Asking Better Questions

Dalia Stern, Daniel B Ibsen, Conor James MacDonald, Yu-Han Chiu, Martin Lajous, Deirdre K Tobias. *AJE*, 11 July, 2024. doi.org/10.1093/aje/kwae110. [Article link](#)

A priority of nutrition science is to identify dietary determinants of health and disease to inform effective public health policies, guidelines, and clinical interventions. Yet, conflicting findings in synthesizing evidence from randomized trials and observational data has contributed to confusion and uncertainty. Often, heterogeneity can be explained by the fact that seemingly similar bodies of evidence are asking very different questions. Improving the alignment within and between research domains begins with investigators clearly defining their diet-disease questions; however, nutritional exposures are complex and often require a greater degree of specificity. First, dietary data are compositional, meaning a change in a food may imply a compensatory change of other foods. Second, dietary data are multidimensional; that is, the primary components (i.e., foods) are comprised of sub-components (e.g., nutrients), and sub-components can be present in multiple primary components. Third, because diet is a lifelong exposure, the composition of a study population's background diet has implications on the interpretation of the exposure and the transportability of effect estimates. Collectively clarifying these key aspects of inherently complex dietary exposures when conducting research will facilitate appropriate evidence synthesis, improve certainty of evidence, and improve the ability of these efforts to inform policy and decision-making.

## Food Classification

### **Toward a Science-Based Classification of Processed Foods to Support Meaningful Research and Effective Health Policies**

Paula R. Trumbo, Rachel Bleiweiss-Sandel, Jessica K. Campbell, Eric Decker, Adam Drewnowski, John W. Erdman, Mario G. Ferruzzi, Ciaran G. Forde, Michael J. Gibney, Julie M. Hess, David M. Klurfeld, Marie E. Latulippe, Lauren E. O'Connor, Kristin J. Reimers, Barbara J. Rolls, Jackie Schulz, Connie Weaver, Lynn Yu. *Front. Nutr.*, 02 July 2024. Sec. Food Policy and Economics. Vol. 11–2024, doi.org/10.3389/fnut.2024.1389601. [Article link](#)



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Processed foods have been part of the American diet for decades, with key roles in providing a safe, available, affordable, and nutritious food supply. The USDA Food Guides beginning in 1916 and the US Dietary Guidelines for Americans (DGA) since 1980 have included various types of commonly consumed processed foods (e.g., heated, fermented, dried) as part of their recommendations. However, there are multiple classification systems based on “level” of food processing, and additional evidence is needed to establish the specific properties of foods classified as “highly” or “ultra”-processed (HPF/UPFs). Importantly, many foods are captured under HPF/UPF definitions, ranging from ready-to-eat fortified whole grain breakfast cereals to sugar-sweetened beverages and baked goods. The consequences of implementing dietary guidance to limit all intake of foods currently classified as HPF/UPF may require additional scrutiny to evaluate the impact on consumers’ ability to meet daily nutrient recommendations and to access affordable food, and ultimately, on health outcomes. Based on a meeting held by the Institute for the Advancement of Food and Nutrition Sciences in May 2023, this paper provides perspectives on the broad array of foods classified as HPF/UPFs based on processing and formulation, including contributions to nutrient intake and dietary patterns, food acceptability, and cost. Characteristics of foods classified as UPF/HPFs are considered, including the roles and safety approval of food additives and the effect of food processing on the food matrix. Finally, this paper identifies information gaps and research needs

### **Ultra-Processing Should Be Understood as a Holistic Issue, from Food Matrix, to Dietary Patterns, Food Scoring and Food Systems**

Anthony Fardet. *J Food Sci.* 2024 Jul;89(7):4563-4573. doi: 10.1111/1750-3841.17139. [Article link](#)

The ultra-processed food (UPF) concept first emerged 15 years ago, and is now studied worldwide in different contexts, for example, human health, food behavior, socio-economic, food consumption, food scoring, and food system sustainability. Briefly, UPFs are defined as containing at least one marker of ultra-processing (MUP). MUPs are (1) cosmetic additives, (2) aromas, (3) some highly processed carbohydrates, proteins, fats, and/or fiber, and (4) drastic processes directly applied to food such as extrusion cooking or puffing. The first three categories of MUPs are on the food packaging in the list of ingredients, and are extracted, then purified, from raw foods or coming from artificial syntheses, leading to a-matrix/a-cellular compounds. Therefore, the core paradigm to define MUP is extreme food matrix degradation, and for UPF, matrix artificialization. Besides, UPFs are more than just junk food, encompassing numerous industrialized foods, falsely presented as healthy, for example, animal-based food analogs, but also organic, vegan, gluten-free, micronutrient-enriched, and/or light foods. In this way, UPFs are “high-quality junk foods.” Otherwise, UPF being a holistic and indivisible concept by essence, we propose in this review to analyze ultra-processing at four holistic levels corresponding to four important scientific issues: the food matrix, the dietary pattern, food system, and food scoring. We reached the main conclusion that UPFs should be first studied with a holistic and scientifically based approach, not a reductionist one. Otherwise, we take the risk of performing greenwashing and create still more new health threats at a global level.

## Protein

### **Higher Muscle Protein Synthesis Rates Following Ingestion of an Omnivorous Meal Compared with an Isocaloric and Isonitrogenous Vegan Meal in Healthy, Older Adults**

Philippe Jm Pinckaers, Jacintha Domić, Heather L Petrick, Andrew M Holwerda, Jorn Trommelen, Floris K Hendriks, Lisanne Hp Houben, et. al. *J Nutr.* 2024 Jul;154(7):2120-2132. doi: 10.1016/j.tjn.2023.11.004. [Article link](#)

**Background:** Plant-derived proteins are considered to have fewer anabolic properties when compared with animal-derived proteins. The anabolic properties of isolated proteins do not necessarily reflect the anabolic response to the ingestion of whole foods. The presence or absence of the various components that constitute the whole-food matrix can strongly impact protein digestion and amino acid absorption and, as such, modulate postprandial muscle protein synthesis rates. So far, no study has compared the anabolic response following ingestion of an omnivorous compared with a vegan meal. **Objectives:** This study aimed to compare postprandial muscle protein synthesis rates following ingestion of a whole-food omnivorous meal providing 100 g lean ground beef with an isonitrogenous, isocaloric whole-food vegan meal in healthy, older adults. **Methods:** In a randomized, counter-balanced, cross-over design, 16 older (65-85 y) adults (8 males, 8 females) underwent 2 test days. On one day, participants consumed a whole-food omnivorous meal containing beef as the primary source of protein (0.45 g protein/kg body mass; MEAT). On the other day, participants consumed an isonitrogenous and isocaloric whole-food vegan meal (PLANT). Primed continuous L-[ring-13C6]-phenylalanine infusions were applied with blood and muscle biopsies being collected frequently for 6 h to assess plasma amino acid profiles and muscle protein synthesis rates. Data are presented as means  $\pm$  standard deviations and were analyzed by 2 way-repeated measures analysis of variance and paired-samples t tests. **Results:** MEAT increased plasma essential amino acid concentrations more than PLANT over the 6-h postprandial period (incremental area under curve  $87 \pm 37$  compared with  $38 \pm 54$  mmol $\cdot$ 6 h/L, respectively; P-interaction  $< 0.01$ ). Ingestion of MEAT resulted in  $\sim 47\%$  higher postprandial muscle protein synthesis rates when compared with the ingestion of PLANT ( $0.052 \pm 0.023$  and  $0.035 \pm 0.021$  %/h, respectively; paired-samples t test: P = 0.037). **Conclusions:** Ingestion of a whole-food omnivorous meal containing beef results in greater postprandial muscle protein synthesis rates when compared with the ingestion of an isonitrogenous whole-food vegan meal in healthy, older adults.

## Low- and No-Calorie Sweeteners

### Properties, Extraction and Purification Technologies of Stevia rebaudiana steviol Glycosides: A Review

Chengxia Huang, Yang Wang, Cunshan Zhou, Xingyu Fan, Qiaolan Sun, Jingyi Han, Chenhui Hua, et. al. *Food Chem.* 2024, 30:453:139622. doi: 10.1016/j.foodchem.2024.139622. [Article link](#)

For health and safety reasons, the search for green, healthy, and low-calorie sweeteners with good taste has become the demand of many consumers. Furthermore, the need for sugar substitutes of natural origin has increased dramatically. In this review, we briefly discussed the safety and health benefits of stevia sweeteners and enumerated some examples of physiological functions of steviol glycosides (SGs), such as anti-inflammatory, anti-obesity, antihypertensive, anti-diabetes, and anticaries, citing various evidence related to their application in the food industry. The latest advances in emerging technologies for extracting and purifying SGs and the process variables and operational strategies were discussed. The impact of the extraction methods and their comparison against the conventional techniques have also been demonstrated. These technologies use minimal energy solvents and simplify subsequent purification stages, making viable alternatives suitable for a possible industrial application. Furthermore, we also elucidated the potential for advancing and applying the natural sweeteners SGs.

## Cognitive Health

### Effects of Ferulic Acid on Cognitive Function: A Systematic Review

Yesim Karademir, Alan Mackie, Kieran Tuohy, Louise Dye. *Mol Nutr Food Res.* 2024 Jul;68(13):e2300526. doi: 10.1002/mnfr.202300526. [Article link](#)

**Scope:** Plant (poly) phenolic compounds have been reported to decrease the risk of developing dementia and have been associated with maintenance of cognitive performance in normal ageing. Ferulic acid (FA) is a phenolic acid, present in a wide variety of foods including cereals, fruits, vegetables, and coffee. The aim of this systematic review is to examine the effect of FA on cognitive function in humans and animals. **Methods and Results:** The search terms "Ferulic acid AND cognit\*" and "Ferulic acid OR feruloyl OR ferula AND (memory OR attention OR learning OR recognition)" are used in Web of Science, Scopus, PubMed, OVID (Medline/PsycInfo), and CINAHL through October 2023. No human studies are identified that matched the inclusion criteria. Twenty-six animal studies are identified. A small number (n = 5) of these studies examined FA in healthy animals whilst the remainder examined animal models of dementia. Alzheimer's disease (n = 11) is

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the most prevalent model. **Conclusion:** Overall, results from studies employing disease models suggest that FA ameliorates induced cognitive decline in a time and dose-dependent manner. Similarly, studies in healthy animals show a beneficial effect of FA. However, further studies are required to determine the effects of FA on human cognitive function.

## Lipids

### **Milk Fat Globule Membrane and its Polar Lipids: Reviewing Preclinical and Clinical Trials on Cognition**

Álvaro Luque-Uría, María V Calvo, Francesco Visioli, Javier Fontecha. *Food Funct.* 2024 Jul 1;15(13):6783-6797. doi: 10.1039/d4fo00659c. [Article link](#)

In most parts of the world, life expectancy is increasing thanks to improved healthcare, public health policies, nutrition, and treatment. This increase in lifespan is often not accompanied by an increase in health span, which severely affects people as they age. One notable consequence of this is the increasing prevalence of neurodegenerative diseases such as mild cognitive impairment, dementia, and Alzheimer's disease. Therefore, dietary and pharmaceutical measures must be taken to reduce the burden of such pathologies. Among the different types of nutrients found in the diet, lipids and especially polar lipids are very important for cognition due to their abundance in the brain. Amid the most studied sources of polar lipids, milk fat globule membrane (MFGM) stands out as it is abundant in industrial by-products such as buttermilk. In this narrative review, we discuss the latest, i.e. less than five years old, scientific evidence on the use of MFGM and its polar lipids in cognitive neurodevelopment in early life and their potential effect in preventing neurodegeneration in old age. We conclude that MFGM is an interesting, abundant and exploitable source of relatively inexpensive bioactive molecules that could be properly formulated and utilized in the areas of neurodevelopment and cognitive decline. Sufficiently large randomized controlled trials are required before health-related statements can be made. However, research in this area is progressing rapidly and the evidence gathered points to biological, health-promoting effects.

## Sodium

### **Advancements in Production, Assessment and Food Applications of Salty and Saltiness-Enhancing Peptides: A Review**

Yingying Hu, Iftikhar Hussain Badar, Yue Liu, Yuan Zhu, Linwei Yang, Baohua Kong, Baocai Xu. *Food Chem.* 2024, 30:453:139664. doi: 10.1016/j.foodchem.2024.139664. [Article link](#)

Salt is important for food flavor, but excessive sodium intake leads to adverse health consequences. Thus, salty and saltiness-enhancing peptides are developed for sodium-reduction products. This review elucidates saltiness perception process and analyses correlation between the peptide structure and saltiness-enhancing ability. These peptides interact with taste receptors to produce saltiness perception, including ENaC, TRPV1, and TMC4. This review also outlines preparation, isolation, purification, characterization, screening, and assessment techniques of these peptides and discusses their potential applications. These peptides are from various sources and produced through enzymatic hydrolysis, microbial fermentation, or Millard reaction and then separated, purified, identified, and screened. Sensory evaluation, electronic tongue, bioelectronic tongue, and cell and animal models are the primary saltiness assessment approaches. These peptides can be used in sodium-reduction food products to produce "clean label" items, and the peptides with biological activity can also serve as functional ingredients, making them very promising for food industry.

## Gut Health

### **The Role of Nondigestible Oligosaccharides in Alleviating Human Chronic Diseases by Regulating the Gut Microbiota: A Review**

Meiyu Yuan, Zhongwei Zhang, Tongying Liu, Hua Feng, Yuhuan Liu, Kai Chen. *Foods.* 2024 Jul 8;13(13):2157. doi: 10.3390/foods13132157. [Article link](#)

The gut has been a focus of chronic disease research. The gut microbiota produces metabolites that act as signaling molecules and substrates, closely influencing host health. Nondigestible oligosaccharides (NDOs), as a common dietary fiber, play an important role in regulating the structure and function of the gut microbiota. Their mechanism of action is

mainly attributed to providing a carbon source as specific probiotics, producing related metabolites, and regulating the gut microbial community. However, due to the selective utilization of oligosaccharides, some factors, such as the type and structure of oligosaccharides, have different impacts on the composition of microbial populations and the production of metabolites in the colon ecosystem. This review systematically describes the key factors influencing the selective utilization of oligosaccharides by microorganisms and elaborates how oligosaccharides affect the host's immune system, inflammation levels, and energy metabolism by regulating microbial diversity and metabolic function, which in turn affects the onset and progress of chronic diseases, especially diabetes, obesity, depression, intestinal inflammatory diseases, and constipation. In this review, we re-examine the interaction mechanisms between the gut microbiota and its associated metabolites and diseases, and we explore new strategies for promoting human health and combating chronic diseases through dietary interventions.

## Emerging Science

### AI Nutrition Recommendation Using a Deep Generative Model and ChatGPT

Papastratis, I., Konstantinidis, D., Daras, P., Dimitropoulos K. *Sci Rep* 14, 14620 (2024). doi.org/10.1038/s41598-024-65438-x. [Article link](#)

In recent years, major advances in artificial intelligence (AI) have led to the development of powerful AI systems for use in the field of nutrition in order to enhance personalized dietary recommendations and improve overall health and well-being. However, the lack of guidelines from nutritional experts has raised questions on the accuracy and trustworthiness of the nutritional advice provided by such AI systems. This paper aims to address this issue by introducing a novel AI-based nutrition recommendation method that leverages the speed and explainability of a deep generative network and the use of novel sophisticated loss functions to align the network with established nutritional guidelines. The use of a variational autoencoder to robustly model the anthropometric measurements and medical condition of users in a descriptive latent space, as well as the use of an optimizer to adjust meal quantities based on users' energy requirements enable the proposed method to generate highly accurate, nutritious and personalized weekly meal plans. Coupled with the ability of ChatGPT to provide an unparalleled pool of meals from various cuisines, the proposed method can achieve increased meal variety, accuracy and generalization capabilities. Extensive experiments on 3000 virtual user profiles and 84000 daily meal plans, as well as 1000 real profiles and 7000 daily meal plans, demonstrate the exceptional accuracy of the proposed diet recommendation method in generating weekly meal plans that are appropriate for the users in terms of energy intake and nutritional requirements, as well as the easiness with which it can be integrated into future diet recommendation systems.

## Engage with IAFNS

### IAFNS Nutrition for Gut Health Committee Meeting

August 7, 2024, Washington, DC

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### IAFNS Lipids Committee Meeting

August 7, 2024, Virtual Event

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### IAFNS Carbohydrates Committee Meeting

August 23, 2024, Virtual Event

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### Low- and No-Calorie Sweeteners and Body Weight: How Systematic Reviews on Low Calorie Sweeteners Produce Disparate Results

September 10, 2024, Virtual Event

This webinar will focus on the research conducted to decipher how systematic review methodologies influence the findings produced when investigating the association between LNCS consumption and body weight.

[Learn more](#)

### **IAFNS Food Microbiology Research Roundtable**

September 11, 2024, Washington, DC

The IAFNS Food Microbiology Committee will host a Research Roundtable to identify research gaps in microbial food safety and define priority research areas to fund.

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### **Menopause, Cognition and Nutrition: Understanding the Intersection**

September 11, 2024, Virtual, Event

Women's health and related knowledge and research gaps have been highlighted as focus grows on incorporating population diversity into research.

[Learn more](#)

### **Nutritional Considerations for Anti-Obesity Medications: Evidence-Based Guidance**

September 12, 2024, Virtual, Event

This webinar will present recent work translating the clinical experience with 'new' obesity medications into practical nutritional considerations and guidance that can support effective use.

[Learn more](#)

### **American Association of Family Physicians – FMX 2024**

September 24, 2024 – September 28, 2024, Phoenix, AZ

IAFNS-supported researchers will deliver the presentation 'Live Dietary Microbes: Evidence That Intake Supports Health' to physicians.

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