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Dietary Patterns

The Impact of the Mediterranean Diet on Immune Function in Older Adults

Fiona Ecartot, Stefania Maggi. *Aging Clin Exp Res*. 2024 May 23;36(1):117. doi: 10.1007/s40520-024-02753-3. [Article link](#)

Diet is one of the lifestyle factors that is most amenable to intervention and has a substantial effect on the potential for successful aging and mitigation of the risk of disease. Good nutrition is a pillar of healthy aging, and a large body of evidence attests to the benefits of the Mediterranean diet on the quality of the aging process. The Mediterranean diet comprises a wide range of nutrients which, both individually and collectively, exert positive effects on immunity, in large part mediated by the gut microbiota. In this article, we review the effect of the Mediterranean diet on immunity, and how its beneficial effects are mediated by the gut microbiota. We review the effects of certain key components of the Mediterranean dietary pattern, including vitamins, zinc, selenium, and polyphenols. Overall, the existing body of evidence convincingly demonstrates that the Mediterranean diet affects immune health by maintaining a healthy body weight and reducing the risk of metabolic and cardiovascular diseases; by reducing inflammation and by promoting a healthy gut microbiota profile.

Carbohydrates

The Association of Ultra-Processed Food Intake with Neurodegenerative Disorders: A Systematic Review and Dose-Response Meta-Analysis of Large-Scale Cohorts

Ali Pourmotabbed, Sepide Talebi, Sanaz Mehrabani, Atefeh Babaei, Reza Amiri Khosroshahi, Reza Bagheri, Alexei Wong, et. al. *Nutr Neurosci*. 2024 May 16:1-14. doi: 10.1080/1028415X.2024.2351320. [Article link](#)

Objectives: Our systematic review and meta-analysis aimed to uncover the relationship between UPFs intake and neurodegenerative disorders, including multiple sclerosis (MS), Parkinson's disease (PD), Alzheimer's disease (AD), cognitive impairment, and dementia. **Setting:** A systematic search was conducted using the Scopus, PubMed/MEDLINE, and ISI Web of Science databases without any limitation until June 24, 2023. Relative risk (RR) and 95% confidence interval (CI) were pooled by using a random-effects model, while validated methods examined quality and publication bias via Newcastle-Ottawa Scale, Egger's regression asymmetry, and Begg's rank correlation tests, respectively. **Results:** Analysis from 28 studies indicated that a higher UPFs intake was significantly related to an enhanced risk of MS (RR = 1.15; 95% CI: 1.00, 1.33; I² = 37.5%; p = 0.050; n = 14), PD (RR = 1.56; 95% CI: 1.21, 2.02; I² = 64.1%; p = 0.001; n = 15), and cognitive impairment (RR = 1.17; 95% CI: 1.06, 1.30; I² = 74.1%; p = 0.003; n = 17), although not AD or dementia. We observed that a 25 g increment in UPFs intake was related to a 4% higher risk of MS (RR = 1.04; 95% CI: 1.01, 1.06; I² = 0.0%; p = 0.013; n = 7), but not PD. The non-linear dose-response relationship indicated a positive non-linear association between UPF intake and the risk of MS (Pnonlinearity = 0.031, Pdose-response = 0.002). This association was not observed for the risk of PD (Pnonlinearity = 0.431, Pdose-response = 0.231). **Conclusion:** These findings indicate that persistent overconsumption of UPFs may have an adverse impact on neurodegenerative conditions, potentially leading to a decline in quality of life and reduced independence as individuals age.

Protein

A Review of Bioactive Compound Effects from Primary Legume Protein Sources in Human and Animal Health

Zachary Shea, Matheus Ogando do Granja, Elizabeth B Fletcher, Yaojie Zheng, Patrick Bewick, Zhibo Wang, et. al. *Curr Issues Mol Biol*. 2024 May 1;46(5):4203-4233. doi: 10.3390/cimb46050257. [Article link](#)

The global demand for sustainable and nutritious food sources has catalyzed interest in legumes, known for their rich

repertoire of health-promoting compounds. This review delves into the diverse array of bioactive peptides, protein subunits, isoflavones, antinutritional factors, and saponins found in the primary legume protein sources-soybeans, peas, chickpeas, and mung beans. The current state of research on these compounds is critically evaluated, with an emphasis on the potential health benefits, ranging from antioxidant and anticancer properties to the management of chronic diseases such as diabetes and hypertension. The extensively studied soybean is highlighted and the relatively unexplored potential of other legumes is also included, pointing to a significant, underutilized resource for developing health-enhancing foods. The review advocates for future interdisciplinary research to further unravel the mechanisms of action of these bioactive compounds and to explore their synergistic effects. The ultimate goal is to leverage the full spectrum of benefits offered by legumes, not only to advance human health but also to contribute to the sustainability of food systems. By providing a comprehensive overview of the nutraceutical potential of legumes, this manuscript sets a foundation for future investigations aimed at optimizing the use of legumes in the global pursuit of health and nutritional security.

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 May 17;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

Nutrition for Dementia Prevention: A State-of-the-Art Update for Clinicians

Rebecca Townsend, Andrea Fairley, Sarah Gregory, Craig Ritchie, Emma Stevenson, Oliver M Shannon. *Age Ageing.* 2024 May 11;53(Supplement_2):ii30-ii38. doi: 10.1093/ageing/afae030. [Article link](#)

Background and Objectives: Dementia prevalence continues to rise. It is therefore essential to provide feasible and effective recommendations to encourage healthy brain ageing and reduce dementia risk across the population. Appropriate nutrition represents a potential strategy to mitigate dementia risk and could be recommended by clinicians as part of mid-life health checks and other health initiatives to reduce dementia prevalence. The purpose of this review is to provide a clinician-focused update on the current state of the knowledge on nutrition and dementia prevention. **Methods:** Narrative review. **Results:** Strong evidence exists to support the consumption of healthy, plant-based dietary patterns (e.g. Mediterranean, MIND or Nordic diet) for maintaining cognitive function and reducing dementia risk in later life and is supported by dementia prevention guideline from leading public health bodies (e.g. World Health Organization). Emerging evidence suggests potential cognitive benefits of consuming specific nutrients/foods (e.g. n-3 fatty acids or fish, flavonols and B-vitamins) and multi-nutrient compounds (e.g. Fortasyn Connect). Challenges and opportunities for integrating nutritional/dietary interventions for dementia prevention into clinical practice are explored in this review. **Conclusions:** Appropriate nutrition represents an important factor to help facilitate healthy cognitive ageing and allay dementia risk. The information provided in this article can help clinicians provide informed opinions on appropriate nutritional strategies as part of mid-life Health Checks and other risk reduction initiatives.

Lipids

Effects of Saponins on Lipid Metabolism: The Gut-Liver Axis Plays a Key Role

Shixi Cao, Mengqi Liu, Yao Han, Shouren Li, Xiaoyan Zhu, Defeng Li, Yinghua Shi, et. al. *Nutrients*. 2024 May 17;16(10):1514. doi: 10.3390/nu16101514. [Article link](#)

Unhealthy lifestyles (high-fat diet, smoking, alcohol consumption, too little exercise, etc.) in the current society are prone to cause lipid metabolism disorders affecting the health of the organism and inducing the occurrence of diseases. Saponins, as biologically active substances present in plants, have lipid-lowering, inflammation-reducing, and anti-atherosclerotic effects. Saponins are thought to be involved in the regulation of lipid metabolism in the body; it suppresses the appetite and, thus, reduces energy intake by modulating pro-opiomelanocortin/Cocaine amphetamine regulated transcript (POMC/CART) neurons and neuropeptide Y/agouti-related peptide (NPY/AGRP) neurons in the hypothalamus, the appetite control center. Saponins directly activate the AMP-activated protein kinase (AMPK) signaling pathway and related transcriptional regulators such as peroxisome-proliferator-activated-receptors (PPAR), CCAAT/enhancer-binding proteins (C/EBP), and sterol-regulatory element binding proteins (SREBP) increase fatty acid oxidation and inhibit lipid synthesis. It also modulates gut-liver interactions to improve lipid metabolism by regulating gut microbes and their metabolites and derivatives-short-chain fatty acids (SCFAs), bile acids (BAs), trimethylamine (TMA), lipopolysaccharide (LPS), et al. This paper reviews the positive effects of different saponins on lipid metabolism disorders, suggesting that the gut-liver axis plays a crucial role in improving lipid metabolism processes and may be used as a therapeutic target to provide new strategies for treating lipid metabolism disorders.

A High-Fat Diet Promotes Cancer Progression by Inducing Gut Microbiota-Mediated Leucine Production and PMN-MDSC Differentiation

Jiwen Chen, Xiyuan Liu, Yi Zou, Erwei Song. *PNAS*. May 6, 2024. 121 (20) e2306776121. doi.org/10.1073/pnas.2306776121. [Article link](#)

A high-fat diet (HFD) is a high-risk factor for the malignant progression of cancers through the disruption of the intestinal microbiota. However, the role of the HFD-related gut microbiota in cancer development remains unclear. This study found that obesity and obesity-related gut microbiota were associated with poor prognosis and advanced clinicopathological status in female patients with breast cancer. To investigate the impact of HFD-associated gut microbiota on cancer progression, we established various models, including HFD feeding, fecal microbiota transplantation, antibiotic feeding, and bacterial gavage, in tumor-bearing mice. HFD-related microbiota promotes cancer progression by generating polymorphonuclear myeloid-derived suppressor cells (PMN-MDSCs). Mechanistically, the HFD microbiota released abundant leucine, which activated the mTORC1 signaling pathway in myeloid progenitors for PMN-MDSC differentiation. Clinically, the elevated leucine level in the peripheral blood induced by the HFD microbiota was correlated with abundant tumoral PMN-MDSC infiltration and poor clinical outcomes in female patients with breast cancer. These findings revealed that the “gut–bone marrow–tumor” axis is involved in HFD-mediated cancer progression and opens a broad avenue for anticancer therapeutic strategies by targeting the aberrant metabolism of the gut microbiota.

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 May 14:453:139664. 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

Sensing of Luminal Contents and Downstream Modulation of GI Function

Kiran Devi Dontamsetti, Laura Camila Pedrosa-Suarez, Rubina Aktar, Madusha Peiris. *JGH Open*. 2024 May 22;8(5):e13083. doi: 10.1002/jgh3.13083. [Article link](#)

The luminal environment is rich in macronutrients coming from our diet and resident microbial populations including their metabolites. Together, they have the capacity to modulate unique cell surface receptors, known as G-protein coupled receptors (GPCRs). Along the entire length of the gut epithelium, enteroendocrine cells express GPCRs to interact with luminal contents, such as GPR93 and the calcium sensing receptor to sense proteins, FFA2 and GPR84 to sense fatty acids, and SGLT1 and T1R to sense carbohydrates. Nutrient-receptor interaction causes the release of hormonal stores such as glucagon-like peptide 1, peptide YY, and cholecystokinin, which further regulate gut function. Existing data show the role of luminal components and microbial fermentation products on gut function. However, there is a lack of understanding in the mechanistic interactions between diet-derived luminal components and microbial products and nutrient-sensing receptors and downstream gastrointestinal modulation. This review summarizes current knowledge on various luminal components and describes in detail the range of nutrients and metabolites and their interaction with nutrient receptors in the gut epithelium and the emerging impact on immune cells.

Emerging Nutrition Science

Emerging Topic: Elevated waist/height ratio and cardiometabolic risk

People with Normal Waist Circumference but with Elevated Waist-to-Height Ratio: An Overlooked Population with Increased Cardiometabolic Risk?

Vicky Chan, Kenneth Lo. *AJCN*. May 09, 2024. doi.org/10.1016/j.ajcnut.2024.04.013. [Article link](#)

Background: The global health burden of cardiometabolic diseases, including diabetes and cardiovascular diseases (CVDs), highlights the necessity for using reliable and easy-to-measure anthropometric indicators to identify at-risk individuals [1]. Although body mass index (BMI) is a widely used adiposity indicator, accumulating evidence suggests that waist-to-height ratio (WHtR) may provide better screening power for cardiometabolic risk [1]. WHtR emerges as a more effective tool than BMI for assessing central obesity and may surpass waist circumference (WC) by accounting for the variations in height [1]. From a practical perspective, the measurements of both weight and height are required for calculating BMI, whereas the measurement of WHtR only requires a simple tape measure, which is a more readily available and convenient method compared with using weighing apparatus [2]. In view of the evidence from studies on the accuracy of different adiposity measures for predicting or identifying health conditions, the National Institute for Health and Care Excellence has updated its clinical guidelines to replace WHtR for WC to identify individuals with central obesity [3]. However, prospective epidemiologic studies that directly compare the predictive power of central obesity and general obesity measures on disease risk are still inadequate. Furthermore, many previous studies have selected BMI as the indicator for general obesity [4 , 5], but research evidence using body fat percentage (BF%), a more precise indicator of general obesity for comparison with WHtR, is lacking.

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