



Editorial

Nutrition and the Brain – Exploring Pathways for Optimal Brain Health Through Nutrition: A Call for Papers

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Recent advances in neuroscience have transformed our understanding of the human brain, yielding more detailed images of its cells, more accurate measures of its function, and more precise models of its network organization. As our knowledge of the brain deepens, it becomes increasingly clear that the food we consume plays a vital role in its development, maintenance, and resilience throughout life [1]. Nutrition influences brain function at multiple levels, from molecular and cellular mechanisms to the complex neural networks that underlie human intelligence and mental health.

Despite the growing recognition of nutrition's impact on the brain, researchers face several scientific challenges. This Special Collection on *Nutrition and the Brain* aims to address these challenges and foster a deeper understanding of how nutrition affects cognitive and brain health. We invite researchers from the nutritional and brain sciences to contribute original empirical research, systematic reviews, and thought-provoking perspectives to this collection, focusing on the following scientific challenges.

Interdisciplinary Studies of Nutrition and the Brain

The complexity of the brain itself presents a primary challenge for researchers. Comprised of billions of neurons and trillions of connections, the brain's complex signaling pathways make it difficult to comprehend the precise mechanisms through which nutrition influences brain health. Therefore, we encourage studies that (i) apply advanced neuroimaging methods to investigate the respects in which diet and nutrition

may influence the network organization and dynamics of the brain [2–4], (ii) employ state-of-the-art computational modeling methods that integrate neuroimaging with measures of nutritional status to derive novel brain health phenotypes [5], and (iii) apply nutrient biomarker pattern analysis [1–5] and other modern omics techniques to uncover possible mechanisms of action with respect to the genome, transcriptome, proteome, and metabolome. These approaches will help to elucidate the complex signaling pathways that link nutrition to the brain and provide new insights into the effects of diet and nutrition on brain health, employing both humans and animal models [6–7].

Nutrition and the Gut-Brain Axis

Modern research in the nutritional and brain sciences has revealed novel signaling pathways between the gut and the brain, known as the gut-brain axis. Emerging research suggests that a healthy gut microbiome, promoted by a diverse and fiber-rich diet, may have positive effects on brain health, mood regulation, and even mental disorders such as depression and anxiety [8–10]. Researchers are encouraged to explore the dynamic relationship between nutrition, the gut, and the brain, elucidating the mechanisms involved and investigating potential dietary strategies for maintaining optimal gut and brain health.

Nutrition and Lifespan Development

Understanding the role of nutrition in brain health throughout the lifespan is another important challenge. Diet influences brain

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health not only during early development but also throughout adulthood and into old age [11–13]. Chronic consumption of an unhealthy diet characterized by high levels of saturated fats, refined sugars, and processed foods has been linked to an increased risk of developing neurodegenerative disorders. Conversely, a diet rich in antioxidants, polyphenols, and anti-inflammatory compounds has shown protective effects against age-related cognitive decline and neurodegenerative conditions [14]. Further research to examine the effects of natural protein sources on brain health, including beef, pork, poultry, eggs, fish, and plant-based protein, will be important for understanding the impact of diet and nutrition on brain health across the lifespan. We, therefore, invite researchers to investigate how specific nutrients, dietary patterns, and nutritional interventions can influence brain health at different stages of life, including the potential for dietary interventions to promote early brain development or mitigate neurodegenerative diseases in late life.

Nutrition and Cognition

Research on the importance of nutrition for brain health further establishes its effects on cognitive performance throughout life [15, 16]. Deficiencies in specific nutrients have been associated with impaired cognitive function, including decreased attention, learning, and memory. Conversely, a nutrient-rich diet, particularly during critical periods of brain development, has been linked to improved cognitive abilities and enhanced academic performance. Investigating the underlying mechanisms and identifying potential dietary interventions to promote cognitive function is a critical challenge.

Nutrition and Mental Health

The influence of nutrition on mental health is an increasingly important area of study [17, 18]. Diet has been linked to risk and progression of psychiatric conditions, such as mood and anxiety disorders. Researchers are invited to explore the relationship between nutrition and mental health, including the mechanisms through which diet influences psychiatric conditions and the potential for dietary interventions to support mental health and psychological wellbeing.

Nutrition and Public Health

Given the significant impact of diet and nutrition on brain health, promoting healthy eating habits becomes a public health imperative [19–20]. Educational campaigns, policy interventions, and targeted initiatives should aim to raise awareness about the importance of nutrition in brain function, particularly among vulnerable populations. Additionally, interdisciplinary collaborations involving healthcare professionals, nutritionists, educators, and policymakers are crucial for developing evidence-based guidelines that encourage brain-healthy dietary choices. We invite submissions that discuss the implementation and dissemination of evidence-based nutritional interventions and highlight strategies to bridge the gap between research and practice.

Call for Papers

The Journal of Nutrition invites submission of high-quality, original research manuscripts, reviews, perspectives, and systematic reviews with meta-analyses on studies that apply interdisciplinary methods to advance research on nutrition and the brain. Papers must be submitted by 15 December 2024 to be considered for this Special Collection. To be included in the Collection, select the appropriate Article Type for your manuscript. You will later be prompted to enter a Section/Category. Select “Nutrition and the Brain” to be considered for this Collection.

Accepted papers will be published continuously in their respective monthly issues, as well as on a collection landing page. Please prepare submissions in compliance with *The Journal of Nutrition*’s Instructions for Authors and submit them on *The Journal of Nutrition* submission site, selecting the Article Type of “Nutrition and the Brain.”

Articles will be peer reviewed, and submission does not guarantee manuscript acceptance. Articles are subject to the charges described under the “Policies, Fees, and Style” section in the author guidelines. Dr. Aron Barbey will serve as Guest Editor of the Collection. Please send questions to *The Journal of Nutrition*’s Editor-in-Chief.

Conflicts of interest

AKB is a Guest Editor, and TAD is Editor-in-Chief of *The Journal of Nutrition*.

Funding

AKB’s research has been supported by Abbott Nutrition, the National Cattleman’s Beef Association, and the National Pork Board. TAD’s research is supported by the NIH (HD085573-23 and HD099080) and the USDA (3092-51000-060-01S).

Acknowledgments

The authors’ responsibilities were as follows—all authors conceived of and drafted the manuscript and read and approved the final manuscript.

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