

Annual Review of Nutrition, 2021. Patrick J. Stover and Rudi Balling (eds). Annual Reviews, El Camino Way, PO Box 10139, Palo Alto, California 94304-0139, USA Vol. 41. x + 576 pages. Price: US\$ 118.00.

Like many other scientific disciplines, nutritional science has become highly interdisciplinary, encompassing areas such as basic biochemistry, molecular biology, genetics, nutritional guidelines, and recent developments in eating behaviours and nutrition policies. The *Annual Review of Nutrition* plays an important role in moving this interdisciplinary field forward by providing narrative reviews that identify gaps in research and the current knowledge that supports evidence-based nutrition practice and policies. Additionally, the editors have provided a brief overview of the 40-year journey of the *Annual Review of Nutrition*, highlighting its contribution to recording advances in nutrition science. There is also an autobiography of Prof. W. P. T. James, a respected nutrition scientist-administrator and public health policy maker who established the criteria for assessing, managing and preventing obesity globally.

Within the 2021 volume, chapters delve into basic nutritional biochemistry and physiology relating to important nutritional issues. For instance, an article by Inigo *et al.* provides an update on the tricarboxylic acid (TCA) cycle, emphasizing the roles of anaplerosis and cataplerosis in various tissues, their impact on carbon transitions and their contributions to disease mechanisms. Puchalska and Crawford explore the metabolic and signalling roles of ketone bodies in health and disease in their review, while Rahman *et al.* discuss how endocannabinoids and endocannabinoid-like molecules influence lipid and glucose metabolism and feeding behaviour. Zamborski *et al.* provide important insights into the role of cytoplasmic lipid droplets as dynamic triacylglycerol storage organelles that can influence the absorption of dietary fat, which is critical for preventing hyperlipidaemia and associated metabolic disorders.

The review by Blanes sheds light on the terminology used for vitamin A as an antioxidant and underscores the need for a deeper mechanistic understanding of the antioxidant role of vitamin A in the body. Additionally, the article by Wessels *et al.* elucidates the role of zinc in the funda-

mental biological processes, its effects on haematopoiesis and specific immune responses. It explores the need for zinc supplementation, particularly for individuals at risk of deficiency. This is important in the context of the global applicability of the International Zinc Nutrition Consultative Group (IZiNCG) recommended serum zinc cut-offs to diagnose zinc deficiency in humans: these seem to be different in different populations and therefore question the need for a uniform zinc supplementation policy without a close examination of the prevalence of deficiency¹. McKeever *et al.* provide a comprehensive review of the timing of nutrition support, the mechanisms of metabolic harm that could occur while feeding critically ill patients, and the importance of 'precision nutrition' in accounting for patient-specific complexities in critical illness and host genetics. Daniels *et al.* emphasize the need for further evidence and research on how chronic medication could affect micronutrient status.

The genetic link between sleep and obesity is explored in the review by Dashti and Ordovas, highlighting the need for investigations into sleep disorders and their genetic associations. Furthermore, Zuraiyat *et al.* delve into the relationship between sleep and diet, highlighting the cyclical interplay between these two factors and the potential causal impact of dietary patterns on sleep. The context in which health and disease are defined is critical, and one particularly important context is evolution. The timely article by Pontzer and Wood, describing how evolution influences contemporary nutritional physiology and pathophysiology, offers valuable insights. Glenny *et al.* emphasize the importance of well-designed rodent models in advancing cancer and diet research leading to the possibility of effective clinical treatment options. Given the increased use of zebrafish in biomedical research, Watts and D'Abramo emphasize the need for standardized reference diets for this animal model.

Breastfeeding is highly recommended for infants and mothers, with organizations like WHO and national agencies advocating exclusive breastfeeding for six months and beyond for healthy infants. Lackey *et al.* provide evidence for the benefits of breastfeeding beyond one year, highlighting human milk as a valuable source of nutrients and immune components for the developing

infant. They also call for rigorous cross-cultural research in this area.

The age-old tradition of fasting, which is well-represented in Indian culture, is experiencing a resurgence worldwide. In particular, and in recent years, intermittent fasting has emerged as one of the most popular methods for good health, with increased stress resistance, increased longevity and a decreased incidence of diseases². Varady *et al.* present a timely review summarizing the effects of intermittent fasting on markers of cardiometabolic health in humans. The problem of food addiction and its impact on public health is addressed by Gerhardt and Schulte. They explore how approaches used in understanding substance-use disorders can be applied to operationalize food addiction and discuss their clinical and policy implications. Roberto *et al.* focus on front-of-package nutrition labelling, recommending that governments implement mandatory labelling systems to improve population health. They provide a conceptual framework to assess label impact and offer design recommendations highlighting visibility, simplicity, automatic associations, and integration of informational and emotional messaging. This is relevant in India, where the Food Safety Standards Authority of India (FSSAI) is considering implementing mandatory symbol-based front-of-pack nutrition labelling³.

Overall, the current volume offers a collection of excellent articles that showcase diverse advancements in nutrition science. The editors emphasize the need to move beyond correlation to causality and develop mechanistic models for testing and validation that can unravel the complexities of nutrition and its impact on human health.

1. Pullakhandam, R. *et al.*, *Eur. J. Clin. Nutr.*, 2022; doi:10.1038/s41430-022-01088-4.
2. de Cabo, R. and Mattson, M. P., *N. Engl. J. Med.*, 2019, **26**, 381(26), 2541–2551; doi: 10.1056/NEJMr1905136.
3. Pande, R., Gavaravarapu, S. M. and Kulkarni, B., *Lancet Public Health*, 2020, **5**(4), e195; doi:10.1016/S2468-2667(20)30031-1.

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