

Nutrigenetics and nutrigenomics, and precision nutrition

Nutrition and Health
2023, Vol. 29(2) 169–170
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DOI: 10.1177/02601060231167228
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Nutrition and lifestyle modifications have been at the core of disease prevention, and healthy ageing. A personalized approach, that takes into consideration the aspect of biological variability among individuals, therefore, is pivotal for maximizing the benefits of these modifications in the context of health. Biological variability, in turn, is an intrinsic, gene-specific characteristic. In addition, genes also determine how individuals respond to the food they consume, the supplements they take, and ultimately, how foods interact with genes to affect their health. In this regard, nutrigenomics and nutrigenetics have become a significant *pièce de résistance* in the context of both clinical research and practice for the prevention and treatment of disease and illness, and for sustenance and promotion of health and wellness.

Precision nutrition can be regarded as the ‘next big thing’ in the domain of personalized nutrition for the prevention and treatment of diseases. Involving big data management, and ethic foresight analysis, precision nutrition represents the confluence of domains such as agrigenomics, nutrigenomics, nutriproteomics and nutrimetabolomics (Meiliana and Wijaya, 2020). Given that once nutrient–gene interactions are involved, advice related to nutritional interventions cannot be a case of ‘one size fits all’. Therefore, precision nutrition integrates genomic information with data associated with phenotypical, lifestyle, behavioral, physiopathological and sociocultural preferences, as well as metagenomics, and metabolomics, that can, in turn, be leveraged for designing a universal guide and personalized advice for the maintenance of health, management of various non-communicable diseases (NCDs) and implementation of health actions (Marcum 2020; Meiliana and Wijaya, 2020).

Obesity, for instance, despite the considerable debate, is regarded as an outcome of unhealthful nutrition, as well as physical inactivity, particularly, in the wider context of an ‘obesogenic’ environment (Townshend and Lake, 2017). However, more recent research increasingly points to the involvement of genotype as a causative factor as well. This is supported by the evidence that more than 50 candidate genes, such as the melanocortin-4-receptor (MC4R) gene for obesity have been identified through genome-wide association studies in recent years (Goodarzi, 2018). Also, certain variants of one of the obesity susceptibility loci, the fat mass and obesity-associated (FTO) gene are indicated as a major contributor to the elevated risk of development of obesity by way of its influence in altering an individual’s food intake and dietary preferences (Goodarzi, 2018; Livingstone

et al., 2022). This information, and the nutrigenomics/nutrigenetics approach, therefore, can be utilized for designing personalized nutrition solutions for mitigating the obesity pandemic, as well as other metabolic syndromes.

Genetically-guided precision nutrition is, therefore, paving the way for tailored nutrition solutions keeping in view the individuals’ genetic makeup and dietary needs, more effective healthcare services contingent upon the ‘nutrition through lifecycle’ approach for improved health and wellbeing across all age groups, as well as improved management of obesity and consequently, various NCDs and associated pathologies.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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