

Architecture of Food: Processing, structure and health

The foods we eat are generally associated with macro- and micronutrients, such as protein, lipids, carbohydrates, vitamins and minerals that appear in nutrition labels. When these components combine to form a food product, they interact as part of complex microstructures.¹ Evidence accumulating over the past 40 years has shown that these structures play an integral role in relation to food's desirable physical, sensorial, and nutritional properties, as well as any health benefits.¹

The 'food matrix' is a term used to describe the fact that chemical food compounds behave differently in isolation than as part of a whole food product. It is a complex assembly of nutrients and non-nutrients that interact and directly influence the processes of digestion and absorption in the gastro-intestinal tract.² Given the matrix influence's structure and consequently appearance, texture and flavour of foods, the food industry has been able to manipulate certain aspects of food to products that have lower sugar content, higher fibre or protein content, contain added micronutrients and bioactive compounds or be free from gluten.

However, changing the structure of food directly affects the availability of both energy and nutrients and as a result, each food's particular matrix can alter our ability to break down and benefit from the nutrients inside. Whilst some food processing is essential for safe consumption of food, such as yogurt, pasteurised milk and some nuts, there is concern around potential adverse health effects of ultra-processed foods. As such, recent research has become concerned not only with the type and quantity of nutrients required for optimum health, but also with the amount of a given nutrient that is available for our body to utilise.³

The introduction of fortified foods means bioactive compounds are often added to common foods to improve population health. These are compounds that would not naturally be sources of these foods, for example the addition of marine lipids in dairy products to improve the fatty acid composition. To positively impact health, the addition of a new bio-active compound requires the bioactive element to remain active when it reaches the GI tract, which is known as bioavailability. However, the question remains as to whether current processes involved in production, that alter the composition of whole foods, are balanced to ensure optimal nutritional properties.³ Consequently, bioavailability, rather than the amount of nutrient ingested, has become a criterion to access potential nutritional benefits, and sustain their health claims.⁴

Given the complexities surrounding the matrixes of processed foods, it is vital that research into food architecture continues to develop a detailed understanding of the structural changes occurring in the food matrix and the resulting health implications; from raw material harvesting, to processing, to point of breakdown during shelf-life and consumption, through to digestion. With changing patterns of food consumption and the need to create an environmentally sustainable flow of new food, the need to better understand the role of food structure and processing on human health has arguably never been greater.

The Nutrition Society's upcoming Winter Conference will focus specifically on the important effects of food structure and processing

on health. Academics, healthcare professionals, policy makers, and industry leaders from around the world are expected to participate in the engaging programme of lectures, panel discussions and poster presentations.

The conference symposia will consider a range of topics, including findings from the *NutriNet-Sante* cohort and links between ultra-processed foods and risk of chronic diseases to the effects of whole grains and berries on inflammation, gut microbiota and gut barrier function. Speakers include **Professor Pete Wilde**, The Quadram Institute, UK, discussing whether ultra-processed foods can be healthy, and **Professor Clare Mills**, University of Manchester, discussing food processing and the rise in food allergies.

Registration is now open, with discounts available to members of The Nutrition Society, students and groups of seven or more.

Find out more by visiting: <https://bit.ly/NutSocWinter2022>

References: 1. Carlo Mengucci, *et al.* (2022). Food Structure, Function and artificial intelligence. *Trends Food Sci Technol.*; (123): 251-263. 2. José Miguel Aguilera. (2019) The food matrix: implications in processing, nutrition and health. *Crit Rev Food Sci Nutr.*; 59(22): 3612-3629. 3. Redway M, Bouga M, Combet E. (2018). Impact of the food matrix on iodine bioavailability. *Proc Nutr Soc.*; 77(OCE4): E138. 4. Clemens RA, *et al.* (2016). Functionality of sugars in foods and health. *Compr Rev Food Sci Food Saf.*; 15(3): 433-470.

Events Calendar

Conferences

- **Winter Conference:**

Architecture of food: Processing, structure and health.
24-25 January 2023

Nutrition Society Training Academy

Pre-recorded versions of recent NSTA webinars are available to listen to at a variety of different times on the website.

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