

Designing next-generation functional food and beverages: combining nonthermal processing technologies and postharvest abiotic stresses

Daniel A. Jacobo-Velázquez, Jesús Santana-Gálvez and Luis Cisneros-Zevallos

Food Engineering Reviews 13: 592–600. 2021.

Abstract

Currently, consumers are demanding healthier foods that are at the same time fresh, safe, and long-lasting. However, traditional food processing technologies apply thermal treatments, which lead to modifications of sensory properties and losses of health-promoting compounds. Therefore, novel technologies have been increasingly researched and developed to overcome these problems, including postharvest abiotic stresses (PAS) and nonthermal processing technologies (NTPTs). PAS refer to the application of non-biological stimuli (i.e., wounding stress, modified atmospheres, UV light) to which plants respond by synthesizing secondary metabolites as a defense mechanism. Many of these secondary metabolites are nutraceuticals. On the other hand, NTPTs (i.e., high-pressure processing, ultrasound, pulsed electric fields) extend the shelf-life of foods without using high temperatures, allowing the retention of sensory, nutritional, and nutraceutical quality. Furthermore, certain NTPTs can also act as PAS, enhancing the nutraceutical content of foods through physical, chemical, and metabolic changes. This review describes the physiological response of fruits and vegetables to PAS and NTPTs and discusses their strengths and drawbacks when using them as elicitors to induce the accumulation of nutraceuticals. It presents a new concept that consists of the combined application of PAS and NTPTs to design next-generation food and beverages against chronic diseases using colon cancer as an example. Combining PAS and NTPTs is an emerging field; therefore, more research is needed to establish which combinations are most suitable and cost-effective to satisfy consumer demands.