Nanoscience to Increase Nutritional Health

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Proper nutrition plays a major role in the healthy lifestyle that many people strive for, and the food industry has been developing new ways of keeping up with the growing demand for foods that offer more to consumer health. Now scientists are turning to nanoscience for its potential to improve nutrition and nutrient delivery in everyday foods.

A class of nutrients that are of specific interest are bioactives. These are “physiologically active compounds in food or dietary supplements of plant or animal origin that have a role in health beyond basic nutrition” (Augustin and Sanguansri 2008, p 577). Bioactives have potential advantages such as disease prevention, but can be difficult to incorporate into foods due to their instability: they tend to deteriorate before they can be absorbed into the body (Augustin and Sanguansri 2008). One aid to the delivery of bioactive nutrients is nanoencapsulation, and one process by which this can be accomplished is emulsification (Sanguansri and Augustin 2006).

Emulsification produces extremely small droplets in an oil and water mixture through the application of pressures or forces (Sanguansri and Augustin 2006). These droplets have lipophilic centres surrounded by an outer layer of surfactant that protects the core from the external environment (Sanguansri and Augustin 2006). Essentially, they are nanocapsules that are inhibited from recombining by molecules (called emulsifiers) that adhere to the surface of the droplet (McClements and others 2007).

The oxidation of bioactives such as omega-3 fatty acids reduces their nutritional effectiveness in the body and causes adverse effects (such as poor taste) on the foods that contain them (Augustin and Sanguansri 2008). Emulsification could be used to shield bioactives from oxidation (McClements and others 2007), allowing them to be incorporated into foods and delivered effectively to body tissues. Thus, nanoencapsulation could potentially be used to control the release of encapsulated components after ingestion. This technology is already being applied in pharmaceuticals, and utilizes changes to factors such as pH or surface-to-protein interactions in order to initiate the release of the components from the capsule, increasing efficiency of absorption in the body (Sanguansri and Augustin 2006).

Food science is meeting the demand for the development of foods that hold promise for improving the nutritional quality of our everyday meals, and nanoscience applications are at the forefront. Just as emulsification protects omega-3 fatty acids from oxidation, nanoencapsulation of other nutrients or pharmaceuticals may make it possible for scientists to improve the nutritional value of foods without sacrificing sensory appeal, and seemingly unhealthy foods could possibly one day be made healthy (Institute of Food Research 2008). Nanoscience may prove to be the key to a healthier population.

REFERENCES


