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Technological innovation for food and nutrition security, and sustainability: A food biopolymer perspective

Child malnutrition, and diet-related non-communicable diseases, for example, type 2 diabetes, cardiovascular diseases associated with obesity, are among the wicked problems related to food and nutrition security. Overconsumption of energy-dense foods characterized by high sugar, refined carbohydrates rich in rapidly digestible starch, and high fat are causes for diet-related non-communicable diseases. Lack of energy and protein due to food structural properties can contribute to child malnutrition. Biodegradable packaging systems based on biopolymers are important sustainable alternatives to petroleum-based plastics. The main aim of the inaugural lecture is to discuss the roles of technologies used to modify food biopolymers (starch, protein and non-starch polysaccharides) for innovation in addressing food and nutrition security. Infrared, microwave and extrusion as energy-efficient technologies can change the structure of protein and starch biopolymers to produce low viscosity nutrient-dense complementary porridge for use as baby foods. Infrared heat treatment can reduce starch digestibility to create a lower glycaemic index maize porridge due to an increase in slowly digestible starch and resistant starch. Extrusion cooking is a versatile technology used in food structure design to produce (i) instant nutrient-dense complementary baby foods from cereal and pulse composites due to reduced viscosity, (ii) high fibre and high protein porridge and foods with better satiety for adults. Manufactured starch nanoparticles and starch microspheres coated with nanoparticles have good potential as fat replacers to reduce the energy density of foods. Extrusion can also produce compatible starch-protein biomaterial for packaging. A multidisciplinary team is also vital for structure design of food ingredients and food products and biodegradable packaging systems for African or even global sustainable food systems.