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Perspective

Food Related Technologies and Biocompatible Food Based Biopolymers and their Significants

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DESCRIPTION

The term food science & technology refers to a broad, multidisciplinary discipline that includes all aspects of the basic sciences, engineering, and their interactions with human food. Food science and medicine share many basic concepts since food is essential to all living organisms. In addition to the widely accepted idea of food as medicine called as "yaoshitongyuan" in traditional Chinese medicine, there are numerous additional unique aspects of food science and technology that are also highly transferable to clinical applications. Clinical application describes research that is used in patient diagnostic or therapeutic procedures.

Food manufacturing byproducts produced at any stage using different food technologies are referred to as side streams in the food processing industry. The global food industry produces large amounts of these side streams every day. From these side streams, valuable raw materials (green) are collected and then transformed into useful clinical applications (blue). For the value-added transformation of these resistant materials into such applications, fermentation (red) is a crucial translational food technology.

Biocompatible food-based biopolymers derived food processing technology for clinical biomaterial applications In the framework of the medical and clinical sciences, a biomaterial is any polymer or substance that has been created to interact with biological tissues or systems for therapeutic or diagnostic purposes, and a biocompatibility is the probability that the patient will experience unfavorable immunological or toxic reactions to the material. In order to reduce the risks of immunological rejection and infection in clinical applications, biomaterials need to be both biocompatible and approved medical grade. This is crucial in cases of invasive surgical implementation. Natural biopolymers have several intrinsic advantages over synthetic petroleum-based or inorganic biomaterials (glass, ceramics, metals) for clinical biomaterial applications, such as overall higher biocompatibility. Food, in all of its forms, is composed of a variety of biopolymers (proteins, carbohydrates, and polynucleotides), and as a result is by nature extremely biocompatible and a better option for practically all therapeutic biomaterial applications.

The omnipresence of cellulose in food makes it both highly viable and economical as a substitute for petrochemical-derived plastic polymers, particularly in wound care applications such as dressings and sutures. Chitin, the second most abundant biopolymer on Earth, is another similarly linear polysaccharide built from β-1,4-linked N-acetyl glucosamine units and a principal component of the exolayers and exotissues of insects, fungi, invertebrates and fish. The chitin backbone monomers are decolorized, which releases special chemical and biological properties that greatly enhance aqueous solubility and antibacterial activity due to the exposed amino moieties on the glucosamine monomer subunits. Using methods based on energetic hydrolysis, cellulose and chitosan from plant crops and seafood processing side streams are typically extracted to be used in applications for wound care, tissue scaffolding, or drug delivery. These sources are incredibly underutilized and highly sustainable, respectively.

Other clinical applications of food based biopolymers as a material for biosensor implants, cellulose has demonstrated great potential. A personal health care monitoring made of NiSe2 modified cellulose and a biosensor for detecting human movement made of okara derived cellulose both was created. A hypocholesterolaemic effect of chitosan in humans was also observed before lowering the serum Low Density Lipoprotein (LDL) cholesterol concentrations, which makes it an attractive alternative biomaterial for cardiovascular stent design. β-Chitosan, a rarer form of chitosan extracted from molluscs as opposed to α-chitosan from crustaceans, has demonstrated antimicrobial effects against multidrug-resistant bacteria, a serious problem in nosocomial settings.

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