

Streszczenie popularnonaukowe w języku angielskim

The dynamic development of civilization is inseparably connected with satisfying the basic needs of humanity, which include food production. The increasing consumer requirements regarding the quality of food products and, at the same time, the growing ecological public awareness lead to the development of new economic and, above all, human and environmental safe technologies. The solutions proposed by industrial biotechnology, which have great application potential to facilitate both the creation of new and improving existing products, are the basis for the design of healthy and organic food.

Lactobionic acid (LBA) is a product that, due to its properties and potential applications in the food, medical, pharmaceutical, cosmetic, and chemical industries, is arousing growing interest among new research groups. Particularly interesting seems to be the use of lactobionic acid as a potential component of functional food. It can be used as a solubilizing agent, filler in cheese production, calcium carrier in drinks, acidification agent, and fresh aroma preservation factor. Lactobionic acid is also known for its antioxidant, prebiotic, and antimicrobial properties; it shortens the acidification and maturation in the cheese and yogurt production process and improves the bitter or sour taste of dishes. The growing commercial importance of LBA contributes to the development of research into new ways of biotechnological (microbiological and enzymatic) synthesis, which yield a qualitatively competitive product in a cheap and safe way for the consumer and the environment.

The aim of our project is to carry out the biosynthesis of lactobionic acid, through the use of multi-enzymatic systems. The multiyear experience of our team in research on cellulose dehydrogenases and laccases indicates that the enzymes isolated by us from several species of fungi can be successfully used as biocatalysts for the biosynthesis of these acids. In the proposed project, we plan to use immobilized multi-enzymatic systems for the first time, which will ensure high efficiency in the production process of lactobionic acid which is a promising alternative to the economic synthesis of these bioproducts.

In the context of potential applications of the lactobionic acid in the food industry, it will also be reasonable to determine some of their biological, physicochemical, and cytotoxic properties.