

## Fungal Chitin in Medicine: Prospects for Its Application

Ludmila I. Burdyukova and Leontij F. Gorovoj

Institute of Cell Biology and Genetic Engineering, National Academy of Science of Ukraine, 148 Zabolotnogo Str., Kiev 03143, Ukraine

Chitin is one of the most widespread biopolymers in nature. At present several thousand works have been published and more than 100 of them, concerning the structure of chitin, production of its derivatives, studies of their properties, and possible areas of their application, are patented. Practically 90% of those works are dedicated to chitin of crustacea and only 10% to that of mushrooms, still less falling to the higher mushrooms.

The studies performed have shown that chitin and its derivatives may be used in medicine, agriculture, cosmetics, food, and other branches of industry. Of particular interest is the application of chitin in medicine. Most studies are dedicated to this field.

In fungal organisms chitin is contained in cell walls. Its quantity depends on the species and may vary in widely—from 0.2% to 60%.

Laboratory and clinical studies have shown that chitin and its derivatives are not toxic or allergenic and also not mutagenic. They may be used:

- In the pharmaceutical industry as carriers of medicinal agents (MAs) of prolonged action, that allows us to essentially decrease the quantity of MAs necessary for therapeutic effect, to optimize the taste of MAs, to improve solubility of slightly soluble MAs, etc.
- In surgery, to produce artificial skin, vessel prostheses that do not destroy blood cells and bones; in bioceramics, to produce sutural threads that are subject to biodestruction in the organism; to cover wounds—flexible and strong material that permits effective removal of exudate without its congestion and without

removing the cover before healing of the wound; to produce analgesics, antioxidants, antiinflammatory, antibacterial, antifungal agents; to stimulate epithelization, synthesis of fibrin, macrophages, and neutrophils; to cover highly infected skin, etc.

- In stomatology, to accelerate the healing of wounds without allergic and infectious contamination after dental extraction; to inhibit pathogenic microflora of the mouth; as constituents of filling materials, toothpastes, etc.
- In oncology, to prevent the growth and inhibition of metastases of a number of tumors; they permit creation of a high concentration of MAs in the tumor region and their isolation by doses, when significantly decreases any undesirable side effect; to remove toxic substances and decomposition products of tumor cells; to protect an organism from the unfavorable action of chemo- and radiation therapy; in particular, to prevent colonization of intestinal mucosa by species of the genus *Candida*
- In ophthalmology, to produce viscous medium for surgical intervention; to produce antifungal cleaners of soft contact lenses; as constituents of certain ophthalmic MAs
- In urology, to treat chronic renal insufficiency, etc.
- In gastroenterology and dietary regimens of patients who have suffered from the accident at the Chernobyl APP; for their antisclerotic, antiarthrosis action; to improve the effect of microorganisms in processing milk lactose; to control the cholesterol level due to the growth of bifidobacteria in the intestine, etc.; in the production of cheaper (as compared to heparin) antithrombogens and anticoagulants; in hemisorption, to remove up to 60% of cholesterol

without decreasing the total quantity of blood plasma proteins, etc.

We have created the preparation "MY-COTON" which includes such biopolymers as chitin, glucanes and melanins of Higher Basidiomycetes. The preparation has demons-

trated its high sorption properties, is an effective immunomodulator, possesses a bacteriocidal action against a number of pathogenic microorganisms. It promotes rapid healing of wounds and diabetic ulcers, lowers the level of blood cholesterol, shows encouraging results for treatment of hepatitis from various causes, etc.