

Higher Basidiomycetes as Prospective Objects for Mycopharmacological Research

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In view of recent advances in experimental mycology and fungal biotechnology, interest in Higher Basidiomycetes as a natural source of valuable biologically active metabolites (BAMs) has significantly increased. The medicinal properties of macrofungi have long been recognized in China, Korea, and Japan, as well as in Central and North American countries. The BAMs possess different therapeutic actions, such as antibacterial, antifungal, antitumoral, immunomodular, antioxidant, hypoglycemic, antiviral, and so forth. Molecular techniques can be used to establish a scientific basis for observations that have been made centuries earlier. Based on ethnomycological experiences and modern mycopharmacological studies, a special group of Medicinal Mushrooms (MMs) among macrofungi was recently distinguished.

The active compounds of MMs usually have extraordinarily low toxicity, and at certain doses they can be used as subsidiary agents for treatment of many diseases. Some of the mushroom BAMs show combined therapeutic action—antibacterial, antifungal, antitumoral, and antiviral. The active mushroom compounds with antitumor and immune-stimulating activities are mainly polysaccharides (PS), such as lentinan, schizophyllan, and protein-bound PS—krestin and PS-peptide or PS-bound protein complexes. Another group of medicinal substances is the terpenoids, which contribute mainly cytotoxic, hypolipidic, hypotensive, and hepatoprotective activities. Biologically active proteins—lectins—were recently discovered within the mushroom groups. As cell receptors they are able to specifically bind glucan molecules and form

glycoprotein complexes. Fungal lectins play a special role in the host's nonspecific immune responses. However, the detailed mechanism of action of these compounds has not been clearly defined yet.

Today, many mushroom products are used for medicinal purposes. They are mainly extracts or powders, either from the cultivated mycelium or from the fruiting body. Mushroom commercial products were recently separated as a group of "mushroom nutraceuticals." They are sealed in the form of capsules, tablets, or teas as dietary supplements.

Modern mycopharmacological investigations are being successfully carried out in laboratories worldwide. During the 10 years of our research program more than 55 species of higher Basidiomycetes, as prospective objects for mycotechnological and mycopharmacological research, were included. During this period morphological, cultural, ecological, chemical, physiological, and pharmacological screening of macrofungi, especially MM species, was carried out. Investigation of antifungal, antiviral, antibacterial, antioxidant, immunomodulating, fibrinolytic, hemolytic, spasmolytic, hypoglycemic, and enzymatic activities, as well as toxicity of fungal extracts was performed. A specialized culture collection of MMs, including more than 40 species and 100 living mycelial strains, was also established.

Indeed, the MM from a systematic group of Basidiomycetes are potential objects for biotechnological and mycopharmacological research, as well as natural sources of nutraceutical commercial products.