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Medicinal Mushroom Science: History, Current Status, Future Trends, and Unsolved Problems

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ABSTRACT

The present review analyzes the history, current status, and future trends in the study of medicinal mushrooms. The target of the present review is to draw attention to many critically important unsolved problems in the future development of medicinal mushroom science in the 21st century. Special attention is paid to mushroom polysaccharides. Many, if not all, higher Basidiomycetes mushrooms contain biologically active polysaccharides in fruit bodies, cultured mycelium, and cultured broth. The data on mushroom polysaccharides are summarized for approximately 700 species of higher Hetero- and Homobasidiomycetes. The chemical structure of polysaccharides and its connection to antitumor activity, including possible ways of chemical modification, experimental testing, and clinical use of antitumor or immunostimulating polysaccharides, as well as possible mechanisms of their biological action, are discussed. Particularly, and most importantly for modern medicine, are polysaccharides with antitumor and immunostimulating properties. Several of the mushroom polysaccharide compounds have proceeded through Phase I, II, and III clinical trials and are used extensively and successfully in Asia to treat various cancers and other diseases. A total of 126 medicinal functions are thought to be produced by medicinal mushrooms and fungi, including antitumor, immunomodulating, antioxidant, radical scavenging, cardiovascular, antihypercholesterolemia, antiviral, antibacterial, antiparasitic, antifungal, detoxification, hepatoprotective, and antidiabetic effects.

KEY WORDS: medicinal mushrooms, immunomodulatory, polysaccharides, polysaccharide-protein complexes, beta-glucans, antitumor, immunomodulator activity, macrophages, Sarcoma 180, Ehrlich carcinoma, Agaricus brasiliensis, Ganoderma lucidum, Lentinus edodes, Trametes versicolor, Schizothamnus commune, Grifola frondosa

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