

**Wasser, S.P., Didukh, M.Ya. & Nevo, E.** 2005. Antitumor and immunomodulatory activities of medicinal mushroom polysaccharides and polysaccharide-protein complexes in animals and humans (Review). – *Mycologia Balcanica* **2**: 221-250.

**Abstract.** The number of mushrooms on Earth is estimated at 140 000, yet perhaps only 10 % (approximately 14 000 named species) are known. They make up a vast and yet largely untapped source of powerful new pharmaceutical products. Particularly, and most important for modern medicine, they present an unlimited source for polysaccharides with anticancer and immunostimulating properties. Many, if not all Basidiomycetes mushrooms contain biologically active polysaccharides in fruit bodies, cultured mycelia, and culture broth. The data about mushroom polysaccharides are summarized for 651 species and seven intraspecific taxa from 182 genera of higher Hetero- and Homobasidiomycetes. These polysaccharides are of different chemical composition; the main ones comprise the group of  $\beta$ -glucans.  $\beta$ -(1 $\rightarrow$ 3) linkages in the main chain of the glucan and further  $\beta$ -(1 $\rightarrow$ 6) branch points are needed for their antitumor action. Numerous bioactive polysaccharides or polysaccharide-protein complexes from medicinal mushrooms are described that appear to enhance innate and cell-mediated immune responses, and exhibit antitumour activities in animals and humans. Stimulation of host immune defense systems by bioactive polymers from medicinal mushrooms has significant effects on the maturation, differentiation, and proliferation of many kinds of immune cells in the host. Many of these mushroom polymers were reported previously to have immunotherapeutic properties by facilitating growth inhibition and destruction of tumour cells. Whilst the mechanism of their antitumor actions is still not completely understood, stimulation and modulation of key host immune responses by these mushroom polymers appears central. Recent evidence suggests that mushroom polymers ( $\beta$ -glucans) may trigger the stimulation of many kinds of immune cells in animals and humans. Several of the mushroom polysaccharide compounds have proceeded through Phases I, II, and III clinical trials, and are used extensively and successfully in Asia to treat various cancers and other diseases. The present review analyzes the peculiarities of polysaccharides derived from fruit bodies and cultured mycelia (two main ways of biotechnological production today) in selected examples of medicinal mushrooms.

**Key words:** active hexose correlated compound (AHCC), beta-glucans, Ehrlich carcinoma, immunomodulator activity, macrophages, polysaccharides, polysaccharide-protein complexes, Sarcoma 180