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Chemistry, Nutrition, and Health-Promoting Properties of *Hericium erinaceus* (Lion's Mane) Mushroom Fruiting Bodies and Mycelia and Their Bioactive Compounds

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Abstract

The culinary and medicinal mushroom *Hericium erinaceus* is widely consumed in Asian countries, but apparently not in the United States, for its nutritional and health benefits. To stimulate broader interest in the reported beneficial properties, this overview surveys and consolidates the widely scattered literature on the chemistry (isolation and structural characterization) of polysaccharides and secondary metabolites such as erinacines, hericerins, hericenones, resorcinols, steroids, mono- and diterpenes, and volatile aroma compounds, nutritional composition, food and industrial uses, and exceptional nutritional and health-promoting aspects of *H. erinaceus*. The reported health-promoting properties of the mushroom fruit bodies, mycelia, and bioactive pure compounds include antibiotic, anticarcinogenic, antidiabetic, antifatigue, antihypertensive, antihyperlipodemic, antisenescence, cardioprotective, hepatoprotective, nephroprotective, and neuroprotective properties and improvement of anxiety, cognitive function, and depression. The described anti-inflammatory, antioxidative, and immunostimulating properties in cells, animals, and humans seem to be responsible for the multiple health-promoting properties. A wide range of research advances and techniques are described and evaluated. The collated information and suggestion for further research might facilitate and guide further studies to optimize the use of the whole mushrooms and about 70 characterized actual and potential bioactive secondary metabolites to help prevent or treat human chronic, cognitive, and neurological diseases.

Keywords: *Hericium erinaceus*; anti-inflammatory effects; antioxidant capacity; bioactive compounds; cell, rodent, and human studies; erinaceolactones; erinacerins; erinacines; food processing; food use; fruit bodies; glycoproteins; health-promoting properties; immunostimulation; multifunctional health properties; mushrooms; mycelia; nutrients; phylogenetics; polysaccharides; research needs; resorcinols; sterols; volatile compounds.

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