The Lion’s Mane mushroom (Hericium erinaceus) has been reported to support the function and health of the nervous system and has been the subject of several studies investigating the use of various compounds contained in the mushroom for the treatment of various neurodegenerative diseases, declines in cognitive function and injuries to the spine and nervous system. This mushroom has been highly valued in Traditional Chinese Medicine for thousands of years and contains many types of biologically active compounds including hericinones, erinacines, heteropolysaccharides, lectins, peptides, proteins, terpenoids, ergosterol and antioxidants.

Hericium erinaceus has been reported to contain a number of biologically active compounds that affect the synthesis and activity of neurotrophic factors that impact the function of our brain and nervous system. Neurotrophic factors have potent biological activities, such as preventing neuronal death and promoting neurite outgrowth, and are essential to maintain and organize neurons functionally. Glial cells support neurons by releasing neurotrophic factors, such as nerve growth factor (NGF), brain-derived neurotrophic factor (BDNF), neurotrophin 3, and glial-derived neurotrophic factor (GDNF). In particular, it is assumed that functional deficiency of NGF is related to Alzheimer’s disease and plays a part in the etiology of the disease process.

Neurotrophic factors are proteins, and are thus unable to cross the blood–brain barrier; they are also easily metabolized by peptidase enzymes in the GI tract. Therefore, their application as a medicine for the treatment of neurodegenerative disorders is assumed to be difficult. Alternatively, research has been carried out on low-molecular weight compounds that promote NGF biosynthesis, such as hericenones and erinacines that are contained in Hericium erinaceus. The hericinone and erinacine molecules are small enough to cross the blood-brain barrier.

There are currently two Japanese patents on different extracts of Hericium erinaceus. One was filed in the 1990's for an extract named “Nerve Growth Stimulant Factor.” The other, filed in 2004, is for a water extraction process, yielding a product that is likewise used for nerve and myelin healing.
shown to have the potential of stimulating Nerve Growth Factor (NGF) within the brain. NGF is the vital protein required for optimal health of neurons that control various feelings like pain, touch or temperature. Additionally, various antioxidants contained in the mushroom may also influence the function and health of our brain and nervous system. Both alcohol- and water-soluble compounds contained in this mushroom have been shown to have neuroprotective effects.

Hericenones C to H (additional Hericenones may yet to be discovered and named)) are benzyl alcohol derivatives. Hericenones are extracted from Lion’s Mane tissue with ethanol, and for purposes of study, the extract is generally concentrated and fractionated by solvent partition between chloroform and water. Studies have reported that administration of hericenones extracted from Lion’s Mane has a number of neuroprotective effects and stimulates the synthesis of NGF.

Erinacines A to I (additional Erinacines may yet to be discovered and named) are diterpenoid derivatives. For research purposes, these compounds were, in general, extracted with ethanol and fractionated by solvent partition between acetate and water. In rat studies, Erinacines have been reported to increase the levels of noradrenaline, homovanillic acid and NGF in the rat’s brain tissue. Erinacines have been found in the mycelia of Lion’s Mane but have not yet been isolated from the fruit body of this mushroom.

Lion’s Mane also contains the neuroprotectant Dilinoleoyl-phosphatidylethanolamine (DLPE). DLPE is a phospholipid bearing two unsaturated fatty acids, namely, linoleic acids. Phospholipids, mainly phosphatidylserine, and unsaturated fatty acids are known to be activators of protein kinase C (PKC). There are reports that PKC activation attenuates neuronal cell death. DLPE has indeed been reported to protect neuronal cells from endoplasmic reticulum (ER) stress induced cell death, and that the PKC pathway is involved in the protective mechanism. Further studies will elucidate the detailed molecular signaling pathway involved in the protective activity. It is important to note that in cell culture studies, the activity of the crude extracts seemed to be higher than that of the purified DLPE compounds confirming that more than one active ingredient contained in the mushroom can influence nerve function and health in this regard.

Lion’s Mane also may be able to reduce the formation of beta amyloid plaque that is seen in the brain tissue of Alzheimer’s patients. In animal studies, mice were injected with a neurotoxic peptide that induces amyloid plaque formation and than challenged to “Y” maze tests designed to test memory. Mice that were fed a diet supplemented with Lion’s Mane did not show impairment of spatial short-term and visual recognition memory that were exhibited in the mice fed a normal diet. The mice receiving the Lion’s Mane supplement also scored higher in another cognitive capacity test that measured the time spent exploring novel objects as compared to familiar ones; a capacity comparable to curiosity.

REFERENCES


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