

NEUROPROTECTIVE EFFECTS OF HERICIUM erinaceus

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Recent discoveries have opened up an exciting opportunity for developing new types of therapeutics from medicinal mushrooms.

Hericium erinaceus (*H. erinaceus*) is a traditional edible mushroom in several Asian countries, and has generally been used as a food and herbal medicine. The potential neuroprotective effects of *Hericium erinaceus* in neurodegenerative diseases, including dementia, Alzheimer and motor dysfunction, have attracted considerable attention. We studied the effect of 3 months oral supply of *Hericium erinaceus* both in vitro and in vivo experiments. Mice hippocampal sagittal slices 200-300 μ m of depth were prepared by 40-50 days old mice after placebo or after *Hericium erinaceus*. Spontaneous and evoked activity at the synapse between mossy fiber-CA3 neurons shows a statistically significant increases, probably due to an increase in neurotransmitter release from mossy fiber terminal. *Hericium* treated mice in PCR experiments show a significant increase in mRNA NGF expression in hippocampus. In vivo exploring behavior, and space-memory were tested. In conclusion, 3 months *Hericium erinaceus* oral supply in wild-type mice increases neurotransmitter release and the level of NGF-mRNA in hippocampus and increases exploratory activity, spatial memory, recognition memory in learning and memory test in vivo.

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***Hericium erinaceus* (Bull.) Pers.**
The Lion's mane

IN NATURE
Up to 2 kg of weight
It is a parasite species.
It grows on the trunk of trees such as oak, walnut, beech

It is taken as a food for many years

China → Houfou
Japan → Yamabushitake

***Hericium erinaceus* (Bull.) Pers.**

Health Benefits of Lion's Mane

- Anticancer / Anti-tumor (esophagus, stomach, intestine)
- Antioxidant / Immune enhancer
- Hype-cholesterol / lowers cholesterol
- Diabetes
- Skin elasticity
- Dementia, Alzheimer's disease

The most promising activity of *H. erinaceus* is the stimulation of **nerve growth factor** (NGF, Mori et al., 2008; Mori et al. 2011, Obara and Nakahata) synthesis by bioactive compounds hericenones isolated from the fruiting body and erinacines from mycelium.

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THE HIPPOCAMPUS IS POSTULATED TO ENCODE WORKING MEMORY



Long-term modifications of synaptic transmission demonstrated in hippocampal excitatory synapses are thought to be cellular mechanisms underlying learning and memory (Treves 2004, Lisman 2007)

3 MAIN QUESTIONS:

EFFECT OF *H. ERINCEUS* 3 MONTHS ORAL SUPPLY IN WILD-TYPE MOUSE

QUESTION 1: mRNA NGF expression in hippocampus

QUESTION 2: spontaneous and evoked synaptic activity expression in hippocampus

QUESTION 3: spatial memory



CONCLUSIONS

H. ERINCEUS 3 MONTHS ORAL SUPPLY IN WILD-TYPE MOUSE

1. INCREASES mRNA NGF EXPRESSION IN HIPPOCAMPUS
2. IMPROVES SPONTANEOUS AND EVOKED SYNAPTIC ACTIVITY IN THE HIPPOCAMPUS POSSIBLY THROUGH AN INCREASE IN NEUROTRANSMITTER RELEASE
3. INCREASES EXPLORATORY ACTIVITY, SPATIAL MEMORY, RECOGNITION MEMORY