Assessing the Effectiveness of the Hericium erinaceus Extract as Acetylcholinesterase Inhibitors

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Alzheimer’s Disease (AD), a type of dementia, is attributed to the overproduction of the amyloid-beta (Aß) protein caused by the cleavage of the amyloid precursor protein. This project focuses on deriving therapeutics to control the Aß protein by finding an effective acetylcholinesterase (AChE) inhibitor (AChE-I). Research indicates that low levels of acetylcholine (ACh) are correlated with high levels of the Aß protein, thus, an AChE-I will hypothetically decrease the level of the Aß protein and then treat Alzheimer's. The most effective known AChE-I is galantamine, an alkaloid isolated from Lycoris radiata. This particular project will focus on assessing the ability of the extract isolated from Hericium erinaceus as an AChE-I. The first paralysis assay with model organism Drosophila melanogaster demonstrated that high concentrations of the H. erinaceus isopropyl extract significantly increased paralysis in comparison with isopropyl alcohol. This suggests that the extracts are toxic, a characteristic of AChE-Is. An Ellman’s Assay concluded that all the galantamine concentrations and the 0.05g/mL concentration of the extract significantly decreased the AChE concentration ($p<0.01$). The second experiment of wildtype D. melanogaster and lower concentrations demonstrated no significance with the two lowest concentrations of galantamine and extracts compared to alcohol, which suggests the concentrations are safe and can be a new therapy. The implication of this research is that the low concentrations of the H. erinaceus extract could be a potential AChE-I and novel therapeutic for AD. Additionally, this research demonstrates the promise of utilizing fungal extracts to treat neurodegenerative diseases.