Cerium Oxide Nanoparticles and Alzheimer's Disease

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***Abstract*— Alzheimer's disease is a chronic neurodegenerative disease and the most common form of dementia in elderly. About 35 million people worldwide are diagnosed with the disease. To date, there is no cure for the disease. The current available treatments are mainly to treat symptoms associated with the disease. Alzheimer's disease is a costly disease. The financial burden of the disease is overwhelming for patients and their caregivers. Therefore, finding a treatment to cure, or at least halt the disease progression is necessary. Progressive memory impairment and cognitive decline are the major symptoms of the disease. Alzheimer's disease is associated with the presence of senile plaques in the brain areas responsible for learning and memory. Senile plaques are extracellular deposits of insoluble amyloid-beta (Aβ) peptide. Aβ is toxic and has been shown to cause death in many cell types including SH-SY5Y cells. SH-SY5Y cells are human neuroblastoma cells. Aβ-treated SH-SY5Y cells are a popular Alzheimer's disease model for in vitro studies. Cerium oxide nanoparticles have been demonstrated to have potential anti-oxidant and anti-apoptotic properties. We hypothesized that cerium oxide nanoparticles can alleviate Aβ-induced death in SH-SY5Y cells. Cell viability was quantified using 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. We found that the cell viability was reduced to ~75% when treated with Aβ25-35 (50 µM) for 2 days. Cerium oxide nanoparticles (25-100 µg/ml) were able to alleviate Aβ-induced cell death in a dose-dependent fashion. SH-SY5Y cell viability was restored back to ~90% when the cells were treated with 100 µg/ml of cerium oxide nanoparticles. Overall, our results suggest that cerium oxide nanoparticles could be potentially used for the treatment of Alzheimer's disease.**

***Keywords*— Alzheimer disease, amyloid beta-peptides, cell death, cerium oxide, dementia**

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