Inhibition of Glutamate Excitotoxicity in Glaucoma by Liposomes

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Glaucoma is a neurodegenerative eye disease affecting more than 64.3 million people worldwide. The retinal degeneration is, as believed, originally caused by elevated intraocular pressure. Nonetheless, glutamate excitotoxicity has been proven as a major catalyst of retinal ganglion cell apoptosis and thus loss of vision. Although excitotoxicity has been confirmed to cause neurodegeneration independent of intraocular pressure, in case of glaucoma it is still not clinically treated. This project takes a new approach to glutamate excitotoxicity treatment, theorizing application of liposomes as detoxifying agents capable of glutamate absorption via incorporated membrane EAAT2 transporters. It is supposed that absorption of excessive glutamate by liposomes should prevent receptor over-stimulation and neuron cell apoptosis. Methods for further experimental research had been investigated so far. Liposomes were prepared using gel chromatography. Their ability to hold internal media was evaluated by loading them with fluorescent probe SPQ which leakage was then detected using fluorescence spectroscopy. Liposomes were further studied for their physical properties by confocal Raman microscopy and imaging which showed their clustered structure. Liposomes show good membrane stability to hold the internal media. Furthermore, they exhibit globular shape and size between 0.5 and 20 μm. Based on assessed data, it is possible to proceed to the second experimental set of EAAT2 protein reconstitution and neuroprotective effect assay of the liposomes.

Awards Won:
Third Award of $1,000