Treating Blindness: The Role of Autophagy in Diabetic Retinopathy

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Autophagy is a process through which a cell recycles its components to generate energy. Studies show autophagy is involved in diabetic retinopathy, a diabetes complication where retinal cell death under ischemia can lead to vision loss. This project evaluates the effect of three novel autophagy activators on retinal neurons under ischemia and hypothesizes that they will have a protective effect on these cells. R28 rat retinal neuronal cells were placed in a normoxic chamber with media containing glucose, mimicking a normal environment. Another set of cells was placed in a hypoxic chamber with glucose-free media, creating oxygen and nutrient deprivation (OGD) similar to that of retinal ischemia. The three novel autophagy activating compounds, one known autophagy activator, and two known autophagy inhibitors were then added to cells in both conditions.The cell death and cell proliferation in both sets of cells were measured using an LDH assay and proliferation assay. Data was analyzed using a p-test. The cells under OGD showed more cell death and less proliferation compared to those in normal conditions.This also occurred among cells treated with known autophagy inhibitors. However, cells treated with the novel autophagy activators showed less cell death and increased proliferation in both environments, behaving similarly to the known autophagy activator. This experiment shows activating autophagy enhances retinal cell survival because cells treated with autophagy activators exhibited more proliferation and less cell death than control cells and those with inhibited autophagy. These results implicate the potential application of these compounds in diabetic retinopathy.

Awards Won:
Fourth Award of $500