Multiple Sclerosis and the Retina: A Study on Neurodegeneration

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Multiple Sclerosis (MS) is a debilitating neurological disease affecting the central nervous system and significantly impacting patients' quality of life. The disease involves inflammation, demyelination, and neurodegeneration causing irreversible disabilities. Current treatments for MS target the inflammatory phase, with limited effects on the long-term disability. While neuronal damage significantly contributes to MS pathology, mechanisms of neurodegeneration are not well studied. Utilizing data collected from an experimental MS model (EAE, Experimental Autoimmune Encephalomyelitis), and control groups this study evaluated neurodegenerative changes in the retina during disease progression. We investigated the neurodegenerative changes such as loss of retinal ganglion cells and retinal thinning in the retina of the EAE model and the control groups. It is hypothesized that the experimental model of MS will show higher levels of neuronal loss in the retina compared to the control. Our results showed a decrease in the number of cells in the ganglion cell layer (GCL) of the EAE retina at two different time points studied, suggesting a loss of neurons compared to the control group. Thickness measurements showed a reduction in total and inner plexiform layer (where neurons in the GCL connect to interneurons) thicknesses in the EAE retina compared to the controls. Our results indicate that there is evidence of neurodegenerative changes in the retina of the experimental model of MS. The pattern of neuronal loss suggests that neurodegeneration happens in the earlier stage of disease progression. Overall, the retina is an excellent model to investigate the molecular mechanisms of neurodegeneration in MS and possibly other neurodegenerative diseases with further research.

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