Retinal ganglion cell damage

Retinal ganglion cell (RGC) damage serves as a key indicator of various retinal degenerative diseases, including diabetic retinopathy (DR), glaucoma, retinal arterial and retinal vein occlusions, as well as inflammatory and traumatic optic neuropathies. Despite the growing body of data on the RGC proteomics associated with these conditions, there has been no dedicated study conducted to compare the molecular signaling pathways involved in the mechanism of neuronal cell death. Therefore, we launched the study using two different insults leading to RGC death: glutamate excitotoxicity and optic nerve crush (ONC). C57BL/6 mice were used for the study and underwent NMDA- and ONC-induced damage. Twenty-four hours after ONC and 1 hour after NMDA injection, we collected RGCs using CD90.2 coupled magnetic beads, prepared protein extracts, and employed LC-MS for the global proteomic analysis of RGCs. Statistically significant changes in proteins were analyzed to identify changes to cellular signaling resulting from the treatment. We identified unique and common alterations in protein profiles in RGCs undergoing different types of cellular stresses. Our study not only identified both unique and shared proteomic changes but also laid the groundwork for the future development of a therapeutic platform for testing gene candidates for DR and glaucoma [1].

The damage or loss of retinal ganglion cells (RGCs) and their axons account for the visual functional defects observed after traumatic injury, in degenerative diseases such as glaucoma, or in compressive optic neuropathies such as from optic glioma. By using optic nerve crush injury models, studies have revealed the cellular and molecular logic behind the regenerative failure of injured RGC axons in adult mammals and suggested several strategies with translational potential. A review by Williams et al. summarizes these findings and discusses challenges for developing clinically applicable neural repair strategies [2]

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