

Preventing Axonal Degeneration in Glaucoma

K. Martin

Centre for Brain Repair, University of Cambridge, Cambridge, UK

Keeping retinal ganglion cells alive in optic nerve diseases such as glaucoma is necessary but not sufficient to maintain visual function; it is crucial that axons remain healthy and connected to their target neurons. Axonal degeneration occurs by active mechanisms distinct from apoptosis, and thus the therapeutic strategies necessary to protect axons may be distinct from those required to protect cell bodies.

As an example of a potential axoprotective strategy, we have explored the protective effect of the slow Wallerian degeneration gene, *WldS*, on cell body and axonal survival in experimental glaucoma and following optic nerve transection in the rat. We have found that the *WldS* phenotype protects against axonal degeneration after injury in both models, but that protection is temporary. Also, the protective effect of *WldS* on cell body survival in the first 2 weeks was much weaker than the effect on axonal survival. Thus, axoprotection does not necessarily prevent axonal injury from triggering cell body death.

It seems likely that effective neuroprotection of the optic nerve will require a combination of strategies targeting different components of the neuron including the axon and the cell body. The mechanisms by which axonal injury trigger cell body death are an important topic for further research.