Scientists uncover gene network responsible for repair of the central nervous system of the fruit fly

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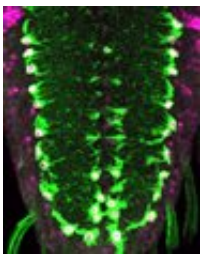

Glia that enwrap axons in the Drosophila larval ventral nerve cord. Credit: Dr Kentaro Kato, University of Birmingham

A gene network that controls repair to the central nervous system (CNS) after injury has been discovered in the fruit fly, Drosophila, by scientists at the University of Birmingham. This breakthrough may help to aid understanding of cell manipulation techniques necessary to repair damage to the human CNS, according to research published today in the journal *PLoS Biology*.

A natural mechanism that promotes structural robustness in animals and encourages CNS repair has been investigated using fruit flies by looking at how cells respond to injury. Axons carry impulses between nerve cells and glial cells normally surround them. After injury, glial cells are responsible for re-enwrapping axons and supporting nerve cells, encouraging recovery. In both insects and mammals, glial cell numbers

increase upon injury and this response can lead to modest recovery of nerve function.

Project Director Dr Alicia Hidalgo, Senior Lecturer from the School of Biosciences at the University of Birmingham, explains:

“Using fruit flies we have discovered a gene network that promotes repair to the central nervous system. We applied injury to the small nerve cord of Drosophila larvae of a range of genetic backgrounds.

“We found that the gene network enables glial cells to clear up cellular debris, to divide and differentiate, and restore normal glia-axon interactions, promoting repair. By removing the genes in the network, or adding them in excess, we can shift from prevention to promotion of lesion repair in the fruit fly.”

The researchers suggest that this gene network may reflect a common underlying genetic mechanism, which, if present in mammals, could help understand how to manipulate glial cells to help the human CNS self-repair.

Dr Hidalgo adds:

“Finding ways to promote central nervous system regeneration is one of the key aims of medical research in neuroscience. If this fruit fly gene network was conserved evolutionarily in human glial cells, it could help us to understand the cellular events and underlying molecular mechanisms that take place after spinal cord injury and demyelinating diseases and eventually contribute to finding therapeutic solutions for these conditions.”

Provided by University of Birmingham