Tiny worm opens big discovery on nerve degeneration
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A new discovery in a transparent roundworm brings scientists one step closer to understanding nerve degeneration.

Australian, US and European scientists have discovered two new proteins that play a role in the degeneration of axons in nerve cells.

The research, by The University of Queensland and Monash University, together with Professor Ding Xue from the University of Colorado, and Professor David Hall from the Albert Einstein College of Medicine in the US, has just been published in the journal *Cell Reports.* The new proteins were discovered in the roundworm *Caenorhabditis elegans* (*C. elegans*) by using a laser to cut axons.

Monash University researcher Dr Brent Neumann, Head of the Nervous System Development and Repair Laboratory within the Monash Biomedicine Discovery Institute said the roundworm was an ideal research model.

"This tiny worm – about 1mm long – allows us to understand what happens in axonal degeneration on a molecular and genetic level," Dr Neumann said.

"We found there is cross-talk between the dying neuron and the surrounding tissue, where the neuron sends a signal that it needs to be cleaned up," he said.

Project leader Associate Professor Massimo Hilliard, from the Queensland Brain Institute, said axons – long, thread-like nerve cell sections that transmit information – were one of the first parts destroyed in neurodegenerative disease.

"By understanding the molecules involved in axonal degeneration, we can find better ways to protect neurons," Dr Hilliard said.

"Axons are often hit and damaged by external trauma or internal injury."

Nerve axons are also damaged in neurodegenerative conditions including Alzheimer's, Parkinson's, and Charcot-Marie-Tooth diseases.

The study co-lead author, Ms Annika Nichols, said this discovery created new avenues for researchers seeking to limit the degenerative process.

"The aim would be to allow neurons to be better preserved," Ms Nichols said.

The proteins identified seem to alter the neuron's membrane when it was dying.

"The molecular components we discovered are conserved across evolution, meaning that the same proteins exist in the *C. elegans* worm as in flies, mice and humans," Ms Nichols said.

The National Health and Medical Research Council, the Australian Research Council, and the National Institutes of Health funded the study, which was published today in *Cell Reports*.