Double agent: Glial cells can protect or kill neurons, vision

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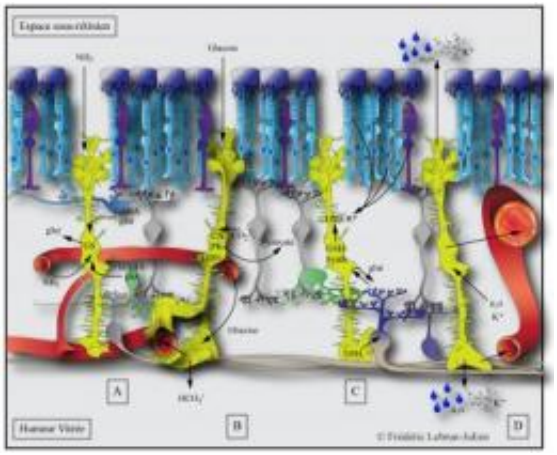

Glial cells normally protect neurons in the retina. Credit: Frédéric Lebrun-Julien, Université de Montréal

Scientists have identified a double agent in the eye that, once triggered, can morph from neuron protector to neuron killer. The discovery has significant health implications since the neurons killed through this process results in vision loss and blindness.

The findings, published in the journal Proceedings of the National Academy of Sciences (*PNAS*), are collaboration between the Université de Montreal, McGill University and the Montreal Neurological Institute in Canada and the Université de Namur in Belgium. The researchers show how an unusual molecule, called proNGF, activates glial cells that

normally protect neurons in the retina and brain.

"We found that glial cells attack and kill neurons after being triggered by proNGF," says coauthor Dr. Philip Barker, a neuroscientist at the Montreal Neurological Institute and a professor at the McGill Department of Neurology and Neurosurgery. "Since glial cells normally protect neurons, we were surprised to find that proNGF can convert glial cells into killers that cause neuron death in the retina."

Coauthor Dr. Adriana Di Polo, a professor at the Université de Montréal Department of Pathology and Cell Biology, compares the proNGF molecule to a cell hijacker. "Before this study, we didn't know what physiological role the proNGF molecule played in the eye," she says. "We now propose that, following brain damage or neurodegenerative diseases, proNGF alters the glial cell network to change its function. Rather than protecting neurons, proNGF makes the glial cells attack neurons."

Scientists must now pay more attention to the damage proNGF can trigger. "Once retinal neurons die, they are gone forever and the permanent loss of these cells causes blindness," warns Dr. Di Polo.

"The next step for researchers is to explore whether proNGF signals can be controlled", says Frédéric Lebrun-Julien, first author and a PhD student at the Université de Montréal's Department of Pathology and Cell Biology.

Dr. Barker concurs. "If we can block factors induced by proNGF, we can protect neurons that would normally be lost. We think these findings may eventually translate into clinical benefits in diseases such as glaucoma."

More information: The paper, "ProNGF induces TNFα-dependent

death of retinal ganglion cells through a p75NTR non-cell-autonomous signaling pathway," published in the journal PNAS, was authored by Frédéric Lebrun-Julien and Adriana Di Polo of the Université de Montréal; Olivier De Backer of the Université de Namur in Belgium; David Stellwagen, Mathieu J. Bertrand, Carlos R. Morales and Philip A. Barker of the Montreal Neurological Institute / McGill University.

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