

Researchers hot on the trail of brain cell degeneration

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A research team headed by Academy Research Fellow Michael Courtney has identified a new molecular pathway in neurons. The pathway is a factor in the degeneration of brain cells, which in turn plays an important role in neurological conditions and diseases, such as Alzheimer's disease, epilepsy and stroke.

Courtney and his team, based at the A. I. Virtanen Institute of the University of Kuopio, joined forces with Docent Eleanor Coffey's team at the Turku Centre for Biotechnology to carry out the study as part of a series of successful collaborations between the two teams. The results of their study are published in the latest issue of *Nature Neuroscience*.

In a number of neurodegenerative diseases, neurons in the brain are over-stimulated, which triggers programmed cell death, or apoptosis. The study shows that the Rho protein, which has long been recognised as an important player in cancer formation, also plays a key role in the destruction of neurons in disease.

"These surprising findings add an entire pathway to the map of neurodegenerative signalling processes," says Courtney. "This area of investigation could therefore offer novel therapeutic strategies for neurodegenerative diseases".

How neurons actually die has been unclear. It is likely that it is associated with a variety of different mechanisms. Research has shown that the destruction of cells by over-stimulation depends on excess entry

of calcium into the cells. Researchers have long been trying to map how cells generate destruction signals in response to the calcium, in the hope of finding new targets for drug design.

The object of the study, the Rho protein, belongs to a family of proteins able to influence signals that had been linked to cell degeneration. The two teams' analysis demonstrated that over-stimulation causes activation of Rho as well as cell destruction signals. Blocking Rho activity by genetic modification keeps the protein in an inactive state, and the nerve cells thus survive a previously toxic level of over-stimulation.

The study identifies a new factor provoking cell degeneration. It is more than likely that future research will uncover more such factors interacting with each other. Investigating these will benefit new forms of treatment and advance research that aims to alleviate symptoms. The researchers behind the study hope that the results can be used in planning new targets for drugs to reduce the cell destruction signals caused by calcium entry. Finding new targets for medicine development is also significant in terms of the economy, owing to the costly treatment of these diseases, both in Finland and globally.

The teams' study is a perfect example of the cooperation between biocentres in Finland (Biocenter Finland) and international networking. The research was funded mainly by the Academy of Finland and the European Union. The two research teams are part of a Europe-wide consortium, STRESSPROTECT, within the EU Sixth Framework Programme. The consortium aims at generating the basis for novel neuroprotective drugs for neurodegenerative conditions involving over-stimulation of neurons.

Source: Academy of Finland

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