Cell disposal faults could contribute to Parkinson's, study finds

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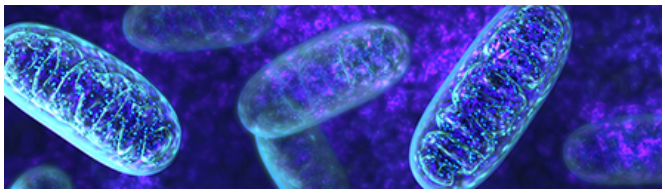

Credit: University of Nottingham

A fault with the natural waste disposal system that helps to keep our brain cell 'batteries' healthy may contribute to neurodegenerative disease, a new study has found.

The research, led by academics at The University of Nottingham and published in the journal *Cell Death and Disease*, centres on problems with mitochondria – the powerhouses which produce energy within a cell.

The results support previous evidence that patients with Parkinson's Disease have faults with brain mitochondria which contributes to dysfunction and death within their neurons.

Dr Lynn Bedford, in the University's School of Life Sciences, said: "The study highlights the importance of the ubiquitin proteasome system (UPS) for healthy mitochondria. The UPS is like a waste disposal system that removes small unwanted proteins from inside cells.

"If waste is not removed it will build up over time and become toxic, causing cells to go wrong and eventually die."

Faults in this system may play an important role in neurodegenerative diseases such as Parkinson's and Alzheimer's because they are caused by the death of neurons – the network through which we transfer information in our brain.

Harmful molecules

Using gene targeting in mice, the researchers have discovered that a faulty UPS in neurons leads to damaged mitochondria that produce less energy. Damages mitochondria are also known to produce harmful molecules that injure the cell – oxidative stress – so it is vital that the brain is able to keep mending, removing and replacing them.

The study also found that when the UPS was faulty, the damaged mitochondria were not removed from neurons in the normal way by the process of autophagy, the disposal system that breaks down larger parts in the cell like mitochondria.

The research was conducted in collaboration with experts at Nottingham Trent University, the University of Dundee, Nottingham University Hospitals NHS Trust and Great Ormond Street Hospital for Children NHS Trust in the UK and the University of Tripoli in Libya.

More information: Aslihan Ugun-Klusek et al. Continued 26S proteasome dysfunction in mouse brain cortical neurons impairs autophagy and the Keap1-Nrf2 oxidative defence pathway, *Cell Death and Disease* (2017). DOI: 10.1038/cddis.2016.443

Provided by University of Nottingham