



Parkinson's Disease Brain Cells at Risk of Burnout

A Bruno Byte

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Although this study is about Parkinson's, the theory of neurons with "a large number of extensions..." much like a tree with numerous branches" are "overheating" and then malfunctioning or dying is exactly the model we propose for "overuse abuse" of poliovirus-damaged spinal cord and brain neurons. Remember, dopamine-producing brain neurons are affected in polio survivors and Parkinson's patients...

PARKINSON'S DISEASE BRAIN CELLS AT RISK OF BURNOUT, LIKE AN OVERHEATING MOTOR

Researchers Find That The Brain Cells Most At Risk Consume Unusually High Amounts Of Energy, Gradually Exhausting And Killing Themselves.

Trudeau, L-E, et al. Current Biology, August 27, 2015

The death of brain cells in Parkinson's disease may be caused by a form of cellular energy crisis in neurons that require unusually high quantities of energy to carry out their job of regulating movement, researchers at the University of Montreal reported today. The neurodegenerative disorder affects over 100,000 Canadians and over 1,000,000 Americans.

"Like a motor constantly running at high speed, these neurons need to produce an incredible amount of energy to function. They appear to exhaust themselves and die prematurely," said lead researcher Louis-Éric Trudeau, a professor at the university's Departments of Pharmacology and Neurosciences.

"It's possible that new medications could be developed to help the neurons in question reduce their energy consumption or produce energy more efficiently, which would reduce accumulated damage over the years," Trudeau said.

Unlike Alzheimer's, which has a wider-ranging impact on billions of brain neurons, the primary symptoms of Parkinson's are caused by the death of tens or hundreds of thousands of neurons in a few more restricted areas of the brain, including regions called the dopamine producing substantia nigra, the locus ceruleus and the dorsal nucleus of the **vagus nerve**.

Key to the mystery may be **mitochondria**, the powerhouses that allow cells to grow and neurons to conduct electrical signals and release their chemical messengers such as dopamine, noradrenaline and acetylcholine. For the past three years, the research team carried out numerous experiments in order to identify why mitochondria in neurons of the substantia nigra work so hard and apparently lead neurons to "overheat".

They discovered that this overheating could be caused by the fact that these neurons have an amazingly complex structure with a large number of extensions and neurotransmitter release sites, much like a tree with numerous branches. Providing energy to these numerous branches may make

the neurons particularly vulnerable, leading, in the context of aging, to malfunction and cell death, thus triggering Parkinson's, with the onset of symptoms generally at around age sixty.

“Our work supports the theory that very complex neurons like those found in the substantia nigra force the mitochondria to constantly work at burnout rates to produce energy. This would explain the accelerated cell deterioration,” Trudeau explained. “To use the analogy of a motor, a car that overheats will burn significantly more fuel, and, not surprisingly, end up at the garage more often.”

<http://www.newswise.com/articles/view/638920/?sc=mwhn>

The Encyclopedia of Polio and Post-Polio Sequelae

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