Parkinson Society British Columbia

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Research Profile:
Charles Ducrot
PhD Student
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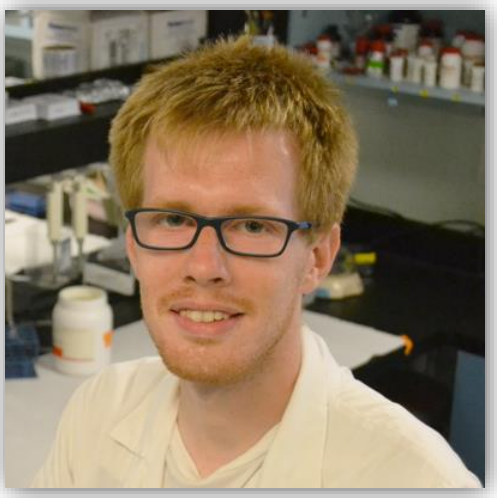

Research Project: Critical connections among brain cells.

Project Grant: Graduate Student Award - Funded by Quebec Research Fund* on Parkinson of Parkinson Quebec and Parkinson Society British Columbia: $30,000 over two years

Project Description:
Survival of Dopamine Neurons in Parkinson's Disease: The Role of Synaptic Contacts
Making connections is not only important for people's emotional well-being – it is also critical for healthy brains. As researchers are now discovering, the synapses, or the connections that convey signals and information from neuron to another, may hold clues about what causes Parkinson's disease.

At the University of Montreal, molecular biologist Charles Ducrot investigates the role synapses play in the reason that dopamine-producing neurons in one part of the brain are more vulnerable to death than those in another part of the brain.

Earlier research has already established the death of those dopamine-producing neurons as central to Parkinson's disease. Now Ducrot, a PhD student, is testing a theory that the less vulnerable neurons in the brain's ventral tegmental area (VTA) stay alive longer than those in the substantia nigra because the VTA neurons establish more synapses that release a chemical messenger called glutamate. Such synapses may allow them to communicate better with their target cells and receive signals that facilitate their survival.

Ducrot wants to find out if dopamine-producing brain cells in the substantia nigra die because they have fewer glutamate synapses, and can't receive as many survival signals.

To test his theory, Ducrot and his colleagues have identified key proteins involved in forming these connections, or synapses. Using cell cultures, he will increase or decrease the amount of these proteins expressed in the cells, to change the number of synapses the neurons form. Then he will expose the cells to toxins that produce Parkinson-like symptoms, to see if the brain cells with fewer synapses are more vulnerable and die.

“We know that synaptic contacts are very important, and in some way involved in survival,” Ducrot says. He believes that “if we increase the expression of these proteins, we increase the number of synapses, and we might decrease the vulnerability of neurons in Parkinson’s disease.”

If Ducrot can prove his theory, he hopes to lay the foundation for a new type of gene therapy.

Ever since his first year in university, when he learned about dopaminergic neurons, Ducrot has been fascinated with discovering the causes of Parkinson’s disease. “It’s a common disease, and I want to know and understand more about it,” he says.

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