

Research Profile:
Dr. Mattia Volta

Research Project:

The role of LRRK2 in the development and transmission of acute alphasynuclein neuropathology.

Project Grant: \$100,000 over two years



Project Description:

Knocking out a Protein to Protect against Parkinson's Disease

"We hope to develop a therapeutic strategy, a treatment avenue that can be tested in other models and ultimately in humans, but that will take time."

Although researchers haven't pinpointed what triggers most forms of Parkinson's disease, the interaction or collaboration among multiple genes and proteins is almost certainly critical to the spread of the illness from one damaged brain cell to another.

At the University of British Columbia, neuroscientist Mattia Volta concentrates on the relationship between the proteins alpha-synuclein and LRRK2 – and what happens if you can take one of those proteins out of the equation. Volta, who began studying Parkinson's disease in his native Italy, works with animal models missing the LRRK2 protein. He documents what happens when mice without LRRK2 are treated with a substance to replicate the alphasynuclein protein.

Clumps of alpha-synuclein are present in the brain cells of people with Parkinson's disease, and mutated forms of both proteins cause familial forms of Parkinson's. Volta has collected preliminary data indicating mice without LRRK2 are free from the cognitive impairment or memory loss that occurs in mice that have both LRRK2 and alpha-synuclein present in their brains.

“Removing LRRK2 appears to be protective when it's early in the disease's progression,” Volta says. Now he's investigating whether the absence of LRRK2 in mice also protects them against the motor problems and progression of the disease that follow cognitive changes and memory loss in Parkinson's disease. Eventually, Volta will knock out LRRK2 to see if removing the first protein can reverse or stop the brain cell death that clumps of alpha-synuclein cause.

Biography:

Volta received his BSc (*summa cum laude*) in Medicinal Chemistry in 2008 from the University of Ferrara (Italy) where he joined the laboratory of Prof. Michele Morari as a PhD student in Molecular Pharmacology. Immediately after completing the PhD in 2012, he moved to the University of British Columbia in Vancouver where he is currently a post-doctoral fellow with Prof. Matthew Farrer.

Volta's interest in neuroscience began in high school, for both personal and educational reasons. He started working on Parkinson's disease during his undergraduate training and never stopped. Initially he learnt about opioid receptors in parkinsonism and focused on research targeting these systems as a therapeutic strategy. During Volta's PhD, he became interested in the genetic etiology of Parkinson's disease, and novel insights from this new field, as knowledge of the underlying biologic pathways may lead to symptomatic and disease-modifying treatments (neuroprotection). Moving to the laboratory of Prof. Farrer has allowed Volta to expand on this topic.

Currently Volta's work is to understand the relative roles of LRRK2 and alpha-synuclein in neuronal function, as these genes have been genetically implicated in familial and sporadic Parkinson's disease. By elucidating the role of the proteins encoded in early events preceding neuronal loss, his ambition is to devise therapeutic interventions to prevent neurodegeneration.