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Structural Changes in Neurons in Multiple Sclerosis

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Title: Structural Changes in Neurons in Multiple Sclerosis

Author: Saad Bhatti

Danielle Pritchard's interest in research started as early as elementary school. Although she did not know which field she wanted to pursue, Danielle firmly decided that she wanted to have a career in science. When she arrived at VCU as a Biology major, Danielle's interest motivated her to participate in the Undergraduate Research Opportunities Program (UROP). Danielle works in the lab of Dr. Jeffrey Dupree, whose primary focus is on the molecular mechanisms that regulate the development of myelin sheaths and axon domains. Danielle's research focuses on multiple sclerosis (MS), specifically investigating if cortical inhibitory neurons are structurally altered in this degenerative disease.

Multiple sclerosis is a neurodegenerative disease symptomized by vision loss, fatigue, and impaired coordination, and is caused by the loss of myelin sheaths on neurons in the central nervous system. As the main communicators of the body, neurons transmit signals from the brain and spinal cord to the rest of the body in order to initiate a behavior. Neurons are the phone lines of the human body: they transmit information across vast distances in a small fraction of time, allowing the body to respond to stimuli rapidly. And so, when myelin sheaths—a protective coating on neurons that prevents dissipation of the signal—start to degrade, the communication between neurons becomes inefficient.

Danielle used mice diagnosed with autoimmune encephalomyelitis (EAE) as her test subjects and immunochemistry to visualize the neurons. EAE is commonly used in mouse models to make conclusions about MS in humans. Danielle discovered that although there was neither no loss in the number of these cortical neurons nor the number of synapses between neurons, there was, however, a structural difference in the length of these axons. Such an insight adds to an already growing body of research on the causes, effects, and potential treatments of multiple sclerosis.

MS affects 1 million people in the United States. Like most other neurodegenerative diseases, MS currently has no cure. With research like Danielle's elucidating the causes of this disease, potential treatments can be developed to combat MS, and help patients lead fulfilling lives.

To learn more about Danielle's research, email pritcharddp@vcu.edu.

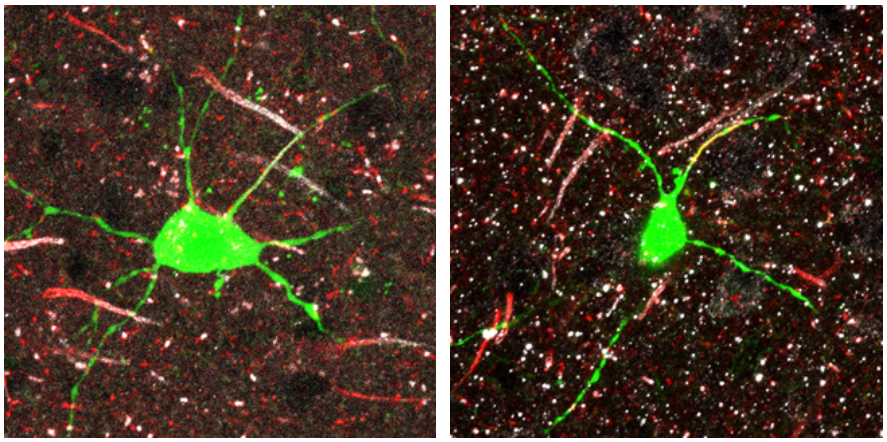

Figure A (left) is from a native mouse and Figure 2 (right) is from an EAE mouse. A significant difference is seen in the axon length.