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September 14th, 2024

Dear Donors,

My name is Hannah Martin, and I am a second year PhD student under the supervision of Dr. Shawn Whitehead, in the department of Anatomy & Cell Biology at Schulich School of Medicine and Dentistry.

Firstly, I would like to thank everyone who made today possible. Thank you, Mr. McKinnon and all the donors, for graciously supporting Western graduate students in our aim to making a difference in the field of mental health and neurodegenerative research. Words truly cannot express how grateful and touched I am to have received the Jonathan and Joshua Memorial Graduate Scholarship. Funding from this award goes beyond attaining financial security as a Graduate Student — this opportunity will allow me to devote more time to my research and will help cover costs for conferences where I can expand my professional network.

My passion for learning about and understanding the brain came at a young age. I learned that the brain, which is arguably the most important organ in the human body, is quite complex allowing us to learn new things, appreciate the world around us, and do things that we love to do like playing a round of golf with our friends that will soon become fond memories. However, I soon learned that the brain is also vulnerable. About nine years ago my grandmother was diagnosed with Alzheimer's disease, which has taken a toll on our family and her friends. I watched first-hand how this disease can affect one's cognition, behaviour, personality, and mental health. And that became my "why" to what I do today.

A statistic that left me asking many questions as a researcher is that 60% of stroke survivors will live with some sort of cognitive impairment within one-year post-stroke, where many of them will progressively develop dementia. What contributes to worse cognitive outcomes post-stroke? Microglia are cells in the brain that have many imperative functions to maintaining a healthy brain such as immune functions, cell-to-cell communication, and waste removal. One can think of them as first responders of the brain. In normal conditions, they exist in a resting state, but when a threat is sensed, such as stroke, they transition to an activated state. Within days and weeks following stroke, activated microglia clean up the site of injury while fighting against additional threats. However, when microglia are activated for too long, they can do more harm than good. Studies show that chronically activated microglia are linked to cognitive decline post-stroke, making microglia a promising target for measuring post-stroke cognitive impairment. Stroke survivors and their caregivers can better be prepared and supported through early detection of worsened cognitive outcomes post-stroke. But currently, screening tools are either inaccessible, they raise critical safety concerns, or lack the ability to accurately measure between diverse microglia that we are only beginning to understand.

To address this technical gap, my lab has established a novel way to detect microglia activation using extracellular vesicles (EVs). EVs are released by every cell in the body and can be thought of as a cell biography, revealing their cell of origin and cellular activation status. Moreover, EVs are detectable in blood draws. In a rat model of stroke, we have successfully detected EVs from different microglia populations within their blood. Compared to non-stroked rats, rats that underwent a stroke had significantly higher EVs released from microglia in their blood. I aim to observe the clinical potential of EVs to be an accessible biological marker that can be brought into primary care to detect and predict those at risk for post-stroke cognitive impairment.

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My main goal is that with early detection, people can make informed decisions on their health, empowering them, giving them hope, and improving their quality of life.

Thank you again for your remarkable support. This award has blessed many researchers and continues to do so. Your generosity is advancing scientific innovation in immense ways.

Sincerely,
Hannah

Western