

**Investigating Neurotrauma:  
Approaches to brain injury, spinal cord injury and dementia**

Notes for Dr. Brown's talk for Georgian Triangle LifeLong Learning, Friday September 16<sup>th</sup> 2022.

The presentation will describe some of the studies we have undertaken in my molecular neurobiology laboratory at the University of Western Ontario. My laboratory is interested in studying what happens in the injured nervous system. What pathological mechanisms are triggered by injury, whether that injury be traumatic or vascular (stroke).

When an injury occurs in the brain or spinal cord there really two phases to that event: a primary injury and a secondary injury. The primary injury is the event itself (perhaps the impact in a car accident). The secondary injury is a series of pathological events that reflect the body's response to the primary injury and unfortunately can make the size of the lesion greater and the disability worse. Our laboratory thus thinks of two goals for the treatment of neurotrauma. The first is to stop the ongoing injury that worsens the lesion and the second is to try and encourage healing. This boils down to our mantra of "stop the injury and promote regeneration".

Friday's presentation will consist of 3 stories. The first will describe a therapy that we have developed, in collaboration with others, that focuses on stopping the secondary injury by muting the overly robust inflammatory response that is triggered by nervous system injury. The second story will be a description of a therapeutic avenue we are pursuing to encourage nerve regeneration in the injured nervous system by trying to recreate an embryonic-like environment in which nerves like to grow. The third story will outline a new avenue of research in our laboratory investigating the link between a history of concussion and the development of dementia. In this segment of the talk while we won't answer the question of how concussion and dementia are related we will discuss the our laboratory's approach to the problem to appreciate how science works.