**Brightening Up Brain Injuries: The Design, Synthesis, and Characterization of a PET Diagnostic Agent for Neuronal Trauma**

**ABSTRACT FOR SESBASS 2021**

**Jessica Allingham1, Dr. Wely Floriano 1 , Dr. Michael Cambell 1,2**

**1Lakehead University, Ontario, Canada**

**2Thunder Bay Regional Health Research Institute, Ontario, Canada**

**BACKGROUND/OBJECTIVES**: The expression of S100B is upregulated in the presence of neuronal trauma, such as concussions. This correlate with astrocyte hypertrophy and proliferation as well as inflammation, thus S100B is a reliable biomarkers of the onset and progression of astrogliosis in neuronal trauma. Concussions are an increasingly significant issue, especially in the sports community. There is currently no single standard for diagnosing mild traumatic brain injuries. This research is conducted to fill the void in concussion diagnostics with a fluorine-18 radiotracer.

**METHOD**: This research is conducted to fill the void in concussion diagnostic techniques by identifying hit compounds using virtual screening, synthesizing them and labelling them with 18F. The radiopharmaceutical will bind to the biomarker. Once bound, the build up of S100B can effectively be imaged using a PET scanner to aid in the diagnosis of mild brain trauma. The ability to bind with the biomarkers will be tested using unlabelled probes using enzyme-linked immunosorbent assay (ELISA) experiments.

**RESULTS**: A hit compound for S100B, selected after virtual screening has been synthesized, radiolabeled and tested *in vitro*. The radiotracer performed very well and will continue to be tested using a cell assay.

**CONCLUSION/IMPLICATION**: This research could provide a very exciting advancement in concussion diagnostics to fill an eminent void in the health care system.