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**NEIL SACHSE
CENTRE
SPINAL CORD
RESEARCH**

Positron Emission Tomography - molecular imaging of the spinal cord: technology innovation for the diagnosis and treatment of spinal cord injury

Chief Investigators: Dr. Ryan O'Hare Doig, Prof. Brian Freeman, Mr. Prab Takhar
Associate Investigators: A/Prof. Jillian Clark, A/Prof. Dylan Bartholomeusz, Dr. Kevin Kuan, Mr. Doug Smyth, Mr. Nicholas Siebert

Despite decades of basic and clinical research in the fields of neurotrauma, it is sobering to note that no current effective treatments for acute, or chronic phases of spinal cord injury (SCI) exist. SCI has left millions of people disabled worldwide (Over 12,000 people in Australia today with 350-400 new cases each year). The socioeconomic cost of SCI in Australia for any calendar year has been estimated in excess of AU\$ 2.0 billion.

One of the consequences of SCI is acute post-traumatic neuroinflammation, whereby there is an induced immune response. Understanding how particular biomarkers of neuroinflammation progress over the course of injury is imperative for tracking and predicting outcomes, providing accurate diagnosis and prognosis, and choosing and monitoring appropriate therapeutic interventions for SCI injured patients. Therefore, Project Discovery, under the Neil Sachse Centre for Spinal Cord research, has gained exceptional momentum, utilising novel radioisotopes as a tool for SCI prognostics and diagnostics. This study, funded by the Lifetime Support Authority proposed to investigate whether PET-CT imaging of [^{18}F]GE-180 will serve as a robust biomarker to discriminate inflammatory responses during acute and chronic phases of SCI.

Through the generosity and support of the Lifetime Support Authority, this project has begun advancing the diagnostic and prognostic techniques used for SCI to determine [^{18}F]GE-180 validity. Funding was utilised to support a Quality control manager, Radiochemist and Research Associate with relevant experience and expertise in radioisotopes and spinal cord injury, crucial to the early development of this research, to ensure competent investigation of the novel radioisotope and verification of equipment needed. 2 transport containers were purchased for the delivery of [^{18}F]GE-180. TGA licensing and scheduling fees were purchased to allow for the approval of [^{18}F]GE-180 to be developed in house within the Molecular Imaging and Therapy Unit at the South Australian Health and Medical Research Institute (SAHMRI). Therefore, allowing for the Human Ethics approval and use of this isotope in a world first clinical trial.

We have, and will continue to develop quantitative techniques which allow accurate, non-invasive predictors of SCI severity and functional impediment. In the near future, thanks to the ongoing support of the LSA, this will likely facilitate the correct application and/or development of neuroprotective therapeutics for both acute and chronic SCI patients. This in turn will reduce the emotional, physical and socio-economic burden associated with such devastating injuries.