Diagnostics and Biomarkers

A Pilot Study of Molecular Neuroimaging of Cerebral Blood Flow (CBF) Abnormalities due to Traumatic Brain Injury (TBI) in a Swine Model

The goal of this research is to discover a molecular neuroimaging biomarker that can be used to detect secondary TBI during the acute phase of injury. Secondary TBI is more prevalent than primary TBI, is not detected with computed tomography (CT) and magnetic resonance imaging (MRI), and accounts for the majority of the morbidity and medical costs associated with TBI. The presentation of secondary TBI is subtle and often presents with nonspecific symptoms such as headache, confusion, cognitive deficits, and posttraumatic stress disorder (PTSD). Without an accurate diagnostic test, physicians cannot appropriately treat secondary TBI, the potential for a recovery is reduced, and Service Members effectiveness is reduced. Researchers at the David Grant US Air Force Medical Center propose to test a radioactive tracer that can capture an image of the brain shortly after the injury and can identify Service Members who need immediate medical attention for secondary TBI. Following brain injury in a porcine model (Sus scrofa), 25 millicurie of Technetium-99m (99mTc) hexamethylpropyleneamine oxime was injected intravenously within one minute, at one hour, and four hours after impact. A Single Photon Emission Computed Tomography/CT scanner can then take delayed pictures of the radiotracer distribution in the brain. Abnormalities in the radiotracer distribution represent areas of injured brain tissues and can be used to detect acute TBI. Initial study results are promising and an invention disclosure has been submitted.