

THE WALTER REED ARMY INSTITUTE OF RESEARCH

Brain Trauma Neuroprotection & Neuroplasticity

Investigators in this program conduct basic and applied research concerned with the early, rapid diagnosis of mild to moderate brain injury and with development of new interventions to minimize immediate damage and limit residual disability following head trauma. Following the impressive success of immediate, aggressive pharmacologic treatments in limiting cell damage after heart attack and stroke, program scientists are progressing toward similarly useful neuroprotective drugs for early use after head injury. Parallel studies are concerned with identifying protein biomarkers that are sensitive and specific for head injury, as well as other interventions such as hypothermia and stem cell transplantation.

Mission

- To conduct basic, and applied research to reduce death and residual disability caused by brain injury in combat.
- To focus on improved diagnostics and the discovery, development and implementation of novel therapeutic strategies including pharmaceuticals, hypothermia, and neural stem cell transplantation.

Research Priorities:

- Deliver an FDA approved therapeutic for the treatment of traumatic brain injury
- Finalize delivery of a medical device to deployed units that accurately detects when a service member has suffered a mild to moderate brain injury

Our expertise is in:

- Identifying protein biomarkers of brain injury.
- Developing and evaluating novel neuroprotective and neurorestorative treatment therapies.

The scope of research challenges:

- In all military conflicts, traumatic brain injury (TBI) has been the largest cause of “Died of Wound and long term disability”
- Among those who have served in our current conflicts in OIF and OEF, it has been confirmed that more than 150,000 combatants have suffered a mild TBI (mTBI) with the possibility that many have experienced repeat mTBIs.

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Major Accomplishments

- Designed and implemented high throughput neurofunctional testing platforms with real-time video recording capabilities for assessment of motor and cognitive abilities following TBI.
- Developed a novel technique to selectively cool the brain as a potential therapy for severe TBI and TBI compromised by polytrauma. This technique has been demonstrated to induce rapid, safe, and effective therapeutic brain cooling within minutes without cooling the entire body
- 1998-2010: successfully negotiated 12 Research CRADAs with private sector pharmaceutical companies to study advanced development neuroprotection drug products
- From 1999 to 2010, the department was awarded eight grants and awards in support of preclinical and clinical TBIA research products
- Established a stem cell neurorestoration project to examine potential therapeutic approaches from the treatment of TBI utilizing human stem cells derived from amniotic tissue with research partnership
- Identified protein markers of TBI to enable the eventual production of a field-ready biomedical device capable of identifying TBI in Service Members with research collaboration
- Completed preclinical brain injury neuroprotection research that led to the initiation of the multi-center, Phase II drug trial in moderate and severe TBI patients (partnered)



Increasing developmental cost and time →

Our future directions include:

- Delivering an FDA approved therapeutic for TBI treatment
- Finalizing delivery of a medical device to deployed units that accurately detects a mild to moderate brain injury
- Enable the discovery of a combination therapy for the treatment of TBI
- Deliver a validated method for inducing rapid and selective brain cooling to Advanced Development
- Identify acute (days) and delayed (weeks) clinical metrics of experimental closed-head concussions repeated mTBI in our non-invasive rat model

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