Neurocognitive and Psychological Health Treatment Strategies

Quantitative Tractography and Volumetric Magnetic Resonance Imaging (MRI) in Blast and Blunt Force Traumatic Brain Injury (TBI): Predictors of Neurocognitive and Behavioral Outcomes

The vast majority of TBIs are classified as mild to moderate but a significant proportion of these patients report persistent and sometimes disabling cognitive, psychosocial, and functional symptoms. Although results from animal studies indicate that diffuse white matter injury occurs after even relatively mild TBI (mTBI), traditional clinical neuroimaging is frequently not sensitive to this type of injury suggesting that newer methods are needed to accurately identify patients with TBI and fully characterize their injuries. Researchers at the Department of Veteran Affairs (VA) Medical Center of San Diego, California, received funding from the Psychological Health/TBI Research Program PH/TBIRP managed by the Congressionally Directed Medical Research Program (CDMRP) to conduct a clinical study to investigate new neuroimaging techniques to characterize mTBI. The major goal of this project is to investigate whether differences in cognitive outcomes are associated with type of injury (blunt versus blast force injury). In addition, researchers are collecting data in order to assess the ability of diffusion tensor imaging (DTI) to measure alterations in structural integrity of the white matter in the brain and determine if these alterations are associated with injury type, psychosocial symptoms, or clinical outcome. The predictive capability of neuroimaging variables will be explored to identify those at highest risk for poor outcomes. Finally, researchers will seek to identify the unique psychosocial challenges posed by differing mechanisms of injury as well as investigate the contribution of genetic factors to brain integrity, neuropsychological functioning, and neurobehavioral outcome. There is a need for integrative, translational studies to advance the understanding of the mechanisms and effects of TBI subtypes, thereby leading to more effective strategies for improved clinical assessment, intervention, and prognosis of patients with mTBI. Results of this study will provide novel information about the effects of differing mechanisms of injury on various brain regions and may provide information on mechanisms of reorganization that may support recovery from injury. Ultimately, these findings can be used to monitor response to potential treatment therapies in future clinical trials.