

A Projectile Concussive Impact Model Produces Neuroinflammation in Both Mild and Moderate-Severe Traumatic Brain Injury_Dataset

Traumatic brain injury (TBI) is as a major cause of death and disability experienced by nearly 3 million people annually resulting from falls, vehicular accidents, or from being struck by or against an object. While TBIs can range in severity, the majority of injuries are considered to be mild. However, TBI of any severity has the potential to have long-lasting neurological effects including headaches, cognitive/memory impairments, mood dysfunction, and fatigue as a result of neuronal damage and neuroinflammation. The goal of the study was to evaluate the neuroinflammatory and neuronal damage outcomes associated with mild or moderate-severe TBI via the modification of an established closed-head injury model of TBI by varying the material of the projectile. Rats that received TBI using a stainless steel projectile exhibited outcomes strongly correlated to moderate-severe TBI, such as prolonged unconsciousness, impaired neurobehavior, increased risk for hematoma and death, as well as significant neuronal degeneration and neuroinflammation throughout the cortex, hippocampus, thalamus, and cerebellum. In contrast, rats that received TBI with an aluminum projectile exhibited characteristics more congruous with mild TBI, such as a trend for longer periods of unconscious in the absence of neurobehavioral deficits, a lack of neurodegeneration and mild neuroinflammation. Our results indicate that different levels of behavioral, neuroinflammatory, and damage outcomes are associated with differing levels of TBI severity.

Data Collection Methods

Adult male Sprague-Dawley rats received either a mild or moderate-severe TBI using the projectile concussive impact model of TBI with an aluminum or stainless steel ball bearing, respectively. Rats were evaluated for the duration of unconsciousness following TBI, as well as neurobehavioral dysfunction from 1 to 72 hours post-TBI. Inflammatory cytokine mRNA expression was measured in the brain by quantitative real time PCR at 6 hours post-TBI.

Publications using this dataset

Michalovicz LT, Kelly KA, Craddock TJA, O’Callaghan JP (2023) A Projectile Concussive Impact Model Produces Neuroinflammation in Both Mild and Moderate-Severe Traumatic Brain Injury *Brain Sciences*. 2023, 13, 623. <https://doi.org/10.3390/brainsci13040623>.

Acknowledgement

The work that generated this dataset was supported by Intramural funding from the Centers for Disease Control and Prevention – National Institute for Occupational Safety and Health and Congressionally-Directed Medical Research Program, Gulf War Illness Research Program grants: GW120037 for the Boston University Gulf War Illness Consortium (K. Sullivan, PI) and GW180106 (LT. Michalovicz, PI).

When a publication makes use of this dataset, acknowledgement of the development of the dataset should be attributed to Michalovicz LT, Kelly KA, O’Callaghan JP.

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