

Effects of Exercise Training on Outcomes Following Traumatic Brain Injury

Approximately 1.5 million Americans sustain a traumatic brain injury (TBI) each year. Many problems after TBI have been linked to activation of the sympathetic nervous system, particularly increased anxiety and impaired working memory. Interestingly, exercise has been shown to reduce anxiety and improve memory. Therefore, because regular exercise training leads to frequent, repetitive activation of the sympathetic nervous system, we hypothesized that it may “acclimate” an individual to the stress of traumatic brain injury. Using a mouse model, a fluid percussion instrument was utilized to induce a TBI. Three controls (TBI without exercise, no TBI with/without exercise) were compared to mice with exercise pretreatment followed by an induced TBI. Before the injury, mice were exposed to two weeks of voluntary exercise using wheels inside their cages. Running distance and time were measured every 24 hours until the day of the injury. Behavioral/neurological deficits were measured by independent observers using a 15 point scoring system (the neuroscore), and memory and anxiety were tested using the acoustic startle box paradigm. Mice with exercise pretreatment and TBI are expected to have significantly lower average neuroscores (fewer neurological deficits) than those without exercise. It will also be expected that mice with TBI and no exercise will have significantly higher neuroscores than mice from all other groups. Results from acoustic startle are expected to show less anxiety and improved memory in those with exercise compared to mice with with TBI and no exercise. It might also be expected that mice without injury and with exercise will have significantly less anxiety than mice without both injury and exercise. The results expected from these experiments may provide insight into the pathophysiological complications following a TBI.