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## The treatment of traumatic brain injury and chronic traumatic encephalopathy in a rat model with stromal vascular fraction and expanded adipose derived mesenchymal stem cells

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Traumatic brain injury results after a blow to the head induces a terminal change in velocity causing the brain to be displaced beyond the blood brain barrier. This impact causes a cascade of cellular injuries. The initial injury is vascular and effects neuronal cells as well. The secondary injury is autoimmune in nature. Adipose derived mesenchymal stem cells (ADSCs) have the ability to migrate to sites of injury (inflammation) and repair damaged neuro-vascular tissue. They also can mitigate immune responses due to their immuno-modulatory characteristics. The first part of our study examined the use of fresh stromal vascular fraction (SVF), which contains ADSCs and hematopoietic stem cells (HSCs), delivered via tail vein injection, to mitigate the effects of shockwave induced TBI. The administration of SVF improved both memory and motor skills functions. Another model was developed to model chronic traumatic encephalopathy (CTE) in the rat model. In this follow up study, rats received a shockwave induced TBI once a week for 10 weeks, followed by 1 million culture expanded ADSCs via tail vein injection (saline control). The rats were monitored for memory and motor skills. Histology was performed and showed human nucleated cells homed in on the site of injury and developed into functional tissue. These two studies show that cell treatment improves patient with acute brain injury and can prevent otherwise long term expected side-effects of CTE.

### Biography

Sean Berman has completed his BS at Amherst College and his MS at Louisiana Tech University. As a college quarterback, he saw first hand effects of traumatic brain injury and realized the clear lack of active treatment options available. He has been researching brain injuries and stem cells in the laboratory setting for 5 years now and actively collaborates with physicians in the hopes of developing clinically relevant research, findings and solutions.

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