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## Longitudinal Assessment of a Porcine Traumatic Brain Injury Model Utilizing Immunohistochemistry

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In the United States alone, approximately 50,000 deaths result from traumatic brain injury (TBI) annually. At this time, there is no adequate TBI treatment. Neural stem cells may serve as a regenerative cell replacement therapy, as they are capable of differentiating into neurons, astrocytes, and oligodendrocytes and produce regenerative factors such as VEGF. These cells have been shown to lead to structural and functional improvement in rodent models that have suffered similar neural injuries. However, treatments that have been developed in rodent models regularly fail in clinical trials, thus more predictive large animal models are needed. With a large gyrencephalic brain and gray-white matter composition similar to humans, the pig is an effective large animal model. The objective of this study is to longitudinally assess changes in brain cellular composition in a piglet model of TBI. Piglets underwent surgery to generate a concussive TBI. To assess the time course of TBI pathology, piglets were sacrificed and brain tissues were collected 1 day, 1 week, and 4 weeks post-TBI. At the site of neural injury, we assessed cellular level changes in TBI pathology using the neuron marker NeuN, astrocyte marker GFAP and the oligodendrocyte marker Olig2. At 1 week post-TBI, NeuN staining demonstrated a significant decrease in neurons. In addition, the upregulation of GFAP expression indicated increased astrogliosis at both 1 week and 4 weeks post-TBI. No significant changes in Olig2+ oligodendrocytes were noted. Standardization of this novel model opens the door for the evaluation of new cell therapies, pharmaceuticals and therapeutic approaches thus providing the field with a critically needed assessment tool.