InSyTe FLECT/CT Application Spotlight

Neurotrauma – CT imaging

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Title: Skull fractures induce neuroinflammation and worsen outcome after closed head injury in mice
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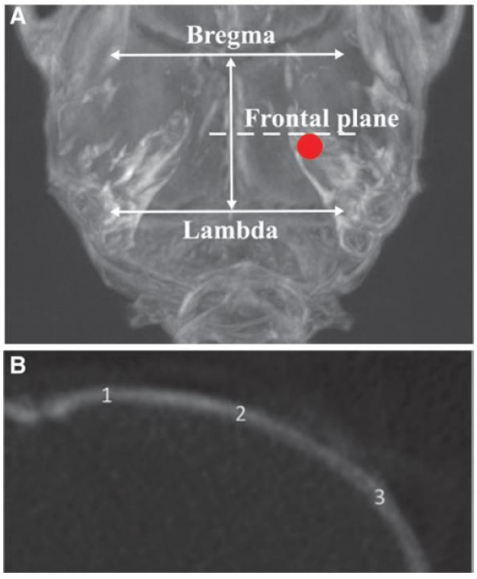
Keywords: neuroinflammation, skull fracture, traumatic brain injury, weight-drop model

Summary: The study of neuroinflammation commonly uses a method known as the weight-drop model. This model is known to induce skull fractures and subsequent expression of cytokines, matrix metalloproteinases and other genes to the injured site. Variability in the weight-drop model will cause differing levels of expression of these genes and will change the duration of remodeling the bone undergoes after injury. Additionally, the age of the mice that were studied also played an impact on whether fractures occurred, due to the thickness of the bone structure, as well as the severity of traumatic brain injury as the mice recovered. In this study, the authors focused on micro-computed tomography (micro-CT) to quantify the skull thickness at the site of impact, using the built-in µ-CT in the InSyTe FLECT/CT. They utilized both the acquired 3D tomographic data to visualize the skull fracture, and the cross-sectional views to assess bone thickness at the site of injury.



The authors used the CT subsystem of the InSyTe FLECT/CT to assess landmarks post-surgery to indicate the area of impact location after using the weight-drop traumatic brain injury model. The landmarks also indicate the thickness and density measurement points on the coronal section of the affected parietal bone impact location. Statistical analysis was performed on these cross sectional measurements to determine the mean and standard error of subjects with and without fractured skulls after impact.

InSyTe FLECT/CT Spotlight: Using the CT system on the InSyTe FLECT/CT, the research team first identified the location of the weight-drop model impact area, then used CT to evaluate skull thickness and bone density at the impact locations. This analysis allowed for the researchers to confirm their hypothesis that traumatic brain injury with skull fractures resulted in a more sever neurobehavioral response and considerable increase in inflammatory gene expression in brain tissue. The research team was able to non-invasively visualize the impact area of injury due to the superior bone imaging CT capabilities of the InSyTe FLECT/CT.