Closed Head Injury Model of Rotation and Acceleration (CHIMERA)

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Technology description

CHIMERA is a translationally relevant platform for human traumatic brain injury (TBI) research. CHIMERA was specifically designed to overcome many of the caveats that limit the translational relevance of most existing TBI models. CHIMERA's innovation lies in its ability to generate, in a biomechanically controlled and reproducible manner, a wide range of TBI severity with completely free head movement.

Traumatic Brain Injury (TBI) is one of the largest unmet medical needs worldwide, with over 2M new injuries annually within North America alone with economic costs estimated at >$20 billion/year. A general need exists for pre-clinical animal models that more closely mimic the human conditions and neuropathology that follow traumatic brain injury.

A significant challenge for translation of animal model findings to meaningful clinical use is the availability of injury models that accurately resemble the biomechanical forces that impinge on the human brain during TBI. Specifically, acceleration and rotation causing deformation and contusion of the brain within the skull accompanies many of the most common TBI incidents such as falls, motor vehicle accidents and blunt force head trauma, which is thought to result in diffuse vascular, axonal and glial damage with a complex collection of secondary manifestations that are the target of ongoing study and therapeutic development.

Theclosedheadinjurymodel ofengineeredrotationalacceleration (CHIMERA) was developed to provide an injury paradigm that is non-surgical, highly reproducible and scalable over a wide range of injury severity and CHIMERA was recently shown in mice to generate selective and diffuse white matter damage that closely resembles features of human diffuse axonal injury.

The CHIMERA platform is intended to provide a meaningful model of diffuse axonal injury for the TBI research community that will lead to advances in basic understanding of TBI-related brain processes of degeneration and repair as well as establish a preclinical model that is more similar to the human condition so that the development of therapies may be approached with greater translational relevance.

Publications

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