

Session/Poster#

Presenter

**B15**

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**Analysis of markerless limb tracking reveals chronic and progressive motor deficits and atrophy after a single closed head injury in mice**

Acute injury following brain trauma may evolve into a chronic and progressive disorder. The chronic consequences of TBI have been understudied due to the lack of robust behavioral changes that are delayed in onset and chronic or progressive. Any assessment of the chronic consequences of TBI must distinguish changes that arise due to age vs from injury. Motor deficits were assessed on open field, beam walk, simple-complex wheel in C57BL/6 mice that received a single closed head injury (CHI) and analyzed 7days post injury (DPI), 14DPI or 180DPI. T2 MRI assessed atrophy. Atrophy occurs subacutely in the injured corpus callosum (CC), progressing into the injured internal capsule, substantia nigra, contralesional CC, and caudate/putamen. In open field center, CHI180 mice have a turn bias not present 7DPI. On beam walk 180DPI, both groups more slowly traverse 2cm and 1cm beams than 7DPI. Foot-faults show no effect of age or injury. On simple wheel, injury affects speed at 14DPI with no effect on distance travelled. Motor behavior was then assessed using Deeplabcut<sup>TM</sup> markerless tracking. Custom Python scripts were developed to compute beam walk absition (foot fault severity) on beam walk; and to measure step frequency and quadrupedal limb coordination in simple-complex wheel. On 2cm beam, age increased absition in CHI and sham mice. On 1cm beam both forelimbs and the left hindlimb of CHI180 mice have larger absition than 7DPI or sham180 mice. On simple wheel, CHI180 mice developed a compensatory running strategy by increasing step frequency variability to reach sham-level quadrupedal limb coordination improving running speed compared to 14DPI. On complex wheel, CHI180 mice do not use this compensation resulting in impaired limb coordination. These data suggest a single impact produces chronic and progressive motor deficits and motor related atrophy in CHI180 mice. Quantitative motor analysis using DeepLabCut<sup>TM</sup> tracking reveals deficits not seen using standard outcomes.