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Behavioral, blood, and magnetic resonance imaging biomarkers of experimental mild traumatic brain injury

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Abstract:

Repeated mild traumatic brain injuries (mTBI) may lead to serious neurological consequences, especially if re-injury occurs within the period of increased cerebral vulnerability (ICV) triggered by the initial insult. MRI and blood proteomics might provide objective measures of pathophysiological changes in mTBI, and indicate when the brain is no longer in a state of ICV. This study assessed behavioral, MRI, and blood-based markers in a rat model of mTBI. Rats were given a sham or mild fluid percussion injury (mFPI), and behavioral testing, MRI, and blood collections were conducted up to 30 days post-injury. There were cognitive impairments for three days post-mFPI, before normalizing by day 5 post-injury. In contrast, advanced MRI (i.e., tractography) and blood proteomics (i.e., vascular endothelial growth factor) detected a number of abnormalities, some of which were still present 30 days post-mFPI. These findings suggest that MRI and blood proteomics are sensitive measures of the molecular and subtle structural changes following mTBI. Of particular significance, this study identified novel tractography measures that are able to detect mTBI and may be more sensitive than traditional diffusion-tensor measures. Furthermore, the blood and MRI findings may have important implications in understanding ICV and are translatable to the clinical setting.

Full text:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4923906/