Military traumatic brain injury

Contact sports athletes and military personnel who suffered a repetitive mild traumatic brain injury (rmTBI) are at high risk of neurodegenerative diseases such as advanced dementia and chronic traumatic encephalopathy (CTE). However, due to the lack of specific biological indicators in clinical practice, the diagnosis and treatment of repetitive mild traumatic brain injury are quite limited.

Zhang et al. used 2-methacryloyloxyethyl phosphorylcholine (MPC)-nanocapsules to deliver immunoglobulins (IgG), which can increase the delivery efficiency and specific target of IgG while reducing the effective therapeutic dose of the drug.

The results demonstrated that MPC-capsuled immunoglobulins (MPC-n (IgG)) significantly alleviated cognitive impairment, hippocampal atrophy, p-Tau deposition, and myelin injury in rmTBI mice compared with free IgG. Furthermore, MPC-n (IgG) can also effectively inhibit the activation of microglia and the release of inflammatory factors.

In the present study, Zhang et al. put forward an efficient strategy for the repetitive mild traumatic brain injury treatment of related cognitive impairment and provide evidence for the administration of low-dose IgG [1)]

Mild Traumatic brain injury (mTBI) is a signature wound in military personnel, and repetitive mTBI has been linked to age-related neurodegenerative diseases that affect white matter (WM) in the brain. However, findings of injury to specific white matter tracts have been variable and inconsistent. This may be due to the heterogeneity of mechanisms, etiology, and comorbid disorders related to mTBI. Non-negative matrix factorization (NMF) is a data-driven approach that detects covarying patterns (components) within high-dimensional data. Bouchard et al. applied NMF to Diffusion-weighted magnetic resonance imaging data from military Veterans with and without a self-reported TBI history. NMF identified 12 independent components derived from fractional anisotropy (FA) in a large dataset (n = 1,475) gathered through the ENIGMA (Enhancing Neuroimaging Genetics through Meta-Analysis) Military Brain Injury working group. Regressions were used to examine TBI- and mTBI-related associations in NMF-derived components while adjusting for age, sex, post-traumatic stress disorder, depression, and data acquisition site/scanner. They found significantly stronger age-dependent effects of lower FA in Veterans with TBI than Veterans without in four components ($q < 0.05$), which are spatially unconstrained by traditionally defined WM tracts. One component, occupying the most peripheral location, exhibited significantly stronger age-dependent differences in Veterans with mTBI. They found NMF to be powerful and effective in detecting covarying patterns of FA associated with mTBI by applying standard parametric regression modeling. The results highlight patterns of WM alteration that are differentially affected by TBI and mTBI in younger compared to older military Veterans [2)].

1)
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2)
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