Title: Blood Biomarkers, Diffusion Tensor Imaging, and Outcome after Mild Traumatic Brain Injury

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Background: Association of blood levels of the axonal biomarker neurofilament light and brain white matter injury in mild traumatic injury (mTBI) has been reported.[1] The purposes of this study were to assess the association between the levels of several non-axonal blood-based biomarkers at admission and post-acute diffusion metrics and to examine their association with outcome in patients with mTBI.

Materials and methods: A total of 92 patients with mTBI (Glasgow Coma Scale ≥ 13) having plasma samples for glial fibrillary acidic protein (GFAP), interleukin 10 (IL-10), heart fatty-acid binding protein (H-FABP), S100 calcium-binding protein B (S100B), total tau (T-Tau), amyloid beta 40 and 42 (amyloid B40 and B42) within 24 h of admission and diffusion-weighted magnetic resonance imaging (DW-MRI) ≥ 90 days post-injury (median = 229) were included. Patients were divided into computed tomography (CT)-positive and CT-negative subgroups. Outcome was assessed using Glasgow Outcome Scale-Extended (GOSE) at the time of imaging. Outcomes were dichotomized as complete (GOSE 8) and incomplete recovery (GOSE <8). Mean fractional anisotropy (FA), mean diffusivity (MD), axial diffusivity (AD), and radial diffusivity (RD) were calculated from the skeletonized white matter (WM) tracts of the whole brain.

Results: The levels of GFAP, IL-10 and T-Tau significantly correlated negatively with FA and positively with MD and RD in patients with incomplete recovery. Similar associations were found in the whole cohort and CT-positive groups, although none of the individual analyses survived after correcting for multiple comparisons. There were no associations between blood biomarkers and the mean FA, MD, AD, or RD in patients with complete recovery or with a normal head CT.

Conclusion: In patients with mTBI, admission plasma levels of GFAP, IL-10, and T-Tau correlate with post-acute WM integrity in patients with incomplete recovery. Higher levels of these biomarkers may be associated with diffuse axonal injury.

1. Hossain I, Mohammadian M, Maanpää H-R, u.c. Plasma neurofilament light admission levels and development of axonal pathology in mild traumatic brain injury. *BMC Neurol*. 2023;23(1):304. doi:10.1186/s12883-023-03284-6