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9 Serum Neurofilament is Associated with Diffusion Kurtosis Imaging in Chronic Mild-Moderate Traumatic Brain Injury

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Objective: To determine the association between blood markers of white matter injury (e.g., serum neurofilament light and phosphorylated neurofilament heavy) and a novel neuroimaging technique measuring microstructural white matter changes (e.g., diffusion kurtosis imaging) in regions (e.g., anterior thalamic radiation and uncinate fasciculus) known to be impacted in traumatic brain injury (TBI) and associated with symptoms common in those with chronic TBI (e.g., sleep disruption, cognitive and emotional disinhibition) in a heterogeneous sample of Veterans and non-Veterans with a history of remote TBI (i.e., >6 months).

Participants and Methods: Participants with complete imaging and blood data (N=24) were sampled from a larger multisite study of chronic mild-moderate TBI. Participants ranged in age from young to middle-aged (mean age = 34.17,

SD age = 10.96, range = 19-58) and primarily male (66.7%). The number of distinct TBIs ranged from 1-5 and the time since most recent TBI ranged from 0-30 years. Scores on a cognitive screener (MoCA) ranged from 22-30 (mean = 26.75). We performed bivariate correlations with mean kurtosis (MK) in the anterior thalamic radiation (ATR; left, right) uncinate fasciculus (UF; left, right), and serum neurofilament light (NFL), and phosphorylated neurofilament heavy (pNFH). Both were log transformed for non-normality. Significance threshold was set at $p < 0.05$.

Results: pNFH was significantly and negatively correlated to MK in the right ($r = -0.446$) and left ($r = -0.599$) UF and right ($r = -0.531$) and left ($r = -0.469$) ATR. NFL showed moderate associations with MK in the right ($r = -0.345$) and left ($r = -0.361$) UF and little to small association in the right ($r = -0.063$) and left ($r = -0.215$) ATR. In post-hoc analyses, MK in both the left ($r = 0.434$) and right ($r = 0.514$) UF was positively associated with performance on a frontally-mediated list-learning task (California Verbal Learning Test, 2nd Edition; Trials 1-5 total).

Conclusions: Results suggest that serum pNFH may be a more sensitive blood marker of microstructural complexity in white matter regions frequently impacted by TBI in a chronic mild-moderate TBI sample. Further, it suggests that even years after a mild-moderate TBI, levels of pNFH may be informative regarding white matter integrity in regions related to executive functioning and emotional disinhibition, both of which are common presenting problems when these patients are seen in a clinical setting.

Categories: Acquired Brain Injury (TBI/Cerebrovascular Injury & Disease - Adult)

Keyword 1: traumatic brain injury

Keyword 2: neuroimaging: structural

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10 Accuracy of Chronic Traumatic Encephalopathy Knowledge Across Three Diverse Samples

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