

Researchers discover oligodendrocyte loss and subtype alteration in CTE brains

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Since 2008, researchers at Boston University School of Medicine (BUSM) and VA Boston Healthcare System have studied chronic traumatic encephalopathy (CTE), a progressive brain disease associated with repetitive head impacts that has been diagnosed after death in the brains of American football players and other contact sport athletes as well as members of the armed services. Clinically, impulsivity,

explosivity, depression, memory impairment and executive dysfunction have been reported to occur in the disease.

While many of the scientific studies to date have focused on repetitive head trauma leading to the development of abnormal tau, a new study provides insights into white matter changes that may offer new targets for therapies.

"Research to date has focused on the deposition of abnormal tau in the [gray matter](#) in CTE. This study shows that the white matter undergoes important alterations as well. There is loss of oligodendrocytes and alteration of oligodendrocyte subtypes in CTE that might provide new targets for prevention and therapies," said corresponding author Ann McKee, MD, chief of neuropathology at VA Boston Healthcare, director of the BU CTE Center.

McKee and her team isolated cellular nuclei from the postmortem dorsolateral frontal white matter in eight cases of CTE and eight matched controls. They conducted single-nucleus RNA-seq (snRNA-seq) with these nuclei, revealing transcriptomic, cell-type-specific differences between the CTE and control cases. What they discovered was that the white matter in CTE had fewer oligodendrocytes and the oligodendroglial subtypes were altered compared to control tissue.

These findings are of particular interest because previous studies have largely focused on the CTE-specific tau lesion located in the cortex in the brain. "In comparison, the cellular death process occurring in white matter oligodendrocytes in CTE appears to be separate from the accumulation of hyperphosphorylated tau," she said. "We know that the behavioral and mood changes that occur in CTE are not explained by tau deposition. This study suggests that white matter alterations are also important features of the disease, and future studies will determine whether these [white matter](#) changes play a role in the production of

behavioral or mood symptoms in CTE, such as explosivity, violence, impulsivity, and depression."

More information: Chancellor, K.B., Chancellor, S.E., Duke-Cohan, J.E. et al. Altered oligodendroglia and astroglia in chronic traumatic encephalopathy. *Acta Neuropathol* (2021).

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