

Examining the Relationship between Concussion and Neurodegenerative Disorders: A Review on Amyotrophic Lateral Sclerosis and Alzheimer's Disease

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Abstract : Background: Current epidemiological studies have examined the associations between moderate and severe traumatic brain injury (TBI) and their risks of developing neurodegenerative diseases. Concussion, also known as mild TBI (mTBI), is however quite distinct from moderate or severe TBIs. Only few studies in this burgeoning area have examined concussion—especially repetitive episodes—and neurodegenerative diseases. Thus, no definite relationship has been established between them. Objectives : This review will discuss the available literature linking concussion and amyotrophic lateral sclerosis (ALS) and Alzheimer's disease (AD). Materials and Methods: Given the complexity of this subject, a realistic review methodology was selected which includes clarifying the scope and developing a theoretical framework, developing a search strategy, selection and appraisal, data extraction, and synthesis. A detailed literature matrix was set out in order to get relevant and recent findings on this topic. Results: Presently, there is no objective clinical test for the diagnosis of concussion because the features are less obvious on physical examination. Absence of an objective test in diagnosing concussion sometimes leads to skepticism when confirming the presence or absence of concussion. Intriguingly, several possible explanations have been proposed in the pathological mechanisms that lead to the development of some neurodegenerative disorders (such as ALS and AD) and concussion but the two major events are deposition of tau proteins (abnormal microtubule proteins) and neuroinflammation, which ranges from glutamate excitotoxicity pathways and inflammatory pathways (which leads to a rise in the metabolic demands of microglia cells and neurons), to mitochondrial function via the oxidative pathways.

Keywords : amyotrophic lateral sclerosis, Alzheimer's disease, mild traumatic brain injury, neurodegeneration

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