CHRONIC TRAUMATIC ENCEPHALOPATHY (CTE)

Frequently Asked Questions

Traumatic Brain Injury Center of Excellence

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WHAT IS CTE?

Chronic traumatic encephalopathy (CTE) is the term used to describe a specific pattern of microscopic changes in the brain. However, there are many disagreements surrounding CTE within the scientific community. Some researchers have suggested that CTE is unique and associated with subconcussive blows to the head[1] or concussions[2] while others suggest that CTE is not unique[3,4], has been found in people with other medical conditions[5], and does not meet criteria to be called a disease[6,7]. Because there are so many unknowns related to CTE, the scientific community continues to work toward a better understanding of how head impacts (both number and severity) and other possible factors are associated with the development of CTE.

HOW IS CTE DIAGNOSED?

There is no current test for CTE in the living. It can only be diagnosed at autopsy after a person is deceased. The National Institutes of Health (NIH) sponsored the "First Consensus Workshop on CTE"[8] in order to create agreed-upon diagnostic criteria which resulted in only one finding specific to CTE—"an accumulation of abnormal hyperphosphorylated tau (p-tau) in neurons and astroglia distributed around small blood vessels at the depths of cortical sulci and in an irregular pattern." Seven additional features were considered supportive of CTE but were not sufficient to make a diagnosis. When CTE is suspected in a living person, a thorough medical and psychological examination may be used to rule out other potential causes of symptoms.

WHAT ARE SUBCONCUSSIVE HEAD IMPACTS OR BLOWS?

Subconcussive head impacts or blows have been described as hits to the head that do not reach the threshold of a concussion and do not cause an alteration or loss of consciousness or loss of memory for the injury event. The scientific community is still working to define the standard of a subconcussive blow.

WHAT ARE THE SYMPTOMS OF CTE?

Within the scientific literature, there have been several attempts to describe a clinical syndrome, or group of symptoms, for CTE which include memory loss, impaired judgement, impulse control problems, aggression, depression, anxiety, suicidality, parkinsonism, and eventually progressive dementia[9,10]. However, there is no recognized syndrome that is unique to CTE and these symptoms may be the result of other potentially treatable conditions.

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HOW COMMON IS CTE?

Little is currently known about how many people may have CTE. The current literature on CTE is based primarily on small samples of symptomatic individuals who experienced subconcussive blows or concussions over many years and who later donated their brains for research[1,9]. These samples may not be typical of the entire group of individuals who have experienced repeated subconcussive blows. Furthermore, recent developments suggest that CTE may have been misdiagnosed in several of the world's brain banks and the microscopic findings may have been due to other age-related tauopathies[11]. Research that follows a representative group of individuals with exposure to repeated subconcussive blows, not only those who express symptoms, over time is required to better understand the relative risk of CTE and how widespread it is.

IS CTE A NEW DISEASE?

CTE has been known by various names such as "Punch Drunk Syndrome"[12] and "Dementia Pugilistica"[13] and discussed within the medical literature since the early 1900s[12]. It was primarily associated with boxers until 2005 following a case study of former NFL player Mike Webster[14]. Since 2005, media exposure and the scientific literature greatly expanded[15], but much work remains to be done for researchers to gain a firm understanding about the nature, cause, prevalence (number of people who have it), diagnostic criteria, co-occurring conditions, or possible treatments.

CAN CTE BE DIAGNOSED IN LIVING PERSONS?

Doctors cannot currently diagnose CTE in a living person. There are investigations underway to identify PET radioligands (signaling molecules) that could be used to detect tau deposition in the brain in living persons using brain imaging. However, these efforts remain in the experimental phase, and much work is needed before an accurate and reliable solution is available in clinical settings[16].

WHERE CAN I GET MORE INFORMATION?

Please view a current research review information paper that describes what is and is not known about CTE in the research section of the Traumatic Brain Injury Center of Excellence's website: Health.mil/TBIResearch.

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