Sports Neuropsychology Society

Chronic Traumatic Encephalopathy:
A Q and A Fact Sheet

For nearly 100 years, the medical community has considered the idea that repeated injuries to the brain may be associated with long-term neurological and psychological symptoms. More recently, there has been a spotlight on the potential risks to the brain resulting from participation in contact sports. This interest has been fueled by reports of some high-profile professional athletes who experienced a progressive decline of their physical and thinking abilities, and changes in mood and behavior as they aged. Examination of these brains after death revealed abnormalities in some, but not all, cases. These abnormal brain findings have been called *Chronic Traumatic Encephalopathy* or *CTE*. Some medical researchers (see references) have suggested that CTE is a result of concussions or repeated impact forces transmitted to the heads of athletes during their playing careers. The media attention that followed raised public concern about the risks of developing CTE from playing contact sports. However, information about CTE is still evolving, and early ideas about its possible causes and effects were launched into the public eye ahead of the scientific evidence, leading to confusion and fear.

Scientific research is being conducted to better understand CTE and how it may be related to head impacts. This research is still in the early stages, and many questions remain unanswered. This ***Q & A Fact Sheet*** was created by the ***Sports Neuropsychology Society*** to provide answers, based on current scientific data, to some of the frequently asked questions and concerns about CTE. It is written for parents, coaches, athletes, policymakers and other health care stakeholders.

What is CTE?

CTE is a condition characterized by changes in brain cells (abnormal tau protein) that can be detected only at autopsy by microscopic examination of brain tissue. The presence of abnormal tau proteins is not unique to CTE since it is also found in the brains of people with other neurological conditions. It has been reported that the pattern of abnormal tau protein deposits appears different in CTE and may be indicative of a unique condition possibly related to head impacts. However, research on the cause and potential cognitive and behavioral effects of CTE is still in its early stages and is inconclusive at this time.

How is CTE diagnosed?

Currently, CTE can only be diagnosed after a person's death by brain autopsy. A neuropathologist conducts special laboratory procedures that detect the presence and distribution of an abnormal tau protein in the brain. Since there are still no definitive clinical markers for CTE in a living person and the proposed signs and symptoms of CTE are common in other medical conditions**,** it is not appropriate to diagnose CTE in a living person.

What are the signs that someone has CTE?
Identifying the possible signs of CTE in the living person is a challenge for science and medicine. Some signs or symptoms that have been reported in association with CTE include problems with thinking, forgetfulness, depression, irritability, and other personality changes. However, these same signs and symptoms of cognitive and behavioral changes also occur in other neurologic and psychological conditions and in individuals with or without a history of concussion or repeated head impacts.

Because there are many other treatable conditions that have symptoms similar to those presumed to be related to CTE (but are not CTE), it is important that any current or former athlete with changes in mood, behavior, and thinking seek a comprehensive medical and neuropsychological evaluation. Proper evaluation and diagnosis can lead to identifying medical conditions that are highly treatable, thus improving the individual's quality of life.

What causes CTE?
Although neuropathologists have made advances in defining and identifying CTE, researchers remain in disagreement about the exact causes of CTE. Many scientists and international consensus groups have stated that while there may be a relationship between repetitive head impacts and CTE, no clear-cut, definitive cause and effect relationship has been established. It appears that multiple biological mechanisms and environmental or lifestyle factors could also produce the brain abnormalities found in CTE. Scientists are currently investigating how a variety of factors and mechanisms may result in CTE.

Are there specific risk factors that may predispose an athlete to CTE?
Multiple genetic, biological, psychological, social, and environmental risk factors for CTE are under investigation but have not been conclusively identified. A history of repeated brain impacts is often found in athletes with CTE, but not all athletes with repeated head impacts history develop CTE. In fact, one large-scale investigation of the brains of former athletes found CTE in less than 10% of autopsied cases, and most had other forms of neuropathology as well. Additionally, CTE has also been found in non-athletes with no known history of brain injury.

Are children who play contact sports at risk for CTE later in life? Has CTE been found in children and adolescents?
At this time, there is no research that links youth contact sport participation with a risk for CTE. To date, there have been no reports of CTE in young children. Although there have been some reports of abnormal tau protein in the brains of a few deceased adolescents, it has not been established that the abnormal protein was related to the cause of death or the cause of any cognitive or behavioral changes these adolescents may have experienced in life.
Parents and coaches should ensure, however, that safe coaching and playing methods (such as limited contact exposure, safe methods of contact, proper skill development, enforcement of good sportsmanship, properly fitting protective gear) are instituted in all youth sports and at all levels of play. *Also of great importance is providing effective training in concussion recognition and management skills to all individuals involved in sports.*

Can CTE be prevented and/or treated?
At this stage of science and knowledge, we do not understand the factors that produce CTE, nor can we determine who will get it. Without such knowledge or a clear understanding of

CTE, it is impossible to create a successful CTE prevention or treatment program. We do know that most people who sustain a concussion or multiple impacts to the head do not develop CTE. Furthermore, given what we do know, it appears appropriate to take reasonable measures to reduce exposure of the head to traumatic forces, to restrict contact practices, and to teach proper contact techniques. Additionally, proper management of concussion reduces the risk of prolonged signs/symptoms and subsequent long-term difficulties.

What should an athlete do if there are changes in thinking, behavior, emotions, or personality?

If an athlete is concerned about such changes, or worried about CTE, they should seek comprehensive medical, neuropsychological, neurological, and psychiatric evaluations that can help identify if there are any treatable problems that are causing the changes. Be sure that the licensed healthcare providers chosen to provide these evaluations are specialists in concussion.

To find a neuropsychologist in your geographic area who specializes in sports-related concussion and athlete brain health, go to www.sportsneuropsychologysociety.com.

Source

The above information is based on the current research evidence that was available at the time of the publication of this document (July, 2022) and represents the consensus of expert opinion of the Policy and Planning Committee members and Executive Board of the Sports Neuropsychology Society.

Disclaimer

Information presented in this document is not intended as medical consultation, guidance, prescription, or advice. The reader should consult a licensed health care provider about any health concerns.

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