

I'm a brain scientist and I let my son play football.



By Dr. Peter Cummings

My name is Peter Cummings. I am a forensic pathologist and a neuropathologist, which means I study brain trauma for a living. I am also a football coach and I let my 11-year-old son play football. I may be the only neuropathologist on Earth who lets his kid play football.

Coming to this decision was a serious undertaking and the result of many hours spent pouring over medical journals and football rulebooks.

Before I began this journey, football was banned in my house. I wouldn't even watch it on TV because I didn't want my son to see it and develop a desire to play. Despite my efforts, he discovered football via a video game. He immediately fell in love with the sport and I was forced to do some serious soul searching: Should I allow him to pursue his interest and play?

Honestly, I was scared of CTE.

CTE stands for "chronic traumatic encephalopathy"; in real words, it means damage to the brain caused by repetitive injury. The hallmark of CTE is the deposition of a protein called 'tau' in the brain. Tau has a number of functions, including stabilizing the structure of nerve cells. When nerves are injured, tau builds up and can cause problems.

You may have a read about a [recently published paper](#) reporting the presence of CTE in the brains of 99 percent of former National Football League players examined. The findings of this study sent the media into a frenzy and produced a lot of negative press toward football. As a result of the media attention, people are

now saying there should be no more youth football; there are even people who are insinuating I am abusing my son by allowing him to play football.

People are coming away from the constant media barrage with the belief that concussions are the sole and direct cause of CTE, most or all football players have CTE, and CTE has led football players to become violent, commit suicide or develop dementia.

I had the same impression before I decided to look a little deeper. But when I dove into the published literature regarding CTE, I discovered the scientific evidence to support the media's narrative was lacking; in fact, I found bodies of evidence to the contrary and a whole other side to the science that is largely ignored.

I'm not alone. A number of members of the medical and research communities are also voicing serious doubts about the current state of the science linking concussion and CTE.

In fact, it's not entirely clear if CTE is unique to traumatic brain injury. CTE-like pathology has also been seen in the brains of people who've died of epilepsy, without any history of head trauma. There are also cases of opioid overdose deaths where the brains show signs of early aging, including tau accumulation. This might suggest other mitigating factors make some people more prone to developing CTE than others.

Replication and independent verification are two crucial steps in the scientific process. Yet many findings associated with CTE haven't passed these tests. Contrary to what appears in the headlines, multiple researchers have found no significant relationship between playing football and increased risk of violence, suicide and dementia in the general football playing population. In fact, studies have shown a [lower rate of death due to violence and suicide in NFL players](#) as compared to the general population.

None of these studies make headlines, let alone even footnotes in most media reports. So when headlines state "CTE found in 99% of brains from deceased NFL players," it only fuels people's fear of CTE. They are assuming, like I did at first, that 99 percent of football players will get CTE.

But one has to be careful about interpreting the headlines, and I will tell you why:

The study population in the most recent CTE paper represents a biased sample, as stated by the authors themselves. This means only the brains of self-selecting people who displayed neurological symptoms while living were studied. This is important because this sample was not a reflection of the general football population. The study was based on 202 brains out of the millions of people who've played football – 111 of which are former NFL players.

So, when you hear "99 percent of football players had CTE," that doesn't mean that almost every football player will get CTE, and it doesn't mean your child has a 99-percent chance of developing CTE if he or she plays football. It means 99 percent of a specifically selected study sample had some degree of CTE; not 99 percent of the general football population. This is an important distinction.

Because of this sampling bias, we cannot estimate the prevalence or incidence of CTE (meaning the total number of cases and the number of new cases expected each year in football players); nor can we establish risk or a cause-effect relationship between head injury and development of CTE. To do that you need a randomly selected population comprised of people with the disease and people without the disease.

In other words, we do not have a complete picture of what causes CTE, how common CTE is, or what the chance of getting CTE may be for anyone, or even what symptoms, if any, CTE causes.



Peter Cummings' son Fionn Parker-Cummings attended Patriots' star Julian Edelman's football camp. (Courtesy of Peter Cummings)

Most of the published CTE cases are from former NFL players. How football might affect the brains of our youngest players, including my son, is a question the research hasn't answered yet.

Despite the lack of cases and evidence, some in the concussion research field have stated children shouldn't play tackle football until high school. Some people are even calling for the end of youth football all together.

They have bolstered their opinion with a paper published in 2015 concluding former NFL players who began playing tackle football before the age of 12 were more likely to experience long-term neurocognitive problems. However, [a more recent study](#) of retired NFL players published last year by a different group at Vanderbilt University found no association between age of first exposure to football and subsequent adverse neurological outcomes.

Other research groups have not found a significant link between playing high school football and an increased risk of later-in-life cognitive deficits.

Two separate papers from the Mayo Clinic failed to show an increase in dementia among former high school football players as compared to other athletes and non-athletes who attended high school between 1946-1956. Another study, released in late August, [also failed to show cognitive deficits](#) in former Wisconsin high school football players from the 1950's.

People may argue that football was different in the 40s and 50s and that today's players are stronger, faster and hit harder. But one also has to consider that football was more violent back then, with little attention to safety. Certainly the equipment provided less protection.

Football is a sport in crisis, and it is so, at least in part, because the sensationalized media coverage is causing a false impression of the strength and validity of the CTE science. The news is terrifying athletes at all levels. Every time an athlete forgets their keys or has a headache, they're scared it's CTE.

The story of former NHL player Todd Ewen is a sad example of how this fear has resulted in tragedy. Todd suffered depression which he believed to be the result of CTE and was untreatable. Sadly, he committed suicide. Even before an autopsy could be performed, the verdict was in: CTE was the culprit. However, the subsequent autopsy [failed to detect any sign of CTE](#).

The fear of CTE can affect on-field performance, as well. I spoke with one NFL player last year who said after our talk, "You mean it's not 100 percent I will get CTE?" I told him no. I was informed later that he felt relieved and his on-field performance thereafter improved significantly.

Concussions are not unique to football; they are seen in hockey, rugby, soccer, water polo and even synchronized swimming. By focusing so much attention on football, other athletes who may be at risk are slipping through the cracks, including girls. Current data suggest in sports in which both boys and girls participate (such as soccer and basketball), [girls have twice as many concussions as boys](#). No one knows why.

The surprising gender discrepancy and the lack of adequate representation of athletes from other sports in the current research makes me wonder if the debate is more about an aversion to football than it is about concussions.

Many of the news stories give the impression football has done nothing to protect players and the sport has been sitting idly while waiting for more proof. But, football has responded proactively to the perceived concussion crisis by implementing innumerable rule changes to promote player safety.

Unfortunately, a lot of people are unaware of these changes. A recent [poll by the University of Massachusetts Lowell](#) reported that 46 percent of parents had no idea what their youth sports organizations or school athletic directors were doing to promote safety in their respective sports. This knowledge gap probably exist to some degree because rules changes aren't sexy news.

I am not paid from a grant studying CTE; I have no association with the NFL. I have one motivating factor: my son. I whole-heartedly support the ongoing CTE research. Although I have no affiliation with any CTE research labs, I have directed the families of deceased athletes to CTE studies. I also directed a friend of mine, who is a female rugby player with post-concussion issues, to a CTE study. I decided to coach so I could stay informed about the constantly evolving rules changes in football. I made the decision to allow my son to play football after long deliberation over all the facts. To suggest this decision is child abuse is preposterous. I am a forensic pathologist, a neuropathologist, and a dad, and I let my son play football. That should speak volumes.

[Editor's Note: Yahoo Sports reached out to Boston University to offer Dr. Ann McKee, director of the Boston University CTE Center, a platform to reply to the points specifically raised in this op-ed. Boston University did not provide an answer.]

Dr. Peter Cummings is board certified by that American of Pathology in anatomic pathology, forensic pathology and neuropathology. He is an Assistant Professor of Anatomy and Neurobiology at Boston University School of Medicine. He has been recognized as a medical expert by courts of 24 States and six different countries. He is the author of two forensic pathology textbooks. He lives outside of Boston with his wife, son and dog.