The National Football League and Chronic Traumatic Encephalopathy: Legal Implications

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The growing awareness of chronic traumatic encephalopathy (CTE) has the potential to change the public perception and on-field rules of the National Football League (NFL). More than 3,000 ex-NFL players or their relatives are engaged in litigation alleging that the NFL failed to acknowledge and address the neuropsychiatric risks associated with brain injuries that result from playing in the NFL. This article explores the intersection between the medical and legal aspects of CTE in the NFL from a forensic psychiatry perspective.

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National Football League (NFL) games have been celebrated as a national passion.[1] The Super Bowl is considered by some to be a *de facto* American holiday and is consistently rated among the most watched sporting events in the world.[2,3] This popularity brings substantial revenue. According to Forbes.com, in 2011, NFL team values averaged over $1 billion each, with the Dallas Cowboys having the highest value, estimated at $2.1 billion.[4,5] Television revenues in particular are an increasingly vital part of the NFL's wealth. A 30-second 2012 Super Bowl ad costs an average $103,000 per second.[6] ESPN pays the NFL $1.9 billion annually to broadcast *Monday Night Football*.[7] From 2014 through 2022, CBS, Fox, and NBC will pay $39.6 billion to broadcast NFL games.[8,9]

Despite this success, some believe that the "future of the NFL is at risk from lawsuits over head injuries."[10] Chronic traumatic encephalopathy (CTE) is caused by repetitive trauma to the brain and affects cognition, behavior, and movement. Legal action against the NFL related to CTE has gained a significant amount of media attention, in part because of high-profile suicides of former NFL players, including former Chicago Bears safety Dave Duerson. Mr. Duerson, who had asked that his brain be studied, committed suicide in February 2011 by shooting himself in the chest. Pathology of his brain ultimately showed diagnostic evidence of CTE.[11] In May 2012, Junior Seau, a 12-time Pro Bowler for the San Diego Chargers, shot himself in the chest, and pathology of his brain also showed CTE.[12,13] More cases are expected to be brought by players against the NFL as litigation proceeds.

At stake for the NFL is more than potential financial settlements. The credibility of the league in its efforts to prevent player injury and disability is under scrutiny, and the public's perception of the violence of the game presents a public relations hurdle. As concerns and medical evidence mount regarding the dangers of head injuries in contact sports, the NFL faces critical decisions that could be game changers for players and fans. In this article, we address the underlying medical questions by first exploring the science behind CTE and then review the legal aspects of the NFL and CTE from a forensic psychiatry perspective.

The Science of Brain Injuries

The term chronic traumatic encephalopathy (CTE) was coined in the 1960s, replacing the earlier

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term, dementia pugilistica, which derived from punch-drunk boxers in the 1920s.[14,15] Much of the literature about CTE continues to come from studies of boxers.[16–22] CTE is a neurodegenerative syndrome caused by repetitive blunt-force trauma to the head that transfers acceleration and deceleration stresses to the brain.

The definitive diagnosis of CTE is made postmortem. In a 2009 review of CTE, McKee *et al.*[23] found that of 51 neuropathologically diagnosed cases of CTE, 46 (90%) occurred in athletes. Although there are currently no consensus-based clinical diagnostic criteria for CTE, Gavett *et al.* summarized the clinical syndrome of changes in "cognition (especially memory and executive functioning, with dementia later in the disease course), mood (especially, depression, apathy, and suicidality), personality and behavior (especially poor impulse control and behavioral disinhibition), and movement (including parkinsonism and signs of motor neuron disease)" (Ref. 24, parenthetical phrases in original). Symptoms can begin with something as benign as a headache and progress to mild changes in concentration in the early stages. Following these early-stage warning signs are depression, aggression, explosive anger, and short-term memory loss. The components of the constellation of symptoms, however, do not always progress in a predictable and sequential series, which makes premortem detection challenging. CTE is distinct from an acute concussion, postconcussion syndrome, or traumatic brain injury; symptoms of CTE typically do not present until years after the traumatic events occur. Furthermore, CTE is pathologically distinct from other neurodegenerative diseases, as discussed in the following section.

Diagnosis: Pathologic Characteristics

CTE is a postmortem diagnosis. A full autopsy must be performed with histochemical and immunohistochemical analyses of the brain.[25–27] Some data suggest that positron emission tomographic (PET) scanning can be used to diagnose CTE premortem, but these findings are preliminary.[28] CTE is associated with the prominence of the protein tau, which is distributed in patches throughout the neocortex. Corsellis *et al.*[29] found that the advanced stages of CTE are accompanied by generalized atrophy of the brain with reduced brain weight, enlargement of the lateral and third ventricles, thinning of the corpus callosum, fenestrations in the cavum septum pellucidum, and scarring and neuronal loss of the cerebellar tonsils. McKee and colleagues[30] noted that there is often pronounced atrophy of the thalamus, hypothalamus, and mammillary bodies and pallor of the substantia nigra and locus coeruleus. Microscopically, accumulations of phosphorylated tau proteins are found throughout the brain. McKee *et al.* noted:

> The neurofibrillary degeneration of CTE is distinguished from other tauopathies by preferential involvement of the superficial cortical layers, irregular, patchy distribution in the frontal and temporal cortices, propensity for sulcal depths, prominent perivascular, periventricular and subpial distribution, and marked accumulation of tau-immunoreactive astrocytes. Deposition of beta amyloid, most commonly as diffuse plaques, occurs in fewer than half the cases [Ref. 31, p 709].

Brain Trauma and Neurodegeneration

NFL football is a contact sport. Trauma to the brain can range from concussions with or without loss of consciousness, sometimes referred to as mild traumatic brain injury (mTBI).[32–40] CTE is caused by repetitive traumatic brain injury from the acceleration and deceleration forces of closed-head impacts.[41] Concussion data recorded by NFL team physicians and athletic trainers from 2002 through 2007 appear similar to data from 1996 through 2001 in player position, concussion signs and symptoms, and loss of consciousness.[42] In 2005, Guskiewicz *et al.*[43] surveyed 2,552 former NFL players and found that 61 percent had sustained at least one concussion in their careers and 24 percent had had three or more. Those who reported three or more concussions had a fivefold increased prevalence of mild cognitive impairment and a threefold increased prevalence of significant memory problems compared with retirees without a history of concussion. These results are consistent with those of Lehman *et al.*,[44] who suggested an increased risk of neurodegenerative disease among football players. They found that the neurodegenerative mortality of ex-NFL players who played at least five seasons in the NFL from 1959 through 1988 was three times higher than that of the general U.S. population and that the incidence of Alzheimer's disease and amyotrophic lateral sclerosis (ALS) was four times higher. Furthermore, a growing body of data suggest that repeated brain injury causes a decline in executive functioning,[45] which is a common clinical feature in neuropathologically confirmed cases of CTE.[46] These conclusions are supported by neuropsychological tests that evaluate

decision-making, impulse control, problem-solving, working memory, and mental flexibility.[47,48]

Mood and Behavior Changes

CTE often falls in the clinical domain of psychiatrists because of the high prevalence of mood and behavior changes. In a review of the CTE literature from 1928 through 2009, McKee *et al.*[49] reported that personality or behavior changes were noted to have occurred in 33 (65%) of 51 individuals with neuropathological evidence of CTE. These changes included aggression or violence in 70% of the 33 cases, paranoia in 42%, agitation in 24%, and hypersexuality in 3%. Major depressive disorder in CTE seems particularly common, with one study finding ex-NFL players with a history of at least three concussions to be three times more likely than those with no concussions to have been diagnosed with depression.[50] Survey data from the National Football League Retired Players Association showed that the nine-year risk of a depression diagnosis increased with the number of self-reported concussions, ranging from 3.0 percent in the no-concussions group to 26.8 percent in the 10+ concussions group.[51]

Legal Considerations and the NFL

There are currently more than 3,000 retired players or their relatives pursuing a class-action lawsuit against the NFL, seeking compensation for lasting head trauma as result of participation in NFL games.[52] The master complaint, filed in federal court in Philadelphia, unites more than 80 pending tort suits filed against the NFL.[53] Central to the suit is whether the NFL knowingly concealed information or engaged in negligence toward its players regarding the seriousness of chronic brain injuries. The suit states that "for decades the NFL has been aware that multiple blows to the head can lead to long-term brain injury, including but not limited to memory loss, dementia, depression, and CTE and its related symptoms" (Ref. 53, p 23).

According to the master complaint, the NFL's annual gross income is approximately $9.3 billion (Ref. 53, p 6). The claim is made that the NFL makes these billions

> . . . by promoting a product of brutality . . . and inculcating in players at every level of the game the false and life-threatening ideas that (a) brutal, ferocious, and debilitating collisions are a required and desired outcome in the game of football; and (b) playing despite repetitive head impacts is a laudable and desirable goal [Ref. 53, p 11].

The legal battle is expected to be fierce because of the billions of dollars in potential damages. Representative Linda Sanchez (California) summarized to NFL Commissioner Roger Goodell at a 2009 House Judiciary Committee hearing that the NFL's response to brain injuries "sort of reminds me of the tobacco companies pre-1990's when they kept saying no, there is no link between smoking and damage to your health or ill health effects. And they were forced to admit that that was incorrect through a spate of litigation in the 1990's."[54]

The master complaint has produced legal action back and forth between the NFL and insurers. On August 13, 2012, Alterra America Insurance Company, one of the NFL's liability insurers, brought suit in New York State Court seeking a declaration that it does not have a duty to defend or indemnify the NFL in 93 tort suits filed by former NFL players.[55] The NFL responded on August 15, 2012, by filing suit in California State Court against Alterra and 20 other liability insurance carriers. The NFL seeks a declaration that its insurers are required to defend the NFL in the concussion suits and must pay any damages that arise as a result of those suits.[56] The NFL alleges that its insurers issued "occurrence policies" that provide both primary and excess coverage "to cover all sums" because of "personal injury caused by an occurrence" (Ref. 56, p 12). On August 22, 2012, subsidiaries of the insurance company Travelers responded with yet another suit seeking a declaration that it is not obligated to defend or indemnify the NFL for any of the concussion-related suits.[57,58] According to the Travelers lawsuit, the company provided liability coverage for NFL Properties, the league's merchandising arm, but not the NFL, and should not be required to pay for a joint defense.

Defining the Field of Battle: Workers' Compensation or Civil Tort?

Tort law is distinct from workers' compensation, which is a form of insurance providing wage replacement and medical benefits to employees injured in the course of employment in exchange for mandatory relinquishment of the employees' right to sue employers for tort negligence.[59] The tradeoff between assured, limited coverage and lack of recourse outside the workers' compensation system is commonly known as "the compensation bargain." One likely future legal battle between the NFL and former players will involve whether the players' alleged inju-

ries are covered by workers' compensation. If courts rule that the medical sequelae of CTE are covered by federal employment law and the NFL's collective bargaining agreement, then former players would be barred from bringing tort claims, because potential negligence of the employer would be immaterial.

The Politics of Informed Consent

"Consent is the master concept that defines the law of contracts in the United States."[60] The politics of informed consent is largely outside the scope of this article, but is worth mentioning to highlight the context in which the legal process will proceed. Many NFL players come from economically disadvantaged backgrounds, and signing a contract of $1.9 million, the average 2011 NFL player salary, may seem like a financial dream come true.[61] However, if the risk that he could develop CTE decades later is explained to an 18-year-old NFL recruit, could a million dollar paycheck constitute coercion? In contracts, an agreement "may be reached only if there has been full disclosure by both parties of everything each party knows which is significant to the agreement."[62] The question of disclosure is a particularly important topic with regard to the NFL because of the imbalances of financial power between the NFL and most players. Racial politics may play an additional role in influencing public perception (and possible jurors) regarding disclosure of CTE, in that no racial minority has ever held majority ownership of an NFL team and about two-thirds of NFL players are African American.[63]

NFL Reactions to Lawsuits and Restructuring of the Game

The league maintains that "Throughout its history, the NFL has made the health and safety of its players a priority and its reach extends to football and sports at all levels."[64] In response to the concerns about CTE and other brain injuries, the NFL gave $30 million in unrestricted medical research funding to the Foundation for the National Institutes of Health (FNIH), the use of which will be overseen by The National Institutes of Health (NIH).[65] The research is planned to include CTE, concussion management and treatment, and the relationship between traumatic brain injury and late-life neurodegenerative disorders, such as Alzheimer's. To promote this and other health initiatives, the NFL has set up a website, http://www.nflevolution.com, which details the NFL Concussion Guidelines to evaluate and minimize brain trauma. The NFL is also collaborating with the United States Military to raise awareness of traumatic brain injuries.[66] It donated another $1 million to USA Football's Heads Up Football initiative, which teaches the basics of proper heads-up tackling, and also will provide "thousands of new helmets to youth football players in low-income communities."[67]

Table 1 Potential Plaintiff Allegations

There is a diagnosis of CTE.
Symptoms include depression, behavioral changes and other psychiatric/behavioral issues as a result of CTE.
Suicide resulted from severe depression secondary to CTE.
There was a substantial business loss due to cognitive dysfunction secondary to CTE.
CTE led to violence through behavioral and cognitive changes.
CTE and its consequences resulted in inability to work and hence lost wages/income.
Risk of developing Alzheimer type dementia is increased as a result of CTE.
Testamentary capacity could be impaired at the time of creating the will secondary to CTE.

Potential Challenges for a Forensic Psychiatrist in a Case of CTE

It is conceivable that a forensic psychiatrist will be called on by plaintiffs, prosecutors, or defendants to evaluate a legal case where CTE has been alleged. Some possible allegations by the plaintiff to consider in this type of case are listed in Table 1.

We suggest that the following clinical considerations be kept in mind should an evaluating psychiatrist be called on to serve as an expert in these cases:

CTE cannot be confirmed as a diagnosis until microscopic examination of the brain is performed. The closest to *in vivo* diagnostic certainty is probable CTE, similar to an Alzheimer's disease diagnosis.

Causal relationships of repetitive concussions and mTBI with subsequent behavioral symptoms are oftentimes unclear, as there is a delay in the onset of neurological symptoms after initial traumas.

No clear dose-response relationship (number of concussions and subsequent severity of symptoms) has been established in football.

A comprehensive neuropsychiatric evaluation must be undertaken that should include detailed

medical, psychiatric, substance abuse, developmental, family, and psychosocial histories. In living ex-players, no evaluation is complete without a thorough physical examination, especially a neurologic examination.

The examiner must be familiar with the diagnostic tests necessary to support the diagnosis. Examples include relevant neuroimaging modalities, neuropsychological tests, and blood tests (including genetic tests when relevant).[68]

The examiner must be familiar with common syndromic presentations of CTE.

Extra caution must be exercised on the part of the examiner to remain objective in light of the high publicity in many of these cases. To that end, potential confounding factors should be investigated thoroughly, including substance abuse, availability of a psychosocial support system, developmental history, prior criminal record, and other medical conditions.

The examining forensic psychiatrist should consider working in concert with other experts, such as a neuropathologist, neuroradiologist, and neuropsychologist.

Conclusions

The NFL is a multibillion dollar industry with fans worldwide, but public support for the violence of the game could be eroded with the increasing awareness of CTE. Minimizing the risk of CTE has already led to on-field rule changes that penalize direct head impacts, as well as additional safe guards in the form of protective gear. A new NFL rule limits contact practices that involve tackling to one per week during the regular season. Furthermore, the NFL's response to the problem of CTE could have an impact on youth football throughout the country. A 2010 Massachusetts law has raised awareness about the dangers of putting high school players with concussions back into practices and games before the brain has had time to heal and also mandates that doctors sign off before a player can return after a concussion. Despite the NFL's longstanding claim questioning the link between long-term brain damage and football, the NFL Retirement Board awarded disability payments to at least three former players after concluding that football had caused their brain injuries.[69] It remains to be seen what effect this could have on the master complaint class-action suit, but it is possible that forensic psychiatrists will play a role in this type of civil litigation. In addition, outcomes from CTE could expand beyond civil suits and into the criminal arena. Knowledge about the science of CTE and expectations for the role of forensic psychiatrists is imperative for making effective and informative contributions.

Update

On August 29, 2013 a tentative $765 million settlement was announced in the NFL concussion-related lawsuits through the U.S. District Court in the Eastern District of Pennsylvania. At press time, district court judge Anita B. Brody must still approve the settlement.[70]

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