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The NFL: Growing Into its Death

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Lee Honors College: Undergraduate Thesis

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Abstract

The following document is about concussions in the National Football League (NFL).

This thesis explores a principal question; is the NFL doing enough to warn its players about the long-term effects of multiple concussions? I start by covering what a concussion is, how it can be diagnosed e.g., what the symptoms are, and some of the long-term effects on the human brain.

Other topics that are discussed include the history of football (including how it was born), the history of professional football (early years up to present time), head injuries in football, litigation, and potential solutions. Most of my research has shown that the NFL could have done more in terms of warning their players about specific long-term illnesses that could, and most likely would, happen if they continued to play after suffering from multiple concussions.

However, in the past couple of years, the NFL and its associates have tried to save themselves from litigation by posting warning signs in every locker room. The majority of the citations used in this document come from Google Scholar, and after reading just a few of the former players' stories, it quickly becomes apparent that they did not know what could happen to them in regards to long-term health.

“I like to believe that my best hits border on felonious assaults” – Jack Tatum (Hall 2010)

I. Introduction

Since the turn of the 20th century, sports have been incredibly influential in American society. For over one hundred years, baseball has been referred to as “America’s past time,” but in the last few decades, the sport of football has gradually taken over as the most popular sport in the United States of America. According to a Gallup poll in 2005, when a group of people were asked to name their favorite sport to watch, football was the number one answer, receiving 34% of the vote; second place was a tie between baseball and basketball at 12% (NFL: America’s Choice, 2007, p. 11). “American football” has been rooted in controversy for as long as it has been played; the main source of this controversy being violent injuries, especially those involving the neck, head, and most importantly, the brain. Anyone who has played or watched a game of football quickly understands the inherent risks for all players involved, including the guys who merely kick the football and try to stay out of everyone else’s way. From my experience watching football for the past fifteen years, I have noticed that concussions are the most common injury in the NFL; yet, up until 2007, the NFL had failed to establish a league-wide policy giving guidelines on what to do when a player suffers a concussion (Werts, 2012-2013). Football is a very violent sport. However, in the past ten to fifteen years, the NFL has implemented a number of new rules and regulations in an attempt to decrease the number of serious injuries, especially concussions. Many questions still arise when considering what the NFL is trying to do. Is it too late to try to change the game? Why did it take so long? Most

importantly, is the NFL doing enough to warn its players about the dangers of concussions and how to deal with the lingering effects of those during life after football? This paper seeks to answer those questions. Before going into the history of football and concussions in football, I will establish some of the medical definitions and statistics when dealing with concussions in sports and in everyday life.

The American Orthopedic Society for Sports Medicine (AOSSM) defined a concussion as “any alteration in cerebral function caused by a direct or indirect force transmitted to the head” (Hecht, 2002, p. 22). A concussion

Occurs when a violent blow to the head causes the brain to slam against the skull so hard that the cerebrospinal fluid is unable to cushion the impact. The brain bounces off the skull. The concussion occurs where the brain strikes the skull on the opposite side of the point of impact. The contact between the brain and the skull (contrecoup injury) can cause bruising of the brain, tearing of blood vessels, and nerve damage (Mecham, 2007-2008, p. 700-701).

Many symptoms appear after a person has experienced a concussion. These symptoms include “headache, dizziness, vertigo, lack of awareness, nausea, vomiting, mental dysfunction, sleep deprivation, and tinnitus” (Hecht, 2002, p. 23). For those who do not know, vertigo is when a person feels as though things around he/she are moving, when in fact they are not, and tinnitus is a more proper way of saying “ringing of the ears.” Some of the deteriorating signs and symptoms are “fluctuating levels of consciousness, balance problems, memory difficulties, and

difficulties concentrating” (Mecham, 2007-2008, p. 704). Concussions can have an adverse effect on a person’s mood. They may cause irritability, sadness, or nervousness. Some of the long-term effects of concussions are dementia, Alzheimer’s disease, and Chronic Traumatic Encephalopathy (CTE). While dementia may be treated and even cured, Alzheimer’s disease and CTE are incurable and typically untreatable (Werts, 2012-2013). Although many people, including myself, only think about concussions in terms of sports-related injuries, they actually occur more often in a number of other situations. “The Brain Injury Association estimates that 300,000 concussions are diagnosed in the United States each year, and over one million worldwide. Motor vehicle accidents account for an estimated two-thirds of all concussions, while sports injuries account for ten percent” (Hecht, 2002, p. 20). Concussions are categorized as mild traumatic brain injuries (TBI). Although most concussions are not considered serious, even the mildest concussion can cause long-term cognitive problems that can make it difficult to perform daily activities (Langlois, 2006). The main concern associated with concussions in the realm of sports is the threat of second-impact syndrome (SIS).

After sustaining a concussion, brain cells that are irreversibly destroyed remain alive but in an extremely vulnerable state. A second blow to the head, no matter how trivial, while the brain is still recovering from the first concussion, may lead to a fatal herniation of the brain. [...] Acute traumatic brain injury represents ‘the neurologic consequence of concussive and subconcussive blows to the head. Chronic traumatic brain injury begins with ‘mild subclinical dysfunction detected only through neuropsychological

investigation and evolves into slowed motor performance, tremors, cognitive deficits, and personality and psychological changes.’ Finally, athletes may also develop ‘post-concussion syndrome,’ which is characterized by fatigue, headaches, disequilibrium, and concentration difficulties (Hecht, 2002, p.24-25).

In March of 1997, the American Academy of Neurology (AAN) and the Brain Injury Association announced that they had established some guidelines for managing the concussions of football players. There are three grades of concussions, beginning with the least severe (Grade 1). A “Grade 1” concussion is defined as “transient confusion with no loss of consciousness, and concussion symptoms that resolve in less than [fifteen] minutes” (Hecht, 2002, p. 46). Athletes can return to action following a successful examination as long as the symptoms resolve themselves in less than fifteen minutes. A “Grade 2” concussion is defined as “a transient confusion with no loss of consciousness, and with concussive symptoms lasting longer than fifteen seconds. Concussion symptoms lasting an hour or longer warrant medical observation” (Hecht, 2002, p. 46). A “Grade 3” concussion is ““any loss of consciousness, either brief (seconds) or prolonged (minutes)”” (Hecht, 2002, p. 46).

II. Birth of Collegiate and Professional Football

The first ever collegiate (and first ever historical) football game (although it may have been more like soccer than football) was played on November 6th, 1869 in New Brunswick, New Jersey between Rutgers and Princeton. Players were not allowed to carry or throw the ball, but because there was plenty of physical contact during the game historians refer to it as football

rather than soccer, and thus the bare beginnings of a new sport had been born. Up until the 1880s, the rules of the game were much different than they are in modern day football. Walter Camp, a former Yale football player, is credited with changing some of the rules to make the game more similar to the current style. He decided to decrease the number of players to eleven on each side, established a scrimmage system in order to put the ball back into play, and he also established the “four downs” system, although at the time the offense only had three downs to gain five yards, compared to the current system which allows four downs to gain ten yards.

(Ours, 2014) Now that the original birth of football has been established, the birth of professional American football is typically traced back to November 12, 1892, when the Alleghany Athletic Association football team defeated the Pittsburg Athletic Club. The reason that most historians peg this as the birth of modern professional football is because one of the players for the Alleghany Athletic Association, named William (Pudge) Heffelfinger, was paid \$500 to play in the game. (History: Birth of, 2014) Less than 15 years later, the growth of American football nearly went from expansion to extinction. The reason that football almost became extinct is because some very important people, including college presidents, thought that colleges were turning into a fight club of sorts due to the inclusion of football as a recreational activity. Former Harvard president Charles Eliot led the charge in an attempt to abolish the game of football.

In 1893, the influential ‘Nation’ magazine warned that colleges were becoming ‘training grounds for young gladiators,’ while in 1897 the New York Times castigated football’s

trend toward 'mayhem and homicide.' Eliot compared football with prize fights, cock fights, and bull fights, complained that its supporters were either ignorant of its horrid effects or barbarians, and tried to abolish the sport at Harvard (Smith, 2011).

Those who were in favor of the continued growth of football argued that the sport taught "competition, resolution, courage, and endurance and channeled 'masculine impulses toward productive ends'" (Smith, 2011). Death due to football was somewhat of a common occurrence in the late 1800s and early 1900s. "At one point, Harvard actually quit playing the game. So did Columbia, Northwestern, Stanford, the University of California, and several small colleges. Following the 1897 death of Richard Von Gammon, a fullback at the University of Georgia, the Georgia state legislature voted to ban football" (Miller, 2011). The idea to rid our nation of football was even broadcast in newspapers. "To give you an idea of just how seriously the get-rid-of-football movement was being taken, the New York Times ran an editorial expressing concern over 'Two Curable Evils' in American life: lynchings and football" (Greene, 2012). Injuries and deaths led to some high schools and colleges banishing the game. "In 1905, a rash of football fatalities almost snuffed out the sport before it began, leading to bans from Illinois school boards and the president's intervention" (Moser, 2012). In November of 1905, a young man named Vernon Wise was playing junior varsity football for Oak Park. He was a line man who was constantly banging heads with his opponents. After one particular play, he was knocked unconscious, and two hours later he died of a broken back. Just one year earlier,

A Chicago man whose 16-year-old son died of peritonitis after a football game pushed state legislation to get the sport banned, joining with an Indiana state senator and a Wisconsin man (whose sons had died the month before) to eliminate the sport in the tri-state area, along with Michigan. [...] The rash of local injuries came just a couple weeks before the president of the United States, Teddy Roosevelt, telegraphed Harvard president Charles Eliot asking him to address the year's record of 19 deaths—'more than double that of the yearly average for the last five years, the total for that period being forty-five'—for fear the sport's bloody reputation would get it banned outright instead of changed to protect the players. In particular, Roosevelt pushed the 'open game,' whose players, he said, 'escaped with less than their usual quota of accidents' (Moser, 2012).

In October of 1905, President Roosevelt set up a meeting involving the coaches of Harvard, Yale, and Princeton to discuss the imminent need for rule changes in order to minimize the brutality of the sport. During the 1905 season, eighteen college and amateur players died due to football related injuries. The coaches went on to form a written agreement "declaring their intention to play the game in an honorable, fair, less rough manner. Subsequent meetings of college coaches in late 1905 and early 1906 led to significant rule changes and the formation of the parent body of the National Collegiate Athletic Association" (Smith, 2011). Although it was not solely Roosevelt who saved the game of football, many historians credit him with being a mega fan whose influence played an important role in continuing the growth of the game.

III. The Evolution of Professional Football

In order to continue the chronological theme, I will jump ahead a few decades and discuss some of the important events that occurred in the 1920s and 1930s. On August 20, 1920, an organizational meeting was held in Canton, Ohio. Four professional football teams were represented at this meeting: the Akron Pros, Canton Bulldogs, Cleveland Indians, and the Dayton Triangles. At the conclusion of this meeting, the first major professional football league with teams from multiple states was established, and it was called the American Professional Football Conference. This league consisted of teams from four states: (a) the aforementioned four teams from Ohio, (b) the Hammond Pros and Muncie Flyers from Indiana, (c) the Rochester Jeffersons from New York, and (d) the Rock Island Independents, Decatur Staleys, and Racine Cardinals from Illinois. The leaders of this new league decided to change the name to the American Professional Football Association (APFA) (History: Chronology, 2014). “On September 26, [1920], the first game featuring an APFA team was played at Rock Island’s Douglas Park. A crowd of 800 watched the Independents defeat the St. Paul Ideals 48-0. A week later, October 3, the first game matching two APFA teams was held. At Triangle Park, Dayton defeated Columbus 14-0” (History; Chronology, 2014).

In 1921, a new president of the league emerged and his name was Joe Carr. He moved the headquarters from Canton to Columbus and “drafted a league constitution and by-laws, gave teams territorial rights, restricted player movements, developed membership criteria for the franchises, and issued standings for the first time, so that the APFA would have a clear

champion” (History: Chronology, 2014). Another big change was that the league increased its membership from ten teams to twenty-two teams. One of the new teams introduced to the league during 1921 was the Green Bay Packers. Another newcomer was the Chicago Staleys. One year later, in 1922, the American Professional Football Association changed its name once again, but this would be the name that stuck. The APFA became known as the National Football League (NFL) on June 24, 1922. During that same year, the Chicago Staleys changed their name to the Chicago Bears, thus two of the longest tenured franchises established names and locations that have stuck for almost one hundred years, the Packers and the bears (History; Chronology, 2014).

Moving ahead a few years, the 1925 season saw the largest crowd ever to watch a professional football game when the Chicago Bears played the Chicago Cardinals at Wrigley Field on Thanksgiving Day. Thirty-six thousand fans watched the game that ended in a 0-0 draw. A few weeks later, the Bears played eight games in twelve days, and the record that had been set just a few weeks earlier was completely shattered (History: Chronology, 2014). “A crowd of 73,000 watched the game against the Giants at the Polo Grounds, helping assure the future of the troubled NFL franchise in New York” (History: Chronology, 2014). The Bears also played a game in Los Angeles during the 1925 season in front of 75,000 fans!

The 1932 and 1933 seasons saw many innovations that would separate professional football from college football. In 1932,

Official statistics were kept for the first time. The Bears and the Spartans finished the season in the first-ever tie for first place. After the season finale, the league office arranged for an additional regular-season game to determine the league champion. The game was moved indoors to Chicago Stadium because of bitter cold and heavy snow. The arena allowed only an 80-yard field that came right to the walls. The goal posts were moved from the end lines to the goal lines and, for safety, inbounds lines or hashmarks where the ball would be put in play were drawn 10 yards from the walls that butted against the sidelines. The Bears won 9-0, December 18, scoring the winning touchdown on a two-yard pass from Nagurski to Grange. The Spartans claimed Nagurski's pass was thrown from less than five yards behind the line of scrimmage, violating the existing passing rule, but the play stood" (History: Chronology, 2014).

Then, in 1933, "The NFL, which long had followed the rules of college football, made a number of significant changes from the college game for the first time and began to develop rules serving its needs and the style of play it preferred. The innovations from the 1932 championship game-inbounds line or hashmarks and goal posts on the goal lines-were adopted. Also the forward pass was legalized from anywhere behind the line of scrimmage, February 25 [1933]" (History: Chronology, 2014).

IV. Head Injuries in Football

During the early years of professional football, statistics on football-related fatalities were relatively unknown. An article written by Moser titled, *A brief history of football head injuries and a look towards the future*, stated “Not until 1931 were statistics regularly kept on football fatalities. Over the years, those numbers would show a pattern of deaths that would return to the numbers that nearly ended football in America before it began” (2012). The same article proposed a bar graph citing the number of football-related brain deaths in five-year increments from the year 1945 to 1999. From 1945-1949, there were just fewer than fifty. From the years 1950-1954 there were roughly forty. In the five-year period from 1955-1959 there were just fewer than fifty again. Then, in the 1960s, the deaths due to brain injuries in football experienced an unprecedented spike. In 1960-1964, there were almost seventy deaths. In the last five years of the 1960s (1965-1969) there were over one hundred football-related deaths due to brain injuries. Looking at it from an average per year standpoint, this statistic adds up to about twenty per year, which relates back to the number of total deaths in the year 1905. Considering the fact that this only includes brain-related deaths in the 1960s, this caused a high level of concern and led people to start talking about banning the sport or making significant rule changes.

During the 1960s, a University of Michigan neuroscientist, Richard Schneider, decided to create

A laboratory model at the University of Michigan to study head and neck injuries, and these experiments ultimately led to the development of the protective helmets used today. In addition, he used game and practice films to study the mechanisms causing these injuries, and his findings led to major rules changes banning so-called spearing and butt-blocking. The result was a dramatic reduction in the incidence of athletics-related 'serious' head and spinal cord injury, as documented in the National Football Head and Neck Injury Register and the National Center for Catastrophic Sport Injury Research data statistics (Moser, 2012).

Helmets have been used since the 1920s, but as the years have passed, technology has improved and scientists have collaborated with the makers of helmets to create the most effective helmets possible. NFL.com has a page dedicated to the history of helmets in the NFL. Back in the 1920s, the soft leather helmet was introduced. In the 1930s, this helmet evolved into a hard leather helmet. Then, in 1939, "the John T. Riddell Company developed and patented the first plastic helmet" (History of the NFL football helmet, 2012). The year 1940 was the year that the first chin strap was invented. A few years later, in 1943, the NFL officially required all of its players to wear helmets. By the end of the 1940s, plastic helmets were officially adopted by the NFL. The 1950s, specifically 1955, saw the addition of the single face bar to the plastic helmet. By the year 1962, face masks were worn by every single player in the NFL. The 1970s saw the invention of energy absorbing helmets. In 1971, Riddell added air bladders inside of the helmets to soften the impact, and in 1975 the full face mask made its appearance in the NFL. Molded

polycarbonate shells made their appearance in the 1980s. The first polycarbonate helmet found its way onto the football field in 1986, while the first protective visor was used in 1984. In 1998, the NFL decided to ban dark/colored visors and established the rule that all face masks must be transparent. In the 2000s, Riddell developed the “revolution helmet” which was created in an attempt to reduce concussions. Single bar helmets were officially banned in 2004. Finally, the most recent design of helmets, created in 2011, include an impact indicator chin strap designed to help identify a head injury (History of the NFL football helmet, 2012). Taking a look back at the graph citing the number of brain-related deaths in football, the new developments in helmets likely assisted in the steady decline following the five-year period from 1965-1969. The years 1970-1974 saw slightly more than sixty deaths compared to the five years prior, which had over one hundred. Following the inclusion of the full face mask in 1975, the years 1975-1979 saw a large decline all the way down to less than forty deaths from brain-related injuries. From 1980-1984 that number dropped to roughly thirty. 1985-1989 saw another slight decrease, between twenty and twenty-five deaths. Incredibly, this number that was once over one hundred dropped down to ten in the five-year period from 1990-1994. Finally, in the last five years of the study, the number increased to between twenty and thirty from 1995-1999. Despite the continued efforts of scientists and helmet makers, it seems like head injuries will always be a part of football due to the violent nature of the sport. In fact, it can be argued that football would be safer without helmets and/or face masks because defensive players would not be nearly as aggressive if they were leading with their bare head opposed to a head that is protected by a

helmet. The late Joe Paterno argued that getting rid of face masks could potentially decrease the number of violent hits and head injuries.

‘I have been saying [it] for [fifteen] years,’ Mr. Paterno said. ‘Then, you would get back to shoulder blocking and shoulder tackling and you wouldn’t have all those heroes out there. Guys would have to worry about broken noses, knocked-out teeth, which we would like to prevent, but you don’t get anything for nothing. We used to have one single bar,’ said Mr. Paterno, who played in the 1940s at Brown University. ‘Now we have a weapon’” (Everson, 2013).

Although this seems to be a valid claim, there is very little evidence to support his hypothesis.

V. Litigation

Since the end of the 20th century, there have been many former football players who have re-emerged into the public spectrum by filing complaints and/or lawsuits against the National Football League for not warning them about the risks associated with head injuries. In the 1990s, there were not very many guidelines associated with the conduct of team doctors in the league. Individual players rarely sought after outside opinions from other medical personnel, and the team doctors felt incredible pressure from the coaches and/or owners to get the player back onto the field as soon as physically possible. Eventually, some former players began to realize that they were putting their lives at risk when listening to and obeying what their team doctors had to say. On October 14, 1994, a former Chicago Bears running back named Merrill Hoge decided to

retire from the NFL at the age of 29, while he was in his prime, because he was afraid of what another concussion could do to him in terms of his long-term health. Mr. Hoge blamed his coaches and the physicians for pressuring him to return to the playing field before he was completely healthy. Hoge also felt that he was entitled to know about the signs and symptoms associated with concussions and any risks that exist when returning to action while still feeling symptomatic. In August of 2000, Merrill Hoge became the first football player to successfully sue a team physician (Hecht, 2002). Mr. Hoge was awarded \$1.55 million to be paid by the Chicago Bears team physician for failing to warn him about the severity of his concussions.

Before going into any other football-related lawsuits, there are a couple of other lawsuits that set the standard for how a judge and jury may view the current lawsuits waged against the NFL. In the case *Bourque v. Duplechin*, the defendant, who was playing softball, veered out of the base path to prevent the second baseman (the plaintiff) from completing the double play. The court ruled that the plaintiff assumed risks from a batted ball, or from a runner, but did not assume the risk of a base runner (the defendant) going out of his way at full speed when he (the plaintiff) was five feet away from the base. The court ruled in favor of the plaintiff, saying that this was “unexpected and unsportsmanlike.” (Standen, 2012-2013, p. 76) In another case, this time during a baseball game, a pitcher intentionally threw at the head of a batter in retaliation, which may also seem “unexpected and unsportsmanlike,” but in this case, the court ruled that the batter, by choosing to play, “assumed the risk” of being thrown at by an opponent, even if

that pitch was aimed at his head with intention (Standen, 2012-2013, p. 76). Although these cases involved a different sport, the principles are the same.

The game of football “inevitably includes repeated blows to the head, thus precluding participants injured by those blows to complain about their ineluctable consequences” (Standen, 2012-2013, p. 79). According to these facts and the collective bargaining agreement (CBA) that each and every professional football player must agree to, it is easy to argue that the players are aware of the risks involved. Players who decide to participate in such a violent sport are voluntarily agreeing to the rules of the game and seemingly are accepting any consequences that may occur in accordance with those rules. “The facts are that players appear to have been injured by legal conduct, unmistakably of the kind to which they expressly consented and anticipated in playing the game” (Standen, 2012-2013, p. 80). Any player who steps on that field has another option; they could choose not to participate. The plaintiffs involved in the current lawsuits will attempt to avoid assumption of risk by claiming that NFL had information regarding the long-term risks of playing the game and that they intentionally withheld that information from players. They could argue that they were never truly made aware of the risks, thus they cannot be deemed to have assumed them (Standen, 2012-2013). “As of June 1, 2013, there are more than 4,800 named player-plaintiffs in the 242 concussion-related lawsuits. Including the players’ spouses, there are more than 5,800 plaintiffs, total” (Plaintiffs/Former players, 2014). The NFL has tried to settle these lawsuits by agreeing to pay out \$765 million to former players, but the judge said that this figure is not large enough. (Brinson, 2014) All of the current players who are

involved in the lawsuit must handle their complaints under the provisions of the current CBA (or the CBA which was current when they filed the lawsuit). It may be easier for the retired players to win their lawsuits because they could argue that the NFL was “fraudulently withholding what they knew about the effects of concussions, [and] the retired players should not be bound by a CBA that was agreed to under false pretenses” (Werts, 2012-2013, p. 187). Although many of the lawsuits have since been lumped together, here are a few of the noteworthy lawsuits that were filed in this current decade. On July 19, 2011, seventy-five former NFL players sued the NFL and the manufacturer of NFL helmets, Riddell Inc., in LA County Superior Court. The name of that case is Maxwell v. National Football League. Less than a month later, on August 17, 2011, six former NFL players decided to launch a lawsuit in the U.S. District Court for the Eastern District of Pennsylvania. This one is a class-action lawsuit that states that the NFL breached their duty of *inter alia* by failing to warn them of the risk of unreasonable harm as a result of multiple concussions (Werts, 2012-2013). Whether the lawsuit is directed at the National Football League, an NFL team doctor, or the helmet manufacturer, they all hold the same basic argument. Players in the National Football League were unaware of the adverse effects that multiple concussions have on their long-term health and well-being. While the majority of the plaintiffs are able to make sound cases, it is very difficult to prove beyond a reasonable doubt that any or all of their injuries are the direct fault of the NFL or its associates. “Players must prove that concussions led to cognitive decline sustained while they were playing in the NFL and that the NFL’s negligence was the proximate cause of the injury” (Werts, 2012-

2013, p. 201). The main reason that it is nearly impossible is because many of these professionals have been playing football since they were kids, teenagers, or young adults (before ever setting foot on an NFL playing field). The vast majority of NFL players played college and/or high school football. Thus, any concussion or subsequent concussions may have been a result of prior concussions while playing non-professional football. In spite of that, it can be argued that the NFL was not proactive in terms of educating its players, coaches, and medical personnel about the dangers associated with concussions, multiple concussions, and playing while experiencing concussion symptoms. One of the main questions that arises in the courtroom is, did the players really know what they were getting themselves into with regards to the risks involved with playing the game of football, or did NFL teams rush them back onto the field in order to benefit their organization, but to the impairment of the players' long-term health (Werts, 2012-2013, p. 176)? Any player hoping to win a lawsuit had to rely on the consensus statements that were being created in the early 2000s.

The first major consensus statement for sports-related concussions was created following the First International Symposium on Concussion in Sport, held in Vienna, Austria in 2001. [...] The experts recommended that players showing 'any symptoms or signs of a concussion' be prevented from returning to the current game or practice and that 'return to play must follow a medically supervised stepwise process.' In 2004, the Second International Conference on Concussion in Sport was held in Prague, Czech Republic, and the same group of experts updated their consensus recommendations. In this update,

the experts recommended categorizing concussions as either simple or complex, for purpose of management. Simple concussions were those that progressively resolved without complication over 7 to 10 days, while complex concussions were those that had ‘persistent symptoms (including persistent symptom recurrence with exertion), specific sequelae (such as concussive convulsions), prolonged loss of consciousness (more than one minute, or prolonged cognitive impairment after the injury.’ [...] In 2006, the American College of Sports Medicine (ACSM) also produced a consensus statement for team physicians. This consensus statement focused on game-day treatment, management, and return-to-play decisions. It reemphasized the idea that athletes should be completely asymptomatic at rest and with exertion before they can return to play. Additionally, the statement explained that return-to-play decisions should be based on the number and duration of post-concussion symptoms, as well as the individual attributes of the particular athlete, including one’s age, history of concussions, and whether they had any learning disabilities (Werts, 2012-2013, p. 188-190).

The NFL and any medical personnel associated with the NFL must have seen or heard about these consensus statements, so why did it take so long for them to establish a concussion policy? Considering that the Mild Traumatic Brain Injury Committee formed in 1994, and the fact that the NHL instituted a concussion policy in 1997, while NASCAR followed suit in 2003, it does not bode well for the NFL that they waited until 2007 to establish a policy of their own. Even when they did finally form their concussion policy, it was not up to the standards of the medical

community. The policy merely covered players who had been knocked unconscious due to a head injury. It stated that a player who has experienced a head injury causing them to lose consciousness should not be able to return to the current game or practice, which clearly does not follow the guidelines established by the American College of Sports Medicine or the International Conferences on Concussion in Sport. In 2009, the NFL finally updated their concussion policy to include players who have any signs or symptoms of a concussion. Although it took the NFL much longer than it should have to establish an adequate concussion policy, they also made some much needed rule changes starting in 2002. In 2002, “the NFL prohibited players from hitting a Quarterback (QB) helmet-to-helmet any time after a change of possession” (Werts, 2012-2013, p. 195). Then, in 2009, they made a rule regarding “defenseless” receivers. A defender is not allowed to hit a defenseless receiver in the head or neck area. The year 2011 saw the formation of the NFL Player Safety Panel. Also, the NFL expanded the definition of who is considered a defenseless player to include the kicker and punter during the kick and return, and also the QB any time after a turnover. Also, the NFL moved the kickoff up 5 yards in order to decrease the number of returns (instead, the kickers were able to cause a touchback more frequently) because it is believed that players are at higher risk for injury during this type of play. In 2012, the NFL once again expanded their definition of a defenseless player by adding defensive players on “crackback” blocks, which protects them from being hit in the head or neck area by an offensive player after a turnover (Werts, 2012-2013). Due to the inception of these rules being so recent, there is not very much data that suggests that these rule changes have had a

positive effect on decreasing the number of concussions. Another rule that reduces the risks of concussions is that the referees blow the whistle and end the play whenever a player's helmet comes off. This rule is designed to prevent a player from taking a direct blow to the head. In spite of all of these rules, the NFL could and should create more rules to ensure a safer game.

VI. CTE and Suicides

The impact of multiple concussions on a person's long-term health can be completely devastating. As mentioned earlier, multiple concussions during an NFL player's career will likely cause cognitive issues such as depression and dementia, but most importantly, it can lead to Chronic Traumatic Encephalopathy (CTE). CTE is defined as

A progressive degenerative disease of the brain found in athletes (and others) with a history of repetitive brain trauma. This trauma, which includes multiple concussions, triggers progressive degeneration of the brain tissue, including the build-up of an abnormal protein called tau. [...] The brain degeneration is associated with memory loss, confusion, impaired judgment, paranoia, impulse control problems, aggression, depression, and eventually, progressive dementia (What is CTE?, 2013).

In 2006, former NFL player Andre Waters committed suicide at the age of forty-four; he was only eleven years removed from the NFL. Dr. Bennet Omalu decided to do examinations of the brain tissue of Andre Waters and two other deceased NFL players who committed suicide, Mike Webster and Terry Long. In 2005, Dr. Omalu researched the brain tissue of Hall of Fame

lineman “Iron Mike” Webster, and she found enough evidence to support the claim that CTE was at least part of the reason why he committed suicide. This became known as the first documented case of CTE in a retired professional football player. In 2006, Dr. Omalu was able to confirm the second case of CTE, this time by studying the brain of Terry Long, who committed suicide by drinking anti-freeze. Then, in 2007, Andre Waters became the third confirmed case of CTE in a former professional football player (Scheuerman, 2012-2013). After much research and testing, she found that all three of them experienced psychiatric symptoms such as paranoia, panic attacks, and major depression before death. She was also able to come to the conclusion that CTE triggered by multiple NFL concussions was at least partially responsible for their decisions to take their own lives (Werts, 2012-2013). Between February of 2008 and June of 2010, a study was done by the Center for the Study of Chronic Traumatic Encephalopathy. This study analyzed the brains of twelve former professional football players. The conclusion of the study found that all twelve of them showed evidence of CTE. Another study found that 93% of professional football players who have had their brains examined have been diagnosed with Chronic Traumatic Encephalopathy (Scheuerman, 2012-2013). By 2009, six former players were found to have CTE. The three players who were mentioned above, along with John Grimsley, Justin Strzelczyk, and Tom McHale. Dr. Omalu found red streaks in Andre Waters’ brain, which was the same as she had found in the brains of Mike Webster and Terry Long. Dr. Omalu also found that Mr. Waters’ brain had experienced significant deterioration, almost certainly caused/accelerated by multiple concussions (Tamburri, 2013).

In February of 2011, Dave Duerson, former NFL player, committed suicide by shooting himself in the chest. In his suicide note, he adamantly stated that he shot himself in the chest so that his brain could be sent to the NFL brain bank to be examined in order to find out if he had the same type of degenerative brain disorder as Andre Waters. In April of 2012, Ray Easterling, former NFL player, took his own life as well, likely due to some form of CTE or dementia. CTE has flung itself into the public spectrum in the past decade due to the greater prevalence of media coverage. Anyone who pays attention to sports knows about Junior Seau taking his own life in May of 2012, due to depression and probably some form of CTE. It has been estimated that after twenty years of being one of the most fearsome defensive players in the league, Junior may have suffered upwards of 1,500 undiagnosed concussions. Seau's suicide made a huge impact because of the fact that he, just like Dave Duerson, made a conscious decision to shoot himself in the chest rather than in the head so that his brain could be examined for cognitive defects such as dementia or CTE in order to possibly help prevent future suicides.

In a study done by the University of North Carolina's Center for the Study of Retired Athletes, researchers were able to establish a strong correlation between depression and the number of concussions suffered during an NFL career. They studied 592 former players who said that they suffered three or more concussions during their NFL career, and of those 592, 20.2% of them suffer from depression (Werts, 2012-2013).

Brain injury increases the likelihood of depression, depression leads to more thought of suicide 'suicidal ideation,' higher suicidal ideation rates increase likeliness of suicide

attempts/suicide. [...] It is difficult for courts to isolate the effect of a player's former concussions or brain injury from other factors that may have contributed to a suicide attempt. Celebrity itself is linked to rates of suicide three times the normal level. [...] A player goes from being cheered on by tens of thousands to the quiet of failed investments and an aching body (which could lead to depression by itself even without brain injury) (Rapp, 2012-2013, p. 130).

Brain injuries can also increase the likelihood of some diseases and disorders. "People with traumatic brain injury (TBI) are 1.8 times more likely to report binge drinking, 11 times as likely to develop epilepsy, and 7.5 times as likely to die. [...] [They are also] 1.5 times increased risk of depression, 2.3 and 4.5 times increased risk of Alzheimer's disease associated with moderate and severe head injury, respectively." (Langlois, 2006) In spite of all of this candid evidence, researchers continue to feel very uncomfortable due to their general lack of knowledge of CTE and all of its complexities. It is nearly impossible to come to any conclusions about how many concussions might cause CTE and if there are any other factors that may contribute to a person being diagnosed with CTE, such as genetic and environmental factors. Due to its violent nature, there will never be a study conducted in which a test subject would take on some sort of "head-jarring" tackle, which would then be compared to some sort of control. Outside of banning football from ever being played again, there may not be any way to solve the issues of TBIs and concussions in football. (Rapp, 2012-2013) "Men this large, this strong, and this fast, simply cannot hit one another at these speeds without exposing both themselves and their opponents to a shocking level of danger and risks of all sorts" (Rapp, 2012-2013, p. 127).

VII. Potential Solutions

Whether or not the NFL has done enough to warn its players about the long-term effects of concussions stirs up quite the debate, and even after doing countless hours of research about this topic, it is still difficult to side with one or the other (the NFL or the players who are trying to sue the NFL). While the NFL has made great strides in the past decade to correct some of their prior flaws, it seems to be “too little, too late,” especially for former players who are in the midst of dealing with the long-term effects of multiple concussions. Many former players are already dealing with the irreversible effects of multiple concussions.

Perhaps the most sensible solution to the NFL’s brain injury dilemma would be to segment a notable portion of the NFL’s revenue to provide compensation to former players-and their families-who suffer serious brain injury. Develop a kind of “9/11 Fund” for former gridiron stars. Such an approach could serve the interests of justice in a way that the current litigation may be unable to do (Rapp, 2012-2013, p.135).

As far as the prevention of head injuries goes, one solution that could help prevent or lessen the long-term effects of concussions is for players to be more aware of medical records. “During each pre-season, agents should arrange for their players to review their medical records in order to confirm all of their actual injuries are reported, and that the records do not contain any injuries that the player has not sustained. Players should also verify that the diagnoses in the records match what he was told at the time of the injury. “Did a trainer tell a player that he was merely

‘shaken up’ on the play and then record the injury as a mild concussion” (Mecham, 2007-2008, p. 706)? Also, there are a few things that players can do to potentially protect themselves from having a concussion. An NFL player should strongly consider strengthening their necks as a part of their work-out routine. “Woodpeckers go through some serious head trauma, yet never suffer from concussions. The reason: they have exceptionally strong necks” (Mecham, 2007-2008, p. 701-702). Along these lines, NFL players should always have their chin strap fastened and they should use the best helmets available.

Players also need to work on their proprioception ‘an automatic sensitivity mechanism in the body that sends messages through the central nervous system (“CNS”). The CNS then relays information to the rest of the body about how to react and with what amount of tension.’ In the moment between when a player realizes he is going to be hit and the impact, whether the player’s muscles become tensed or relaxed is based on the player’s proprioception. Concussions are less likely when a player is prepared for the impact. [...]

When a football player knows he is about to be hit, his proprioception is likely to naturally adjust his joints and muscles so as to avoid injury. Of course, all players are taught to ‘keep their heads on a swivel’ to be prepared for hits coming from all directions. In addition to this coaching, players can train to improve the speed and efficiency of their proprioception by incorporating yoga principles into their training (Mecham, 2007-2008, p. 702).

The players can only do so much to protect themselves, though, and if they were unaware of the adverse effects that concussions have on their future, then they probably did not do very much to try to prevent them. Just before the 2011 season, the NFL finally took a major step in the right direction when it comes to letting the players know what they may have to deal with in the future. The NFL posted warnings in every locker room regarding the long-term effects of concussions, going as far as the use of terms such as depression and dementia (Tamburri, 2013). Another way that concussions could be minimized is by attempting to decrease the media hype that surrounds violent, head-jarring hits. Although this seems to be a viable solution, it is not conceivable due to the society that we live in. I watch “SportsCenter” almost every morning, and during football season, they tend to highlight the best hits in every game, which may promote players to go for bigger hits in order to try to make the highlight reel. If our society changed how we think, then maybe defensive players would not go for the “kill-shot” as often in order to provide self-promotion.

VIII. Conclusion

Although there are many obstacles facing any player who tries to sue the NFL or its associates, I cannot blame them for trying. After reading numerous articles and taking into account all of the things that the NFL could have done or should have done sooner, it is apparent that former players and even some current players who have suffered from multiple concussions have a legitimate case against the NFL. When it comes to solving the issue of concussions in the NFL, technology may have decreased the probability and numeracy, but as long as football is

being played, concussions are going to occur. Some people may argue that they could continue to try to make rule changes, but eventually all of these changes would either make the sport look entirely different than what it was intended to be, or the changes would be so drastic that it would drive away its very most important element: the fans. At this point, the money is far too great for the majority of people to walk away. The NFL is a \$9 billion industry, with the average player salary hovering around \$2 million per year, and those numbers are expected to rise each and every year as they have done for decades (Burke, 2012). So, to answer the principle question proposed at the beginning of this paper, no, the NFL has not done enough to warn its players about the dangers of concussions and how to deal with the lingering effects of those during life after football. Even after the 2011 postings in the locker rooms, players still lie about concussion symptoms because not only do they want to do whatever it takes to help their team, but there is money on the line due to the fact that not all contracts are guaranteed. As much as it pains me to say this, and as strange as it seems to say that Teddy Roosevelt was wrong, the only real solution to this problem is to eliminate the game of football entirely.

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