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A HEADS-UP ON TRAUMATIC BRAIN INJURIES IN SPORTS

SAMUEL D. HODGE, JR.*
SHILPA KADOO**

*“You are supposed to be tough. You are supposed to play through pain. You are not supposed to cry. We are taught that early on in the game as kids. . . . It’s like the gladiator. People want to see the big hits. They wind up on Sports Center. And as a player, you don’t want to admit you are injured.”*¹

–Eric Dickerson
Hall of Fame Running Back

I. INTRODUCTION

Football took away the ability of young Zackery Lystedt to live a normal life, but he continues to change the face of sports.² During a game, he received a severe blow to the head and fell to the ground in pain.³ After a brief respite, Zackery returned to the contest and received a second hit to his cranium causing a brain

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1. *Quotes from Players and Experts As Told to Me*, Head Impacts on Youth Football, STONE PHILLIPS REPORTS, <http://www.stonephillipsreports.com/2012/01/quotes-from-players-and-experts/> (last visited Feb. 28, 2014).

2. Alex Marvez, *Lystedt Lays Down Law on Concussions*, FOX SPORTS, <http://msn.foxsports.com/nfl/story/zack-lystedt-bring-awareness-nfl-concussion-issue-lystedt-law-052012> (last updated May 22, 2012, 1:07 AM).

3. *Id.*

hemorrhage.⁴ He was “in and out” of a coma for several months and physicians questioned whether he would survive.⁵

Zackery’s story did not end with this tragic event but became the motivation for a change in the way head injuries involving student athletes are managed.⁶ At the time, this thirteen-year-old lived in Washington but that state had no laws pertaining to concussions.⁷ There was a lack of awareness about the consequences and risks associated with “return to play” following this form of traumatic brain injury.⁸ Because of the determination of a number of people impressed with Zackery’s plight, Washington became the first state to enact the Lystedt Law.⁹ This model legislation requires mandatory education for athletes, parents, and coaches concerning the dangers associated with blows to the head.¹⁰ If an athlete is suspected of having a concussion, that individual may not resume play until a licensed health care professional clears the athlete to return.¹¹

Because of Zackery’s case,¹² and the highly publicized suits by former professional football players against the National Football League (NFL),¹³ the public has gained a much better appreciation of the health issues associated with

4. *Id.*

5. Joe Frollo, *Three Years Later, Lystedt Law Protects Young Athletes in 34 States and D.C.*, USA FOOTBALL (May 10, 2012; 9:36am), <http://usafootball.com/news/featured-articles/three-years-later-lystedt-law-protects-young-athletes-34-states-and-dc>. Marvez, *supra* note 2 (explaining how physicians told Lystedt’s parents that Lystedt may not survive).

6. Marvez, *supra* note 2.

7. *See id.* (demonstrating that Washington state passed this legislation in 2010, four years after Lystedt’s injury).

8. *See* Zackery Lystedt Law, WASH. REV. CODE § 28A.600.190 (2010) (describing how student athletes were prematurely allowed to return to play following possible concussions).

9. Marvez, *supra* note 2.

10. *See* § 28A.600.190(2) (2010).

11. *Id.* § 28A.600.190(4).

12. *See* Marvez, *supra* note 2 (describing Zackery’s ongoing efforts to publicly share the details of his experience to create greater awareness and advocate for concussion safety legislation).

13. *See* Paul D. Anderson Consulting, LLC, *The Lawsuits Continue*, NFL CONCUSSION LITIGATION (Nov. 12, 2013), <http://nflconcussionlitigation.com/?p=1270> (describing how more than 30% of all former NFL players have filed some form of concussion-related lawsuit against the NFL, and speculating that this number could rise as high as 50%). A suit has now been filed against the National Hockey League over a concussion and some say this litigation may be the impetus to ban fighting in the sport. Paul D. Anderson Consulting, LLC, *NHL Concussion Litigation – The Boogaard Family Strikes First*, NFL CONCUSSION LITIGATION (May 13, 2013), <http://nflconcussionlitigation.com/?p=1446>. About 4,100 plaintiffs in 222 consolidated lawsuits filed by former NFL players are pending in federal district court in Philadelphia. Albert Breer, *Concussion Lawsuit: State of Things Entering Tuesday’s Hearing*, NAT’L FOOTBALL LEAGUE, <http://www.nfl.com/news/story/0ap1000000158376/article/concussion-lawsuit-state-of-things-entering-tuesdays-hearing> (last updated Apr. 9, 2013, 11:50 AM). This litigation is not a class-action lawsuit, but the cases have been consolidated to streamline the claims, so that all pre-trial motions can be taken care of more efficiently. A tentative multi-million dollar settlement was reached but rejected by the presiding judge. *Id.*

brain injuries, including the greater propensity for cognitive slowing, increased propensity for re-injury, early onset of Alzheimer's disease, second impact syndrome, and chronic traumatic encephalopathy.¹⁴ This awareness has also prompted state legislatures as well as governing sports organizations to establish rules and policy changes focused on the increased safety of athletes, along with standardized medical care.¹⁵

II. TRAUMATIC BRAIN INJURIES AND CONCUSSIONS DEFINED

A traumatic brain injury (TBI) does not have a single agreed upon definition. Nevertheless, it is a major health problem in the United States, resulting from trauma to the head from such things as a blow or a jolt.¹⁶ It can also be caused by a penetrating head wound that interferes with brain function.¹⁷ As noted in *Bennett v. Richmond*,¹⁸ a TBI happens in the course of a closed head injury, and its severity can vary from mild to severe.¹⁹ According to the National Collegiate Athletic Association's (NCAA's) Sports Medicine Handbook, a mild TBI involves "a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces."²⁰ On the other hand, a severe head injury is one in which person has lost consciousness for at least for six hours, or the individual suffers post-traumatic amnesia for twenty-four hours or more.²¹

A related form of brain trauma is a concussion.²² This term was defined in *Pham v. Wal-Mart Stores, Inc.* as a mild traumatic brain injury, which usually

14. See, e.g., *State v. McKague*, 246 P.3d 558, 575 (Wash. Ct. App. 2011) (demonstrating increased public awareness of brain injuries through warning labels, increased media coverage, and legislation preventing young athletes from obtaining medical clearance before returning to play after a suspected concussion), *aff'd*, 262 P.3d 1225 (Wash. 2011).

15. See Christopher S. Sahler & Brian D. Greenwald, *Traumatic Brain Injury in Sports: A Review*, REHABILITATION RES. AND PRAC. 1, 7 (Feb. 6, 2012), available at <http://downloads.hindawi.com/journals/rrp/2012/659652.pdf> (discussing the increased awareness of traumatic brain injuries and how various legislative bodies and sport's governing bodies have adopted rules aimed at preventing them).

16. *Traumatic Brain Injury*, CTRS. FOR DISEASE CONTROL AND PREVENTION, <http://www.cdc.gov/TraumaticBrainInjury/severe.html> (last updated Aug. 15, 2013).

17. *Id.*

18. 960 N.E.2d 782, 789 (Ind. 2012).

19. See *id.* at 789–90 (referencing a neuropsychologist's creation of a head injury severity scale for his head trauma rehabilitation program).

20. 2011–2012 *NCAA Sports Medicine Handbook*, THE NAT'L COLLEGIATE ATHLETIC ASS'N, available at <http://www.ncaapublications.com/productdownloads/MD11.pdf> (last visited Oct. 15, 2013).

21. *Severe Brain Injury*, HEADWAY, <https://www.headway.org.uk/severe-brain-injury.aspx> (last visited Oct. 15, 2013).

22. *Concussion and Mild TBI*, CTRS. FOR DISEASE CONTROL AND PREVENTION, <http://www.cdc.gov/concussion/index.html> (last updated Aug. 15, 2013).

occurs after a blow to the head.²³ A concussion has also been labeled an altered disturbance of brain function resulting from trauma.²⁴ As these varying definitions point out, physicians and sports medicine researchers do not agree on one exact definition of this condition.²⁵ Nevertheless, the experts agree that a concussion is an injury to the brain,²⁶ and this type of insult can result from any form of recreational activity, sports or trauma.²⁷ Therefore, sports enthusiasts, parents, and coaches need to become familiar with the symptoms of this form of brain injury and how to proceed if such trauma happens.²⁸

Concussions are often referred to as mild TBIs.²⁹ It is important to note, however, that concussions may be considered mild TBIs, but not all mild TBIs are concussions.³⁰ These types of brain injuries are usually self-limited in length.³¹ The American Academy of Neurology labeled this form of injury as a “trauma-induced alteration in mental status that may or may not involve loss of consciousness.”³² On the other hand, the American Medical Society for Sports Medicine explains a concussion as “a subset of mild traumatic brain injury (MTBI) which is generally self-limited and at the less-severe end of the brain injury spectrum.”³³

Anatomically, the brain is a soft structure that has the consistency of gelatin, and a TBI takes place when some form of energy is transmitted to this delicate structure.³⁴ This energy can be caused by diverse factors, from a whiplash-type

23. *Pham v. Wal-Mart Stores, Inc.*, No. 2:11-CV-01148-KJD-GW, 2012 WL 1957987 at *5 (D. Nev. Aug. 28, 2012).

24. Kimberly G. Harmon et al., *American Medical Society for Sports Medicine Position Statement: Concussion in Sport*, CLIN. J. SPORT MED. (2013).

25. *See Weeks Marine, Inc. v. Am. S.S. Owners Mut. Prot. & Indem. Ass’n*, No. 08 Civ. 9878 (NRB), 2011 U.S. Dist. LEXIS 95358, at *31 (S.D.N.Y. Aug. 25, 2011) (noting that research on the subject of concussions has not led to a universally accepted definition of what constitutes the condition).

26. *See Sahler & Greenwald*, *supra* note 15, at 2 (defining a mild TBI as a “complex pathophysiologic process affecting the brain, induced by traumatic biomechanical forces secondary to direct or indirect forces to the head.”).

27. *Concussion in Sports*, CTRS. FOR DISEASE CONTROL AND PREVENTION, <http://www.cdc.gov/concussion/sports/index.html> (last updated Jul. 22, 2013).

28. *Injury Prevention & Control: Traumatic Brain Injury*, CTRS. FOR DISEASE CONTROL AND PREVENTION, <http://www.cdc.gov/concussion/sports/> (last visited May 13, 2013).

29. *Concussion and Mild TBI*, *supra* note 22.

30. Harmon et al., *supra* note 24, at 16–17.

31. *Id.* at 17.

32. John M. Parisi & Douglas R. Bradley, *Ringling the Bell on Concussions*, TRIAL, Aug. 2012, at 15 (quoting Quality Standards Subcomm. of Am. Acad. Of Neurology, *Practice Parameter: The Management of Concussion in Sports*, Mar. 1997, at 581, 582).

33. Harmon et al., *supra* note 24, at 15.

34. *Id.* at 17.

injury to a cranium-fractured skull.³⁵ The outcome of the insult is a mixture of metabolic, ionic, and functional changes resulting in an axonal injury.³⁶ Symptoms of a concussion include loss of consciousness, headache, dizziness and vertigo, lack of awareness, nausea, vomiting, mental dysfunction, sleep deprivation, and tinnitus.³⁷

Both TBIs and concussions have the potential to have long-term neuropathological, neurological, and neurobehavioral consequences.³⁸ Yet concussions are transient in nature, typically emphasized as having more of a functional rather than structural impact.³⁹ Loss of consciousness may or may not be present,⁴⁰ a structural injury may occur whether a loss of consciousness takes place at the time of insult.⁴¹

III. AN OVERVIEW OF THE PROBLEM

Sports play a large role in society.⁴² Statistically, approximately 30 million children and young adults engage in some type of structured sports events annually.⁴³ In just this population alone, more than 3.5 million sport-related injuries occur annually.⁴⁴ Historically, concussions have not been given the

35. Alexander N. Hecht, *Legal and Ethical Aspects of Sports-Related Concussions: The Merrill Hoge Story*, 12 SETON HALL J. SPORT L. 17, 23 (2002).

36. See generally Barkhoudarian et al., *The Molecular Pathophysiology of Concussive Brain Injury*, 30 CLINICS IN SPORTS MED. 33, 34–36 (describing the physiological effects of a concussion). A diffuse axonal brain injury is both one of the most common and one of the most severe types of injuries, and can lead to death. *Diffuse Axonal Brain Injury*, BRAIN INJURY INSTITUTE.ORG, <http://www.braininjuryinstitute.org/Brain-Injury-Types/Diffuse-Axonal-Brain-Injury.html> (last visited Sept. 10, 2013). An axonal brain injury is referred to as *diffuse* because unlike some other brain injuries that are focused in one generalized area, an axonal brain injury is widespread and affects a larger area. *Id.*

37. Edward M. Wojtys et al., *Concussion in Sports*, 27 AM. J. SPORTS MED. 676, 676 (1999).

38. See Barkhoudarian et al., *supra* note 36, at 42 (summarizing the potential impact of concussions).

39. See Alain Ptito et al., *Contributions of Functional Magnetic Resonance Imaging (fMRI) to Sport Concussion Evaluation*, 22 NEUROREHABILITATION, 217, 218 (2007) (demonstrating the evolution of understanding the potential consequences of concussions from temporary consciousness effects to enduring cognitive effects).

40. *Traumatic Brain Injury*, CTRS. FOR DISEASE CONTROL AND PREVENTION, <http://www.cdc.gov/traumaticbraininjury/> (last updated Aug. 15, 2013).

41. Ptito et al., *supra* note 39, at 217.

42. See generally Anish Chandra et al., *Consumers' Perceptions and Opinions of Sports Injuries: An Exploratory Empirical Study*, HOSP. TOPICS 32, 32 (2008) (explaining that millions of individuals play sports or are involved in strenuous physical activities on a regular basis); see also Eckstein et al., *Sports Sociology's Still Untapped Potential*, 25 SOCIOLOGICAL FORUM 500, 501 (2010) (explaining the importance of sociological analysis of sports due to sports' prominence in today's society).

43. Chandra et al., *supra* note 42, at 32 (citing Am. Acad. of Orthopedic Surgeons, 2007).

44. *Sport Injury Statistics*, CHILDREN'S HOSP. OF WIS., <http://www.chw.org/display/PPF/DocID/21759/router.asp> (last visited Sept. 19, 2013).

attention that they deserve by the sports and medical community.⁴⁵ Generally, sports enthusiasts who incur a mild concussion return to the game in short order as though nothing had happened.⁴⁶ After all, it is a common mantra shared by many athletes that they should push themselves beyond their normal endurances.⁴⁷ This includes playing with a variety of injuries.⁴⁸ Additionally, athletes have an innate desire to help their team win, which often takes precedence over their individual safety.⁴⁹ This causes athletes to underreport medical problems which may cause them to miss time from the game.⁵⁰ There may also be other reasons to excel in sports, such as scholarship opportunities or being drafted by the professionals.⁵¹ Even some parents may be adverse to pulling their son or daughter from the event because of a desire for them to perform well.⁵² Furthermore, physicians cannot attribute a specific number of incidents prior to the onset of permanent brain damage.⁵³

A. Concussions

Concussions are a concern in contact sports, particularly in football and hockey,⁵⁴ because once an individual is cleared to play, the athletes return to an environment in which a head injury is likely to reoccur.⁵⁵ In fact, position and style of play seem to have a bearing on the chances of sustaining a concussion.⁵⁶

45. See Hecht, *supra* note 35, at 18–20 (explaining how not until recently was there legitimating scientific research or a heightened degree of social awareness concerning sports-related concussions); see also Bob Cook, *The Counter-Freakout to the Football Concussion Freakout is Underway*, FORBES (Aug. 23, 2013, 4:18 PM), <http://www.forbes.com/sites/bobcook/2013/08/23/the-counter-freakout-to-the-football-concussion-freakout-is-under-way/> (explaining that until recent scientific evidence and media coverage emerged, head injuries were not taken as seriously as they should have been).

46. Hecht, *supra* note 35, at 23.

47. Sahler & Greenwald, *supra* note 15, at 2.

48. *Id.*

49. *Id.* See also NFL Concussion Poll: 56 Percent of Players Would Hide Symptoms to Stay on Field, SPORTING NEWS (Nov. 11, 2012 at 9:53 PM EST), <http://www.sportingnews.com/nfl/story/2012-11-11/nfl-concussions-hide-symptoms-sporting-news-midseason-players-poll> (demonstrating that 56% of NFL players would try to hide concussion symptoms in order to stay in a game).

50. Sahler & Greenwald, *supra* note 15, at 2

51. *Id.* at 3.

52. *Id.*

53. Hecht, *supra* note 35, at 23.

54. Carly Weeks, *Most Sports-Related Brain Injuries Occur in Hockey, Study Finds*, GLOBE AND MAIL, <http://www.theglobeandmail.com/life/health-and-fitness/health/most-sports-related-brain-injuries-occur-in-hockey-study-finds/article10530575/> (last updated Mar. 28, 2013, 6:03 PM EDT) (explaining how a recent study finding that hockey is the biggest contributor to sports-related brain injuries in minors prompted calls for major changes to how the game is played).

55. Ptito et al., *supra* note 39, at 218.

56. Harmon et al., *supra* note 24, at 18.

Concussions typically occur as the result of “player-to-player” contact.⁵⁷ Therefore, sports in which collisions are a regular part of the game will result in a higher percentage of athlete concussions.⁵⁸ For instance, the positions in professional football that have higher numbers of concussion include running backs, defensive backs, quarterbacks, and wide receivers.⁵⁹ In fact, a player in one of these positions has three times the risk of suffering concussions than a “lineman”.⁶⁰ It is no wonder that college and professional football are discouraging runbacks on kickoffs since these athletes have four times the risk of sustaining concussions as athletes involved in a running or passing play.⁶¹ Linebackers and running backs in high school are the most frequent players to suffer concussions at that level of competition.⁶² There is also misconception that soccer is “safe” to play but these athletes suffer concussions as the result of player-to-player contact;⁶³ however, studies show that head injuries occur with some frequency in those sports in which the head is used as part of the game, such as in soccer.⁶⁴ It is difficult to implement safeguards to protect the head in this sport, such as requiring the wearing of head gear, because heading is an integral part of the game.⁶⁵ In fact, one study reported that at least 60% of those playing soccer on the collegiate level developed symptoms compatible with a concussion during a season.⁶⁶ These statistics vividly demonstrate that head injuries in soccer are more common than most imagined.⁶⁷ An investigation performed by the U.S. Consumer Product Safety Commission reveals that 40% of concussions in soccer result from head-to-player contact;⁶⁸ 12.6% are caused by the soccer ball striking the cranium;⁶⁹ 10.3%

57. *Id.*

58. *Id.*

59. *Id.*

60. *Id.*

61. *Id.*

62. Harmon et al., *supra* note 24, at 18

63. *Id.* at 18–19.

64. See, e.g., J.T. Matser et al., *A Dose-Response Relation of Headers and Concussions with Cognitive Impairment in Professional Soccer Players*, 23 J. CLINICAL & EXPERIMENTAL NEUROPSYCHOLOGY 770, 770 (2002) (demonstrating that more than half of amateur soccer players in the U.S. suffered at least one concussion over two seasons via a 1998 study by Boden, Kirkendall, and Garrett).

65. *Sports-Related Head Injury*, AM. ASS’N OF NEUROLOGICAL SURGEONS, <http://www.aans.org/Patient%20Information/Conditions%20and%20Treatments/Sports-Related%20Head%20Injury.aspx> (last visited May 13, 2013).

66. *Id.*

67. *Id.*

68. *Id.*

69. *Id.*

result from the player's head contacting the goal post, ground, or wall;⁷⁰ and 37% are not specified.⁷¹

The effects of concussions are revealed through neuropsychological tests, which measure concentration, problem solving, memory, visual-spatial, counting, and language skills.⁷² Common results of concussions include deterioration of planning and memory, functions which are controlled by the brain's frontal and temporal lobes.⁷³ In addition, difficulty with memory of new material, attention, information processing speed, and integrative tasks contributing to executive function have also been shown to occur.⁷⁴ Studies show that soccer players who regularly head the ball experience more concussions, and are more likely to exhibit impaired performance on neuropsychological tests.⁷⁵ It is not surprising that those who sustain repeated concussions in football also report worse performances on neuropsychological testing than players with either a lone concussion or no concussion at all.⁷⁶

Most concussions will become asymptomatic as long as the person is allowed the proper time to rest.⁷⁷ Players who return to sports prematurely following a concussion, however, are at an increased risk of developing permanent brain damage;⁷⁸ this risk is even greater in children because their brains are still developing.⁷⁹ This vulnerability is attributed to the difference in blood volume, blood-brain barrier, the brain's water content, amount of myelination, cerebral metabolic rate of glucose, and other metabolic factors.⁸⁰ A child's brain may also have less cognitive reserves than the adult brain.⁸¹ This may explain the proven increase in time required to recovery from concussion seen in younger athletes.⁸² Catastrophic consequences are more probable in younger athletes and are believed to be linked to the physiologic differences between younger and older brains.⁸³

70. *Id.*

71. *Id.*

72. *Neuropsychological Testing*, PENN STATE HERSHEY, http://www.pennstatehershey.org/web/neurology/patientcare/specialty/services/neuropsychological_testing (last visited Sept. 9, 2013).

73. *Id.*

74. *Id.*

75. *See, e.g.,* Matser et al., *supra* note 64, at 772–73 (finding that both headers and concussions may contribute to “cognitive impairment”).

76. Pfito et al., *supra* note 39, at 218.

77. Parisi & Bradley, *supra* note 32, at 15.

78. *Id.*

79. *Id.*

80. Harmon et al., *supra* note 24, at 18.

81. *Id.*

82. *Id.*

83. *Id.*

B. Second Impact Syndrome

While a single, isolated concussion will not typically cause death, repeated TBIs may cause cumulative damage to the brain, resulting in severely harmful effects.⁸⁴ For example, repeated concussions raise the probability that second impact syndrome,⁸⁵ a potentially fatal condition,⁸⁶ will occur.⁸⁷ As noted in *Parker v. South Broadway Athletic Club*,⁸⁸ this syndrome is demonstrated by a swift swelling of the brain.⁸⁹ After the initial concussion, brain cells that are not irreversibly destroyed remain vulnerable.⁹⁰ A second hit to the head while an athlete is still recovering from a prior concussion could lead to a fatal herniation of the brain.⁹¹

Returning to athletics too soon after sustaining second impact syndrome places the person at risk of permanent disability and even death.⁹² Unfortunately, sideline personnel are not usually able to diagnose this injury during the event, thereby complicating the problem.⁹³ The only way to identify it is through magnetic resonance imaging (MRI) or computed tomography (CT) scans of the brain, yet these techniques may not even catch the subtle pathology associated with concussions.⁹⁴

C. Chronic Traumatic Encephalopathy

84. Hecht, *supra* note 35, at 24.

85. Second impact syndrome is a condition which occurs when an athlete sustains an additional blow to the head after suffering an initial concussion. Terry Zeigler, *Second Impact Syndrome*, SPORTSMED, <http://www.sportsmd.com/articles/id/38.aspx> (last visited May 11, 2013). The second injury need not be strong to put the effects in motion; the athlete may be the subject of only a minor blow to the head or a hit to the chest that snaps the head enough to have the brain rebound within the skull. *Id.*

86. *Id.*; see also Zeigler, *supra* note 85 (demonstrating the high mortality rate of second impact syndrome in young athletes).

87. See Robert Cantu, *Return to Play Guidelines After a Head Injury*, 17 CLINICS IN SPORTS MED. 45, 51–54 (1998) (demonstrating that when an individual still has symptoms from a prior head injury, fatal brain swelling can occur even from a second minor head trauma).

88. 130 S.W.3d 642, 644 (Mo. Ct. App. 2007).

89. *Id.* at 644.

90. Wojtys et al., *supra* note 37, at 677.

91. See Harmon et al., *supra* note 24, at 24 (demonstrating potential risks involved in returning an athlete to play too soon after a head injury including brain herniation that could lead to death).

92. Hecht, *supra* note 35, at 24.

93. *Id.* at 25.

94. *Id.*

Another harmful effect of repeated concussions and brain trauma is chronic traumatic encephalopathy (CTE).⁹⁵ This condition is closely associated with athletes who play contact sports such as boxing,⁹⁶ football, wrestling, and hockey.⁹⁷ CTE is a progressive neuro-degeneration clinically associated with memory disturbances, behavioral and personality changes, Alzheimer's disease, Parkinson's disease, and speech and gait abnormalities.⁹⁸ It eventually leads to dementia.⁹⁹ It is also characterized by numerous pathological conditions, including brain atrophy.¹⁰⁰ Further, CTE develops well before clinical manifestation of its symptoms.¹⁰¹

IV. STATISTICS

The scope of the problem with TBIs is far-reaching. According to the Centers for Disease Control and Prevention (CDC), more than 300,000 sports and recreation-related TBIs occur each year in the United States.¹⁰² In fact, it is believed that at least 3.8 million concussions occur annually in this country during sports activities.¹⁰³ Unfortunately, 50% of these concussions go unreported.¹⁰⁴ Concussions in scholastic sports are also on the rise, after an eleven-year study ascertained that the number of concussions in scholastic sports increased 16.5% since 1997.¹⁰⁵

95. Ann C. McKee et al., *Chronic Traumatic Encephalopathy in Athletes: Progressive Tauopathy After Repetitive Head Injury*, 68 J. NEUROPATHOLOGY & EXPERIMENTAL NEUROLOGY 709, 709 (2009).

96. It is fairly well known that professional and amateur boxers can incur permanent brain damage. *Sports-Related Head Injury*, *supra* note 65. A professional boxer's punch is equivalent to "being hit with a thirteen-pound bowling ball traveling twenty miles per hour, or about fifty-two times the force of gravity." *Id.*

97. Michelle Saulle & Brian Greenwald, *Chronic Traumatic Encephalopathy: A Review*, REHABILITATION, RES. & PRAC. 1, 1 (2012).

98. *Id.* at 3–4.

99. David S. Cerra, *Unringing the Bell: Former Players Sue NFL and Helmet Manufacturers Over Concussion Risks in Maxwell v. NFL*, 16 MICH. ST. U. J. MED. & L. 265, 267–68 (2012).

100. *See* McKee, *supra* note 95, at 720 (describing a number of common neuropathologic features of CTE, including "a reduction in brain weight" and atrophy of the frontal, temporal, and occipital lobes).

101. *Id.* at 732.

102. *Press Release: CDC Announces New Initiative to Help High School Coaches Recognize and Manage Concussions*, CTRS. FOR DISEASE CONTROL & PREVENTION, (Sept. 22, 2005, 12:00 PM), <http://www.cdc.gov/media/pressrel/r050922.htm>; Hecht, *supra* note 35, at 20.

103. Harmon et al., *supra* note 24, at 17.

104. *Id.*

105. *Id.* (citing Andrew E. Lincoln et al., *Trends in Concussion Incidence in High School Sports*, 35 AM. J. SPORTS MED. 958 (2011), available at http://www.medstarsportshealth.org/documents/Am_J_Sports_Med-2011-Lincoln-0363546510392326%5B1%5D.pdf).

This issue is one of great concern, particularly because it involves the brain, which is incapable of regeneration.¹⁰⁶ Brain injuries are also one of the leading causes of death in athletes and a source of catastrophic injury.¹⁰⁷

V. ATHLETES' STORIES

Numerous athletes are negatively affected by the lack of proper concussion management. One such person is Merrill Hoge, a six-foot-two-inch tall, two hundred thirty-pound professional football player and current sports announcer.¹⁰⁸ This rugged athlete suffered a concussion during a preseason game while playing for the Chicago Bears.¹⁰⁹ He described the experience as feeling like an “earthquake . . . I got hit from at least three directions. I had a hard time getting up, but I stayed in for two more plays and walked to the sideline. I played the next week, even though I had trouble remembering plays.”¹¹⁰ Six weeks later, Hoge sustained another concussion during a game.¹¹¹ Ten days later, his symptoms remained unabated and he complained of headaches, dizziness, the inability to stay awake, and his memory was impaired.¹¹² In addition, he had trouble with his short-term memory, including remembering what he was speaking of from one minute to the next.¹¹³ Later that year, Hoge retired from the NFL at the age of twenty-nine.¹¹⁴

Mike Webster, an all-pro center for the Pittsburgh Steelers and member of the NFL Hall of Fame, died at the age of fifty from a heart attack.¹¹⁵ Following the end of his football career, his life took an unfortunate turn, and he became unemployed because of his inability to complete the duties of his job.¹¹⁶ Following his death, an autopsy confirmed the presence of CTE, most likely the result of repeated blows to his head during his football career.¹¹⁷

Terry Long, another former Pittsburgh Steelers player, committed suicide at forty-five years old.¹¹⁸ Long displayed similar symptoms to those displayed by Mr.

106. Cantu, *supra* note 87, at 45.

107. *Id.*

108. Hecht, *supra* note 35, at 25.

109. *Id.* at 26.

110. *Id.*

111. *Id.*

112. *Id.* at 26–27.

113. *Id.*

114. *Id.* at 27.

115. Christopher Nowinski, *Head Games: Football's Concussion Crisis*, BRAINLINE.ORG, http://www.brainline.org/content/2008/08/head-games-footballs-concussion-crisis_pageall.html (last visited May 6, 2013).

116. *Id.*

117. *Id.*

118. *Id.*

Webster, including depression and erratic behavior.¹¹⁹ CTE was discovered at autopsy, a by-product of his football career and repeated blows to the head.¹²⁰

These examples are not isolated. In 2005, the University of North Carolina's Center for the Study of Retired Athletes surveyed thousands of former NFL players on their experiences with concussions.¹²¹ The survey determined that the players' risk of suffering from neurological illnesses such as Alzheimer's disease, depression, and cognitive impairment was proportionate to the number of concussions they suffered.¹²² Players who suffered three concussions in their lifetime had more than three times the rate of clinically diagnosed depression and five times the rate of mild cognitive impairment, a precursor to Alzheimer's disease.¹²³

VI. POST-CONCUSSION TESTING AND RETURN TO PLAY GUIDELINES

Recognition and management of concussions is a topic of much controversy.¹²⁴ Recent data suggested a trend of increased annual concussion rates over the past decade.¹²⁵ While the reason for this increase is unknown, much emphasis is placed on concussion education and awareness for players, coaches, physicians, and medical trainers.¹²⁶ Awareness, and an emphasis of the importance of following concussion guidelines, may play a key role in making a difference in the impact that concussions have had on the brain and person. A lack of awareness of the impact of concussions, however, may be the cause of athletes returning to play sooner than they should. For example, Troy Aikman, a former quarterback for the Dallas Cowboys, sustained eight detected concussions in his professional career.¹²⁷ Aikman's performance on the field declined, causing many to blame the concussions.¹²⁸ Though Aikman was treated by medical professionals, he was assured that the concussions would have no long-term effects, so he continued to play.¹²⁹ Theoretically, had Aikman been informed of the long-term effects of

119. *Id.*

120. *Id.*

121. David Williamson, *New Study at UNC Shows Concussions Promote Dementias in Retired Professional Football Players*, UNIV. N. C. CHAPEL HILL (Oct. 10, 2005), <http://www.unc.edu/news/archives/oct05/guskie101005.htm>.

122. *Id.*

123. *Id.*

124. Harmon, *supra* note 24, at 16.

125. Jennifer M. Hootman et al., *Epidemiology of Collegiate Injuries for 15 Sports: Summary and Recommendations for Injury Prevention Initiatives*, 42 J. ATHLETIC TRAINING 311, 311 (2007).

126. See Harmon, *supra* note 24, at 20 (emphasizing the importance of concussion awareness for players, coaches, and physicians in sports).

127. *Brain Injury In Sports*, BRAIN INJURY RES. CTR., <http://www.headinjury.com/sports.htm>.

128. Hecht, *supra* note 35, at 37.

129. *Id.*

concussions, he may have chosen to take some time off to rest or perhaps even retire in order to prevent any future damage.

A. Concussion Guidelines

It is difficult to standardize the treatment of sports-related concussions because at least sixteen different concussion guidelines exist.¹³⁰ The guiding principle of the rules is that any athlete who remains symptom-free for seven days and fails to demonstrate any residual neurologic deficits may be allowed to return to athletics.¹³¹

1. American Academy of Neurology and Brain Injury Association Guidelines

The American Academy of Neurology (AAN) and the Brain Injury Association announced guidelines for concussion management in 1997.¹³² The guidelines attempt to use neuroscience to create a model for concussion management,¹³³ and are based on a grading scale system that determines the severity of the concussion.¹³⁴ A “Grade 1” concussion is defined as one that is transient in nature, without any loss of consciousness, and where symptoms abate in under fifteen minutes.¹³⁵ This form of injury is hard to diagnose because the person does not lose consciousness and has only temporary confusion.¹³⁶ In order to treat Grade 1 concussions, the AAN recommends removing the person from athletic participation, providing an immediate examination with follow-up care spaced out in five-minute intervals, and permitting a return to play only if post-concussive symptoms clear up within fifteen minutes.¹³⁷ If the athlete suffers a second Grade 1 concussion in the same game, he or she may not return to the event that day.¹³⁸

130. Hecht, *supra* note 35, at 45.

131. *Id.*

132. See Am. Acad. of Neurology, *Practice Parameter: The Management of Concussion in Sports*, 48 NEUROLOGY 581, 581, available at <http://www.neurology.org/content/48/3/581.full.pdf+html> (This article was released by the American Academy of Neurology as a guideline for athletic coaches and trainers to use when assessing a player who is showing concussion-like symptoms).

133. *Id.* at 584.

134. *Id.* at 582.

135. *Id.*

136. *Id.*

137. *Id.* at 583.

138. *Id.*

A “Grade 2” concussion is transient confusion with no loss of consciousness and symptoms that last longer than fifteen minutes.¹³⁹ If the symptoms of a Grade 2 concussion last longer than one hour, medical observation is required.¹⁴⁰ A “Grade 3” concussion is any loss of consciousness, whether brief or prolonged.¹⁴¹ This type of concussion is the most serious and the AAN guidelines recommend extensive treatment.¹⁴²

In March of 2013, the AAN updated its sports management concussion guidelines. Among the most important recommendations made is that any athlete suspected of suffering a concussion must be immediately removed from play.¹⁴³ Additionally, the athlete must not return to play until assessed by a licensed health care professional trained in concussions.¹⁴⁴ When the athlete does return to the sport, he or she must return to play slowly and only after all acute symptoms are gone.¹⁴⁵ High school athletes and young children who sustain concussions must be followed closely, because it takes their brains much longer to recover than college athletes.¹⁴⁶

2. *The American Medical Society for Sports Medicine*

In January 2013, the American Medical Society for Sports Medicine (AMSSM) published a position statement to provide a best practices summary for physicians who evaluate and manage sports concussions.¹⁴⁷ The AMSSM took the position that any athlete believed to have sustained a concussion should be removed from the game and examined by a licensed health care provider trained in the evaluation and management of concussion.¹⁴⁸ The initial assessment should be governed by a symptom checklist, cognitive evaluation, including questions pertaining to orientation, past and immediate memory, new learning, and concentration, balance tests, and an additional neurologic physical examination.¹⁴⁹ The AMSSM expresses the view that standardized sideline tests offer an important

139. *Id.* at 582.

140. *Id.*

141. *Id.* at 582–83.

142. *Id.*

143. *Press Release: AAN Issues Updated Sports Concussion Guideline: Athletes with Suspected Concussion Should Be Removed from Play*, AM. ACAD. OF NEUROLOGY (June 2, 2013), <http://www.aan.com/PressRoom/Home/PressRelease/1164>.

144. *Id.*

145. *Id.*

146. *Id.*

147. Harmon, *supra* note 24, at 16.

148. *Id.* at 20.

149. *See id.* at 20–22 (explaining the various tests that can be used to evaluate and treat concussions).

guide for the examination.¹⁵⁰ The reliability of these tests among different populations, however, is for the most part indeterminate.¹⁵¹ Their usefulness is also not completely identified.¹⁵² Difficulty with balance, for example, may be diagnostic for a concussion but is not a very sensitive symptom as it relates to the ability to correctly identify those with this form of brain trauma.¹⁵³ Balance testing can differ from standard baseline tests because of such simple things as the type of shoes being worn, artificial turf versus natural grass, and the use of braces or tape.¹⁵⁴

As a basic rule, there should be no return to play for any athlete on the same day that the concussion is diagnosed.¹⁵⁵ In fact, these athletes must be closely monitored to make sure that there is not a diminishing of his or her physical or mental condition.¹⁵⁶ In fact, concussion symptoms should be resolved before the player is allowed to return to exercise and this should be followed by a measured, increase in sports related activities.¹⁵⁷ If the symptoms resurface with this gradual return to play, the athlete must be rested.¹⁵⁸ Therefore, a return to practice following a concussion should only take place following the appropriate medical clearance.¹⁵⁹

3. *The Cantu Guidelines*

The Cantu guidelines, created in 1986, are based on the study and experience of Dr. Robert C. Cantu, MD.¹⁶⁰ These guidelines focus on repeated concussions in an athlete and are designed to prevent second impact syndrome.¹⁶¹ They support the proposition that a return to play decision should only be made by a qualified physician, but there may be some divergence from the doctor's recommendation based upon individual circumstances.¹⁶²

The Cantu guidelines also have a grading scale system to determine the severity of a concussion.¹⁶³ An "asymptomatic" concussion is one in which there are no headaches, dizziness, memory loss or inability to concentrate.¹⁶⁴ Cantu

150. *Id.* at 26.

151. *Id.*

152. *Id.* at 21.

153. *Id.*

154. *Id.*

155. *Id.*

156. *Id.*

157. *Id.* at 23.

158. *Id.*

159. *Id.*

160. Hecht, *supra* note 35, at 48.

161. *Id.*

162. *Id.*

163. *See id.* at 49 (explaining the three grades for concussion severity).

164. *Id.* at 48–49.

describes a “Grade 1” concussion as one in which the patient sustains no loss of consciousness and amnesia that last less than thirty minutes.¹⁶⁵ A “Grade 2” concussion involves loss of consciousness of less than five minutes and post-traumatic amnesia greater than thirty minutes.¹⁶⁶ A concussion classified as “Grade 3” requires amnesia of more than twenty-four hours or a loss of consciousness greater than five minutes.¹⁶⁷

4. Colorado Guidelines

The Colorado Medical Society Guidelines (Colorado Guidelines) were established in 1991 as the result of the deaths of several high school football players who sustained severe brain injuries.¹⁶⁸ These guidelines are quite rigorous and require emergency transport and close follow-up care for those who are unconscious for any length of time.¹⁶⁹ The Colorado Guidelines also create a three-tier grading system,¹⁷⁰ with a “Grade 1” concussion involving symptoms that resolve within thirty minutes with no signs of no amnesia or loss of consciousness.¹⁷¹ Those who sustain a concussion labeled “Grade 1” may go back to a sports-related activity only if their symptoms clear up after twenty minutes.¹⁷² A “Grade 2” concussion encompasses those injuries in which confusion is present but there is no amnesia or loss of consciousness.¹⁷³ If, however, the person suffers two “Grade 2” concussions, he or she must remain inactive for at least a month.¹⁷⁴ Finally, a “Grade 3” concussion requires a complete loss of consciousness.¹⁷⁵

5. Baseline Testing

Baseline testing, which involves a series of questions, is now standard protocol in many sports.¹⁷⁶ This protocol requires a doctor or trainer to check the “athlete’s orientation, memory, vision, attention span, language, mental flexibility,

165. *Id.* at 49.

166. *Id.*

167. *Id.*

168. Kimberly G. Harmon, *Assessment and Management of Concussion in Sports*, 60 AM. FAM. PHYSICIAN 887, 887 (1999).

169. Hecht, *supra* note 35, at 49.

170. See Robert C. Cantu, *Posttraumatic Retrograde and Anterograde Amnesia: Pathophysiology and Implications in Grading and Safe Return to Play*, 36 J. ATHLETIC TRAINING 244, 245 tbl. 2 (2001) (displaying the three level Colorado Medical Society Grading System for Concussions).

171. *Id.*

172. Hecht, *supra* note 35, at 49.

173. *Id.*

174. *Id.*

175. *Id.*

176. *Id.* at 50.

and coordination.”¹⁷⁷ The general protocol is for the athlete to undergo a benchmark study at the start of the season in order to establish a baseline, and then follow-up studies are conducted after a concussion is sustained.¹⁷⁸

In 1995, the NFL first utilized a variation of this baseline testing technique, which involved testing players at established times both before and after a suspected concussion.¹⁷⁹ This assessment, which became protocol in 2012,¹⁸⁰ involves asking an injured player the following three questions: (1) “Where are we?” (2) “Who did we play in the last game?” and (3) “What is the date today?”¹⁸¹ In addition, a baseline test done during physicals at the start of the preseason is utilized for comparison.¹⁸² Both tools are used by all NFL teams after a pilot program was successfully implemented by a few teams.¹⁸³ By using such an assessment tool, results of a baseline test and a post-injury test are able to be compared side-by-side.¹⁸⁴ The desired result is that this type of comparisons “will speed diagnosis and assist doctors and trainers in recognizing when a player should be removed from a game.”¹⁸⁵ The goal of the NFL is to eventually have independent neurologists present at a game to help team doctors in diagnosing and properly treating players.¹⁸⁶ The players union is pushing for independent doctors with an expertise in concussions who will have an almost exclusive authority in detecting concussions and administering tests.¹⁸⁷ This will allow them to focus exclusively on individuals who have a concussion, unlike team doctors who may be busy tending to multiple players.¹⁸⁸

The post-injury test takes only six to eight minutes to administer and is comparable to baseline testing.¹⁸⁹ This type of test is desired because it provides a comparison of the two protocols, which may show a decline in cognitive function.¹⁹⁰ By way of comparison, both tests contain a player’s concussion history section in addition to a twenty-four-symptom checklist.¹⁹¹ Athletes are then asked

177. *Id.*

178. *Id.*

179. *Id.*

180. Judy Battista, *N.F.L. Will Expand Concussion Efforts During Games*, N.Y. TIMES (Feb. 26, 2013), <http://www.nytimes.com/2013/02/27/sports/football/nfl-will-use-ipads-to-expand-in-game-concussion-testing.html?ref=headinjuries>.

181. *Id.*

182. *Id.*

183. *Id.*

184. *Id.*

185. *Id.*

186. *Id.*

187. *Id.*

188. *Id.*

189. *Id.*

190. *Id.*

191. *Id.*

to self-assess themselves in categories such as sleeping problems, dizziness, confusion, and irritability.¹⁹² Neck pain and reaction of pupils to light are recorded,¹⁹³ and balancing and concentration tests are administered.¹⁹⁴

The marked difference contained in the post-injury test is that it includes a series of five questions, known as Maddocks questions, designed to test the orientation of the player.¹⁹⁵ Such questions include: Where are we?; What quarter is it right now?; Who scored last in the practice or game?; and Did we win the last game?¹⁹⁶

6. *Pre-Participation Qualification Process*

Pre-participation qualifications are also used for standardized concussion treatment.¹⁹⁷ Under this process, a physician decides whether an athlete is healthy enough to compete in athletics.¹⁹⁸ One area that is assessed in this process is the medical history of an athlete, which includes inquiry into any past episodes of loss of consciousness.¹⁹⁹ Pre-participation qualification attempts to recognize medical issues that prevent participation in sports and develop treatment and rehabilitation plans to advise the player of which sports are suitable for participation.²⁰⁰

7. *Ineffectiveness of the Guidelines*

While these guidelines attempt to serve as a method in which to better manage and treat athletes' concussions, they are still not perfect. First of all, there are no standardized grades and testing for concussions.²⁰¹ As a result, concussions are handled in different manners based on the guideline system which is utilized.²⁰² The guidelines also lack agreement on the specific time in which an athlete may return to play, further increasing the disparity in the method of handling concussions.²⁰³ Also, the guidelines fail to consider individual variability in the

192. *Id.*

193. *Id.*

194. *Id.*

195. *Id.*

196. *Id.*

197. See Albert C. Hergenroeder, *The Preparticipation Sports Examination*, 44 PEDIATRIC CLINICS OF N. AM. 1525, 1535 tbl. 4 (1997) (listing a number of pre-participation physical evaluation questions).

198. See generally *id.* at 1525 (explaining the procedures a physician must employ in the preparticipation examination to decide if an athlete is healthy enough to participate in sports).

199. *Id.* at 1526.

200. *Id.*

201. Harmon, *supra* note 168, at 887.

202. See *id.* (explaining that grades vary by which guideline is used).

203. Hecht, *supra* note 35, at 53.

presentation of concussion symptoms.²⁰⁴ In addition, the guidelines rely on the reporting of the injured athlete, who may or may not be fully aware of his symptoms.²⁰⁵ A uniform management system for concussions would better serve the needs of athletes.²⁰⁶

While these tests are helpful in diagnosing concussions, they are not perfect tools and may not always detect all problems prior to a player's return to play.²⁰⁷ For example, New York Jets running back Shonn Greene was hit in the head while playing in an NFL football game²⁰⁸ and was consequently removed from the field after walking unsteadily.²⁰⁹ He was able to pass the NFL baseline tests and returned to the game.²¹⁰ In addition, NFL quarterback Alex Smith was hit in the head, resulting in blurred vision.²¹¹ Though he remained in the game for several plays after passing the NFL baseline tests, he was later found to have had a concussion.²¹² These examples demonstrate that while these tests are useful in detecting concussions, they should not be considered as conclusive evidence.²¹³

VII. ADDITIONAL EFFORTS

A. *International Conference in Zurich*

Every four years since 2001, the International Conference, consisting of representatives from various organizations including the NFL, the NHL, and FIFA, is held to find a consensus on the best way to manage and prevent concussions in sports.²¹⁴ One topic of discussion in 2012 was that of symptoms and signs of an acute concussion.²¹⁵ It was determined that this diagnosis involves the assessment of a range of areas, including cognitive, somatic, and emotional clinical symptoms,

204. *Id.* (quoting Michael W. Collins et al., *Current Issues in Managing Sports-Related Concussions*, 282 J. AM. MED. ASS'N. 2283, 2283 (1999)).

205. *Id.*

206. Hecht, *supra* note 35, at 54.

207. See Battista, *supra* note 180 (providing some doctors' concern that the NFL concussion tests just involve a checklist of items).

208. *Id.*

209. *Id.*

210. *Id.*

211. *Id.*

212. *Id.*

213. *Id.*

214. Paul McCrory et al., *Consensus Statement on Concussion in Sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012*, 48 J. ATHLETIC TRAINING 554, 555 (2013); Associated Press, *Expert: No Head Shots Before 14*, ESPN (Nov. 2, 2012), http://espn.go.com/espn/story/_/id/8584853/concussion-expert-stresses-age-limit-blows-head (demonstrating that FIFA hosted the conferences and advisors to the NFL and NHL were in attendance).

215. McCrory et al., *supra* note 214, at 555–56.

physical signs such as loss of consciousness and amnesia, behavioral changes such as irritability, cognitive impairment including slow reactions times, and sleep disturbances.²¹⁶ If any of these symptoms are present, it was determined that a concussion should be suspected and that appropriate steps must be taken.²¹⁷

It was also determined that if a player shows any signs of a concussion, the athlete should be removed from play and be evaluated by a physician or other licensed healthcare professional.²¹⁸ Once immediate first aid issues are addressed, sideline assessment tools should be utilized to assess the concussive injury.²¹⁹ All athletes should undergo a clinical neurological assessment, which includes an evaluation of their cognitive function,²²⁰ and should not be left alone following the concussive trauma.²²¹ The Conference also agreed that a player who is thought to have a concussion must not be permitted to return to any athletic endeavor on the day of injury.²²² Following a concussion, athletes allowed to return to play on the same day may demonstrate neuropsychological deficits post-injury that may not be evident on the sidelines and are more likely to have a delayed onset of symptoms.²²³

In order to assist in a diagnosis or exclusion of an injury, it was stated that conventional structural neuroimaging contributes little to concussion evaluation.²²⁴ Nevertheless, this methodology should be used if a structural lesion such as a skull fracture exists.²²⁵ In addition, imaging modalities like functional MRIs (fMRIs)²²⁶ show patterns that correlate with concussions symptoms, their severity and prognosis for recovery, and may offer further understanding into the

216. *Id.* at 556.

217. *Id.*

218. *Id.*

219. *Id.*

220. *Id.*

221. *Id.*

222. *Id.*

223. *See id.* at 556 (noting that it may take several hours for symptoms to appear, and as a result, the injury should be viewed as evolving in the acute stage).

224. *Id.*

225. *Id.*

226. This procedure involves the following:

Functional magnetic resonance imaging, or fMRI, is a technique for measuring brain activity. It works by detecting the changes in blood oxygenation and flow that occur in response to neural activity – when a brain area is more active it consumes more oxygen and to meet this increased demand blood flow increases to the active area. fMRI can be used to produce activation maps showing which parts of the brain are involved in a particular mental process.

Hannah Devlin, *What is Functional Magnetic Resonance Imaging (fMRI)?*, PSYCHCENTRAL, <http://psychcentral.com/lib/2007/what-is-functional-magnetic-resonance-imaging-fmri/> (last visited Sept. 14, 2013).

pathophysiological process.²²⁷ Magnetic resonance spectroscopy (MRS)²²⁸ and positron emission tomography (PET),²²⁹ however, should not be performed unless done for research purposes, as these tests are still considered investigational for brain trauma.²³⁰

B. The CDC's "Heads Up" Campaign

The CDC developed the "Heads Up" campaign to prevent and control TBIs in sports and increase awareness about the dangers of concussions for young athletes.²³¹ It also made numerous resources available to the public to assist in this goal, such as guidelines to properly identify the signs of concussions.²³² This includes a set of rules for high school coaches to follow.²³³ For instance, the following rules apply when a coach suspects an athlete has suffered a concussion: (1) remove the athlete from the game; (2) have the athlete examined by a physician; (3) notify the parents of the athlete about the brain injury and provide information about concussion; and (4) do not allow the athlete to participate in any sport activities on the day of the injury and until a physician allows the athlete to return to sports.²³⁴

The National Federation of State High School Associations adopted the CDC's approach to concussion recognition and management and established guidelines stating that coaches must be aware of the symptoms and behaviors that

227. McCrory et al., *supra* note 214, at 556.

228. MRS is used to examine central nervous system disorders. *Clinical Policy Bulletin: Magnetic Resonance Spectroscopy (MRS)*, AETNA, http://www.aetna.com/cpb/medical/data/200_299/0202.html (last visited Oct. 15, 2013). This diagnostic imaging modality is non-invasive and employed to exam metabolic alterations in brain tumors, seizure disorders, depression and other illnesses affecting the brain. *Id.*

229. A PET scan is a diagnostic test of function that utilizes a radioactive substance to look at organs and tissues to see how they are working. *PET Scan*, MEDLINE PLUS, <http://www.nlm.nih.gov/medlineplus/ency/article/003827.htm> (last visited Oct. 15, 2013).

230. McCrory et al., *supra* note 214, at 556 (explaining that these technologies have "demonstrat[ed] some compelling findings, [but] are still at early stages of development.").

231. *Heads Up: Concussion*, CTRS. FOR DISEASE CONTROL AND PREVENTION, <http://www.cdc.gov/concussion/headsup/index.html> (last updated Sept. 24, 2012).

232. See, e.g., *Concussion in Sports: How Can I Recognize a Possible Concussion?*, CTRS. FOR DISEASE CONTROL AND PREVENTION, <http://www.cdc.gov/concussion/sports/recognize.html> (last updated Dec. 8, 2009) (listing tips on concussion recognition).

233. See *Heads Up: Concussion in Sports*, CTRS. FOR DISEASE CONTROL AND PREVENTION, <http://www.cdc.gov/concussion/HeadsUp/youth.html> (last updated May 24, 2012) (listing an online training course, factsheet, posters, quizzes, and other resources for high school coaches as part of the tool kit).

234. *Concussion in Sports: What Should I Do if a Concussion Occurs?*, CTRS. FOR DISEASE CONTROL AND PREVENTION, <http://www.cdc.gov/concussion/sports/response.html> (last updated May 16, 2012).

signal a possible concussion.²³⁵ Furthermore, if an athlete is thought to have a concussion, that student must be removed from play immediately.²³⁶ No athlete should return to play or practice on the same day that he or she sustains a concussion.²³⁷ While the CDC guidelines are not mandatory, they serve as a model standard of care for high school coaches.²³⁸

The CDC also provides a free online training course for healthcare professionals.²³⁹ This course includes rules for concussion assessment and management of athletes who are suspected to have sustained a concussion.²⁴⁰ Prior to approval of return to play, the individual must be asymptomatic and returned to pre-concussion baseline status.²⁴¹

C. *The AMSSM's Statement*

The AMSSM recently published a Position Statement for Concussions in Sports²⁴² with the purpose of “provid[ing] a best practices summary to assist physicians with the evaluation and management of sports concussion.”²⁴³ In addition, it was written in order to establish areas that may need additional research.²⁴⁴ The AMSSM Position Statement is useful in that it provides guidance on the recommended assessment for sports-related concussion. First, it identifies a number of risk factors associated with sports-related concussions²⁴⁵ such as a history of concussions or migraines, being female or young, having a learning disorder, or an attention deficit disorder.²⁴⁶ It further explains that sports concussions are best managed by qualified physicians who are familiar with the patient and have experience relating to the assessment of concussions.²⁴⁷ In assessing a person for a concussion, a number of steps should be used including a

235. See SPORTS MED. ADVISORY COMM., NAT'L FED'N OF STATE HIGH SCH. ASS'NS, SUGGESTED GUIDELINES FOR MANAGEMENT OF CONCUSSIONS IN SPORTS 2, 5 (Jan. 2011), <http://www.schsl.org/2010/concussion3-17-11.pdf> (listing the “Heads Up: Concussion in High School Sport” program as an additional resource).

236. *Id.* at 2.

237. *Id.*

238. Parisi & Bradley, *supra* note 32, at 16.

239. See *Heads Up Concussion – Clinicians Training*, CTRS. FOR DISEASE CONTROL AND PREVENTION, <http://www.cdc.gov/concussion/HeadsUp/clinicians/index.html> (last visited Sept. 22, 2013) (including interactive training on concussion diagnosis, management, and prevention).

240. *Id.*

241. *Id.*

242. Harmon, *supra* note 24, at 15.

243. *Id.* at 16.

244. *Id.*

245. *Id.* at 18–19 (discussing various concussion risk factors).

246. *Id.*

247. *Id.* at 16.

symptom checklist, cognitive testing for memory, balance, learning, and concentration, and other neurologic procedures.²⁴⁸ Imaging modalities should also be employed to assess cerebral bleeding.²⁴⁹ Those players found to have concussion like symptoms should not be allowed to return to play that day and must be followed to make sure that there is not a decline in physical or mental status.²⁵⁰

The AMSSM Position Statement also expresses “concern that head impact exposure and recurrent concussions contribute to long-term neurological issues” such as CTE.²⁵¹ Because of the possibility of recurrent concussions, the AMSSM Position Statement identifies the importance of improving the diagnosis of concussions, their management, and prevention.²⁵² The AMSSM also addressed the need for additional research to assess diagnostic tools, develop the proper role for neuropsychological testing, and to improve the identification process for those at risk for developing long-term problems.²⁵³ Evolving technologies for the diagnosis of concussion may also offer a fresh understanding on how to evaluate and manage concussions in sports.²⁵⁴

VIII. CONCUSSION LITIGATION

Various cases have been litigated as a result of individuals suffering from sports-related concussions.²⁵⁵ The cases range from suits against coaches to claims against sports organizations.²⁵⁶ For example, Merrill Hoge, whose story was previously discussed,²⁵⁷ sued the Chicago Bears’ athletic trainer for not warning him about the signs and symptoms of his concussion and the risks of returning to play while still symptomatic.²⁵⁸ Because he was unaware of this information, Hoge claimed that he was denied the chance to recover from his brain injury²⁵⁹ and sought damages as the result of his premature retirement from professional football

248. *Id.*

249. *Id.* at 23.

250. *Id.* at 21, 26.

251. *Id.* at 25.

252. *Id.*

253. *Id.* at 26.

254. *Id.* at 23–24.

255. See Timothy Davis, *Tort Liability of Coaches for Injuries to Professional Athletes: Overcoming Policy and Doctrinal Barriers*, 76 UMKC L. REV. 571, 592 (2008) (discussing various lawsuits by NFL players for compensation for injuries, including concussions, as a result of playing in the NFL).

256. See *id.* at 596 (providing some of the difficulties professional athlete plaintiffs face in suits against their team or coaches).

257. See *supra* notes 108–114 and accompanying text.

258. Hecht, *supra* note 35, at 21.

259. *Id.*

as well as his loss of earning power.²⁶⁰ He claimed that as a result of his multiple concussions, he suffers from permanent damage such as headaches, light sensitivity, anger-management issues, and problems with concentration and memory.²⁶¹ Furthermore, Hoge alleged that he was “unable to fully attend to his ordinary duties for nearly a year . . . and continues to suffer from certain post-concussion signs and symptoms.”²⁶² Hoge also demanded pain and suffering damages as well as money for a permanent disability.²⁶³ In the end, the jury found in favor of Hoge and awarded him \$1.45 million for the two years of his contract that the Bears did not honor, along with an additional \$100,000 for pain and suffering.²⁶⁴

Suits by professional football players relating to concussions are not always successful.²⁶⁵ For instance, *Atkins v. Bert Bell/Pete Rozelle NFL Players Retirement Plan* involved a former football player who sued to gain more lucrative disability benefits as the result of a claimed brain injury.²⁶⁶ The NFL Players Retirement Plan offers monthly assistance to qualified former professional football players known as “Football Degenerative” or “Inactive” total and permanent disability benefits.²⁶⁷ Football Degenerative allowances are available if the disability is the result of “football activities.”²⁶⁸ A player may obtain “Inactive” benefits if his disability “arises from other than League football activities.”²⁶⁹ Atkins asserted he could not work because of pain, headaches, and difficulties in dealing with people.²⁷⁰ A doctor appointed by the NFL Players Retirement Plan concluded that Atkins suffered from illiteracy and borderline mental abilities, which were not related to Atkins’s prior football activities.²⁷¹ He further concluded that Atkins suffered from depression, which could not be determined to be the result of football, and pain which was the result of football.²⁷² On the other hand, the expert called by Atkins testified that the plaintiff was experiencing severe post-concussion

260. *Id.* at 29.

261. *Id.*

262. *Id.*

263. *Id.*

264. *Id.*

265. See Davis, *supra* note 255 (discussing the obstacles professional athletes face when bringing state tort claims regarding concussions); see, e.g., *Smith v. Houston Oilers, Inc.*, 87 F.3d 717, 717 (5th Cir. 1996) (dismissing the suit on preemption grounds based on a collective bargaining agreement).

266. 694 F.3d 557, 559 (5th Cir. 2012).

267. *Id.* at 560.

268. *Id.*

269. *Id.*

270. *Id.* 560–61.

271. *Id.* at 561.

272. *Id.* at 561–62.

syndrome and was “probably beyond that into early traumatic encephalopathy.”²⁷³ The court ruled in favor of the NFL Players Retirement Plan, holding that the former player only qualified for “Inactive” disability benefits instead of the more lucrative “Football Degenerative” benefits.²⁷⁴ This decision was sustained on appeal.²⁷⁵

In *Cerny v. Cedar Bluffs Junior/Senior Public School*, a high school football player attempted to recover money for a head injury allegedly sustained as the result of the negligence of his coaches who permitted him to return to the football game, and to participate in practice a few days later.²⁷⁶ When he came out of the game following the initial head injury, Cerny told the coaches that he felt dizzy, disoriented, and extremely weak.²⁷⁷ He was also observed to have shortness of breath.²⁷⁸ When the coaches later observed him, Cerny appeared to be completely normal.²⁷⁹ The plaintiff showed no signs of a brain injury such as disorientation, abnormal speech, or headaches.²⁸⁰ His coaches also observed that his color looked good, his eyes looked clear, and his speech was normal.²⁸¹ As a result, he was allowed to re-enter the game.²⁸² Even though this case exhibited a similarity to that of Hoge’s case due to a failure to warn and because both players were allowed to return to play without a recovery period, the court in *Cerny* found in favor of the school.²⁸³ The court determined that the appropriate duty of a coach regarding the diagnosis of a brain injury was that of “a reasonably prudent person holding a state teaching certificate with a coaching endorsement.”²⁸⁴ In this instance, the evidence supported the court’s conclusion that the coaches’ conduct in evaluating Cerny and allowing him to return to play were actions that would have been taken by a reasonable state-endorsed football coach in a similar position.²⁸⁵

In *Shriber v. The Care Station*, a high school football player sued a physician at an urgent care facility.²⁸⁶ The plaintiff alleged that he suffered a head injury during practice.²⁸⁷ The doctor believed that the student merely suffered from

273. *Id.* at 562–63.

274. *Id.* at 559–60.

275. *Id.* at 560.

276. 679 N.W.2d 198, 202 (Neb. 2004).

277. *Id.* at 200–01.

278. *Id.* at 201.

279. *Id.*

280. *Id.*

281. *Id.*

282. *Id.*

283. *Compare id.* at 207 (affirming the district court’s that the coaches’ conduct met the standard of care and that the School was not negligent.), with *Hecht*, *supra* note 35, at 26.

284. *Cerny*, 679 N.W.2d at 207.

285. *Id.* at 206–207.

286. *Hecht*, *supra* note 35, at 30.

287. *Id.*

dehydration and therefore advised him not to engage in athletics as long as he had a headache.²⁸⁸ On the other hand, Shriber maintained that the doctor was negligent in failing to discover that he had sustained a concussion and for not informing him to stay away from contact sports for five to seven days.²⁸⁹ The jury found in favor of the player and awarded him \$7.5 million.²⁹⁰

Sports-related TBI litigation also occurs in a products liability setting.²⁹¹ These matters often deal with the liability of a football helmet manufacturer to those who sustain a brain injury while playing football.²⁹² In *Lister v. Bill Kelley Athletic*, a high school football player was tackled during a game, resulting in a head impact and a fracture of his cervical spine.²⁹³ Even though the player was paralyzed, the Illinois appellate court held that the inherent danger of football precluded a duty by the helmet manufacturer to warn a user of a possible head injury.²⁹⁴ Similarly, in *Rawlings Sporting Goods Co. v. Daniels*, a high school football player brought suit against a helmet manufacturer after his helmet caved in when he collided with another player during practice, resulting in a massive brain injury.²⁹⁵ The court found the manufacturer grossly negligent and held that the manufacturer should have provided a warning that the helmet would not protect against concussions and subdural hematomas.²⁹⁶ The court stated that “where it is foreseeable that a consumer will rely on the product, thus exposing himself to a risk he might have avoided had he known of the limitations, there is a duty to warn.”²⁹⁷

Litigation also occurs as a result of concussions sustained from actions that were not part of a game, such as during practice.²⁹⁸ In *People of the State of New York v. Schacker*, an action was brought against a hockey player who struck an opponent on the back of the neck with his hockey stick after the play was over.²⁹⁹ The player suffered a concussion and memory loss as the result of the insult.³⁰⁰ The court dismissed the action, holding that “the normal conduct in a hockey game can not be the standard for criminal activity under the Penal Law, nor can the Penal

288. *Id.*

289. *Id.* at 30–31.

290. *Id.* at 31.

291. *Id.*

292. *Id.*

293. *Lister v. Bill Kelley Athletic, Inc.*, 485 N.E.2d 483, 483 (Ill. App. Ct. 1985).

294. *Id.* at 487.

295. 619 S.W.2d 435, 437 (Tex. Civ. App. 1981).

296. *Id.* at 440–441 (showing that based on the evidence, a jury could find that the manufacturer was grossly negligent).

297. *Id.* at 439.

298. *See, e.g., Cerny v. Cedar Bluffs Junior/Senior Pub. Sch.*, 679 N.W.2d 198, 206 (Neb. 2004).

299. 670 N.Y.S.2d 308, 309 (N.Y. Dist. Ct. 1998).

300. *Id.*

Law be imposed on a hockey game without running afoul of the policy encouraging athletic competition.”³⁰¹

Concussion litigation is also brought in the context of insurance disputes.³⁰² For instance, *Boston Mutual Insurance Co. v. New York Islanders Hockey Club, L.P.* involved Brett Lindros, whose hockey career was cut short by repeated concussions.³⁰³ The facts demonstrated that the Islanders contracted with Boston Mutual Insurance Company for coverage, but failed to explain that the player had suffered three concussions within the year prior to becoming a member of the hockey franchise.³⁰⁴ The court found in favor of the defendant, holding that the Islanders “intended to deceive the underwriters and that the misstatements had the effect of increasing the insurers’ risk of loss.”³⁰⁵

Athletes also sue the governing bodies of sport organizations. For instance, in *Serrell v. Connetquot Central High School District of Islip*, the plaintiff claimed that he suffered a serious injury as the result of a series of head injuries incurred while playing football at high school.³⁰⁶ The plaintiff instituted suit against the State Public High School Athletic Organization (Athletic Organization), whose primary task was to arrange sporting events for academic institutions.³⁰⁷ The student claimed that the defendant failed to implement rules pertaining to head injuries and return to play protocols and these omissions were the cause of his injuries.³⁰⁸ The court found in favor of the Athletic Organization because no factual issue was presented that the defendant’s omission was the cause of the student’s injuries.³⁰⁹ Rather, it was the responsibility of the school districts, the individual schools and medical experts to implement rules concerning concussions and return to play guidelines.³¹⁰ Furthermore, the court found that as an administrative body, the defendant’s primary purpose was to arrange sporting events, and it did not have sufficient employees or expertise to create mandates dealing with concussions and related issues.³¹¹

301. *Id.* at 310.

302. Hecht, *supra* note 35, at 33.

303. *See generally* 165 F.3d 93, 93–95 (1st Cir. 1999) (discussing Lindros’s injury history).

304. Hecht, *supra* note 35, at 33 (citing *Boston Mut. Ins. Co.*, 165 F.3d at 94–95).

305. *Boston Mut. Ins. Co.*, 165 F.3d at 96 (stating the district court’s ruling in the case). The First Circuit upheld the district court’s ruling. *Id.* at 99.

306. 721 N.Y.S.2d 107, 107 (N.Y. App. Div. 2001).

307. *Id.* at 107–08.

308. *Id.* at 108.

309. *Id.*

310. *Id.*

311. *Id.*

Since it is well established that “coaches and instructors have a duty not to increase the risks inherent in sports participation,”³¹² athletes are also suing their coaches. Whether a coach has a duty to limit participation of an injured player to avoid exasperating an injury largely deals with the foreseeability of further injury.³¹³ In *Zemke v. Arreola*, a high school football player sued his coach for injuries sustained as the result of playing with a concussion.³¹⁴ The player, however, did not appear to have a head injury and did not inform his coach or medical personnel.³¹⁵ Instead, he merely complained of a finger injury.³¹⁶ The player returned to the game and sustained a right subdural hematoma.³¹⁷ This case was dismissed because the evidence failed to establish that the coaching staff took any actions that increased the player’s risk of a foreseeable injury.³¹⁸ Furthermore, it was established that a player who does not notify the coach of an injury may be contributorily negligent thereby barring or proportionally reducing any recovery to which the person is entitled.³¹⁹

In *Yatsko v. Berezwick*, the plaintiff was a starter on her high school basketball team.³²⁰ During a game, she leapt for a rebound and her head struck another player.³²¹ She consequently developed a headache and problems with her vision.³²² When the game was over, Yatsko told a coach that she had struck her head, and was having symptoms.³²³ The coach escorted the player to her mother telling her that the plaintiff had been “bumped around in the game,”³²⁴ but the coach did not urge the player to talk to the trainer because she was afraid that the

312. *Avila v. Citrus Cmty. Coll. Dist.*, 131 P.3d 383, 392 (Cal. 2006) (citing *Kahn v. E. Side Union High Sch. Dist.*, 75 P.3d 30, 39 (Cal. 2003)).

313. *Zemke v. Arreola*, No. B182891, 2006 WL 1587101, at *2–3 (Cal. Ct. App. June 12, 2006). See e.g., *Lamorie v. Warner Pac. Coll.*, 850 P.2d 401, 401–03 (Or. Ct. App. 1993) (reversing summary judgment so that a jury could determine if the exacerbation of a preexisting injury to a plaintiff athlete’s eye was foreseeable to his coach). But see, *Stephenson v. Commercial Travelers Mut. Ins. Co.*, 893 So. 2d 180, 186–87 (La. Ct. App. 2005) (holding that school officials had a duty to withhold a student from further play due to an ankle injury, but granting summary judgment on other grounds).

314. *Zemke*, 2006 WL 1587101, at *1.

315. *Id.*

316. *Id.*

317. *Id.*

318. See *id.* at *3–4 (finding that the medical and coaching staff were not put on notice because *Zemke* did not disclose his head injury).

319. *Stowers v. Clinton Cent. Sch. Corp.*, 855 N.E.2d 739, 746–47 (Ind. Ct. App. 2006) (upholding a lower court’s ruling that a genuine issue of material fact existed as to whether a plaintiff youth football player who died of dehydration during a practice was contributorily negligent for ignoring warnings to drink fluids and not reporting feeling sick to coaches).

320. No. 3:06cv2480, 2008 WL 2444503, at *1 (M.D. Pa. June 13, 2008).

321. *Id.*

322. *Id.*

323. *Id.*

324. *Id.*

trainer would remove the athlete from the game.³²⁵ The team had a game the following day, at which point the student informed the coaches that she had sustained a concussion,³²⁶ and still exhibited symptoms of a concussion during warm-ups.³²⁷ The coaches dealt with the problem by setting up a signal for the athlete to use when she had to remove herself from the game.³²⁸ The coaches further encouraged her to continue to play, noting that she was their tallest player.³²⁹ The plaintiff maintained that these actions were the “legal and moral equivalent of pressuring, goading and coercing the Plaintiff . . . to play the game after a serious head injury.”³³⁰ The student instituted suit claiming that the coaches’ conduct violated her due process rights.³³¹ The court dismissed the claim, stating that it “could not find a constitutional violation in conduct by a state actor that, as alleged, rises only to the level of negligence.”³³²

Cases involving sports-related injuries, but absent concussions, are instructive in ascertaining liability-producing conduct for the management of a sport injury by a coach. *Jarreau v. Orleans Parish School Board*, involves a high school running back who injured his wrist.³³³ There was some evidence that the wrist injury may have been exacerbated in subsequent athletic endeavors, but the coaches continued to allow the student to practice and play in games.³³⁴ When the season was over, the athlete’s request for a referral to a sports medicine doctor was denied.³³⁵ While the court stated that a coaching staff may not be expected to diagnosis the extent of an athlete’s injury, they should refer any player who continues to have medical problems to a physician.³³⁶ In finding the defendant liable, the court noted this obligation is clear as the result of relationship between a coach and athlete.³³⁷ Therefore, a coaching staff has an affirmative duty to send a student for medical care in the face of persistent medical complaints.³³⁸ A coach may also incur liability for failing to notify the parents when an athlete is injured, for not

325. *Id.*

326. *Id.*

327. *Id.*

328. *Id.*

329. *Id.*

330. *Id.*

331. *Id.* at *5.

332. *Id.* at *6.

333. 600 So. 2d 1389, 1390 (La. Ct. App. 1992).

334. *Id.*

335. *Id.* at 1390–91.

336. *Id.*

337. *Id.*

338. *Id.*

summoning a rescue squad so that a player can obtain the proper medical care³³⁹ or when the coach allows an injured athlete to participate in sports before the player receives the proper medical clearance.³⁴⁰ Liability can also attach when the coach mandates that a student athlete play in the game while injured.³⁴¹

IX. FEDERAL AND STATE STATUTES

Attempts to enact remedial legislation on the federal level have been unsuccessful.³⁴² In May 2013, however, a bill was introduced in Congress to protect children from sports-related traumatic brain injuries and to eliminate misinformation about the safety of equipment by manufacturers.³⁴³ This proposed law, entitled the Youth Sports Concussion Act of 2013, would also require safety standards for helmets and other protective gear, in addition to reducing the number of deceptive safety claims by manufactures.³⁴⁴ As one of the bill's sponsors noted: "We want our children to be active and participate in sports, but we must take every precaution to protect them from traumatic head injuries."³⁴⁵

On the state level, laws relating to TBIs in sports have been more widely adopted. Washington was the first to pass remedial legislation on the topic in May 2009.³⁴⁶ This law sets guidelines and standards to help recognize concussions and protect young athletes from further injury by returning to play too soon.³⁴⁷ As a

339. See *Halper v. Vayo*, 568 N.E.2d 914, 920–21 (Ill. App. Ct. 1991) (finding that a triable issue existed as to whether a coach was reckless when said coach failed to contact an injured student's parents or paramedics and instead attempted to repair the injury himself).

340. See, e.g., *Cerny v. Cedar Bluffs Junior/Senior Pub. Sch.*, 628 N.W.2d 697, 705–06. (Neb. 2001) (holding that coaches must make a reasonable determination whether to withhold a student athlete complaining of concussion-like symptoms from further play until the athlete can be assessed by a physician), *abrogated by Cerny v. Cedar Bluffs Junior/Senior Pub. Sch.*, 679 N.W.2d 198 (Neb. 2004) (affirming lower court's finding of fact that coaches did not negligently fail to withhold plaintiff from return to play).

341. See *Yatsko v. Berezwick*, No. 3:06cv2480, 2008 WL 2444503, at *5 (M.D. Pa. June 13, 2008) (discussing that liability could possibly be imposed had the plaintiff alleged that coaches "used their authority to force her to play").

342. Lesley Lueke, *High School Athletes and Concussions*, 32 J. LEGAL MED. 483, 491–92 (2011) (discussing unsuccessful attempts at federal legislation).

343. See Press Release, Office of Senator Jay Rockefeller, Rockefeller Introduces Legislation to Protect Young Athletes From Concussion (May 22, 2013), <http://www.rockefeller.senate.gov/public/index.cfm/press-releases?ID=02b69aac-ec7-4a48-8ad3-c73285213f1a> (describing the legislation proposed by the Senator).

344. *Id.*

345. *Udall, Rockefeller Introduce Bill to Help Protect Young Athletes from Sports-Related Traumatic Brain Injuries*, TOM UDALL SENATOR FOR N.M. (May 22, 2013), http://www.tomudall.senate.gov/?p=press_release&id=1305 (last visited Oct. 16, 2013).

346. See *Marvez*, *supra* note 2 (demonstrating that Washington was the first state to pass legislation of this kind).

347. *Zackery Lystedt Law*, WASH. REV. CODE § 28A.600.190 (2010) (setting concussion and head injury guidelines and requiring that youth athletes "who [are] suspected of sustaining a

result of the lobbying efforts by the NFL and the passage of the Lystedt Law,³⁴⁸ most other states have enacted concussion legislation.³⁴⁹

As of 2014, all fifty states, along with Washington, D.C., have enacted legislation addressing concussions with most of them being modeled after the Washington law.³⁵⁰ Many states include the three basic tenets of the Lystedt Law: (1) the requirement of education for athletes, parents, and coaches about the dangers of concussion, (2) the requirement that if an athlete is suspected of having a concussion, he must be removed from the game or practice and may not return to play, and (3) the mandate that a licensed health care professional must also clear the athlete to return to play in the following days or weeks.³⁵¹ Beyond these three tenets, a number of jurisdictions require coaches to receive training, particularly guidance specific to concussions.³⁵² Many jurisdictions also require that such training be conducted on a regular basis.³⁵³ Others mandate that a statewide group develop policies and standards for youth concussion awareness to be used by the state's school districts.³⁵⁴

Nevertheless, there are many discrepancies between these laws.³⁵⁵ For example, only a small minority of jurisdictions require that states review and

concussion” be removed from competition and not be allowed to return until “evaluated by a licensed health care provider”).

348. See Associated Press, *NFL, NCAA Lobby for Concussion Laws*, ESPN (Jan. 12, 2012), http://espn.go.com/nfl/story/_id/7454729/nfl-ncaa-urge-states-pass-concussion-laws (describing lobbying efforts by the NFL as well as the influence of the Lystedt Law amongst the states).

349. See *Concussion Legislation by State*, NFL EVOLUTION, <http://www.nflevolution.com/article/concussion-legislation-by-state?ref=767> (last updated July 22, 2013) (demonstrating that forty-eight states have passed youth concussion legislation).

350. *Id.*; see also *Summary Matrix of State Laws Addressing Concussions in Youth Sports*, THE NETWORK FOR PUBLIC HEALTH LAW (effective December 31, 2012), http://www.networkforphl.org/_asset/7xwh09/StateLawsTableConcussions_2-19-13.pdf (summarizing the legislative steps taken by each individual state); *Traumatic Brain Injury Legislation*, NATIONAL CONFERENCE OF STATE LEGISLATURES (last updated July 2013), <http://www.ncsl.org/issues-research/health/traumatic-brain-injury-legislation.aspx> (also summarizing the steps taken by the individual states).

351. Zackery Lystedt Law, WASH. REV. CODE § 28A.600.190 (2010).

352. See, e.g., COLO. REV. STAT. ANN. § 25-43-103 (West Supp. 2012) (requiring coaches to receive training in concussion recognition).

353. See, e.g., CONN. GEN. STAT. ANN. § 10-149b (West Supp. 2013) (requiring annual training for coaches in order to review current information on head injuries).

354. See, e.g., ARIZ. REV. STAT. ANN. § 15-341 (Supp. 2012) (requiring that “[g]uidelines, information and forms” be developed “in consultation with a statewide private entity that supervises interscholastic activities”).

355. Compare COLO. REV. STAT. ANN. § 25-43-103 (West Supp. 2012) (requiring coaches from both public and private schools, as well as volunteer coaches at private or public clubs and athletic leagues to take a course annually), with CONN. GEN. STAT. ANN. § 10-149b (West Supp. 2013) (requiring only those coaches holding a coaching permit issued by the State Board of Education to take a course, followed by annual updates and a refresher course within five years for reissuance of that permit).

update their youth concussion information outreach programs on a regular basis.³⁵⁶ In addition, few states focus on ensuring that incentives to report concussions are provided.³⁵⁷ This is because few states lack liability clauses that impose penalties on coaches who fail to comply with the legislative provisions.³⁵⁸ Without enforcement mechanisms, there is little incentive for compliance with such laws.³⁵⁹

X. CONCLUSION

Traumatic brain injuries are matters of great concern.³⁶⁰ It is a problem that permeates the sports world among all athletes: whether young or mature athletes and amateur or professional.³⁶¹ While efforts are being made to address this problem, athletes, coaches, officials, and parents all must be educated about signs, symptoms, and dangers of these types of injuries.³⁶² They must also be aware of

356. Compare ALA. CODE § 22-11E-2 (LexisNexis Supp. 2012), and ALASKA STAT. § 14.30.142 (2012), and ARIZ. REV. STAT. ANN. § 15-341 (Supp. 2012), and COLO. REV. STAT. ANN. § 25-43-103 (West Supp. 2012) (all not requiring regular updates to outreach programs), with CONN. GEN. STAT. ANN. § 10-149b (West Supp. 2013) (requiring the state Board of Education to update its materials regarding concussions annually and coaches to review the new material approved by the Board of Education annually).

357. See Lisa Kocian, *State Revises Concussion Reporting After Weak Response From Schools*, BOS. GLOBE, July 11, 2013, <http://www.bostonglobe.com/metro/regionals/west/2013/07/10/state-revises-concussion-reporting-after-weak-response-from-massachusetts-schools/cnetImdeVhGs552ms3HQQP/story.html> (discussing the lack of compliance by athletic directors with new concussion reporting laws).

358. See Phoebe Anne Amberg, *Protecting Kids' Melons: Potential Liability and Enforcement Issues With Youth Concussion Laws*, 23 MARQ. SPORTS L. REV. 171, 183 (2012) (discussing the lack of recourse should coaches or school systems fail to comply).

359. *Id.* Hosea Harvey, a professor at Temple University Beasley School of Law, noted in the American Journal of Public Health that “Youth sports traumatic brain injury laws have generally taken a one-size-fits-all approach.” *Concussion: State Laws Ignore Science*, TBI BLOG (May 25, 2013), <http://tbiblog.sossisson.com/2013/05/concussion-state-laws-ignore-science.html>. “The laws do not incorporate scientific consensus that youth concussions vary on the basis of age, the type of sport, and whether the athlete is male or female.” *Id.* Also, “there is no agreed-upon traumatic brain injury diagnostic metric, and there are no uniform national traumatic brain injury reporting protocols.” *Id.* The article also demonstrated that many of these state laws don’t draw on evidence around what works. *Id.* For instance, the vast number of laws creates a minimum 24-hour period of removal of the athlete from sports, but there is no scientific consensus about the optimal minimal time someone who has suffered a sports-related TBI should be removed from sports. *Id.*; see also *Reducing Traumatic Youth Sports Injuries, Q and A with Hosea Harvey*, NEW PUB. HEALTH (May 23, 2013), <http://www.rwjf.org/en/blogs/new-public-health.html?t=topics%3A371>.

360. See *supra* Part III (describing the scale and damage associated with concussion issues in athletics).

361. See *supra* Part III.A (describing the broad scope of concussion issues).

362. See *supra* Part V (noting the importance of awareness in reducing the damage done by concussions).

the appropriate methods of evaluation and treatment.³⁶³ Effort must also be put forth to ensure that standardized systems of approaching concussions are present.³⁶⁴ While most states have passed laws addressing these issues, few states impose penalties on coaches who fail to comply with reporting requirements, therefore weakening the efficacy of the legislation.³⁶⁵

363. *See supra* Part V (describing how the appropriate methods of evaluation and treatment could have extended Troy Aikman's career).

364. *See supra* Part VI.A (discussing the numerous approaches to concussion evaluation and the need for a more streamlined approach).

365. *See supra* Part VIII (noting that there remain jurisdictions without effective concussion legislation).