



# Traumatic Brain Injury in the National Football League

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## Introduction

The present chapter is going to encompass a different perspective of concussion and chronic traumatic encephalopathy (CTE) linked to the National Football League (NFL).

## Brief History of NFL

The National Football League (NFL) was founded in 1920 as the American Professional Football Association (APFA). It included ten teams from four states; all of them existed in some form as participants of regional leagues in their respective territory. It took on its current name in 1922 [1]. The NFL was the first professional football league to successfully establish a nationwide presence, after several decades of failed attempts. League membership progressively stabilized throughout the 1920s and 1930s as the league adopted more formal organization.

During World War II, NFL football activity declined. After that the rival American Football League was founded in 1960. At a certain point, there was a merge with NFL that resulted in a greatly expanded league and the creation of Super Bowl, which has become the most watched annual sporting event in USA. At that time, its current size had 32 teams. A series of agreements have helped the league to be one of the most profitable and the only major league in the USA since the 1990s.

## Local and National US Policies [Adapted from 2]

During the last decade, laws, policies, and action plans on concussion were created.

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**State Laws** In 2009, the State of Washington was the first to create a law about concussion in sports, the Zackery Lystedt Law [3]. One month later, Max's law [4] was passed in Oregon. In total, between 2009 and 2012, 43 states, and the District of Columbia, passed laws on concussion in sports for youth and/or high school athletes, often called Return to Play Laws. So far in 2013, four additional states have also passed Return to Play Laws. Some organizations, such as the National Conference of State Legislatures, have created online maps to track and update concussion in sports laws by state [5].

Most concussion in sports laws includes three action steps:

1. Inform and educate coaches and athletes and their parents and guardians about concussion through training and/or a concussion information sheet.
2. Remove athlete from play: an athlete who is believed to have a concussion is to be removed from play right away.
3. Obtain permission to return to play: an athlete can only return to play or practice after at least 24 h and with permission from a health-care professional.

These action steps are based on recommendations presented in the international concussion consensus statement [6]. First created in 2002 and most recently updated in 2008, the consensus statement was developed by experts in the field and includes the latest science available on concussion in sports.

**Local Policies and Action Plans** Along with the three action steps listed above, some school and league concussion policies include additional strategies in their policies or implementation plans. Research is needed to learn if including these additional strategies can help protect children and teens from concussion and other serious brain injuries. Based on interviews by the Centers for Disease Control and Prevention (CDC) with nine states, below is a list of some examples of additional strategies in local policies and action plans.

- *Be ready for an emergency* by creating a concussion emergency medical action plan. These plans often include contact information for local emergency medical responders and the location of trauma centers, if available. Identify appropriate health professional(s) for games and practices to help assess and manage concussion among their athletes.
- *Ensure Safer Play* by:
  - (a) Limiting contact during sports practices (when appropriate for the sport).
  - (b) Putting in place rule changes and/or banning or limiting the use of certain drills or techniques to help reduce the chances of injury.
  - (c) Checking sports equipment often. This includes making sure the equipment fits the athletes well, is in good condition, is stored properly, and is repaired and replaced based on instructions from the equipment companies.
- *Build the Science* by:
  - (a) Collecting data from schools on the number of concussions reported by athletes during the season
  - (b) Studying changes in concussion knowledge and awareness among coaches and parents before and after the policy is put in place
- *Focus on Education* by:
  - (a) Posting information for parents, coaches, and athletes at schools and on the field or sidelines. Posted information often includes concussion signs and symptoms, as well as what to do if a concussion occurs.
  - (b) Hosting or requiring regular trainings for athletes, parents, coaches, and school and health-care professionals about concussion.
- *Manage Return to School* by:
  - (a) Providing information on returning to school. It includes creating a concussion management team to check on students with concussion for any changes in behavior or increased problems with schoolwork and a plan that includes special support or help for students during the school day to help with their recovery.

A National Concussion Surveillance System was created in the CDC [7] in order to inform, prevent, and guide the population and the amateur and professional teams (coach, sports official, physician, others) on this issue.

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## NFL Policies and Rules [Adapted from 8]

The NFL implemented the concussion protocol in 2009 and has adjusted it in the last 7 years. The league has instituted protocol to address the diagnosis and management of concussions.

The NFL made changes to the protocol after completing investigations in the way two teams handled head injuries to

players during the 2017 season. The Seahawks were fined \$100,000 when the league found they did not follow the protocol with quarterback Russell Wilson. The Texans were cleared by the league regarding their process with quarterback Tom Savage, but those two investigations pushed the league to refine the protocol to better protect players.

After the Seahawks investigation concluded, the league added a rule that requires teammates, coaches, or officials to take the player directly to a member of the medical team for evaluation. The changes after the Savage investigation were more sweeping. Among other things, the NFL has added an additional unaffiliated neurotrauma consultant to each post-season game, including the Super Bowl, to identify, monitor, and evaluate players for head injuries. Players also must be removed from the field of play and taken to the locker room for evaluation after the update.

In September 2016, the NFL announced the initiative “Play Smart, Play Safe” to continue to strive for a healthier game. The “NFL Game Day Concussion Protocol” was first implemented in 2009, adjusted in 2011, and tweaked in the last 5 years, including the introduction of disciplinary action in 2016 for teams that do not adhere properly.

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## NFL’s Concussion Protocol

In addition to the team medical staff and an unaffiliated neurological consultant, the league employs two medical spotters in the booth who watch the game with binoculars and video replay to identify injuries that others missed. The league added a rule in 2015 allowing for the medical spotters to stop the game with a medical timeout to remove an injured player.

### “Observable Symptoms”

The following are the seven observable symptoms used to identify players with concussions:

- Any loss of consciousness
- Slow to get up following a hit to the head (“hit to the head” may include secondary contact with the playing surface)
- Motor coordination/balance problems (stumbles, trips/falls, slow/labored movement)
- Blank or vacant look
- Disorientation (e.g., unsure of where he is on the field or location of bench)
- Clutching of head after contact
- Visible facial injury in combination with any of the above

When spotters or other medical personnel see those signs, that’s when the protocol goes into effect.

## Return to Play Process

In addition to the in-game protocol, there is also a “Return-to-Participation Protocol” that can keep players out of action for more practices or games until they pass and are cleared to return.

It is a five-step process without any set timeline for a full return from a concussion:

1. *Rest and recovery*: Until a player returns to the “baseline level of signs and symptoms and neurological examination,” only limited stretching and balance activities are recommended. Electronics, social media, and team meetings are all to be avoided.
2. *Light aerobic exercise*: The NFL recommends 10–20 min on a stationary bike or treadmill without resistance training or weight training. The cardiovascular activity is monitored by an athletic trainer to “determine if there are any recurrent concussion signs or symptoms.”
3. *Continued aerobic exercise and introduction of strength training*: Increased duration and intensity of aerobic exercise with strength training added. An athletic trainer will supervise to watch for recurrent concussions signs or symptoms.
4. *Football-specific activities*: The cognitive load of playing football will be added and players will participate in non-contact activities for the typical duration of a full practice.
5. *Full football activity/clearance*: A player returns to full participation in practice, including contact without restriction.

During the off-season this year, the NFL added a measure that would punish teams that failed to properly enforce the concussion protocols. Any violation—either in-game or return-to-participation—could cost a team fines or even the forfeiture of draft picks.

The decision to add an unaffiliated neurotrauma consultant was stationed at the command center that has been used primarily for game-replay review [9].

- A central UNC will be stationed in the NFL’s command center to assist in oversight of each game via broadcasts.
- Any sign of impact seizure will be considered the same as loss of consciousness, and the player will be taken out of the game and may not return.
- A referee who removes a player from the game for suspected head trauma must notify the medical staff.
- A player who exhibits gross motor instability or significant loss of balance must be taken to the locker room for evaluation if it is not diagnosed as an orthopedic injury.
- A player who is evaluated for a concussion must be re-evaluated within 24 h, even if the player has an off day.

- A third unaffiliated neurotrauma consultant will be on site for the playoffs and the Super Bowl, in addition to the two already assigned to each regular-season game.

The adjustments were implemented by the league’s head, neck, and spine committee and communicated in two conference calls headed by Sills and Dr. Thom Mayer, the medical director for the NFL Players Association, with an estimated 400 people involved in the concussion process, including every team physician, every athletic trainer, every unaffiliated neurotrauma consultant, and every booth spotter [9].

The reason to add an extra unaffiliated neurotrauma consultant (UNC) for the playoffs and the Super Bowl is to allow a UNC to still be present if another is occupied when a player is taken to the locker room. This practice will be re-evaluated in the next season.

## Future Directions

History of sports concussion and chronic traumatic repetitive injury in sports had changed a lot in the last two decades. Significant literature contributions were made and the knowledge is transcending science and coming to the general public. The issue is being diffused and broadcasted by the media in order to inform people and prevent lesions. Several laws and policies have already been created and will be continuously updated in order to turn our football games safer.

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