

Concussion Information

Information taken from the Sports Concussion Institute

<http://www.concussiontreatment.com>

What is a Concussion?

A concussion is defined as a complex pathophysiological process that affects the brain, typically induced by trauma to the brain. It can be caused either by a direct blow to the head, or an indirect blow to the body, causing neurological impairments that may resolve spontaneously. Symptoms usually reflect a functional disturbance to the brain, and may include physical (e.g., headaches, nausea), cognitive (e.g., difficulty with concentration or memory), emotional (e.g., irritability, sadness), and 'maintenance' (e.g., sleep disturbances, changes in appetite or energy levels) symptoms. A concussion is considered a brain injury.

[↑ top](#)

What happens to the brain during a Concussion?

The adult brain is a three pound organ that basically floats inside the skull. It is surrounded by cerebral spinal fluid, which acts as a shock absorber for minor impacts. When the brain moves rapidly inside the skull, a concussion has technically occurred. One common scenario that can lead to a concussion is a direct blow to the head or a whiplash effect to the body. The impact rapidly accelerates the head, causing the brain to strike the inner skull (i.e., the coup). When the head decelerates and stops its motion, the brain then hits the opposite side of the inner skull (i.e., the contrecoup). The second common scenario is a rotational concussion, in which the head rapidly rotates from one side to another causing shearing and straining of brain tissues. In either case, delicate neural pathways in the brain can become damaged, causing neurological disturbances.

[↑ top](#)

Does age play a role in Concussion management?

There are distinct differences in age when it comes to managing sport related concussions. Recent research demonstrates that high school athletes not only take longer to recover after a concussion when compared to collegiate or professional athletes, but they also may experience greater severity of symptoms and more neurological disturbances as measured by neuropsychological and postural stability tests. It is also estimated that 53% of high school athletes have sustained a concussion before participation in high school sports, and 36% of collegiate athletes have a history of multiple concussions. Because the frontal lobes of the human brain continue to develop until age 25, it is vital to manage youth concussions very conservatively to ensure optimal neurological development and outcomes.

What are some risk factors for sustaining a sport-related concussion?

A major determinant of sport-related concussions is an athlete's prior history of concussions. Research suggests that if someone has already received one concussion, they are 1-2 times more likely to receive a second one. If they've had two concussions, then a third is 2-4 times more likely, and if they've had three concussions, then they are 3-9 times more likely to receive their fourth concussion.

Some studies have shown that females are more likely than their male counterparts to sustain a concussion, and they tend to have more symptoms and require more time to recover. Various neuroanatomical and biomechanical differences exist between the genders in sports that could contribute to these differences.

Additionally, a history of developmental disorders, psychiatric disorders, or a history of headaches or migraines can play a part in concussion recovery time. Research suggests that for every concussion, the person is 1-2 times more likely for a second; 2-4 times more likely for a third; and 3-9 times more likely for a fourth. The factors contributing to concussions and their recovery is regularly revealing new information, and it's important that the people responsible for the health of the athletes stay up to date on the latest research on prevention and treatment.

What are some long-term consequences of multiple concussions?

Long term effects of multiple concussions are currently being studied by researchers around the globe. Not only can multiple traumatic incidents contribute to the development of mild cognitive impairments (MCI's), chronic traumatic encephalopathy (CTE), and other adverse outcomes, but a storied concussion history can also cause post-concussion syndrome (PCS). While we are still elucidating the causes of these long term effects, it is imperative that a person fully recover from one concussion before risking a subsequent one. Failing to do so adequately can lead to additional neurologic damage. Given this new understanding, managing concussions requires specialized, comprehensive and state-of-the-art approaches.

Concussion: By the Numbers

- CDC estimates reveal that 1.6 million to 3.8 million concussions occur each year
- 5-10% of athletes will experience a concussion in any given sport season
- Fewer than 10% of sport related concussions involve a Loss of Consciousness (e.g., blacking out, seeing stars, etc.)
- Football is the most common sport with concussion risk for males (75% chance for concussion)

- Soccer is the most common sport with concussion risk for females (50% chance for concussion)
- 78% of concussions occur during games (as opposed to practices)
- Some studies suggest that females are twice as likely to sustain a concussion as males
- Headache (85%) and Dizziness (70-80%) are most commonly reported symptoms immediately following concussions for injured athletes
- Estimated 47% of athletes do not report feeling any symptoms after a concussive blow
- A professional football player will receive an estimated 900 to 1500 blows to the head during a season
- Impact speed of a professional boxers punch: 20mph
- Impact speed of a football player tackling a stationary player: 25mph
- Impact speed of a soccer ball being headed by a player: 70mph

Emergency Procedure Protocol: Before the season ever begins, the coaches, ATC's, and others involved in the athletic and academic pursuits of an athlete should have an emergency procedure ready in the event of a suspected concussion. This would involve having an outlined plan for the various stages of concussion management, starting with education and baseline testing before the season, emergency procedures to follow on the sideline in the event of a suspected concussion (e.g., SCAT2 exam, conditions defining when to transport the athlete to an emergency department, procedure to contact parents or family of athlete, etc), and a plan for ongoing evaluation and accommodations for those recovering from a concussion.

Information for Coaches

Acute Care and Concerns on the Sideline

During a suspected concussion, it is recommended that the athlete be removed from play immediately. For athletes who are unable to stand up after an injury, the proper first-aid emergency procedures should be followed. For athletes who have sustained an impact but can make their own way off the field, the following protocol is recommended: 1) **Remove from Play**, 2) **Sideline Assessment**, and 3) **Re-evaluation**.

Remove from Play: In some states, laws exist requiring the removal of a youth athlete from physical play if a concussion is suspected. The concussed brain is particularly vulnerable at this time because if a person sustains a second concussion within a short amount of time, they are susceptible to further injury, prolonged recovery, and in some cases, Second-Impact Syndrome, which can result in long-term brain damage or even death. It is recommended that if you suspect a concussion in one of your athletes, do not return the athlete to play until they are cleared by a healthcare professional trained in concussion management.

Sideline Assessment: Once an athlete is suspected of receiving a concussion, the proper first-aid assessment should be performed and your organization's Emergency Procedures should be followed. The next step is to observe the signs (what you see) and assess the athlete's symptoms (what they say) immediately after the suspected injury. Further assessing an athlete's cognitive status, coordination and balance, and physical signs of injury is recommended. An easy-to-use and widely accepted tool to quickly evaluate an athlete's (age 10+) mental and physical status after a suspected concussion is the [Sport Concussion Assessment Tool 2 \(SCAT2\)](#). The following is taken from this tool:

Sideline Assessment Tool		
Ask the athlete the following questions		
1 point for each correctly answered ques		
At what venue are we today?	0	1
Which inning/half is it now?	0	1
Who scored last?	0	1
Who did we play at the last game?	0	1
Did your team win the last game?	0	1
<hr/>		
SCORE OUT OF 5		
Inability to answer these questions indicates a need for further evaluation		

Re-evaluation: The concussed athlete may change their behavior and disposition in the minutes and hours following a concussion. In general, the athlete may experience symptoms in the acute phases, but the development of any new symptoms or continual worsening of the existing symptoms should be treated seriously. The following 'red flags' may warrant a visit to your closest emergency department:

- Headaches that Worsen
- Neck Pain
- Unusual Behavior Change
- Weakness/Numbness in Arms/Legs
- Looks Very Drowsy (Cannot be Awakened)
- Repeated Vomiting

- Focal Neurologic Signs (Lacerations, Fractures, Bruising, Raised Skin, etc.)
- Change in State of Consciousness
- Can't Recognize People or Places
- Increased Confusion or Irritability
- Slurred Speech
- Seizures

If the athlete is stable after being evaluated, it is recommended that they return home with a parent or other responsible adult who can monitor for any additional changes in signs or symptoms.