HOUSTON Methodist SM
NEUROLOGICAL INSTITUTE

Concussion Basics

What Is a Concussion

Simply put a concussion is a "brain sprain." When an athlete hits an object or is hit, their brain moves around inside the skull stretching and twisting the cells and fibers causing a transient disruption in brain functioning. The energy created when the head makes contact with something pulses through the brain distorting the shape of the cells that also disrupts brain functioning. Less than 10% of concussions have loss of consciousness.

What Happens During a Concussion

Our brain cells maintain a delicate chemical balance. During a concussion the brain cells' membrane (the outer layer) is distorted; disrupting its chemical balance. This leads to a disruption in blood flow and the brain's ability to get oxygen and glucose that it desperately needed for recovery. This mismatch between supply (up to 50% decline) and demand (up to 150% of normal) causes concussion symptoms.

Types of Sports Concussions

Presently, sports concussions are divided into simple and complex. A simple concussion is when there is no overt or detectable damage to the brain itself and recovers in 7-10 days. A complex concussion is one that takes more than 10 days to recover. Upwards of 10% of concussions can take more than one month to heal. Formally popular grading systems, such as Grades 1, 2, & 3 are no longer useful. They are not designed for teenagers or younger brains and do not guide treatment.

Epidemiology of Sports Concussion

An estimated >350,000 sports related concussions occur annually (there is a total of 1.7 – 3.6 million brain injuries in the US annually). Several factors determine the rate of concussions in a given sport. However, American style football has the highest rate with other sports like ice hockey, soccer, lacrosse and field-hockey not far behind. Gender and age are also important factors with younger athletes being more vulnerable and women are more likely to suffer concussions compared to males. In general, the research suggests about a 10-15% (some as high as 20%) rate of concussions in contact sports.

What to Expect If You/Your Child Has a Concussion

Immediately: Loss of consciousness (LOC) occurs in only 10% of concussions. However, a LOC; even if only momentarily, indicates a concussion. Immediately after a concussion one can be confused and disoriented with difficulties recalling events immediately before or after. Their balance can be off and they can repeat themselves. Irritability is common as well as headache and sensitivity to light and sound. Below are common symptoms that can follow after a concussion:

- Headache
- Poor balance
- Nausea/Vomiting
- Fatigue
- Irritability
- Tearfulness/Sadness
- Feeling slowed down
- Increased sleep
- Decreased appetite
- Feeling "foggy"
- Sensitivity to light or noise
- Blurred vision
- Poor memory/concentration
- Dizziness
- Decreased sleep

After: Symptoms can linger for several days (and in some cases longer). Headaches, fatigue, irritability, fogginess, and memory problems are common, but not the only symptoms. Sometimes there can be whiplash (neck injury) and poor balance (vestibular problems).

What to Do If You're Child Sustains a Concussion

Typically concussions are transient injuries that do not require extensive medical treatment. However, they must be monitored closely and often soon after the actual event to detect any medical complications that may develop and require urgent medical attention. Your child should not continue to play if he/she has a concussion. Your child should be evaluated immediately after the concussion (i.e., coach or athletic trainer) with close monitoring for any signs of worsening symptoms. If there is evidence of **worsening symptoms** (such as lethargy, severe headache, repeated vomiting, stiff neck, slurred speech, and confusion, difficulty walking or numbness/weakness/loss of sensation) then **immediate medical care is required**. If you child was not evaluated on the field/ice/court, then contact your child's physician for advice or seek an emergency room evaluation. Often brain imaging such as brain CT is not required and can be determined by a physician. *When in doubt check it out.* Do not use aspirin or NSAIDs for the first 48 hours after a concussion. Tylenol for pain is acceptable.

Why All the Concern

It is important not to return an athlete to play before they have fully recovered from a concussion. The human brain has not fully matured until the early 20's. Younger brains take longer to recover from a concussion and may be more vulnerable to the effects of another concussion, within the first few days or when it has not healed or fully recovered from the previous one – called second impact syndrome (SIS). SIS occurs when the brain losses its ability to control blood flow and the pressure builds up to unsafe levels and damages the brain. SIS happens in response to a second concussion before the athlete has been able to heal from the previous one. *SIS is extremely rare,* but can lead to rapid, severe and permanent brain injury. It is crucial to make sure a young athlete fully recovers before returning to play.

When an Athlete Is Ready To Return

A gradual, incremental approach is recommended. First an athlete must be symptom free, cognitively intact (e.g., memory or concentration) without school problems, and good balance. Then a return to play (RTP) exercise protocol can begin. This is when an athlete is slowly reintroduced to competitive athletics with exertional testing, then non-contact practice, contact practice, and game play. There should be approximately 24 hours between each step and the athlete cannot have any return of concussion symptoms following each step. If concussion symptoms return the athlete must rest (no exercising) until all symptoms have resolved. Then the RPP can be re-initiated.

The Best Method for Determining Recovery

The best method for determining recovery from a sports concussion is through assessing performance sensitive to the effects of a concussion: namely symptoms, cognitive abilities, and balance. Tasks such as memory, concentration, reaction time, and how quickly you think are the most sensitive measures of a concussion, while neurological examinations, neuroimaging (CT and MRI) are notoriously insensitive in detecting a sports concussion. The best method for measuring the effects of sports concussion is through baseline testing of an athlete. This way one can directly compare testing after a concussion to how the same individual performed before he/she was concussed. Thus, baseline testing has become the "corner stone" of any sports concussion safety program. Innovative computerized testing has been developed specifically for this and takes 30 minutes to complete. The testing is simple, easy to understand, and can be administered in small group settings. We recommend **ImPACT** as it is the most widely used sports concussion software. It has been extensively researched and Dr. Podell was instrumental in its original development.

Website Resources

- sportsconcussions.com
- cdc.gov/concussion

For more information: Houston Methodist Concussion Center

713-441-8277

Or go to: houstonmethodist.org/concussion