

## Concussions

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### Introduction

Exercise is perhaps the most important activity that a child or adolescent can do to insure a healthy life, and sports are a fun way for everyone to get exercise. Unfortunately sporting injuries are common and can keep an athlete off the playing field and away from physical activity. Head injuries and subsequent concussions are among the most feared.

Unfortunately, head injuries are common in sporting activities, possibly numbering over three million events per year. Although head injuries may occur in any sport, football concussions outnumber those in wrestling, soccer, lacrosse, hockey and other sports. High velocity head injuries are most common in football and hockey therefore helmets are required for play, but wrestling and soccer head injuries usually result from head to head contact with an opponent.

### Definition

Concussions are brain contusions caused by direct or indirect forces. Another definition is a "complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces." Common acute signs and symptoms of concussions include loss of consciousness, lightheadedness, vertigo, cognitive dysfunction, memory disturbances, amnesia, tinnitus, blurred vision, difficulty concentrating, headache, nausea, vomiting, photophobia, and balance disturbances. Delayed signs and symptoms can include sleep irregularities, fatigue, personality changes, an inability to perform usual daily activities, depression, and lethargy.

### Classification

Concussions were once classified based on certain symptoms, but today, classification groups are not used. This emphasizes and also simplifies the diagnosis of concussions in athletes.

### Evaluation

The initial evaluation of an athlete on the field with a suspected concussion during play or practice should be made immediately. This often requires stopping play. After determining adequate airway, breathing and circulation, the athlete should be evaluated for a neck injury. Once the neck has been cleared, there are sideline assessment tools that should be used along with other diagnostic tests. Once the diagnosis of a concussion has been made, the athlete is never cleared to go back to the same game or practice, and should be closely monitored for post-concussive symptoms.

### Return to Play

Return to play after a concussion is based on a gradual stepwise return to activity. The athlete should proceed to each level of the stepwise approach every 24 hours if they continue to be asymptomatic. If any symptoms do recur, the athlete needs to fall back to the previous step and can only continue if the symptoms resolve at that level.

The steps are as follows:

- 1) No activity
- 2) Light aerobic exercise
- 3) Sport-specific exercise
- 4) Non-contact training drills
- 5) Full contact practice, and lastly
- 6) Return to play

In the example of a high school football player that suffers a concussion on a Friday night game, they would not be ready to return to play until next week's game assuming that they were completely asymptomatic the entire week as they used the stepwise return to play guideline. All children and adolescent athletes, no matter their level of participation, should be kept out of the same game after suffering a concussion.

### Second Impact Syndrome

Complications of concussions are usually transient and resolve completely, but some can be dangerous. One of the most concerning sequelae is termed "second impact syndrome." This is a very rare, but devastating head injury that occurs to an adolescent athlete's brain that has not recovered from a recent concussion. As discussed above, the brain tissue must recover from a concussion, and if it does not, a second impact can cause immediate cerebral edema and brain herniation which results in death within minutes. There have only been a handful of players that have survived second impact syndrome, and the morbidity is always high in survivors. The most important thing that primary physicians can do to prevent second impact syndrome is to insure athletes do not return to play too soon after a concussion no matter how mild their symptoms.

### Summary

Concussions are common injuries that occur often in athletes. Early preparation by the medical team is recommended so that there is a coordinated effort on the field to assess and manage an athlete with a suspected head injury or concussion. A stepwise approach to return to play is recommended to insure athletes return to sports safely and avoid catastrophic problems like second impact syndrome.