

# Concussion

## Definition

A concussion is a heterogeneous [mild traumatic brain injury](#) (mTBI) characterized by a variety of [symptoms](#), clinical presentations, and [recovery](#) trajectories.

May be accompanied by temporary [loss of consciousness](#).

Is identified in awake individuals.

Has measures of neurologic and cognitive dysfunction.

[Brain Trauma Foundation](#) developed this definition based on the most current evidence available. It is used by leading organizations, such as the NCAA.

see [Mild traumatic brain injury](#).

see [Spinal cord concussion](#).

## Etiology

A concussion is caused by an external force hitting the [head](#). This can happen anywhere, anytime, and to anyone in situations like [sports](#) games, [car](#) crashes, or falls.

## Risk factors for concussion

- History of previous [concussion](#) increases the risk for further concussion.
- Being involved in an accident: bicyclist, pedestrian, or motor vehicle collision
- Combat soldier
- Victim of physical abuse
- Falling (especially pediatrics or elderly)
- Males are diagnosed with a sports-related concussion more than females (due to an increased number of male participation in sports studied) but females have a higher risk overall when compared to males who play in the same sport (i.e., soccer and basketball) <sup>1)</sup>.
- Participating in sports with a high risk of concussion:
  - [American football](#)
  - Australian rugby

☐ Ice hockey

☐ Boxing

☐ \*Soccer is the highest risk for females

● (For contrast, sports with the lowest risk of concussion: baseball, softball, volleyball & gymnastics)

● BMI > 27 kg/m<sup>2</sup> and less than 3 hours of training per week increased risk of sports-related concussion <sup>2)</sup>.

## Epidemiology

In the U.S. alone, reports estimate over 2.5 million cases of concussion annually.

## Classification

The Glasgow coma scale is too insensitive for use.

Many concussion grading systems have been proposed, the two most widely used are those of Cantu, and that of the American Academy of Neurology (AAN)

LOC by itself may not be a significant discriminant (e.g. confusion > 30 minutes may be worse than LOC for a few seconds). Most systems consider a concussion to be mild if there is a change in sensorium without loss of consciousness, however they differ mostly in the definition of "change in sensorium".

There is no scientific basis to recommend one system over another.

Recommendation: select one system and use it consistently. Do not place undue emphasis on grading.

Five concussion subtypes with varying prevalence within 3 d following injury are commonly seen clinically and identifiable upon systematic literature review. Sleep disturbance, a concussion-associated condition, is also common. There was insufficient information available for analysis of cervical strain. A comprehensive acute concussion assessment defines and characterizes the injury and, therefore, should incorporate evaluations of all 5 subtypes and associated conditions <sup>3)</sup>.

1) cognitive

2) ocular-motor

3) headache/migraine

4) vestibular

5) anxiety/mood

2 concussion-associated conditions:

1) sleep disturbance

2) [cervical strain](#).

## Sport-Related Concussion

see [Sport-Related Concussion](#).

## Clinical features

see [Concussion clinical features](#).

## Diagnosis

[Concussion diagnosis](#).

## Differential Diagnosis

[Concussion Differential Diagnosis](#).

## Complications

[Cognitive impairment](#) and post-concussive symptoms (PCS) represent hallmark sequelae of [pediatric mild traumatic brain injury](#) (pmTBI).

[Attention Deficit Hyperactivity Disorder...](#)

## Treatment

[Concussion treatment](#).

## Concussion in motocross accident

see [Concussion in motocross accident](#).

# Journal

see [Concussion Journal](#)

1) , 2)

Giza CC, Kutcher JS, Ashwal S, et al. Summary of evidence-based guideline update: evaluation and management of concussion in sports: report of the Guideline Development Subcommittee of the American Academy of Neurology. *Neurology*. 2013; [28] 80:2250–2257

3)

Lumba-Brown A, Teramoto M, Bloom OJ, Brody D, Chesnutt J, Clugston JR, Collins M, Gioia G, Kontos A, Lal A, Sills A, Ghajar J. Concussion Guidelines Step 2: Evidence for Subtype Classification. *Neurosurgery*. 2019 Aug 21. pii: nyz332. doi: 10.1093/neuros/nyz332. [Epub ahead of print] PubMed PMID: 31432081.

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