

# Mild Traumatic Brain Injury and Concussions

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# Learning Objectives

- Increase awareness of Mild Traumatic Brain Injury (MTBI) evaluation and management
- Realize the need for patient-centered evaluation and management of MTBI patients
- Availability of MTBI online education and credentialing





- What have been your experiences with concussion or MTBI?

# Mild Traumatic Brain Injury (MTBI) or Concussion Incidence

- Approximately 3.8 million Americans per annum in sports related activities



# MTBI Incidence



- Approximately 50% of the MTBI athletes do not report the injury to a health professional...
- Harmon KG, Drezner JA, Gammons M, Guskiewicz KM, Halstead M, Herring SA, Kutcher JS, Pana A, Putukian M, Roberts WO. American Medical Society for Sports Medicine position statement: concussion in sport. See comment in PubMed Commons below *Br J Sports Med*. 2013 Jan; 47(1): 15-26.



## Confusion

- Hallmark symptom of TBI is confusion
- Eyes glassy, loss of focus
- Incoherent speech
- Going to wrong team's huddle
- Memory Loss
  - Loss of memory prior to event-retrograde amnesia
  - Loss of future memory-anterograde amnesia

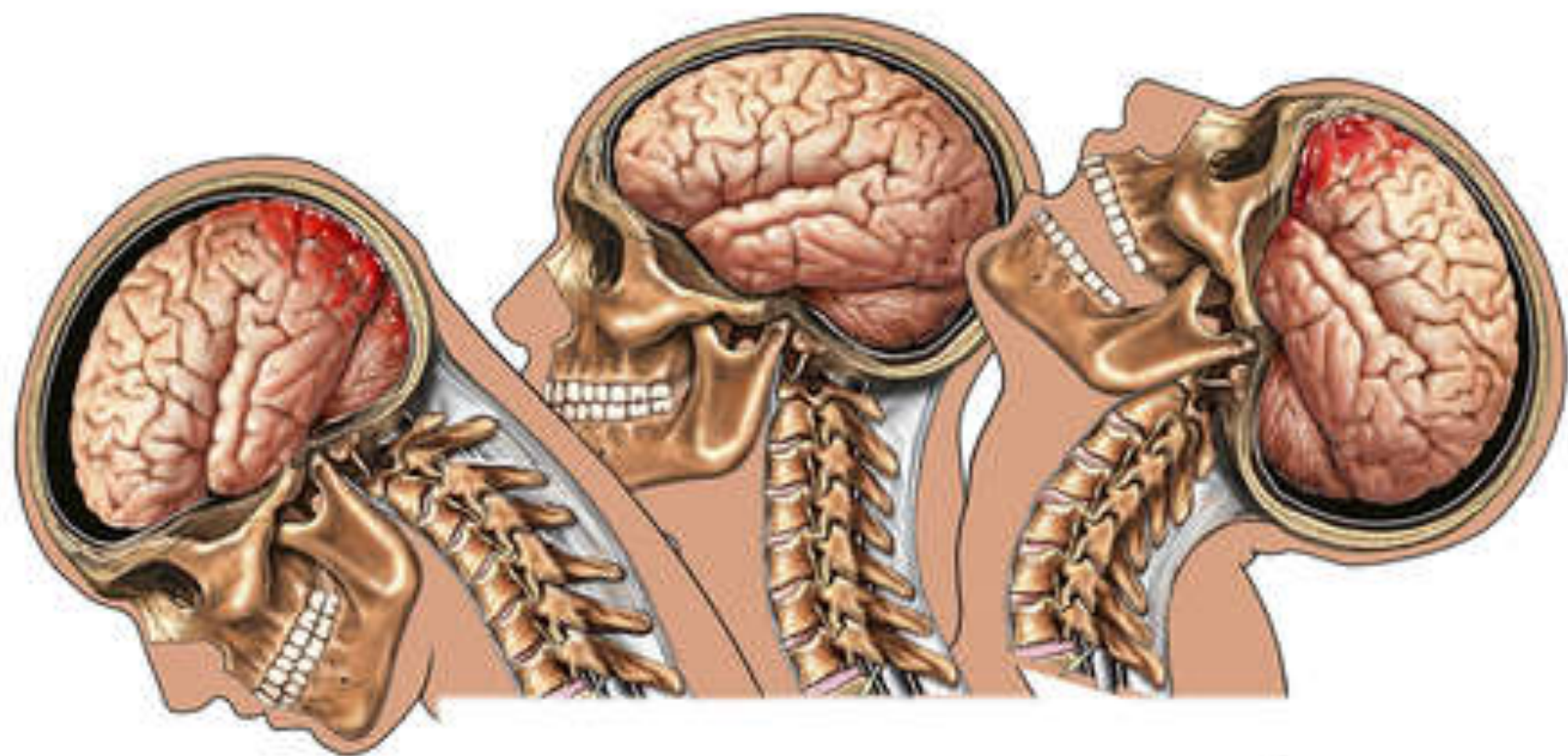


# Mild Traumatic Brain Injury (MTBI)

- An injury to the head due a blunt trauma or acceleration or deceleration forces that result in one or more of the following (mental status changes) signs or symptoms...

- National Center for Injury Prevention and Control







# MTBI Mental Status Signs or Symptoms

- Transient confusion
- Disorientation
- Impaired consciousness
- Dysfunction of memory around time of injury
- Loss of consciousness lasting less than 30 minutes



# Observed Signs of Neurological or Neuropsychological Dysfunction (children)

- Seizures post head injury
- Irritability, lethargy, or vomiting following head injury (infants or young)



# Observed Signs of Neurological or Neuropsychological Dysfunction (adults)

- Seizures post head injury,
- headache,
- dizziness,
- irritability,
- fatigue or poor concentration,
- loss of consciousness or altered consciousness
- when identified soon after injury.



# Glasgow Coma Scale

Best eye response (E)	Spontaneous – open with blinking at baseline	4
	Opens to verbal command, speech, or shout	3
	Opens to pain, not applied to face	2
	None	1
Best verbal response (V)	Oriented	5
	Confused conversation, but able to answer questions	4
	Inappropriate responses, words discernible	3
	Incomprehensible speech	2
	None	1
Best motor response (M)	Obeys commands for movement	6
	Purposeful movement to painful stimulus	5
	Withdraws from pain	4
	Abnormal (spastic) flexion, decorticate posture	3
	Extensor (rigid) response, decerebrate posture	2
	None	1

## GLASGOW COMA SCORE

### Eye(s) Opening

Spontaneous	4
To speech	3
To pain	2
No response	1

### Verbal Response

Oriented to time, place, person	5
Confused/disorientated	4
Inappropriate words	3
Incomprehensible sounds	2
No response	1

### Best Motor Response

Obeys commands	6
Moves to localised pain	5
Flexion withdraws from pain	4
Abnormal flexion	3
Abnormal extension	2
No response	1

<i>Best response</i>	15
<i>Comatose patient</i>	8 or less
<i>Totally unresponsive</i>	3

# Concussion Definition

*A traumatically induced transient disturbance of brain function and involves a complex pathophysiological process.*

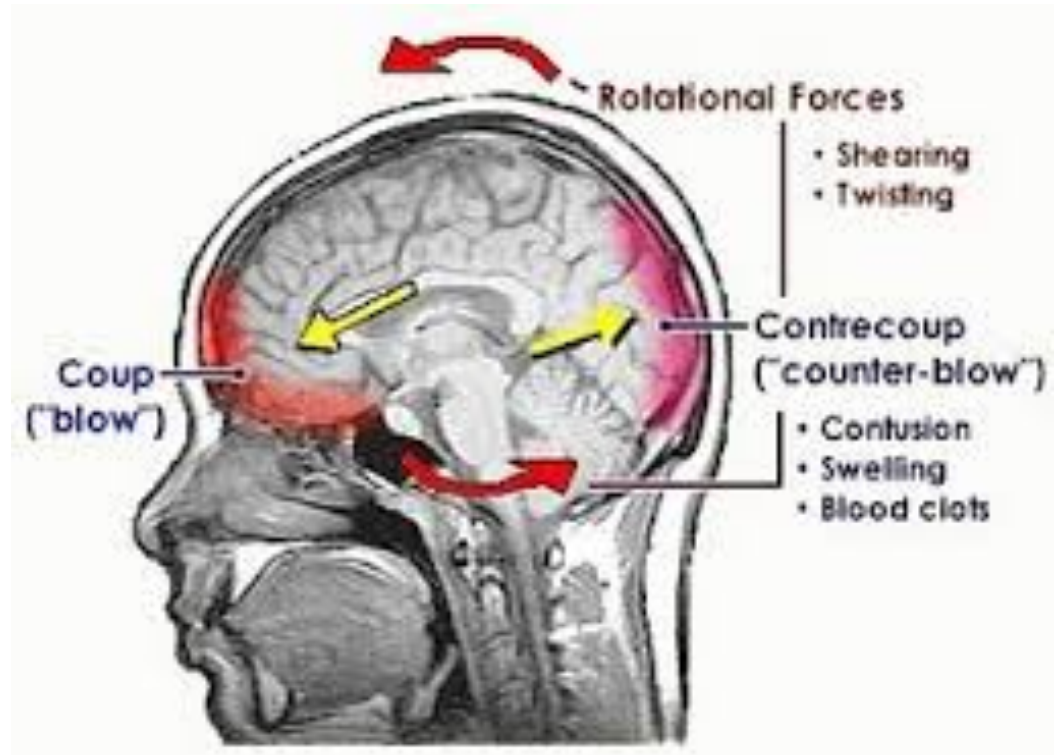
American Medical Society for Sports  
Medicine



# Concussion Definition

*Concussion is a subset of mild traumatic brain injury that is generally self-limited and at the less severe end of the brain injury spectrum.*

American Medical Society for Sports  
Medicine



# School of hard knocks

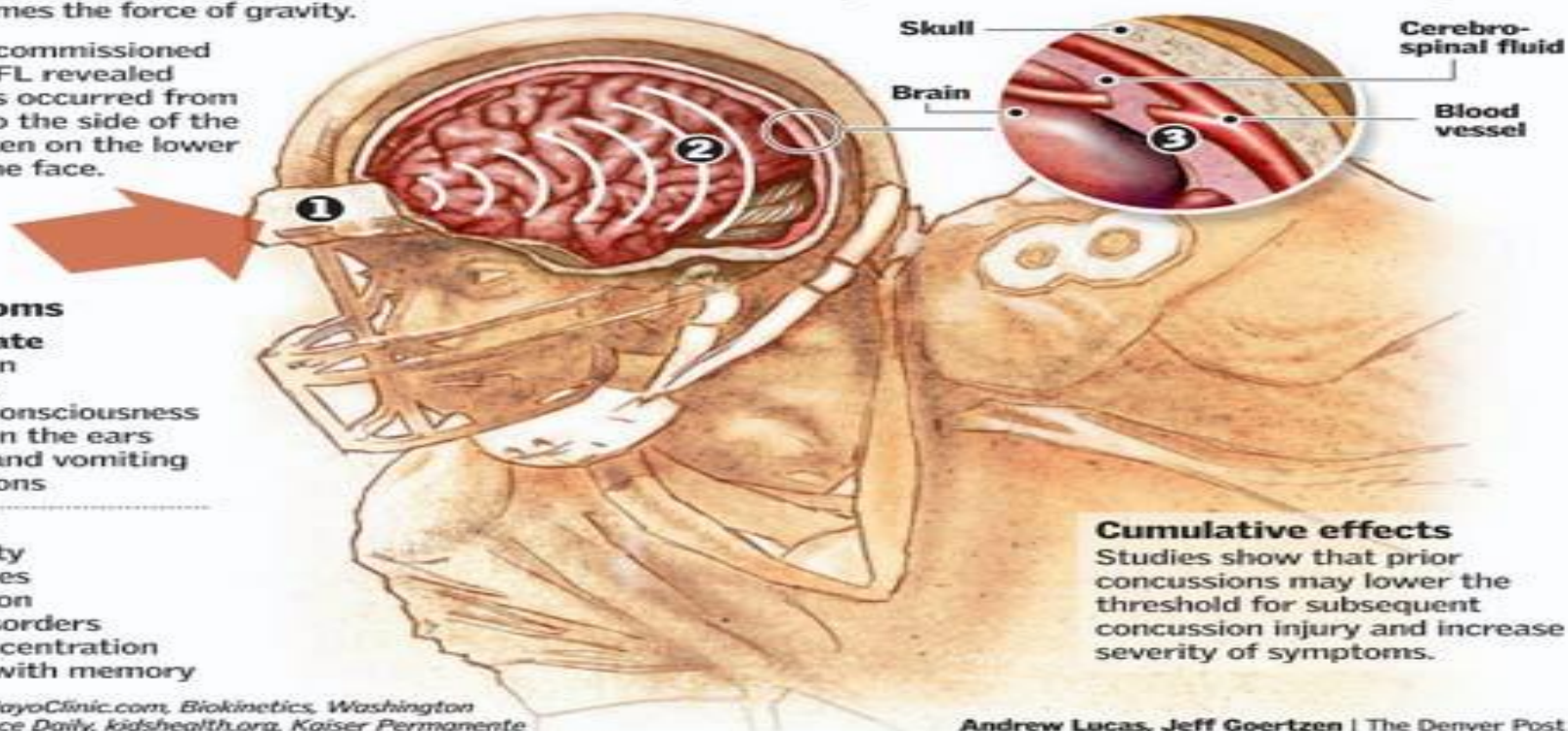
A concussion occurs when a violent blow to the head causes the brain to slam against the skull beyond the ability of the cerebrospinal fluid to cushion the impact. Between 1996 and 2001, NFL teams reported nearly 900 concussions.

**1** When a football player takes a hit to the head, speeds range from 17 to 25 miles per hour with a force averaging 98 times the force of gravity.

A study commissioned by the NFL revealed most hits occurred from a blow to the side of the head, often on the lower half of the face.

**2** The shock wave passes through the brain and bounces back off the skull. The concussion usually occurs at the opposite side from the point of impact.

**3** The impact can cause bruising of the brain, tearing of blood vessels and nerve damage.





## Bloodless Concussion: The Misunderstood Injury

Athletic trainers, coaches, medical staff, parents, and injured players often perceive that a concussion is unimportant because no blood or other obvious clinical signs are visible.



Concussion is used interchangeably with mild traumatic brain injury (MTBI) and should not be interpreted as clinically insignificant in terms of:

- risk,
- attributable factors,
- detection,
- diagnosis,
- management,
- treatment,
- or follow-up care.

David Martinez. Research & Science: Bloodless Concussion: Misunderstood Injury. *J Amer Chiropr Assoc* 2011 Sept- Oct; 48(7):16-39.

Other health problems, such as uncontrolled diabetes, severe dehydration, and adverse drug reactions, can cause signs and symptoms similar to concussion.



## Signs of Dehydration



### Early Signs

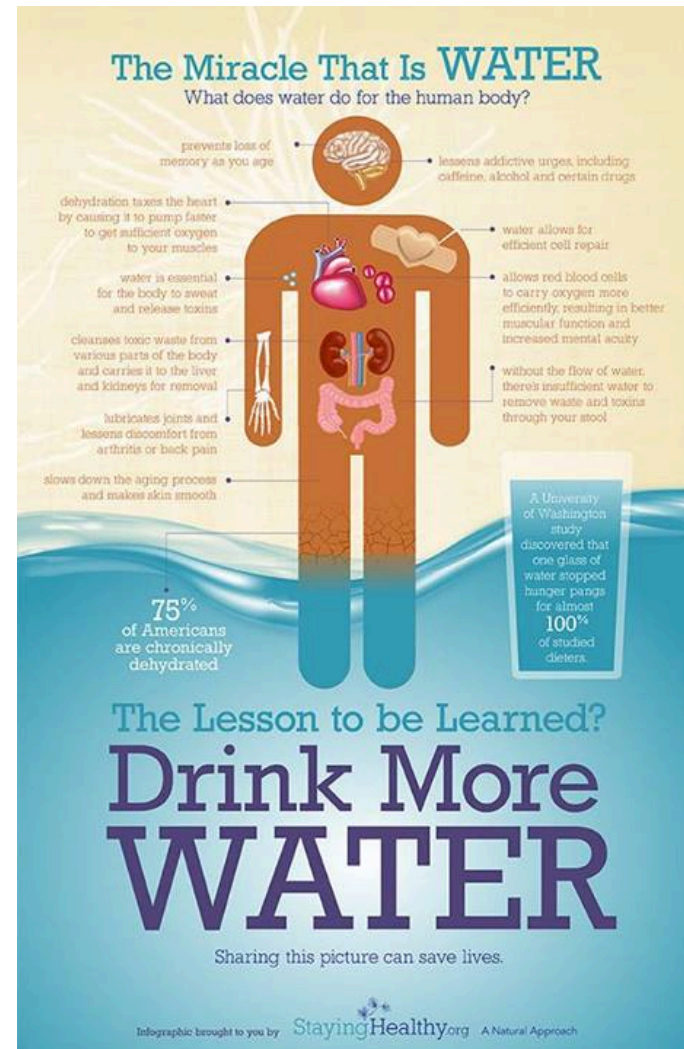
- Fatigue
- Anxiety
- Irritability
- Depression
- Cravings
- Cramps
- Headaches

### Mature Signs

- Heartburn
- Joint Pain
- Back Pain
- Migraines
- Fibromyalgia
- Constipation
- Colitis

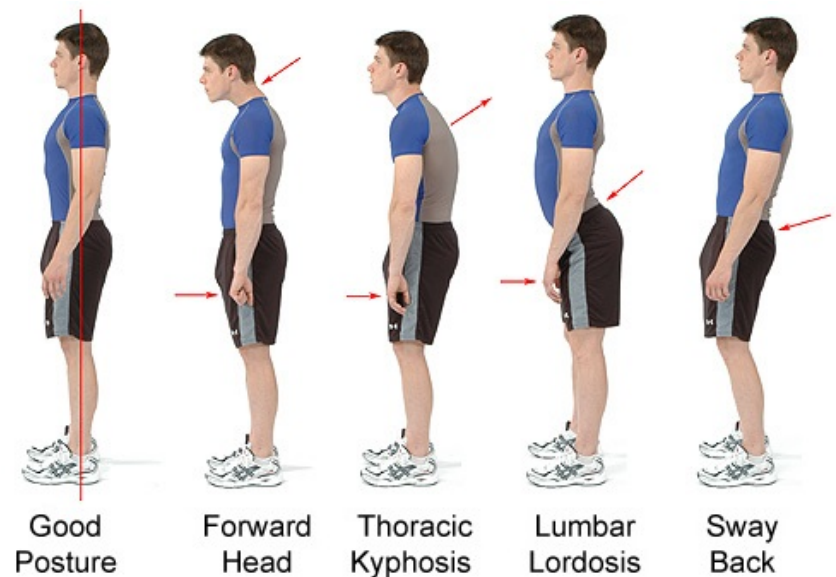
# Hydration: Fluids for Life

- This monograph provides readers with an overview of current knowledge related to the functions of water, methods of determining hydration status, sources of water in the diet, and for infants, children, physically active individuals, and the elderly.



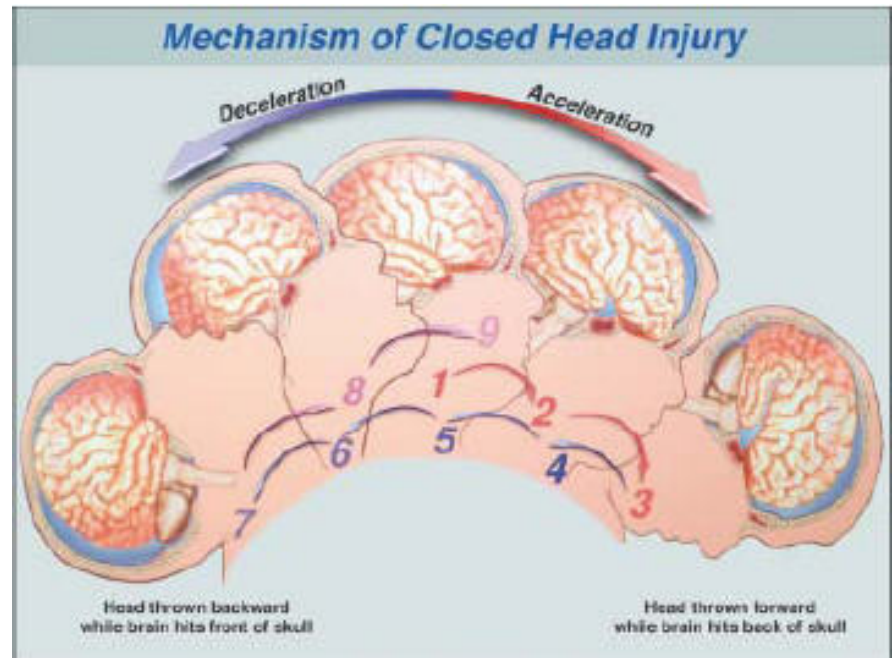
- The effects of cerebral concussion on postural control persist for longer than three to four days, even among athletes with no signs of unsteadiness.

Cavanaugh JT. Guskiewicz KM; Giuliani C; Marshall S; Mercer VS; Stergiou N. Recovery of Postural Control After Cerebral Concussion: New Insights Using Approximate Entropy. *Journal of Athletic Training* 2006; 41(3):305–313.



# Diffuse Axonal Injury

- It has been reported that impact acceleration to the head causes traumatic brain injuries (TBI) with damage to the white matter tracts composed of long axons traversing the brain.



# Deadly Uppercut

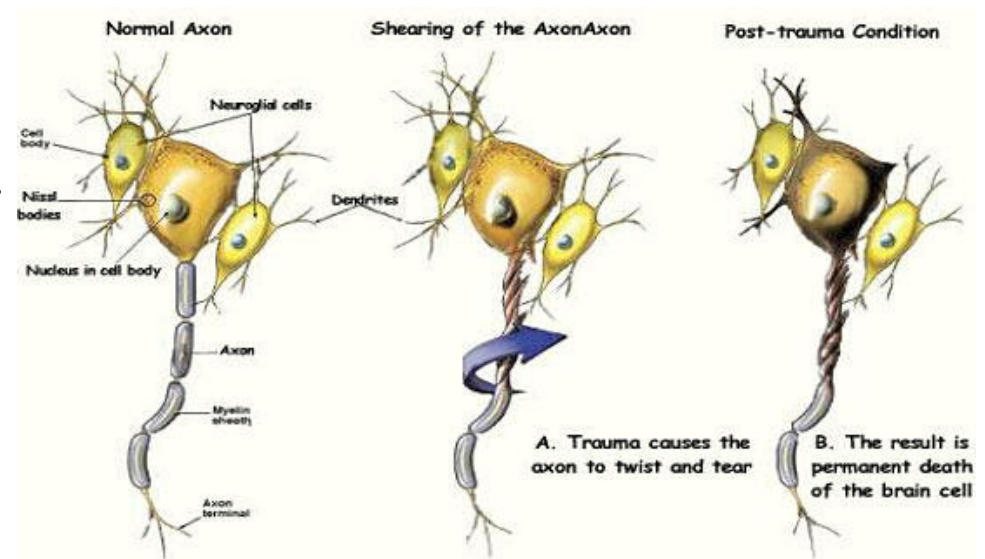
- The acceleration-deceleration shearing forces generated by motor vehicle accidents and the rotational shearing forces generated with boxing, most especially the uppercut, cause diffuse axonal injury.
- Adams JH, Doyle D, Ford I, Gennarelli TA, Graham DI, McLellan DR. Diffuse axonal injury in head injury: definition, diagnosis and grading. *Histopathology*. 1989; 15: 49–59.

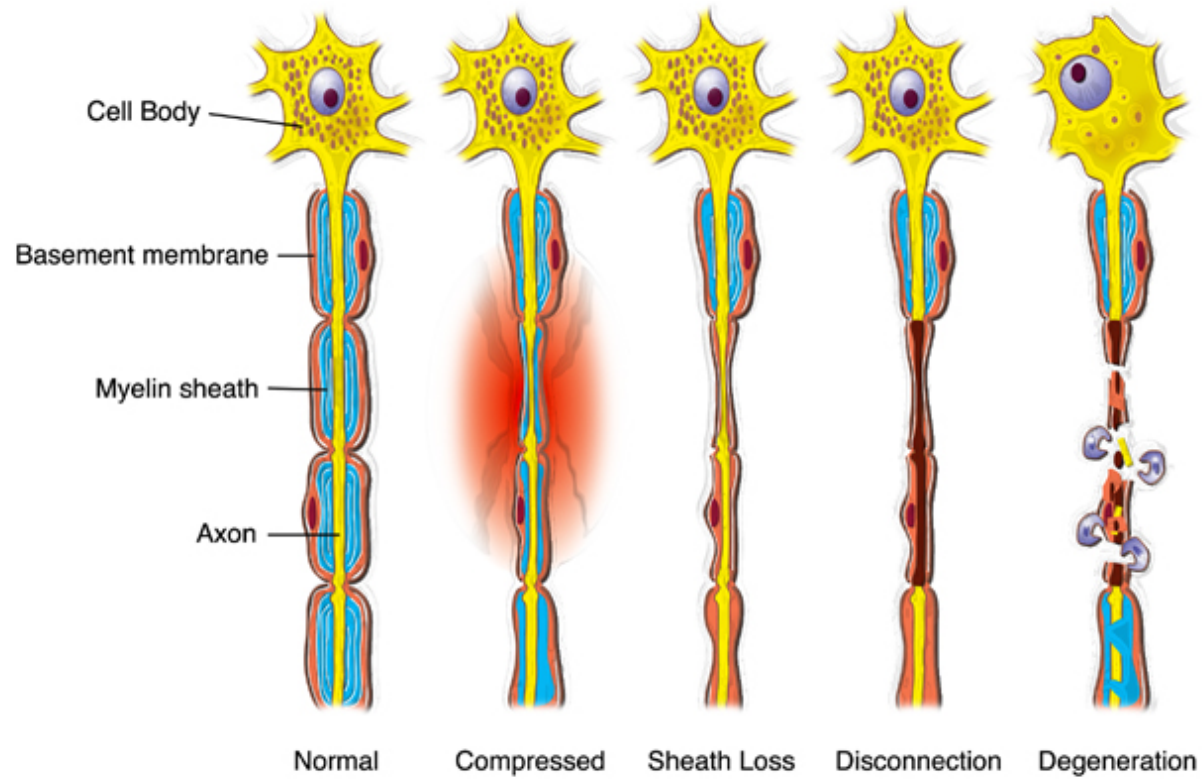




# Diffuse Axonal Injury

- The initial response to mechanical axonal injury is reversible.
- Incomplete clinical evaluation of the involved white matter and early return to unrestricted activities may lead to secondary insults and irreversible axonal fragmentation





# American College of Sports Medicine

- Attempts to assist the team physician in providing optimal medical care for athletes who have experienced a concussion  
To accomplish the goal, the college suggests that all team physicians should have knowledge of and be involved with the following:



# American College of Sports Medicine

- Epidemiology
- Pathophysiology
- Gameday evaluation and treatment
- Post-gameday evaluation and treatment
- Diagnostic imaging
- Management principles
- Return-to-play
- Complications of concussion
- Prevention

# American Medical Society for Sports Medicine Position Statement: Concussion in Sport

- *The ideal care of athletes with sports concussion should be performed by health care professionals with specific training and experience in the assessment and management of concussion.*
- Hence, the sports medicine position intends to assist sports medicine physicians, other physicians and health care professionals in the care of patients with sports concussion.
- This integrative mentality appears to support the National Prevention Strategy: America's Plan for Better Health and Wellness recommendation to enhance coordination and integration of clinical, behavioral and complementary health strategies.

# Conclusions

- Injured individuals are usually not aware of their MTBI and often do not seek care.
- In order to improve the treatment of these patients, all health care providers should become more aware of best practices and evidence-based care of MTBI and concussion.
- All health providers treating athletes should become familiar with the guidelines for evaluation and management of patients with MTBI.



**HEADS UP**

**CONCUSSION**

**IN YOUTH SPORTS**

The logo for brainline.org features a semi-circle of dots above the text. The dots are arranged in two rows: the top row has six grey dots and the bottom row has six orange dots. The text "brainline.org" is positioned below the dots, with "brain" in orange and "line.org" in grey.

brainline.org

**preventing, treating, and living**  
with traumatic brain injury



# Assignments

1. Complete Heads Up and remit certificate for one-hour of credit.
2. Complete “BrainLine-Military” course and remit certificate of completion to UB HSPED for an additional five (5) hours of credit toward orthopedic hours and gain certificate of completion demonstrating training and awareness of evaluation and management of MTBI.
3. There are no charges for the five hours of BrainLine Military credits.



obrigado

Dank U

Merci

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спасибо

Grazie

Thank  
you

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Takk

Gracias

Dziękuję

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Kiitos