

Best Ways to Handle Sports Concussions

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Concussion: What Happened?



Consensus Statement on Concussion in Sport: International Conference on Concussion



- 1st Vienna 2001
- 2nd Prague 2004
- 3rd Zurich 2008
- 4th Zurich 2012
- 5th Berlin 2016
- 6th Amsterdam 2022



11 R's of Sport Related Concussion (SRC)

- RECOGNIZE
- REDUCE
- REMOVE
- REFER
- RE-EVALUATE
- REST
- REHAB
- RECOVER
- RETURN TO LEARN
- RETURN TO SPORT
- RECONSIDER
- RETIRE
- REFINE

Patricios JS, Schneider KJ, Dvorak J, *et al*
Consensus statement on concussion in sport: the 6th
International Conference on Concussion in
Sport—Amsterdam, October 2022 *British Journal of Sports
Medicine* 2023;**57**:695-711.



6th Symposium 2022 - Sport Related Concussion: Recognize



Defined as:

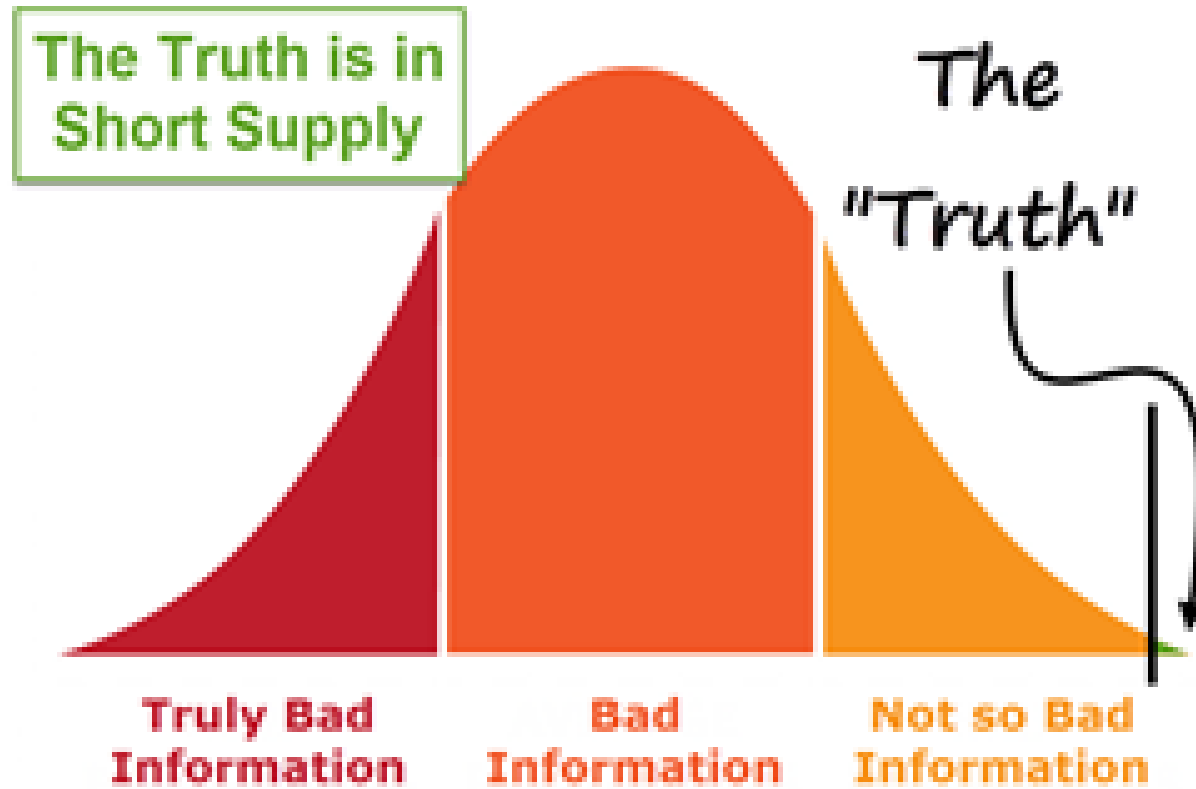
- “Traumatic brain injury caused by direct blow to head, neck or body resulting in an impulsive force being transmitted to the brain that occurs in sports and exercise-related activity.”
- Causes a neurotransmitter and metabolic cascade, with possible axonal injury, blood flow change and inflammation affecting the brain.
- Signs and symptoms can present immediately or evolve, over minutes to hours; commonly resolving in days but can be prolonged.
- No abnormal findings on standard imaging (CT scan, MRI, x-ray, etc.).
- May or may not involve loss of consciousness (LOC).
- *Clinical signs and symptoms cannot be explained by drug, alcohol, or medication use, other injuries (such as cervical injuries, peripheral vestibular dysfunction, etc.) or other comorbidities (e.g., psychological factors or coexisting medical conditions).*

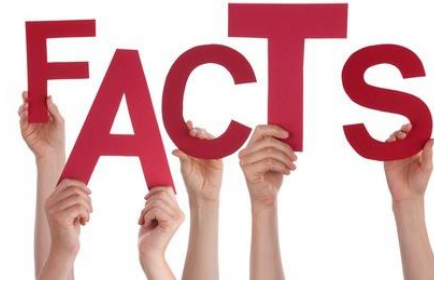
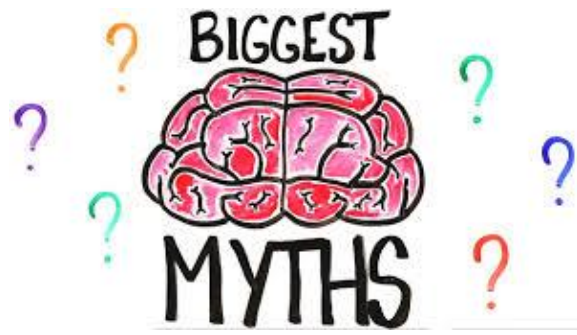


6th International Conference on Concussion in Sport

- Held in Amsterdam, October 2022.
- With all these changes, still need to remember assessment, treatment, management and advice still specific to each patient.





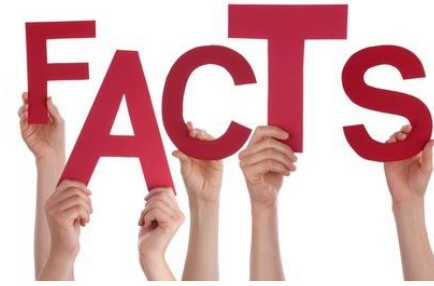


- You have to hit your head!
- You need a CT scan or an MRI to diagnose concussion!
- If you lose consciousness you are in big trouble!
- Helmets and soccer bands prevent concussion

- You do NOT have to hit your head
 - Can come from whiplash-type injuries
- CT scan, x-ray and MRI are NORMAL
 - **Functional disturbance**
- The majority of concussions occur WITHOUT loss of consciousness
- Helmets are important and protect against skull fracture/brain bleeds



- Once your headache is gone you can play again.
- There is nothing to do for a concussion.
- Concussion causes CTE (chronic traumatic encephalopathy).

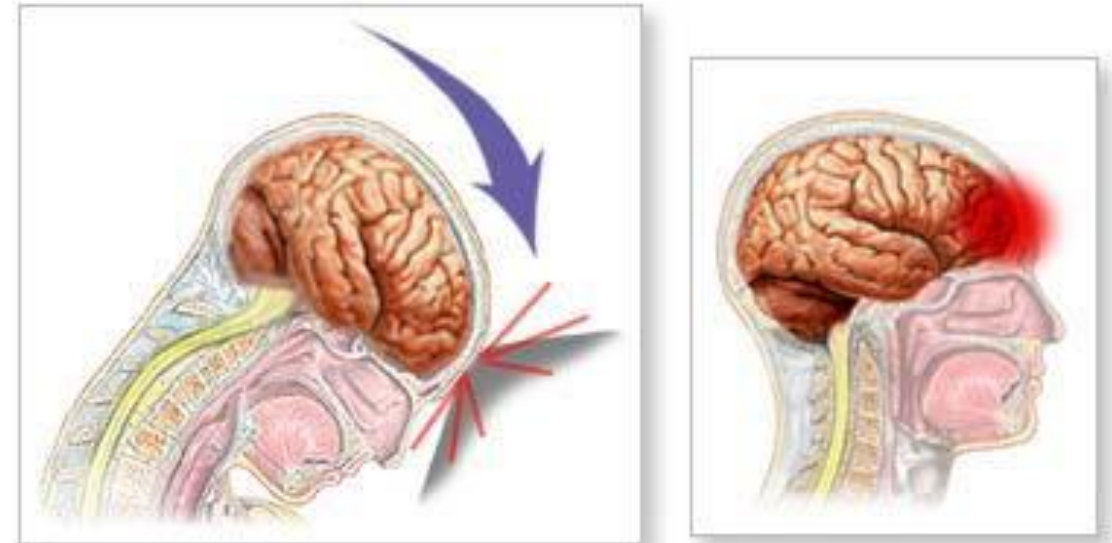


- Other symptoms can really be limiting with return to play, like dizziness.
- ACTIVE approach to concussion:
 - Restores hope in coaches and athletes.
- There is no study that directly links concussion to CTE (chronic traumatic encephalopathy).

Concussion

- Most common head injury in sports
- Caused by shearing forces with direct blow to the head, face, neck or elsewhere in the body and forces transmitted to head to create injury
- Changes way brain works
- Presents different for each athlete
 - Wide range of severity
- Can occur during practice or competition and in ANY sport

A concussion is a violent jarring or shaking that results in a disturbance of brain function



If any one or more of these components is present, a concussion should be suspected:

- **Somatic** –
 - headache, nausea, vision changes
- **Cognitive** –
 - feeling like in a fog, everything slowed down
- **Emotional symptoms** –
 - lability, more tearful, anxious
- **Physical signs** –
 - LOC, amnesia, vomiting
- **Behavioral changes** –
 - “not themselves”
- **Cognitive impairment** –
 - slowed reaction times, impaired ability to perform simple functions
- **Sleep disturbance** –
 - drowsiness, difficulty falling asleep



SIGNS OF A CONCUSSION



Loss of Consciousness



Disorientation



Incoherent Speech



Confusion



Memory Loss



Dazed or Vacant Stare

SYMPTOMS OF A CONCUSSION



Headache or Dizziness



Difficulty Concentrating



Sensitivity to Light



Ringing in the Ears

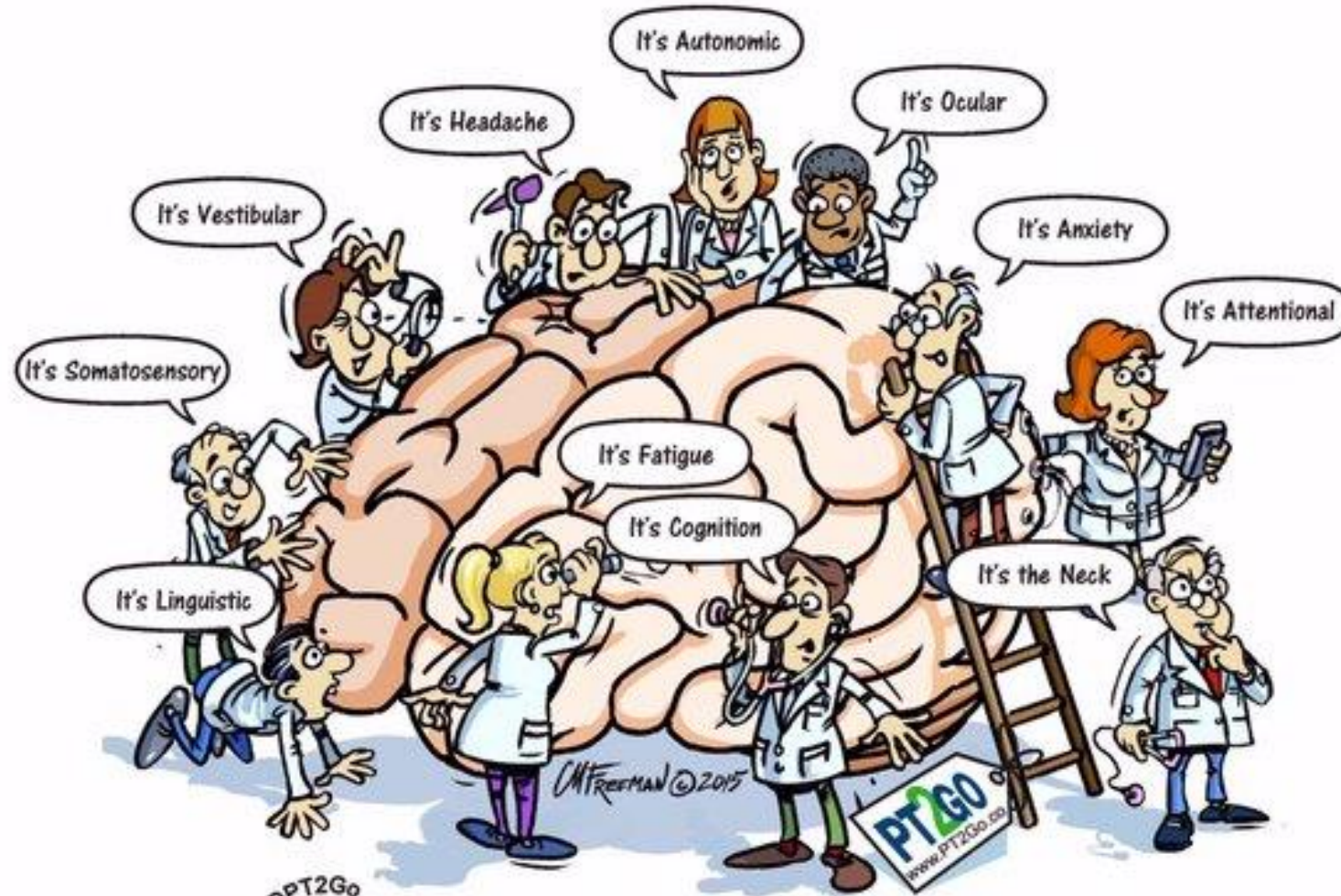


Fatigue



Vomiting

It's Not Really So Hard, Right?



@DPT2Go
Concussion

Sport Related Concussion: Reduce

- Policy disallowing body checking in child or adolescent ice hockey reduced rate of concussion in games by 58%.
- Policies that disallow body checking in youth ice hockey applied across all levels of children's ice hockey and most levels of adolescent.
- Mouthguards associated with 28% reduced concussion rate in ice hockey across all age groups.
- American football reduction of practice related concussion & reduced head impact rates reduced by 64% in all age groups by changing policy & rules limiting number & duration of contact practices & strategies to restrict collision time in practices.
- Participation in on-field neuromuscular training 3x/wk associated with lower rate of concussion in rugby across all age groups.



What to Do if You Suspect Concussion: Remove

- Symptoms can be:
 - Rapid in onset; delayed; or appear, resolve, and then return later
- Ask specific questions about circumstances around event
- Don't leave athlete alone – make sure they have supervision in the following hours so they can be watched
- ***If suspect concussion, athlete should NOT be allowed to return to play on the day of injury***
 - Get athlete in for medical evaluation as soon as possible



Concussion: What to Do When You Suspect Head Injury

- ***When in doubt, sit them out!***





- Removal of player
 - Immediate removal: actual or suspect LOC, seizure, tonic posturing, ataxia, poor balance, confusion, behavioral changes & amnesia
- No return unless evaluated by HCP experienced in concussion management
- Maddocks questions

CRT6™

Concussion Recognition Tool

To Help Identify Concussion in Children, Adolescents and Adults

What is the Concussion Recognition Tool?

A concussion is a brain injury. The Concussion Recognition Tool 6 (CRT6) is to be used by non-medically trained individuals for the identification and immediate management of suspected concussion. It is not a diagnostic or prognostic tool.

Recognize and Remove

Red Flags - CALL AN AMBULANCE

ANY of the following signs or symptoms or a combination of several are reported after a trauma to the head or body the victim should be immediately transported to hospital and transported to appropriate care by a qualified professional (EMT).

- | | |
|--|---|
| <ul style="list-style-type: none"> • Loss of consciousness • Seizure, fits, or convulsion • Loss of vision or double vision • Loss of consciousness • Increasing confusion or deteriorating conscious state (becoming less responsive, slurred) | <ul style="list-style-type: none"> • Weakness or numbness/tingling in more than one arm or leg • Repeated vomiting • Severe or increasing headache • Increasingly restless, agitated or combative • Visible deformity of the skull |
|--|---|

Remember

- Do not take the head straps off the concussion helmet unless there is a clear danger of fire, choke, neck injury, breathing, secondary risk for reduced consciousness or otherwise危及生命的情况。
- Do not attempt to move the person unless there is a clear danger of fire, choke, neck injury, breathing, secondary risk for reduced consciousness or otherwise危及生命的情况。
- Do not remove someone wearing a helmet without
- Advise a health professional if you suspect a concussion
- Athletes with known physical or developmental disabilities should have a lower threshold for removal from play.

If there are no Red Flags, identification of possible concussion should proceed as follows:

Individuals should be transported after an impact to the head and/or spine if there is a clear danger of fire, choke, neck injury, breathing, secondary risk for reduced consciousness or otherwise危及生命的情况。Athletes should have a lower threshold for removal from play.

This tool may be freely used in its current form for educational purposes, team, group, or organization. Any alteration (including translation) and digital re-formatting, re-branding, or sale for commercial gain is not permitted without the expressed written consent of BMC.

- [The Concussion Recognition Tool 6 \(CRT6\) \(bmj.com\)](https://www.bmj.com)

What To Do If You Suspect Concussion

- ***Evaluation by medical professional as soon as possible***
 - Can be ER or urgent care
 - Primary care provider
- DO NOT stay at home and not go to school until symptom-free
 - Find out school policy
 - Return to learn education

• KEY POINTS:

- ER/urgent care is not for definitive management!
- Concussion = outpatient diagnosis and management
- Do not go to the urgent care/ER for sports return to play clearance!
- Remember, we are very fortunate in the district to have a district-wide policy that covers all students.



SCAT-6 (Sideline Concussion Assessment Tool)

- Use within 72 hours
- Use up to 5-7 days from injury
- Utility diminishes after 72 hours
- Child SCAT-6 – 8-12 yrs old
- Paper and electronic forms
- Add timed dual gait tasks
- Cognitive changes



Sports Concussion Assessment Tool (SCAT 6)

SCAT6™

Sport Concussion Assessment Tool

For Adolescents (13 years +) & Adults

What is the SCAT6?

The SCAT6 is a standardized tool for evaluating concussion (defined as any trauma to the head that momentarily disturbs the brain's normal function). The SCAT6 assessment consists of 17 items and is intended to be used in the acute phase, ideally within 72 hours (2-4 weeks) and up to 7 days following injury. It is used to help determine if an athlete should be cleared to return to play.

The SCAT6 is used for evaluating athletes aged 13 years and older that sustain sport-related or physical injuries. Please see the Concussion Definition.

If you are not an HCP, please use the Concussion Recognition Tool 6.

Providers should always refer the SCAT6 to a health care provider for interpretation and follow-up. The SCAT6 is provided as a reference. Please refer to the Concussion Recognition Tool 6 for more information. The SCAT6 is not intended to be used as a substitute for medical care.

This tool may be freely copied, in its current form or adapted to meet local needs, provided that the original source is acknowledged. This document is provided as a reference only. It is not intended to be used as a substitute for medical care.

Key Points

- Any athlete with suspected concussion should be removed from play immediately and referred to a medical health care provider.
- No athlete suspected with concussion should return to play on the day of injury.
- If an athlete is suspected of having a concussion and medical attention is not immediately available, the athlete should be referred (or transported if needed) to a medical health care provider.
- Assessing and managing an athlete with a concussion should not be a substitute for medical care. If an athlete is suspected of having a concussion, they should be referred to a medical health care provider.
- Concussion signs and symptoms may occur over time. It is important to monitor the athlete for ongoing, worsening, or new signs and symptoms.
- The diagnosis of concussion is a clinical diagnosis made by an HCP.
- The SCAT6 should NOT be used by itself to make, or assist, in a diagnosis of concussion. It is intended to be used as part of a comprehensive medical evaluation.

Remember

- The SCAT6 should not be used to make a diagnosis of concussion. It is intended to be used as part of a comprehensive medical evaluation.
- Do not attempt to return an athlete with a suspected concussion to play until they have been cleared by a medical health care provider.
- Assessment for a suspected concussion should not be a substitute for medical care. If an athlete is suspected of having a concussion, they should be referred to a medical health care provider.
- Do not return a patient to play until they have been cleared by a medical health care provider.

Completion Guide

For use by Health Care Professionals Only

SCAT6™

Developed by: The Concussion in Sport Group (CISG)

Sponsor:

Child SCAT6™

Sport Concussion Assessment Tool

For Children Ages 8 to 12 Years

What is the SCAT6?

The Child SCAT6 is a standardized tool for evaluating concussion (defined as any trauma to the head that momentarily disturbs the brain's normal function). The Child SCAT6 assessment consists of 17 items and is intended to be used in the acute phase, ideally within 72 hours (2-4 weeks) and up to 7 days following injury. It is used to help determine if a child should be cleared to return to play.

The Child SCAT6 is used for evaluating children aged 8 to 12 years. The SCAT6 is used for evaluating adolescents aged 13 years and older. Please see the Concussion Definition.

If you are not an HCP, please use the Concussion Recognition Tool 6.

Providers should always refer the Child SCAT6 to a health care provider for interpretation and follow-up. The Child SCAT6 is provided as a reference. Please refer to the Concussion Recognition Tool 6 for more information. The Child SCAT6 is not intended to be used as a substitute for medical care.

Key Points

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Sponsor:



When To Worry?

- Prolonged loss of consciousness, especially over 5 minutes
- Other distracting injuries
- Repetitive vomiting
- Worse headache of life
- Unresponsive
- Rapid decline of consciousness
- Difficult to arouse



When to Worry?

When they look like THIS...



Coaches and Parents: Sideline Assessment

- Best practice = having a certified athletic trainer present for sporting activities
- “When In Doubt Sit Them Out”
- Ask sports specific questions
- Learn what signs and symptoms to watch out for
- Error on the side of caution



- **“Brain rest”**
 - What do we do with this now?
 - Rest still has a role but it’s not the WHOLE story
 - May need a period of both physical AND cognitive rest
 - In the first week as a student, get them back to school
 - In school, remember RETURN TO LEARN comes before RETURN TO PLAY



- **“Return to Learn”**

- If athlete/student tells you they are exhausted at the end of the day and feels terrible, find out what academic adjustments they are taking in school.
- You can't “push through” a concussion without paying the price with interval worsening of symptoms.
- Needs formal clearance from physician for return to activity/play.
- DON'T TRY TO MANAGE THIS ON YOUR OWN. GET HELP!
- **All symptoms need to be resolved and then student/athlete starts a graded return to activity/play.**



- **“Rest and exercise”**

- Encouraged to recommend early (24-48 hrs) return to Physical activity (walking, stationary biking), avoid risk of fall/contact
- Reduced screen time in first 48 hours, uncertain beyond that **
- Increase exercise based on symptoms exacerbation
- 2-10 days after SRC can recommend subsymptom threshold exercise treatment, based on HR threshold that does not increase more than MILD symptom exacerbation
- STOP exercise if symptom provocation more than mild & brief; ok to resume once symptom returned to previous level
- Exacerbation of symptoms that are mild is brief (under 1 hr) and doesn't delay recovery
- Sleep disturbance in the 10 days AFTER SRC associated with increased risk of persisting symptoms and needs more evaluation

Return to Learn vs Return to Play



RETURN TO LEARN!

- CU Sports Medicine & Performance Center = medical responsibility to patients



Sports Medicine and Performance Center

UNIVERSITY OF COLORADO | SCHOOL OF MEDICINE

IN PARTNERSHIP WITH BOULDER COMMUNITY HEALTH

- Boulder Valley School District = academic responsibility to students





- Sherrie Ballantine-Talmadge, D.O.
 - Shannon Aberton, ATC
- Christina Petrozella Norman, BS, BSN, RN
 - Sadie Marthaller, BSN, RN
 - Karen Brady, MS, CCC-SLP



- **Boulder**

- Eric McCarty, MD
- Shannon Aberton, ATC

- **Fairview**

- Derek Stokes, MD
- Mario Rivera, ATC

- **Nederland**

- Sherrie Ballantine-Talmadge, DO
- Katie Harris, ATC

- **Centaurus**

- Ortho Sports Medicine Fellows
- Edien Fernandini, ATC

- **Monarch**

- Brad Changstrom, MD
- Alex Esposito, ATC

- **Broomfield**

- Sherrie Ballantine-Talmadge, DO
- Shelby Shadix, ATC



Concussion Symptoms	Academic Adjustments Grouping
Headache, nausea, vision changes	Somatic
Feeling like in a fog, everything slowed down	Cognitive
Emotional lability, more tearful, anxious	Emotional symptoms
Vomiting	Physical signs
“Not themselves”	Behavioral changes
Slowed reaction times, impaired ability to perform simple functions, amnesia	Cognitive impairment
Drowsiness, difficulty falling asleep, fatigue	Sleep disturbance

- **Academic adjustments** – use this word instead of modifications.
- **Differentiation** – tailoring instruction to meet individual needs. Whether teachers differentiate content, process, products, or the learning environment, the use of ongoing assessment and flexible grouping makes this a successful approach to instruction.
- **504 plan** – civil rights law prohibiting discrimination based on disability in any program receiving federal financial assistance; this legislation defines a person with a disability as anyone who has a mental or physical impairment that substantially limits one or more major life activity.
- **IEP (Individualized Education Plan)** – can be referred to as plan or program; map that lays out the program of special education instruction, supports, and services kids need to make progress and thrive in school.
- ****A 504 plan isn't part of special education. It serves a different purpose than an IEP****



BVSD Teacher Feedback Form - Concussion

Student Name: _____ Date: _____

Date of Concussion: _____ Concussion Team Leader: _____

Teachers: To ensure appropriate brain rest and opportunity for recovery, we are asking for feedback on any adjustments or symptoms continuing in your classroom(s). Information should be returned to the Concussion Team Leader.

Your Name and Class Taught	Is the student still receiving any academic adjustments in your class? If so, what?	Have you noticed, or has the student reported, any continuing, new or worsening symptoms lately? <small>(e.g. complaints of headaches, dizziness, difficulty concentrating/remembering, irritability, fatigue)</small>	Do you believe this student is performing at their pre-concussion learning level?
Name: _____ Class: _____	Yes, adjustments include: No	Yes No	Yes No Don't know Date: Signature:
Name: _____ Class: _____	Yes, adjustments include: No	Yes No	Yes No Don't know Date: Signature:
Name: _____ Class: _____	Yes, adjustments include: No	Yes No	Yes No Don't know Date: Signature:
Name: _____ Class: _____	Yes, adjustments include: No	Yes No	Yes No Don't know Date: Signature:

This material is adapted from the Center for Concussion, Rocky Mountain Hospital for Children, RFA? (2014)

This form is to be completed initially 3 weeks post-concussion and will be used to assess the need for a formal 504 if symptoms are still present at that time.

[Concussion/ Head Injuries - Boulder Valley School District \(bvdsd.org\)](https://www.bvdsd.org/Concussion-Head-Injuries)



Academic Options

- Nurses office for break
- Sunglasses/hat in school
- Decreased bright screens
- Decrease busy areas (lunchroom and hallways)
- Short burst of activity in 20-30 minutes
- Use symptoms to help figure out best academic adjustments
- Use other forms of learning like auditory
- Remind students how important sleep is
 - Encourage normal sleep patterns, no napping
- Consider pass/fail
- Decrease overall workload
- Prorating work
- No more than one test per day
- Take test in quiet place
- No standardized testing
- Oral testing
- Exemption from pop quizzes or the tests
- Crucial assessment for overall grade
- IEP or 504 plan

Remaining Concussion Symptoms	Academic Adjustments and Treatment: 504
Headache, vision changes	PT or more focused vision therapy
Exacerbated pre-existing mood disorders	Medication changes/additions
Exacerbated pre-existing learning disabilities, i.e., dyslexia	Speech pathology/cognitive therapy
Concussion unleashed a formal NEW learning disability, psychiatric disease	Neuropsychology evaluation
Additional MSK issue that needs to be treated	Further sports med evaluation: X-rays, MRIs, injections
Exacerbated underlying sleep disorder	Cognitive impairment - Sleep medicine consult

Concussion: It's All About the Team Boulder Community Health

• Academic

- Student
- Family
- Teacher
- Coach
- Principal/Vice-Principal
- Guidance Counselor
- School nurse/school para
- Athletic Trainer (in the school)
- School Psychologist
- School Speech Pathologist
- Athletic Secretary

• Medical

- Student
- Family
- Athletic Trainer (in clinic and at school)
- Lead Health Care Provider
- Physical therapist
 - MSK, vestibular, oculomotor, cognitive
- Occupational therapist
 - Trauma therapy, vision therapy
- Optometry
 - Neuro-Optometry
- Speech pathology/ Cognitive therapy
- Massage therapy
- Psychologist
- Neuropsychologist



Game Changers: Concussion Modifiers

- **Symptoms Number**
 - Duration (10 days)
- **Severity**
 - Signs Prolonged loss of consciousness, amnesia
- **Sequelae**
 - Concussive convulsions
- **Temporal Frequency**
 - Repeated concussions over time
- **Timing**
 - Injuries close together in time
- **“Recency”**
 - Recent concussion or traumatic brain injury
- **Threshold**
 - Repeated concussions occurring with progressively less impact force or slower recovery after each successive concussion
- **Age**
 - Child and adolescent (<18 years old)
- **Co- and pre-morbidities**
 - Migraine, depression or other mental health disorders, attention deficit hyperactivity disorder, learning disabilities, sleep disorders
- **Medication**
 - Psychoactive drugs, anticoagulants
- **Behavior**
 - Dangerous style of play
- **Sport High risk activity**
 - Contact and collision sport, high sporting level

- Athletes may not recognize previous concussions
- Missed previous concussions
- Helpful to get previous concussion history
- Coaches/teammates may or may not be able to give accurate histories
- Previous head, neck, face injuries
- Typically, athletes under-report symptoms
- Fear of removal from game/sport





CONCUSSION **RETURN TO PLAY**

YOU **MAY NOT RETURN TO
ACTIVITY WITHOUT PROPER
MEDICAL CLEARANCE !**

- Can start steps in the first 24 hours
- Each step still takes 24 hours
- After Step 3 must have HCP clearance and proper monitoring
- Manage on individual basis
- Unrestricted return to sport usually occurs in ~19.8 days

- <https://bjsm.bmj.com/content/bjsports/57/11/695.full.pdf>
- [BVSD Return to School Sport Form Rev 12.2023 FINAL .pdf - Google Drive](#)

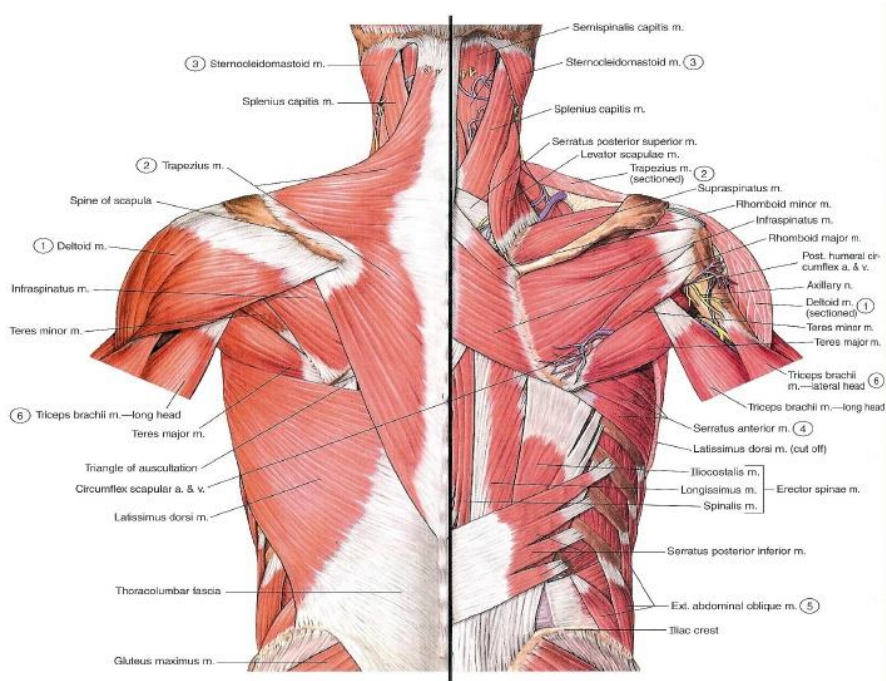
- **Persisting symptoms** used for symptoms that persistent > 4 weeks
 - Children, adolescents & adults
 - May be because of pre-existing issues, concussion-related symptoms or both



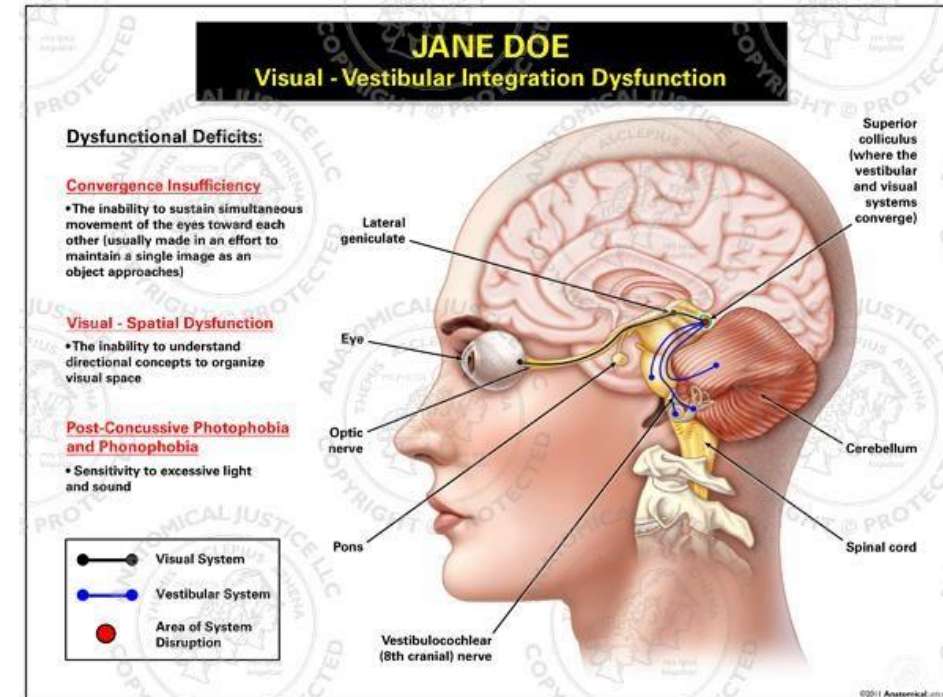
- Dizziness, neck pain &/or headache persist for more than 10 days, recommend rehab
- Symptoms beyond 4 weeks in children & adolescents, recommend rehab
- Watch for symptoms with Return to Learn as well

ACTIVE MANAGEMENT: Role of Physical Therapy in Concussion Management

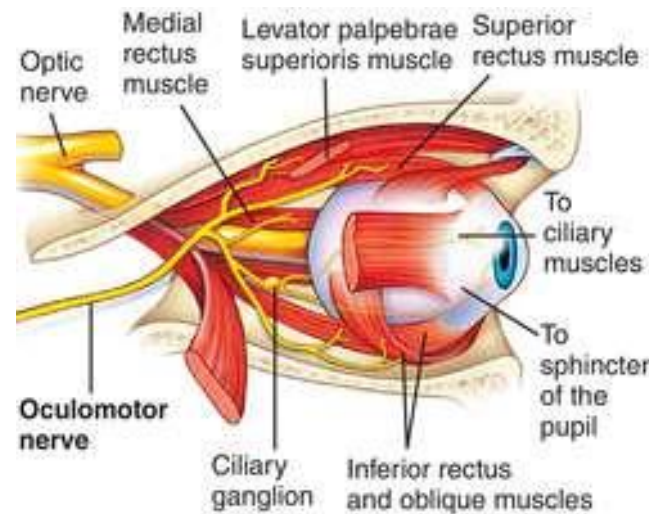
Muscular system



Vestibular system



Oculomotor system



Concussion Physical Therapy: Exertional Therapy

Exertion/return to play

Exertion testing:

- Cardio
- Functional
- Sport specialize

Exertion therapy:

- Follow graduated return to play guidelines
- Gradual increase in difficulty
- Takes into account sport/activity goals and vestibular/balance needs





- Characterized by continuation late concussive symptoms for extended period
- More and more relationships with pre-existing psych diagnoses
- May engage more testing
 - MRI, CT, Neuropsych testing
- Treatment
 - Physical therapy
 - Speech therapy
 - Medications
 - Psychotherapy
 - Massage therapy
 - Academic accommodations, i.e., 504

Post-Concussive Syndrome

- You do NOT leave the ER/urgent care with post-concussive syndrome
- You leave with a CONCUSSION!
- Remember MOST concussions will resolve without complication or treatment on their own

Second Impact Syndrome

- Rapid brain swelling & herniation after second head injury while still recovering
- Can be mild and athlete seems dazed
- Progress to collapse, rapidly dilating pupils, coma & respiratory failure in *minutes!*
- May be over-reported, but this is why the laws for concussion exist in each state
- **NO SYMPTOMATIC ATHLETE CAN RETURN TO PLAY!**



Where Do We Go From Here?




- **Consider:**

- Para athletes
- Peds
- The athlete's voice
- Ethical considerations, limitations & improvements
- Equity, diversity & inclusion
- Stakeholder voices
- Observer input
- Sustainability of consensus process
- Potential conflicts of interest and transparency
- Timing of consensus meeting and expert panel consensus meeting

What Have We Learned:

- Kids graduate and teachers change jobs
- Kids and teachers **MUST** talk
- Bridging between school nurses, the health room paras, and school athletic trainers is **ESSENTIAL**
- Coaches need education as well
- Speaking the same language is critical
- Concussion doesn't matter until it matters!
- Once you have seen one concussion, you have seen one concussion
- Concussion programs work





It's kind of fun to
do the impossible.

- *Walt Disney*



SMPC

Special Appreciation

- We could never have been so successful without all these people and more!
 - Students and their families
 - BIRT
 - Stephanie Faren
 - Cristina Norman
 - Harry Waterman
 - Shannon Aberton
 - Ann McNamara
 - All the BVSD ATCs in the schools and ATCs in the clinic
 - CUSM & PC Concussion PT Team
 - All the Boulder concussion collaborating health care providers
 - Joan DePuy
 - Allison Stamm
 - CUSM & PC Front Desk team



Questions? Concerns? Comments?

