

It's Enough to Make You Dizzy! Concussion Update 2017

Rachel A. Coel, MD, PhD, FAAP, CAQSM
Medical Director

Acknowledgments: Tracy Zaslow, MD; Greg Canty, MD; Mark Halstead, MD

Disclosures

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Objectives



The “Game Plan”

1. Review presentation of concussion
2. Update on management of concussion
3. Review return-to-play guidelines
4. Discuss injury prevention strategies and equipment
5. My plug for “EARLIER...”

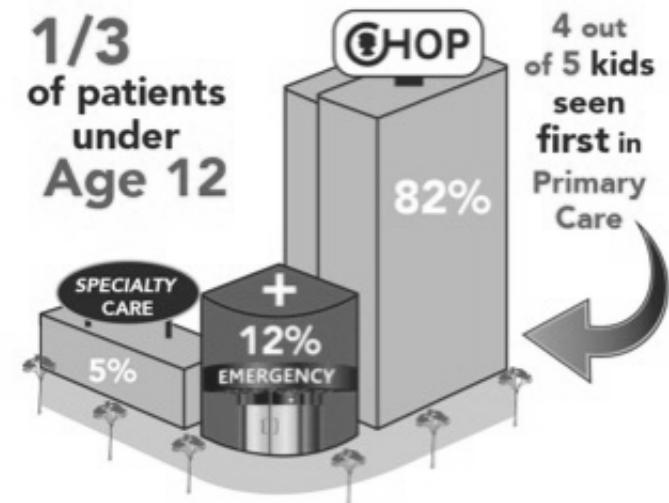


What's this gotta do with me???

Point of Entry (2016)

- Primary care (> 3/4 of concussion patients start here)
- Emergency Department
- Sports Medicine
- Neurology
- Physical Medicine & Rehabilitation
- Neurosurgery

Reality at a Large Diverse Health System*



Primary care clinicians need up-to-date concussion training and diagnostic tools

U.S. needs to reconsider how it estimates number of pediatric concussions

www.chop.edu/concussion

Original Investigation

Point of Health Care Entry for Youth With Concussion Within a Large Pediatric Care Network

Kristy B. Arbogast, PhD; Allison E. Curry, PhD; Melissa R. Pfeiffer, MPH; Mark R. Zonfrillo, MD, MSCE; Juliet Haarbauer-Krupa, PhD; Matthew J. Breiding, PhD; Victor G. Coronado, MD, MPH; Christina L. Master, MD

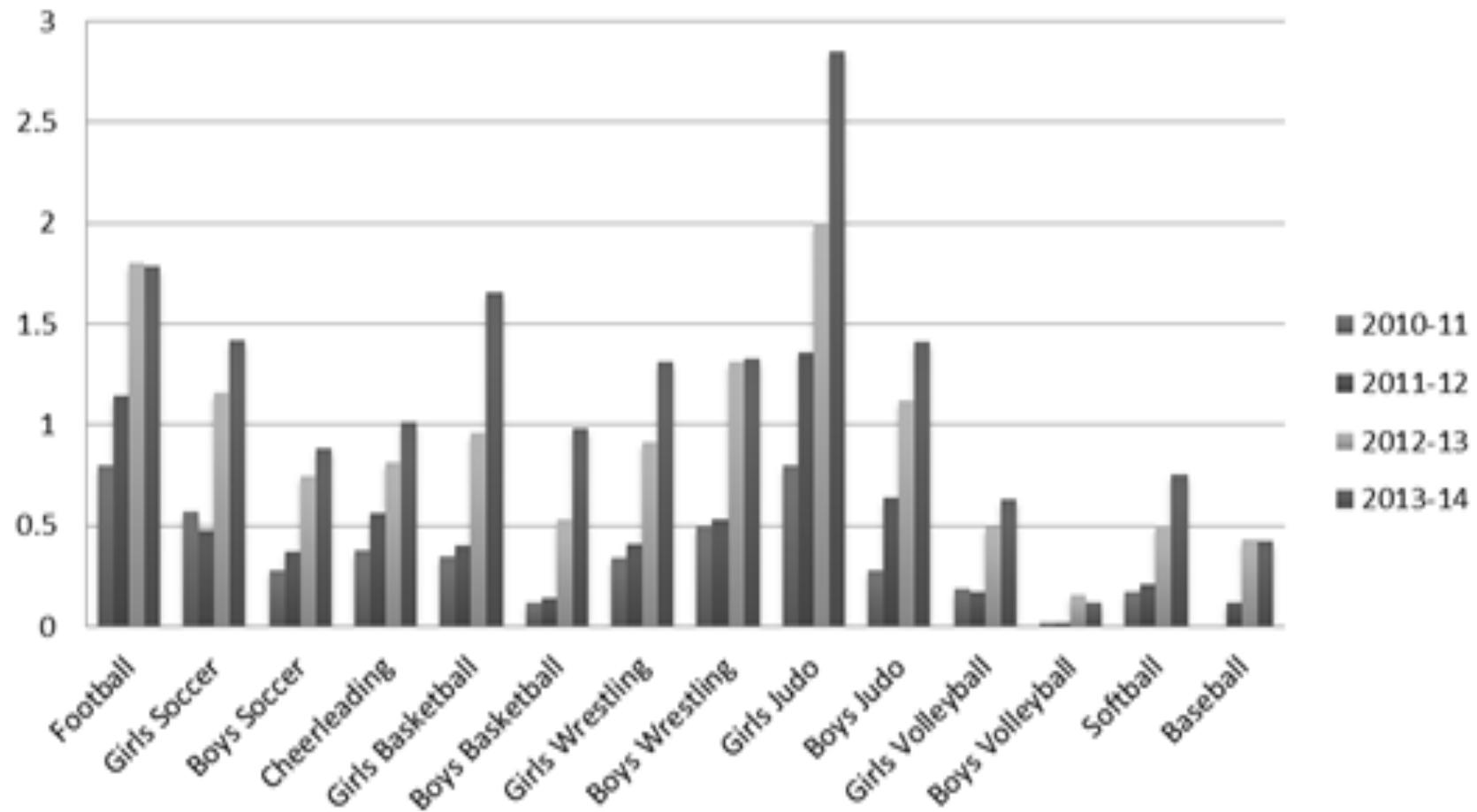
*Researchers from The Children's Hospital of Philadelphia (CHOP) and the Centers for Disease Control and Prevention looked at data from 2010–2014 on 8,000 0-to-17-year-old patients enrolled with a CHOP primary care provider and diagnosed with a concussion.
Arbogast KB et al, JAMA Pediatrics, May 2016.

ImPACT baseline testing for 67 schools participating state-wide including private schools

School Year	# of Baselines	# of Concussions
2010-11	4683	446
2011-12	10,113	895
2012-13	10,496	1140
2013-14	10012	1370
2014-15	9451	1052
2015-16	9066	1092

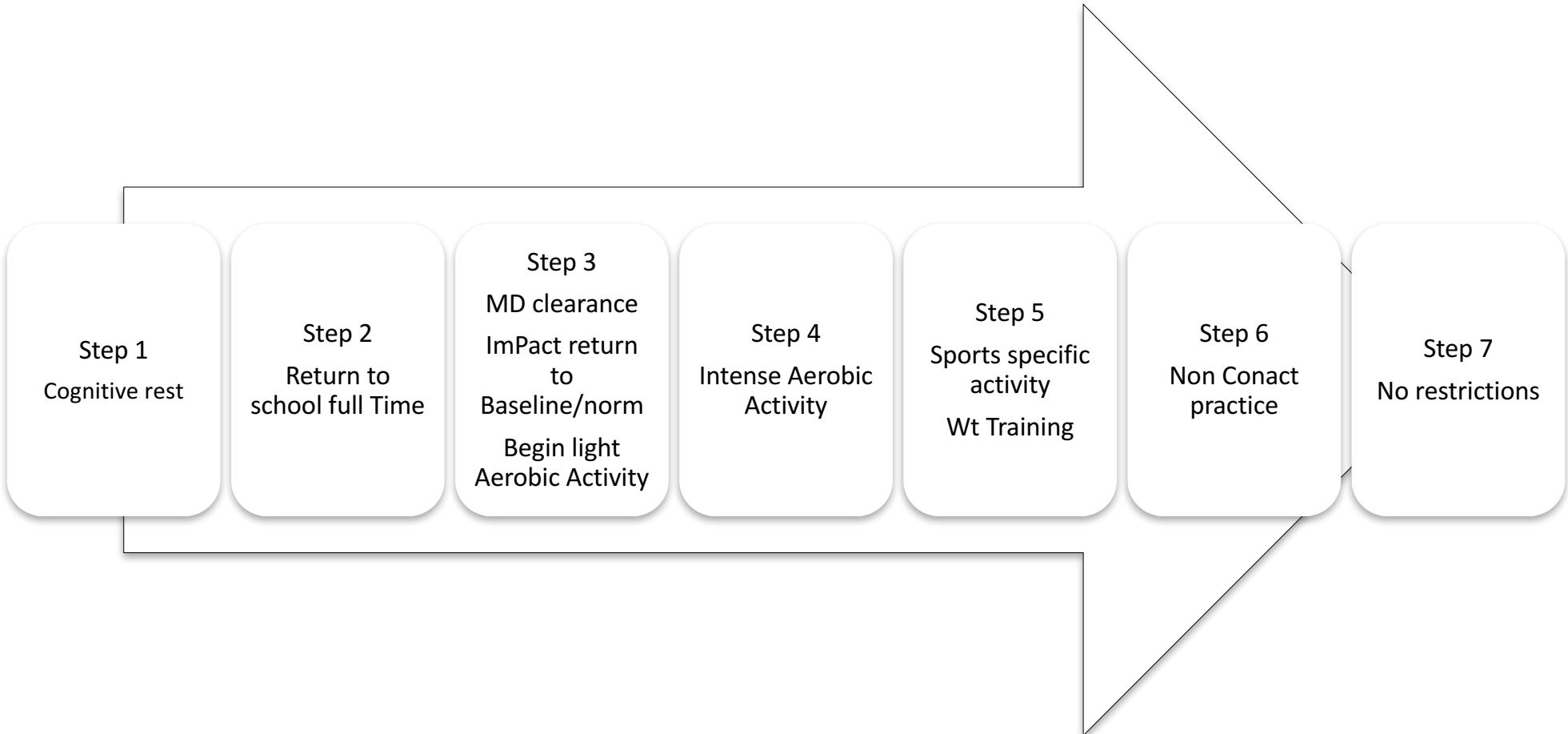
Concussion Injury Rate per 1000 exposures

Concussion Injury Rate per 1000 exposures for 14 Sports during School Years 2010-2014



Gradual Return to Play Protocol

Milestones of Concussion Recovery



so, what's the
problem?

Average Number of Sport Days Missed

Hawaii Concussion Awareness & Management Program (HCAMP)
Report from August 1, 2011 to July 31, 2016
Number of Days Missed

Days Missed	MEAN	SD
August 1, 2015 – July 31, 2016 (n=1092)	21.68	19.08
August 1, 2014 – July 31, 2015 (n=1052)	31.68	21.68
August 1, 2013 – July 31, 2014 (n=1370)	26.15	25.17
August 1, 2012 - July 31, 2013(n=1140)	26.2	18.98
August 1, 2011 - July 31, 2012 (n=845)	23.5	16.5

Relationship Between Time in Each Step

School Year	2010-2012	2013-2014
Onset to Step 1	1.1	1.1
Step 1 to Step 2	3.0	3.0
Step 2 to Step 3 (school/cardio)	9.9	13.7
Step 3 to Step 4	2.0	2.3
Step 4 to Step 5	2.1	2.2
Step 5 to Step 6	2.6	2.8
Step 6 to Step 7	2.7	2.1

How do we get them moving sooner?

What concerns young athletes about concussions?

CJSM study (Stein) of 121 pediatric athlete patients

Worst thing about concussion:

- Symptoms – 58%
- Loss of activity – 56.2%
- Both symptoms and loss of activity – 14%

TABLE 2. Examples of Patients' Free-Text Responses to the Question, "What Is the Worst Thing for You About Having a Concussion?"

"Headache, fogginess"

"Miserable, falling behind in school work, bored, no fun"

"Having to be on brain rest—it is very boring"

"Cannot do anything and cannot drive"

"The worst thing for me is that if I get another one I could potentially not be allowed to play contact sports"

"I cannot watch television, use my phone, or play sports"

"Headaches, bright lights, not being able to concentrate, trouble reading"

"The headaches, not being able to do all of my school work like normal and not being able to play sports"

"Depression issues, low energy, insomnia, not being able to keep up in school"

"Not being able to go to gymnastics or soccer and not being able to be with friends"

"Feeling tired all the time"

"I can't play a sport until I am cleared by a doctor. Which can take forever"

"Not being able to do anything"

"I get really dizzy a lot"

"Headaches, not being able to remember things"

"Feeling like I can think/process something but not being able to do it, painful consistent headaches, and not being able to play soccer"

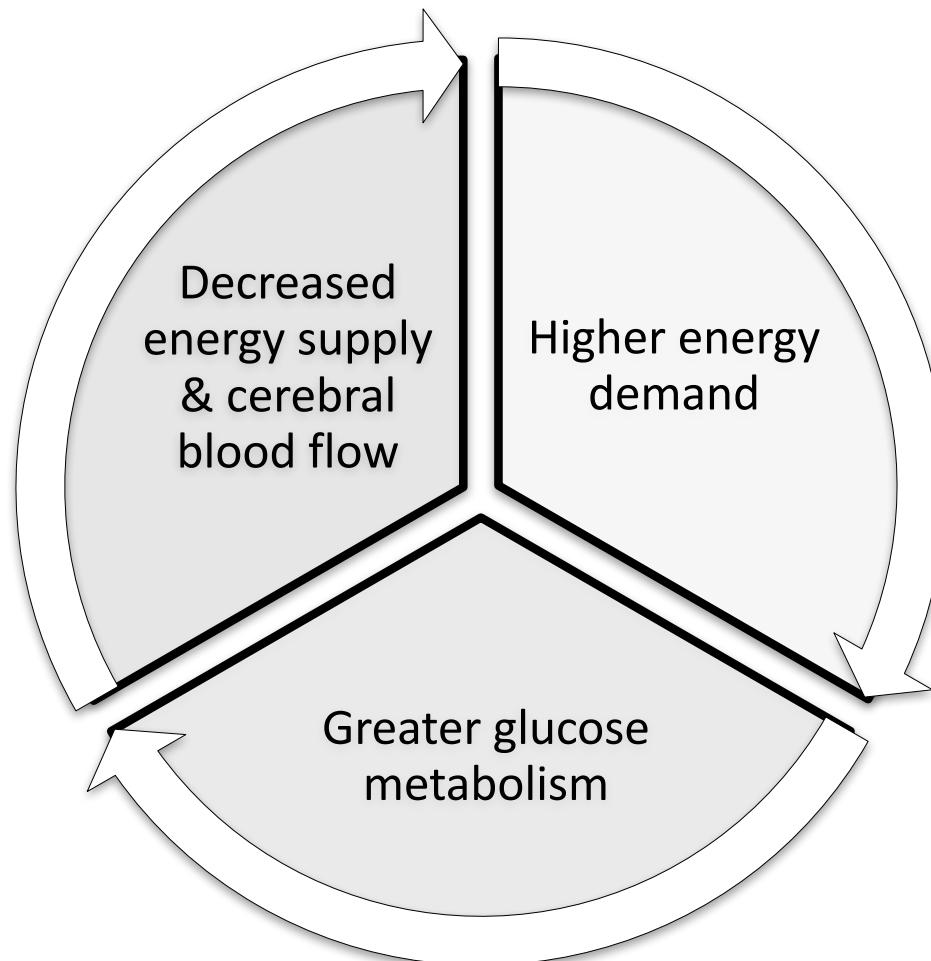
"I am not allowed to do the things I love"

What happens in a concussion?

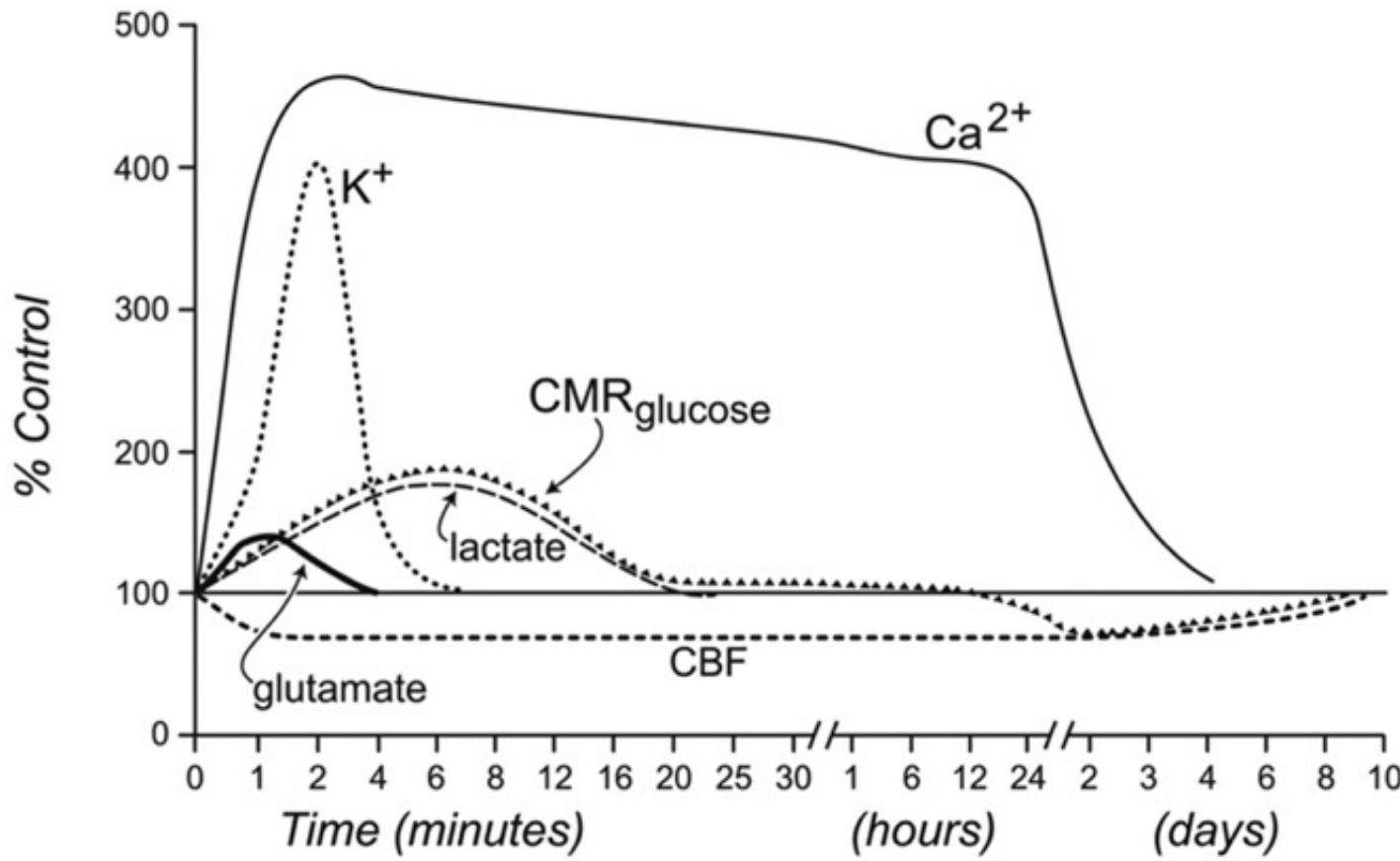


Metabolic Mismatch

BRAIN = ENERGY CRISIS



Timeline for Cellular Correction



7 – 10 DAYS

Giza CC, Hovda DA. Ionic and metabolic consequences of concussion. In: Cantu RC, Cantu RI. *Neurologic Athletic and Spine Injuries*. St Louis, MO: WB Saunders Co; 2000:80–100.

**Family
History?**

**Pre-
morbid
History?**

Stress?

Age?

**Doing
Too
Much?**

???

**Poor
Sleep/Nutrition?**

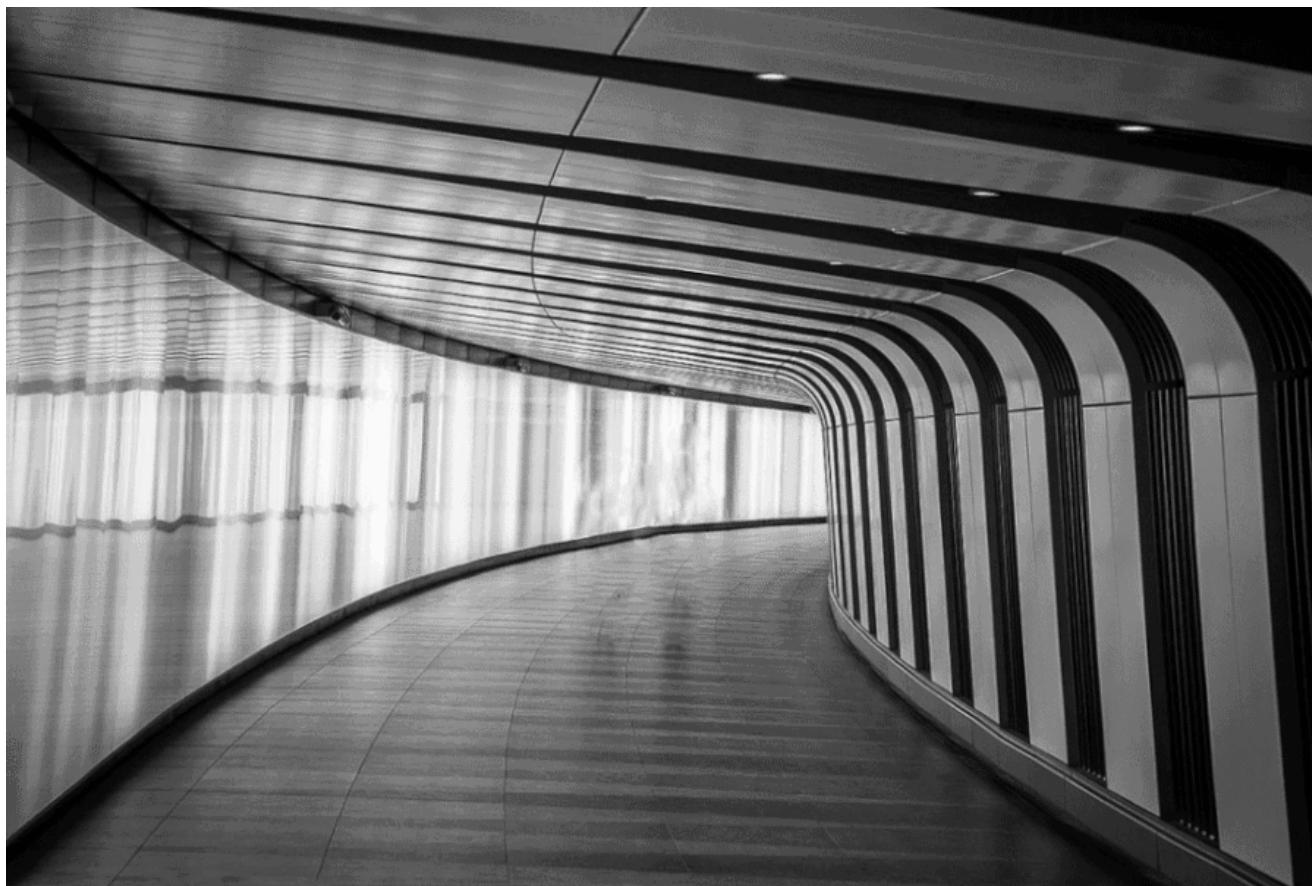
**Mechanism
of Injury?**

**Second
Injury?**

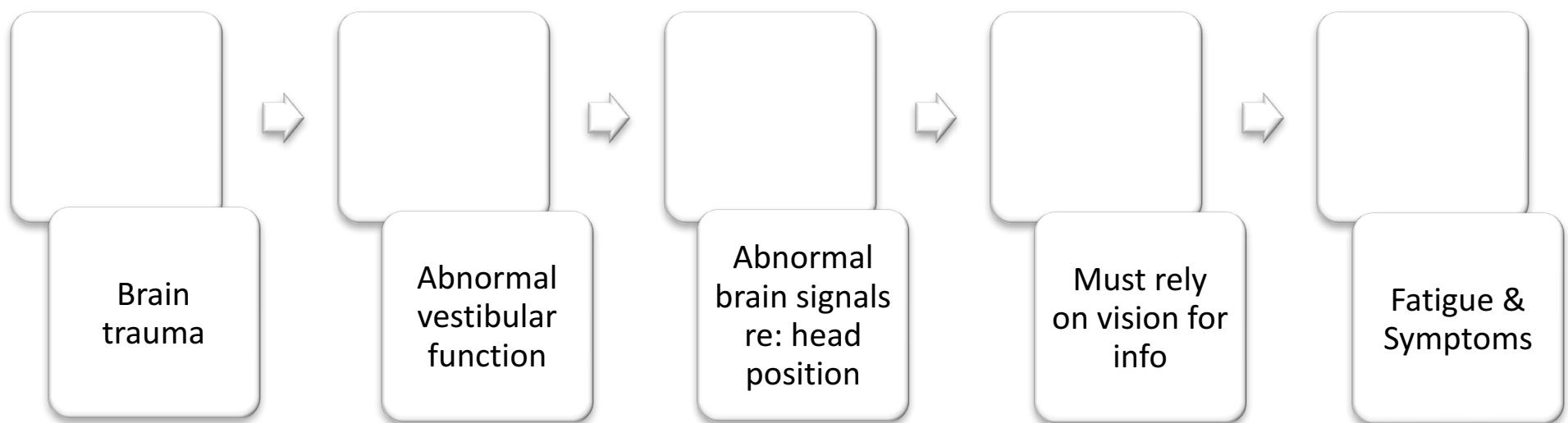
Genetics?

**Doing
Too
Little?**

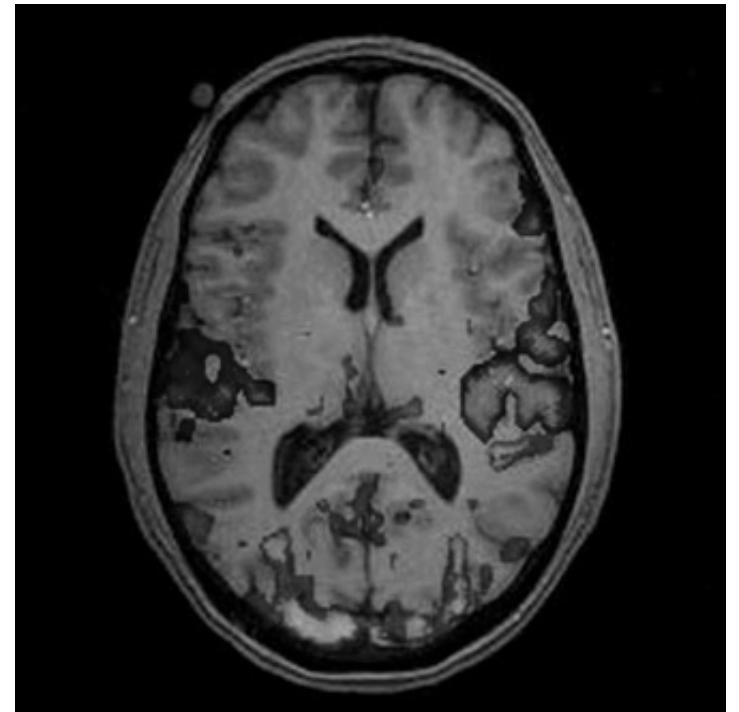
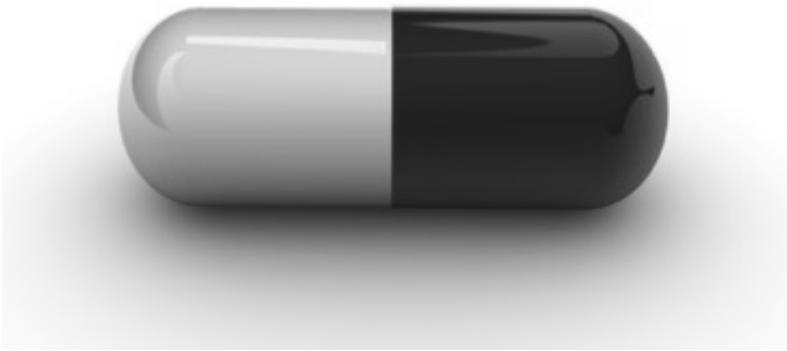
This is vestibular dysfunction!



Concussion & the Vestibular System



What do I dream about?



Where are we currently?

- History & Symptom Checklists
- Physical Exam
- Balance Testing
- Imaging
- Computerized neurocognitive testing
- Neuropsychological testing
- Physical therapy
- Vision therapy
- Medication
- Coping



Child SCAT3

- 5-12 year-olds
- Age-appropriate symptom checklist and questions
- Questions for parents
- Designed to be used by medical professionals







Sport Concussion Assessment Tool for children ages 5 to 12 years
For use by medical professionals only

What is childSCAT3?¹

The ChildSCAT3 is a standardized tool for evaluating injured children for concussion and can be used in children aged from 5 to 12 years. It supersedes the original SCAT and the SCAT2 published in 2005 and 2009, respectively². For older persons, ages 13 years and over, please use the SCAT3. The ChildSCAT3 is designed for use by medical professionals. If you are not qualified, please use the Sport Concussion Recognition Tool³. Preseason baseline testing with the ChildSCAT3 can be helpful for interpreting post-injury test scores.

Specific instructions for use of the ChildSCAT3 are provided on page 3. If you are not familiar with the ChildSCAT3, please read through these instructions carefully. This tool may be freely copied in its current form for distribution to individuals, teams, groups and organizations. Any revision and any reproduction in a digital form require approval by the Concussion in Sport Group.

NOTE: The diagnosis of a concussion is a clinical judgment, ideally made by a medical professional. The ChildSCAT3 should not be used solely to make, or exclude, the diagnosis of concussion in the absence of clinical judgement. An athlete may have a concussion even if their ChildSCAT3 is "normal".

What is a concussion?
A concussion is a disturbance in brain function caused by a direct or indirect force to the head. It results in a variety of non-specific signs and/or symptoms (like those listed below) and most often does not involve loss of consciousness. Concussion should be suspected in the presence of any one or more of the following:
 -Symptoms (e.g., headache), or
 -Physical signs (e.g., unsteadiness), or
 -Impaired brain function (e.g., confusion) or
 -Abnormal behaviour (e.g., change in personality).

SIDELINE ASSESSMENT
Indications for Emergency Management
NOTE: A hit to the head can sometimes be associated with a more severe brain injury. If the concussed child displays any of the following, then do not proceed with the ChildSCAT3; instead activate emergency procedures and urgent transportation to the nearest hospital:
 - Glasgow Coma score less than 15
 - Deteriorating mental status
 - Potential spinal injury
 - Progressive, worsening symptoms or new neurologic signs
 - Persistent vomiting
 - Evidence of skull fracture
 - Post traumatic seizures
 - Coagulopathy
 - History of Neurosurgery (eg Shunt)
 - Multiple injuries

1 Glasgow coma scale (GCS)

	1
No eye opening	1
Eye opening in response to pain	2
Eye opening to speech	3
Eyes opening spontaneously	4
Best verbal response (V)	
No verbal response	1
Incomprehensible sounds	2
Inappropriate words	3
Confused	4
Oriented	5
Best motor response (M)	
No motor response	1
Extension to pain	2
Abnormal flexion to pain	3
Flexion/Withdrawal to pain	4
Localizes to pain	5
Obey commands	6
Glasgow Coma score (E + V + M)	of 15

GCS should be recorded for all athletes in case of subsequent deterioration.

Potential signs of concussion?
If any of the following signs are observed after a direct or indirect blow to the head, the child should stop participation, be evaluated by a medical professional and **should not be permitted to return to sport the same day** if a concussion is suspected.

"If so, how long?" _____

Balance or motor incoordination (stumbles, slow/laboured movements, etc.)? Y N

Disorientation or confusion (inability to respond appropriately to questions)? Y N

Loss of memory: _____

"If so, how long?" _____

"Before or after the injury?" _____

Blank or vacant look: Y N

Visible facial injury in combination with any of the above: Y N

2 Sideline Assessment – child-Maddocks Score³
"I am going to ask you a few questions, please listen carefully and give your best effort." Modified Maddocks questions (1 point for each correct answer)

Where are we at now?	0	1
Is it before or after lunch?	0	1
What did you have last lesson/class?	0	1
What is your teacher's name?	0	1
child-Maddocks score	of 4	

Child-Maddocks score is for sideline diagnosis of concussion only and is not used for serial testing.

Any child with a suspected concussion should be REMOVED FROM PLAY, medically assessed and monitored for deterioration (i.e., should not be left alone). No child diagnosed with concussion should be returned to sports participation on the day of Injury.

BACKGROUND

Name: _____	Date/Time of Injury: _____
Examiner: _____	Date of Assessment: _____
Sport/team/school: _____	
Age: _____	Gender: <input checked="" type="checkbox"/> M <input type="checkbox"/> F
Current school year/grade: _____	
Dominant hand: <input checked="" type="checkbox"/> right <input type="checkbox"/> left <input type="checkbox"/> neither	
Mechanism of Injury ("tell me what happened?"): _____	

For Parent/carer to complete:

How many concussions has the child had in the past? _____

When was the most recent concussion? _____

How long was the recovery from the most recent concussion? _____

Has the child ever been hospitalized or had medical imaging done (CT or MRI) for a head injury? Y N

Has the child ever been diagnosed with headaches or migraines? Y N

Does the child have a learning disability, dyslexia, ADD/ADHD, seizure disorder? Y N

Has the child ever been diagnosed with depression, anxiety or other psychiatric disorder? Y N

Has anyone in the family ever been diagnosed with any of these problems? Y N

Is the child on any medications? If yes, please list: _____

CHILD-SCAT3 SPORT CONCUSSION ASSESSMENT TOOL 3 | PAGE 1

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Computerized Neurocognitive Testing (ie. ImPACT)

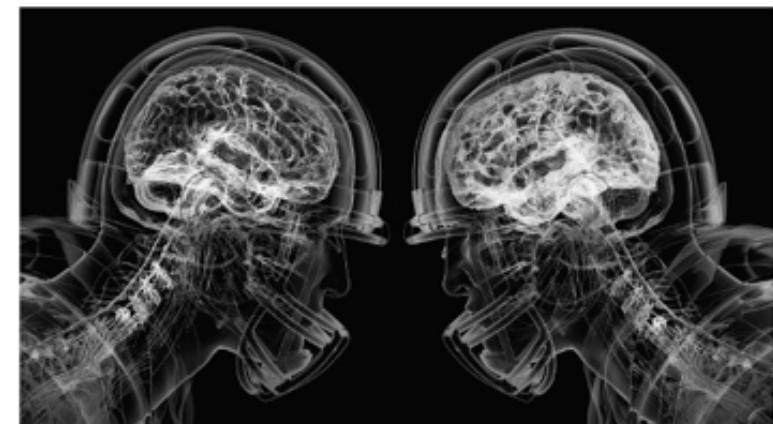
- First used in 1982
- Attempts to measure attention, memory, problem solving, and reaction time
- Baseline? Who? How often?
False sense of security?
Validity?
- Not formally recommended
- Comprehensive plan required
- Neuropsychologist evaluation is preferable

Concussion test may not be panacea

ImPACT sells tests and training to thousands, but some question program's validity

By Peter Keating | ESPN The Magazine

Updated: August 26, 2012, 11:21 AM ET



Bryan Christie Design; reference imagery: Purdue Neurotrauma Group / Purdue University



Treatment Options

- Physical Rest
- Cognitive Rest
- Vestibular therapy
- Cervical physical therapy
- Speech pathology
- Vision therapy
- Medication
- Exercise
- Coping / Psychology / Cognitive Behavioral Therapy
- Reassurance & Time



My Current Approach...

- Close observation first 24-72 hrs!
- Limited medications (no defined role)
- Emphasize nutrition/stress/sleep hygiene
- Some cognitive and physical rest: decrease electronics, music, physical activity, and cognitive stress
- Return to school within 48-72 hours
- Return to symptom-limited light exercise within 3-5 days
- Exertional stress testing to determine tolerance
- Review expectations and return-to-play guidelines!
- Must return to school fully prior to returning to sports!

Vestibular Therapy & Buffalo Stress Test



Concussion Home Exercise – Saccades Exercises (Vertical)
In this CHOC video, learn how to perform home exercises to deal with symptoms of concussion such as problems with vision, balance and dizziness.



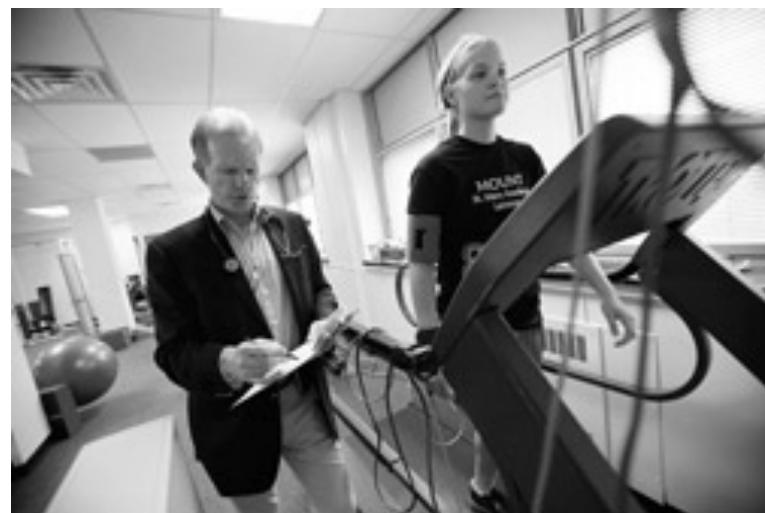
Concussion Home Exercise – Saccades Exercises (Horizontal)
In this CHOC video, learn how to perform home exercises to deal with symptoms of concussion such as problems with vision, balance and dizziness.



Concussion Home Exercise – Two Thumb Exercise
In this CHOC video, learn how to perform home exercises to deal with symptoms of concussion such as problems with vision, balance and dizziness.



Concussion Home Exercise – Advanced Ball Exercise
In this CHOC video, learn how to perform home exercises to deal with symptoms of concussion such as problems with vision, balance and dizziness.



From Children's Hospital of Orange County website

What happened to...

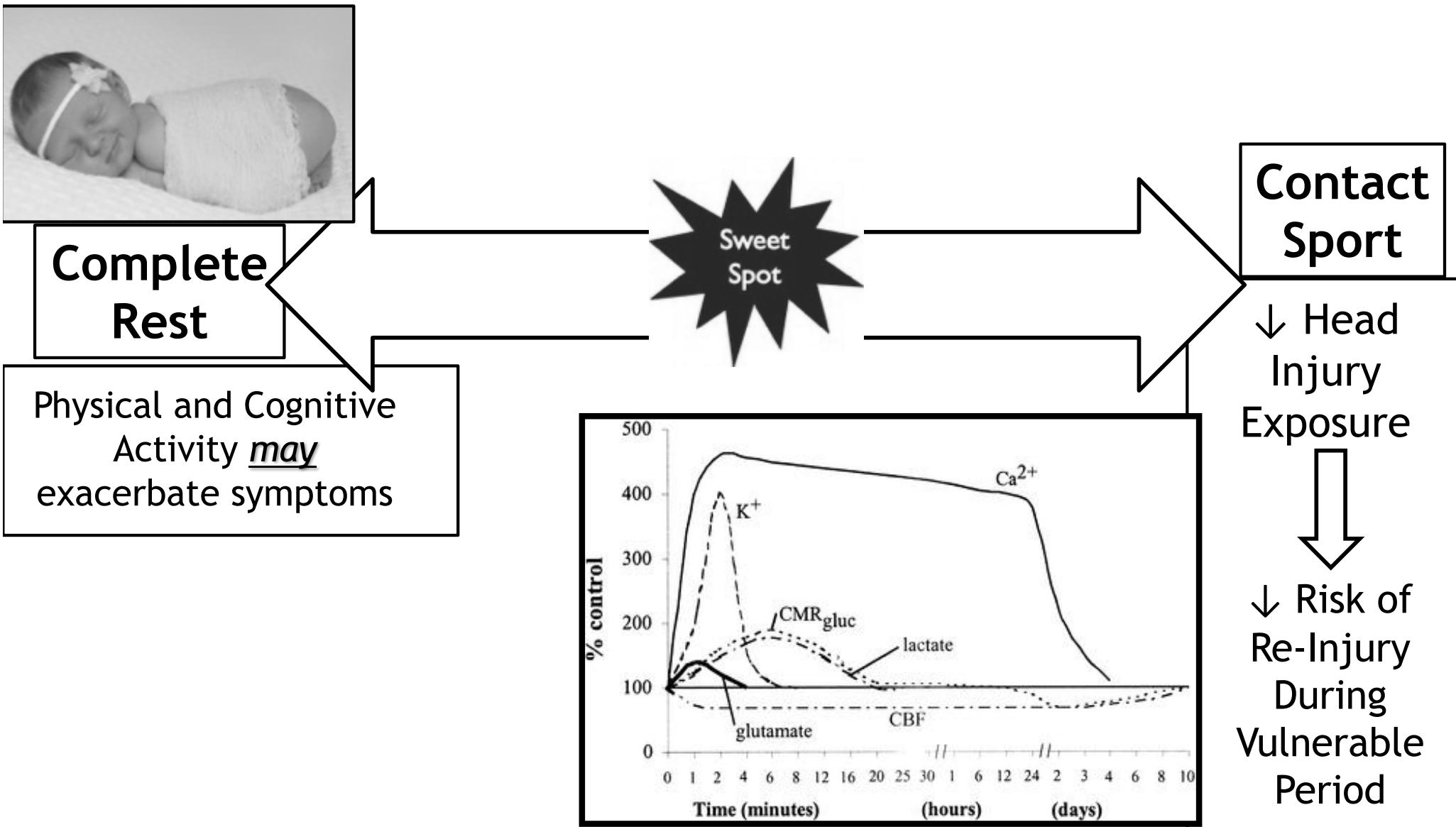


Concussion Management



Physical and cognitive rest
****until symptoms resolve****

To Rest or Not to Rest?



Is Too Much Rest Bad?

BAD? Back Pain → Brain Injury

Malmivaara A, Hakkinen U, Aro T, et al. The treatment of acute low back pain: bed rest, exercises, or ordinary activity? *N Engl J Med.* 1995;332(6):351-355; Deyo RA, Diehl AK, Rosenthal M. How many days of bed rest for acute low back pain? A randomized clinical trial. *N Engl J Med.* 1986;315(17):1064-1070; Relander M, Troupp H, Af Bjorkesten G. Controlled trial of treatment for cerebral concussion. *Br Med J.* 1972;4(5843):777-779.



HARM?

- Hypervigilance on symptoms
- Preoccupation w/restrictions
- Support of negative expectations
- Social isolation
- Anxiety/Depression
- Removal from normal routines

[Cacioppo JT, Hawkley LC, Norman GJ, Berntson GG. Social isolation. *Ann N Y Acad Sci.* 2011;1231:17-22; Colloca L, Finniss D. Nocebo effects, patient-clinician communication, and therapeutic outcomes. *JAMA.* 2012;307(6):567-568; Ponsford JL, Zino C, Parcell DL, et al. Fatigue and sleep disturbance following traumatic brain injury: their nature, causes, and potential treatments. *J Head Trauma Rehabil.* 2012;27(3):224-233]

Cocoon vs. Light Activity

- Prolonged rest and inactivity do not speed recovery time.
 - *Kids who returned to light activity (rest only 1-2 days) felt better faster than kids who underwent prolonged rest (5 days of strict rest).*
 - *Kids who rested longer had more severe symptoms and had longer lasting symptoms than the active kids.*

Hammeke et al. (2015) Benefits of Strict Rest After Acute Concussion: A Randomized Controlled Trial. *Pediatrics*. Vol 135, No 2.

Early Non-Contact Physical Activity

Safe

Effective

Better than
rest alone

May
shorten
symptom
duration

Collins MW, Statements of Agreement From the Targeted Evaluation and Active Management (TEAM) Approaches to Treating Concussion Meeting Held in Pittsburgh, October 15-16, 2015. Neurosurgery. 2016 Oct 12]

Leddy JJ, Kozlowski K, Donnelly JP, Pendergast DR, Epstein LH, Willer B. A preliminary study of subsymptom threshold exercise training for refractory postconcussion syndrome. Clin J Sport Med. 2010;20(1):21-27.

Gagnon I, Grilli L, Friedman D, Iverson G. A pilot study of active rehabilitation for adolescents who are slow to recover from sport-related concussion. Scand J Med Sci Sports. 2016;26(3):299-306.

Leddy JJ, Sandhu H, Sodhi V, Baker JG, Willer B. Rehabilitation of concussion and post-concussion syndrome. Sports Health. 2012;4(2):147-154.

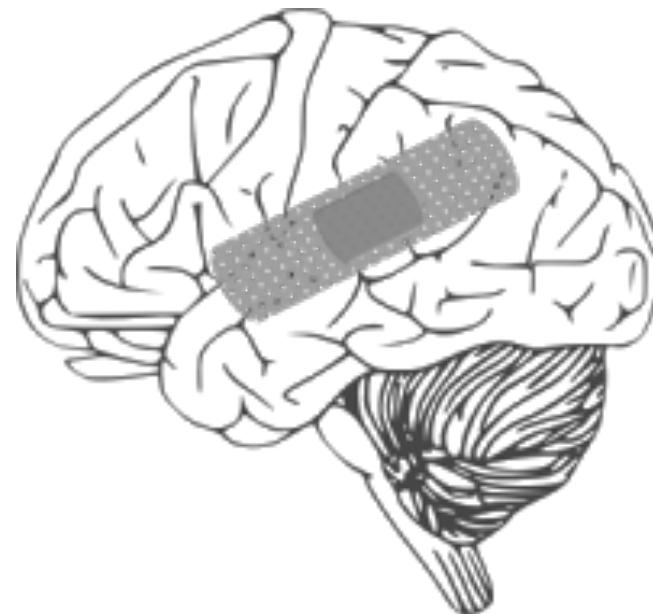
Silverberg ND, Iverson GL. Is rest after concussion “the best medicine?”: recommendations for activity resumption following concussion in athletes, civilians, and military service members. J Head Trauma Rehabil. 2013;28(4): 250-259.

Zafonte R. Diagnosis and management of sports-related concussion: a 15-year-old athlete with a concussion. JAMA. 2011;306(1):79-86.

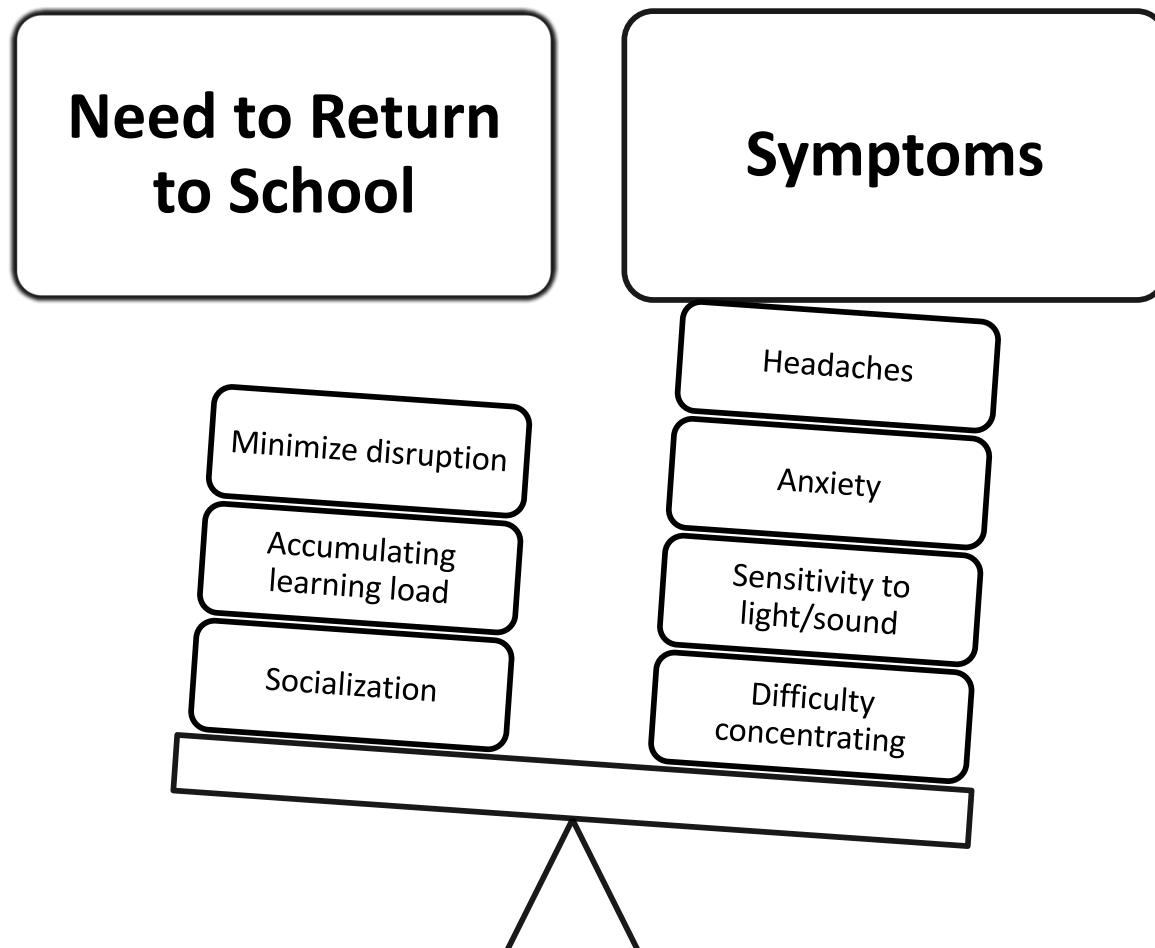
Normal Time to Recovery

Children/Adolescents: 3 - 4 Weeks

Adults: 10 - 14 days



The Challenge



Halstead, et al. Returning to Learn Following a Concussion.
Pediatrics, Nov 2013, 132 (5) 948-957



HEADACHES

Limit over-stimulation

Frequent
breaks

Identify Aggravating Factors
* Smart boards, screens, etc. *

↓ Stressors



Halstead, et al. Returning to Learn Following a Concussion. *Pediatrics*, Nov 2013, 132 (5) 948-957



DIZZINESS

Limit over-stimulation

Avoid rapid transitions



Avoid crowded hallways

Allow to put head down in class

Vestibular HEP



VISUAL SYMPTOMS

Light sensitivity, double vision, blurry vision

Hat/Sunglasses

↓ **Screen
Exposure &
Brightness**

**Double vision:
Cover one eye**

**Use
audiobooks**

**Turn off
fluorescent
lights**



Halstead, et al. Returning to Learn Following a Concussion. *Pediatrics*, Nov 2013, 132 (5) 948-957



NOISE SENSITIVITY

Ear plugs

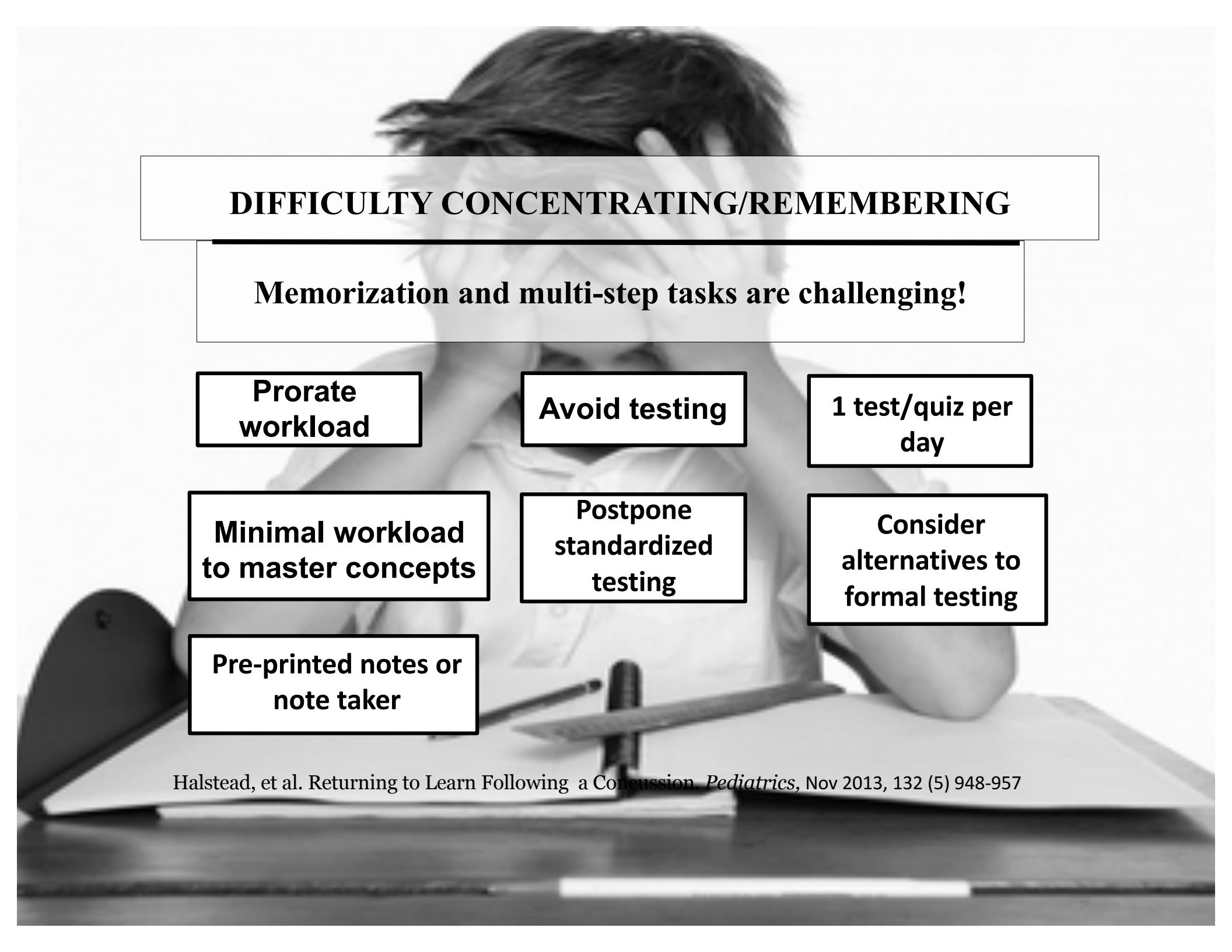
Limit/Avoid
Band, Choir,
Shop Classes

Lunch in quiet
area

Avoid noisy
gyms,
practices &
games

Avoid
crowded
hallways





DIFFICULTY CONCENTRATING/REMEMBERING

Memorization and multi-step tasks are challenging!

**Prorate
workload**

Avoid testing

**1 test/quiz per
day**

**Minimal workload
to master concepts**

**Postpone
standardized
testing**

**Consider
alternatives to
formal testing**

**Pre-printed notes or
note taker**

Halstead, et al. Returning to Learn Following a Concussion. *Pediatrics*, Nov 2013, 132 (5) 948-957

Not all symptoms are concussion!

MENTAL HEALTH BEST PRACTICES



INTER-ASSOCIATION CONSENSUS DOCUMENT: BEST PRACTICES FOR
UNDERSTANDING AND SUPPORTING STUDENT-ATHLETE MENTAL WELLNESS

Sports must wake up about depression

By Reid Forgrave FoxSports



Speaking of Depression...

Mom Suing Pop Warner Wants to Stop Pre-Teen Tackle Football

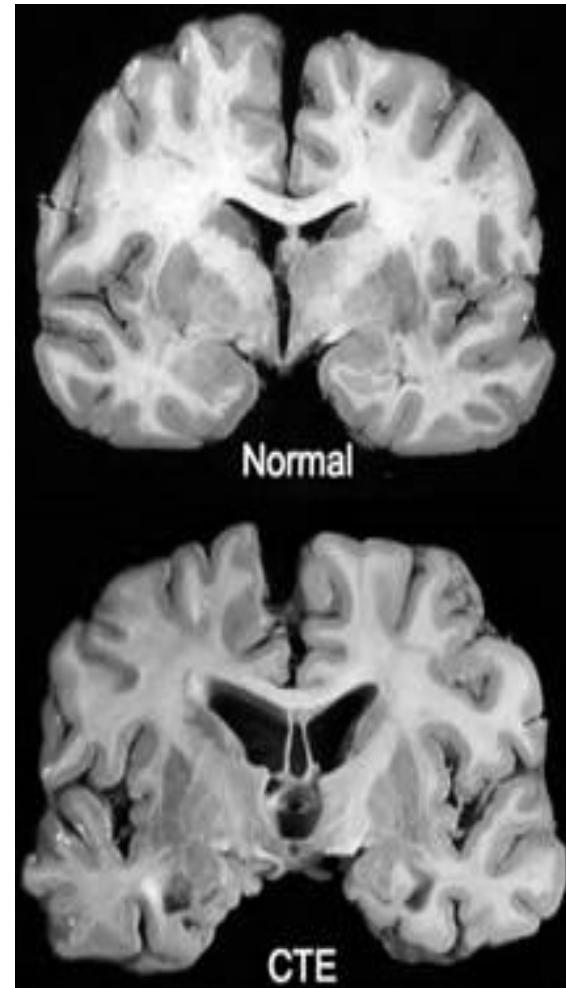
Study: Former NFL Players Who Played Tackle Football Before Age 12 at Increased Risk of Memory and Thinking Problems Later



Mom Sues Pop Warner Football for Son's CTE-Related Suicide

Chronic Traumatic Encephalopathy (CTE)

- Neurodegenerative disorder
- Microscopically defined POST MORTEM by accumulation of tau-based neurofibrillary tangles
- *Linked* to repetitive head trauma
 - No direct cause-effect relationship demonstrated
 - Selection bias
- Symptom profile
 - Dementia
 - Aggression
 - Depression
 - Other emotional changes



CTE: Our Conflicting Knowledge

Proposed Theory:

Concussions and/or subconcussive blows start a neurodegenerative process

- Tau deposition found in brain of *collision athletes*
- Tau deposition *Mortality and Suicide rates in former NFL player are lower than the general population*

[Baron, S.L., Hein, M.J., Lehman, E., & Gersic, C.M. (2012). Body mass index, playing position, race, and the cardiovascular mortality of retired professional football players. American Journal of Cardiology, 109, 889–896.]
- Some athletes with Tau changes do not have CTE symptoms
- *Tau deposition is found in other neurodegenerative diseases*
- *Tau deposition found in similar areas in individuals with symptoms of CTE without Tau changes*
 - *CTE symptoms are not specific to this proposed entity*

What is risk of problems later in life?

- Study evaluated football players from 1956-1970
 - 296 football athletes, 190 other athletes
 - Compared to varsity swimmers, wrestlers and basketball players
- Head injury more likely reported in football
- *No increased risk in football players of neurodegenerative diseases and specifically dementia, Parkinsonism, and ALS*

Janssen PH, Mayo Clin Proc, 2017

CTE Questions

- *Which athletes are at greatest risk?*
- *Is the age at sustained head trauma significant?*
- *What amount of head trauma produces the CTE changes?*
- *Is tau protein a problem or just a finding on autopsy?*
- *Do sports with inherent high head impact forces need to be changed?*
- **CTE Limitations:**
 - No controlled epidemiological data
 - Only anecdotal case reports and selection-bias limited studies
 - Post mortem diagnostic criteria
- **What's needed....**
 - Prospective, longitudinal, population-based, blinded neuropathological studies evaluating athletes involved in high- and low-impact sports
 - Clinical or pathological criteria to diagnose CTE while symptomatic

It's Not Just the Brain We Should Be Worrying About...

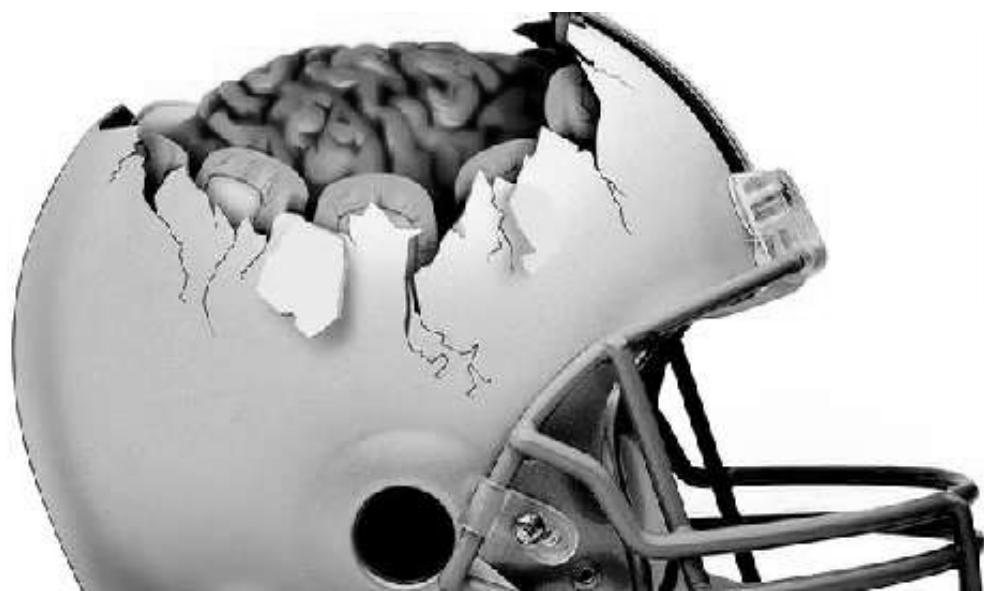
Concussion Increases Odds of Sustaining a → Lower Extremity Musculoskeletal Injury After Return to Play Among Collegiate Athletes

M. Alison Brooks, MD, MPH*,†,‡, Kaitlin Peterson, BS§, Kevin Biese, BS||,

**In 90 days following
concussion: 2.5x
increased risk of lower
extremity MSK injury**

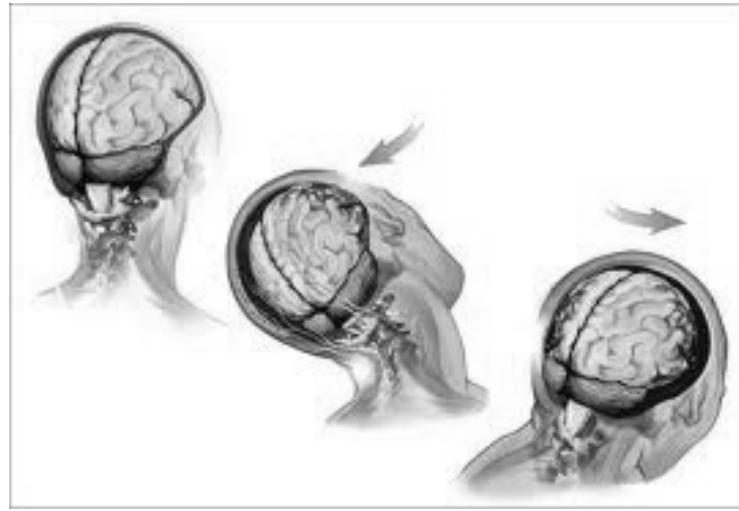
(Brooks, 2016)

So... Can We Prevent Concussion?



There is no concussion-proof helmet or head gear...

Helmets and head gear DO reduce the risk of skull fractures, severe head injury, eye injuries.



They DO NOT reduce the risk of concussion!

Gear should fit & be worn properly





TRY TO ROTATE HELMET
SHOULD NOT Wobble, TILT, OR ROTATE

3rd Party Add-Ons Don't Work

Guardian Caps



Unequal Technologies

HEAD PROTECTION ZONE

Unequal takes head protection to a new level by integrating function and design with our products. All products are fortified with Kevlar® to provide concealed, customizable protection to athletes at every level.

We don't just talk about protection, we prove it. Unequal head products are extensively tested at independent third party ISO/TS1025 accredited test labs. Tests show that our products reduce up to 90 percent of severity index, or measured impact. That's a number we can all feel good about.

GYRO GYRO is a supplemental head padding that you simply Place in Play into flat coverage head gear. Headband has 1/2" thick foam a .25 mm thick liner. The liner is made from a soft, pliable material designed to give you customized, concealed protection with no helmet modification. Recommended for: <ul style="list-style-type: none">Football	MAXX MAXX is a supplemental head padding that you simply Place in Play into most flat coverage head gear products. This single pad can be easily cut to give you maximum head protection with no helmet modification. Recommended for: <ul style="list-style-type: none">FootballFootballLacrosseHockeyMotocrossBike SportsSnow SportsBoard Sports
DOME DOME is a protective skull cap made with Unequal's patented padding technology in the band and liner areas. These the best padded band and liner areas for comfort and protection. The DOME is fully adjustable for a custom fit. Recommended for: <ul style="list-style-type: none">FootballFootballLacrosseHockeySkateboardingSkateboardingEquestrianBikingMotocycling	BAND BAND is a protective headband that removes Unequal's patented supplemental head padding. Pads are replaceable for many uses. Fully adjustable for a custom fit. Recommended for: <ul style="list-style-type: none">SoccerFootballBasketballVolleyballCheerleading
HALO HALO is supplemental head padding designed for incidental contact. And you know what? It's super comfortable! It's also great for use in the DOME or DOME caps, golf caps, swim caps, and recreational caps. Recommended for: <ul style="list-style-type: none">Baseball CapsGolf CapsGolf CapsGolf CapsRecreational Caps	IPADS Available in universal and specifically cut fits that accommodate any helmet's molding pads. IPADS are designed to be cut to your specific helmet shapes and features a safety undercut. Pre-cut specifically fits size perfectly in your helmet. Recommended for: <ul style="list-style-type: none">FootballFootballFootballHockeySkateboardingSkateboardingBikingSnow SportsEquestrian

Warning: ANY PLAYER IN ANY SPORT CAN SUSTAIN A HEAD INJURY WITH EVEN THE VERY BEST HEAD PROTECTION. UNEQUAL IPADS CAN NOT PREVENT CONCUSSIONS OR ELIMINATE THE RISK OF SERIOUS HEAD OR NECK INJURIES. Suppliers have not reached agreement on how the results of impact absorption tests relate to concussions. No consensus about a reduction of risk or severity of concussive injury should be drawn from impact absorption tests alone.

What about mouthguards???

Proven protection against dental and orofacial injury



Mouth guards DO NOT reduce risk of concussion

These don't prevent concussion!



Head Gear in Soccer

- Insufficient evidence that current headgear prevents head injury
- May increase how aggressively athletes play?



Niedfeldt MW. Head Injuries, Heading, and the Use of Headgear in Soccer. CSMR 2011;10(6): 324-29

Is Heading Dangerous Play?

Recent systematic review included 310 articles

Heading



**Riskiest part
of soccer**

* Due to athlete-athlete contact

↓ *Athlete-Athlete contact*
may be more effective
than heading bans to
prevent concussion, and
other injury

Comstock RD. An Evidence-Based Discussion of Heading the Ball and Concussions in High School Soccer. *JAMA Pediatr.* 2015.

*Children are more
susceptible than adults to
concussion from heading*
* Primarily in game situations

Contributing factors
include:

- Biomechanical forces
- Less developed technique
- Immature brain's
susceptibility to injury

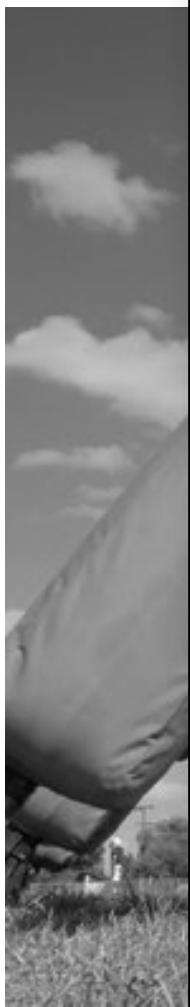
O'Kane, JW. The Physician And
Sportsmedicine, 2016; Comstock RD, An Evidence-
Based Discussion of Heading the Ball and Concussions in
High School Soccer. *JAMA Pediatr.* 2015.

Prevention

Correct heading technique

- Practice with rag, nerf, and inflatable balls
- Do not force young athletes to head the ball
- Avoid excess heading training in practices
- Strengthen “heading” musculature





Change the Sport?

- U11: no heading
- U12 & U13: max 30 minutes heading training/week
(max 15-20 hits/player)



AAP Policy Statement

American Academy
of Pediatrics



DEDICATED TO THE HEALTH OF ALL CHILDREN™

Tackling in Youth Football

COUNCIL ON SPORTS MEDICINE AND FITNESS

Pre-participation Exams

- Concussion history: #, length of symptoms
- Baseline SCAT5?
- Baseline symptom checklist?
- Computerized neurocognitive baseline?

- | |
|--|
| 34. Have you ever had a head injury or concussion? |
| 35. Have you ever had a hit or blow to the head that caused confusion, prolonged headache, or memory problems? |
| 36. Do you have a history of seizure disorder? |
| 37. Do you have headaches with exercise? |
| 38. Have you ever had numbness, tingling, or weakness in your arms or legs after being hit or falling? |
| 39. Have you ever been unable to move your arms or legs after being hit or falling? |

Educate, educate, educate...

U.S. athletes still reluctant to admit head injuries: report

BY SUSAN HEAVEY

WASHINGTON | Thu Oct 31, 2013 10:26am EDT

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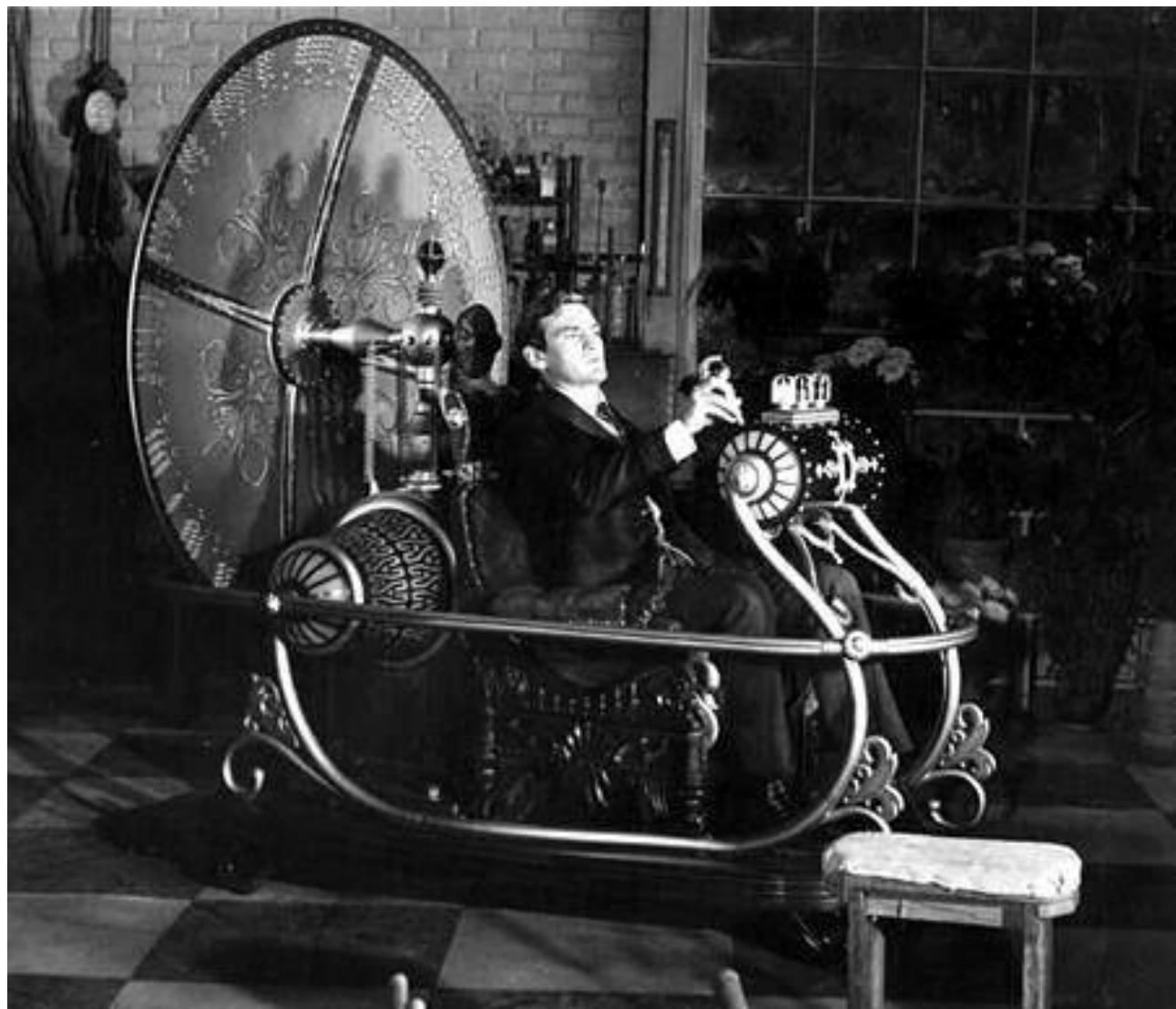


1 OF 7. Seventeen year-old Hannah Steenhuisen watches her high school's girls soccer team prepare for a game against Bishop Feehan in Attleboro, Massachusetts October 25, 2013.

CREDIT: REUTERS/BRIAN SNYDER

The Case of Judo Jane





1. Remove from play & initiate medical care in the first few days





Avoid "Playing Through It"

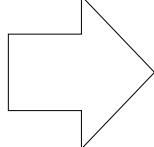
Journal of Athletic Training 2016;51(4):329–335
doi: 10.4085/1062-6050-51.5.02
© by the National Athletic Trainers' Association, Inc
www.natajournals.org

original research

"Playing Through It": Delayed Reporting and Removal From Athletic Activity After Concussion Predicts Prolonged Recovery

Breton M. Asken, MS, ATC*; Michael A. McCrea, PhD, ABPP/CNT†;

51.5% did not immediately report symptoms



- **~5 more missed practice days**
- **2.2x ↑ prolonged recovery**

clearance for return to contact. Associations between RFA group and prolonged (8 or more days) versus normal (7 or fewer days') recovery were also analyzed.

Results: Fifty (51.5%) of the 97 athletes did not immediately report concussion symptoms. The D-RFA athletes averaged 4.9

Key Words: symptom reporting, window of vulnerability, mild traumatic brain injuries, collegiate athletes

Key Points

- A substantial number of athletes did not immediately recognize or report concussion symptoms.
- Athletes who delay reporting concussion symptoms are at risk for protracted recoveries.
- Not engaging the medical staff and continuing to participate in athletic activity during the immediate postconcussion period potentially exposes the athlete's already injured brain to additional neuronal stress that can compound injury neuropathophysiologic processes.

Asken B, McCrea M, Clugston J, Snyder A, Houck Z, Bauer R. "Playing Through It": Delayed Reporting and Removal From Athletic Activity After Concussion Predicts Prolonged Recovery. *Journal Of Athletic Training* (Allen Press) [serial online]. April 2016;51(4):329-335.

Optimal Recovery begins at time of injury!

**High school athletes who continued to play
with concussion symptoms**

**= 8.8x more likely to have protracted recovery
> 21 days**

Elbin RJ, Pediatrics.



2. Earlier referral to appropriate sub-specialists



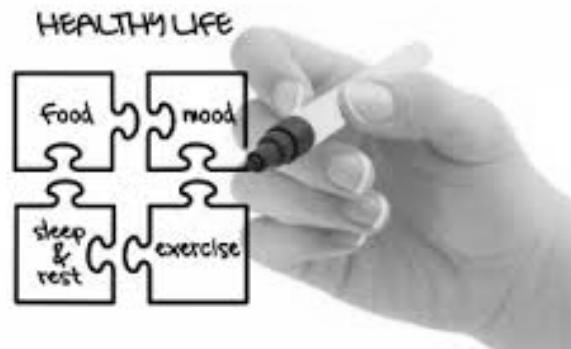
3. Earlier collaboration with school



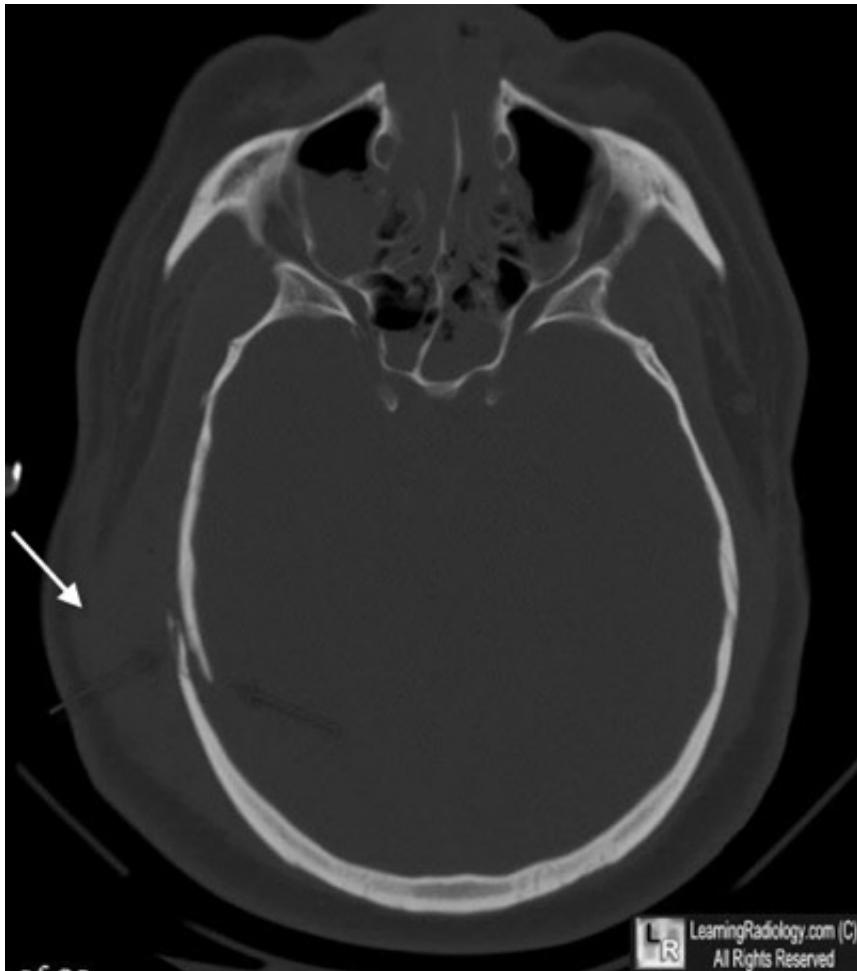
4. Earlier return to routines



5. Earlier lifestyle interventions



6. Earlier care coordination of co-morbidities and RTP planning



Summary

Earlier referral to concussion specialist may:

- Reduce post-concussive sequelae
- Reduce time to return to play
- May facilitate earlier return to school
- Improve patient's mood
- Improve coordination between providers



Resources

CDC Head's Up Campaign

<http://www.cdc.gov/concussion/headsup>

National Federation of State High Schools

<http://nfhslearn.com/>

STOP Sports Injuries campaign

<http://www.STOPSportsInjuries.org>



Dr. Rachel Coel
Medical Director



Dr. Elizabeth Ignacio
Surgical Director



Ross Oshiro
Program Coordinator

THANK YOU!

Queen's Center for Sports Medicine
(808) 691-4449
rcoel@queens.org



Dr. Ryan Moore
Physical Therapist



Jessica Oshiro
Athletic Trainer



Dr. David Kurihara
Physical Therapist