

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

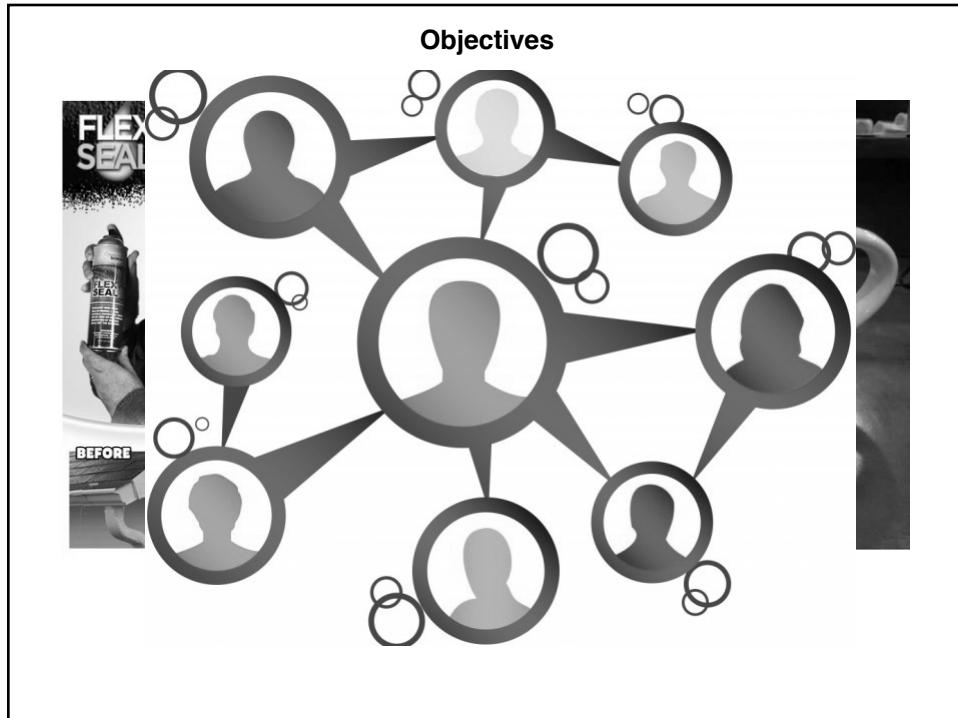
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Medical Director

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

### **Disclosures**

**I, Rachel A. Coel, have no relevant financial relationships with the manufacturers(s) of any commercial products(s) and/or provider of commercial services discussed in this CME activity.**

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## 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...”

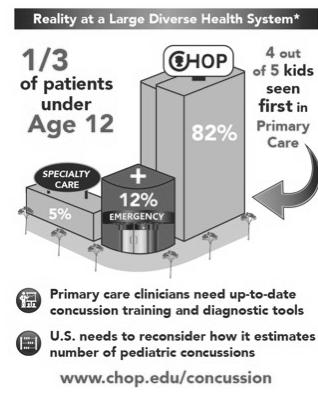


## What's this gotta do with me???

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## Point of Entry (2016)

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



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

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

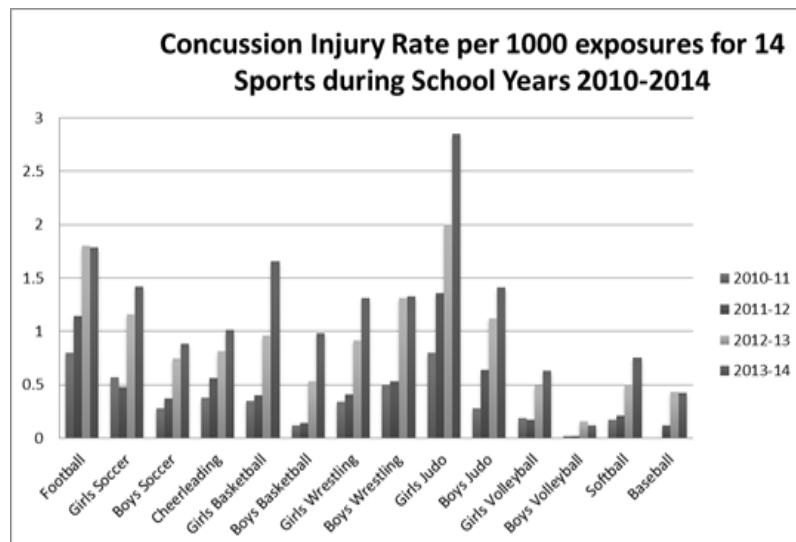
\*Researchers from The Children's Hospital of Philadelphia (CHOP) and the Centers for Disease Control and Prevention looked at data from 2010–2014 on 8,000 0-to-17-year-old patients enrolled with a CHOP primary care provider and diagnosed with a concussion.

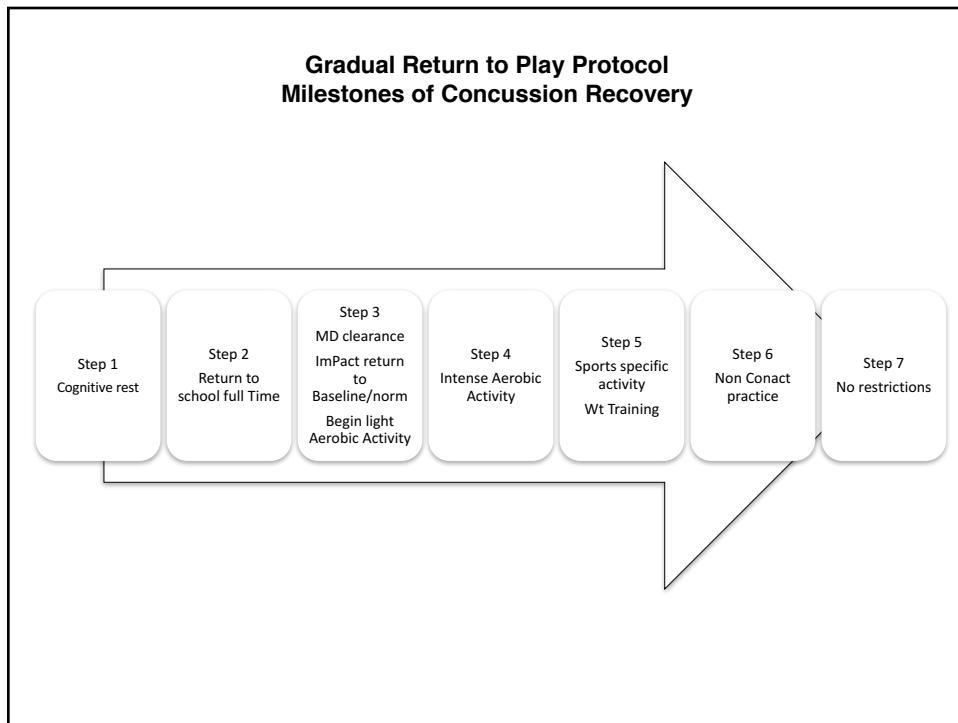
**ImPACT baseline testing for 67 schools  
participating state-wide including private schools**

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**





## 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"

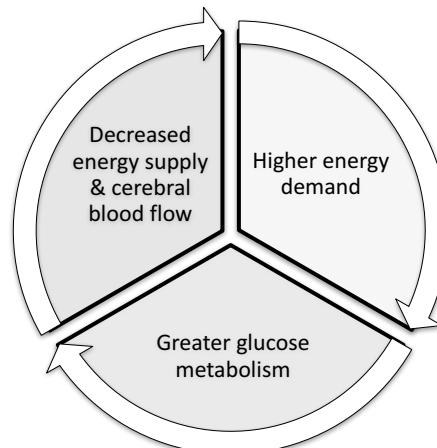
**What happens in a concussion?**

15

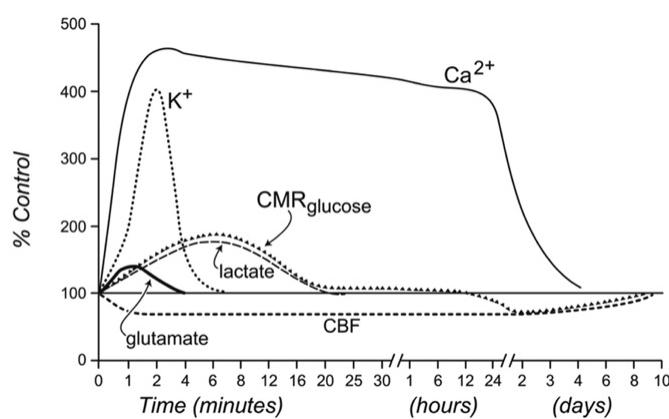


## Metabolic Mismatch

BRAIN = ENERGY CRISIS

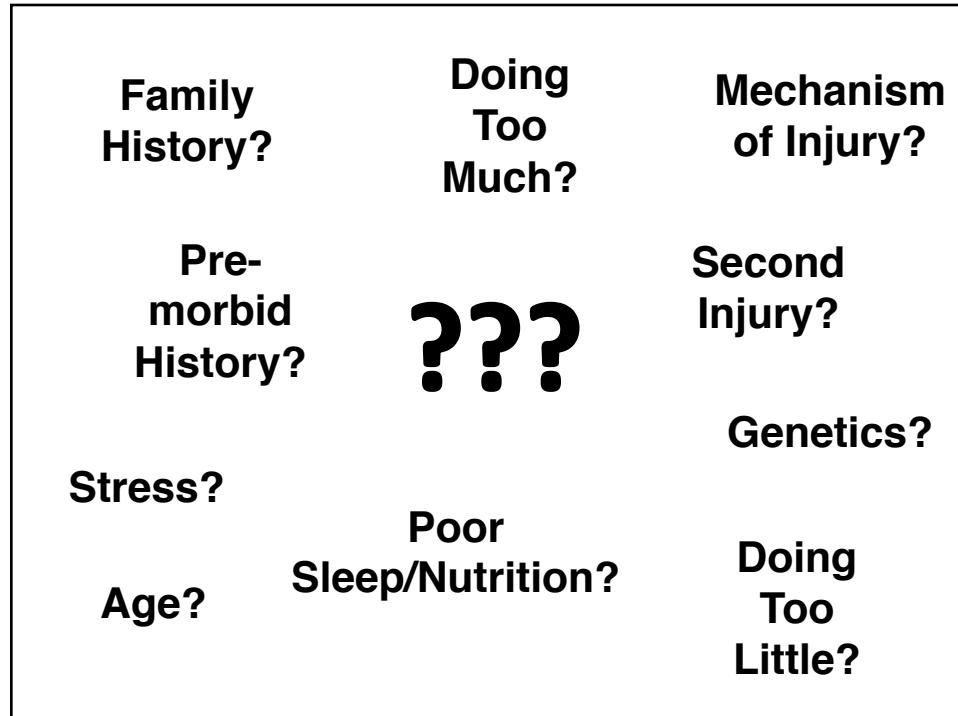


## Timeline for Cellular Correction



7 – 10 DAYS

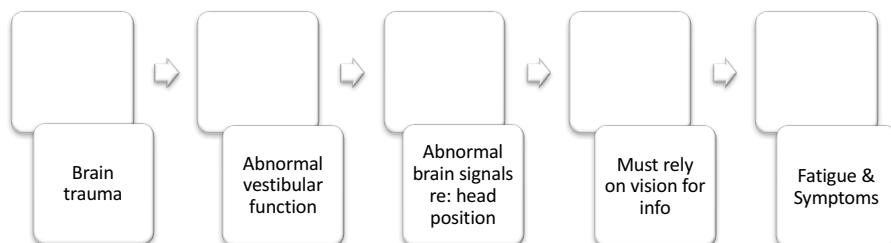
Giza CC, Hovda DA. Ionic and metabolic consequences of concussion. In: Cantu RC, Cantu RI. *Neurologic Athletic and Spine Injuries*. St Louis, MO: WB Saunders Co; 2000:80–100.



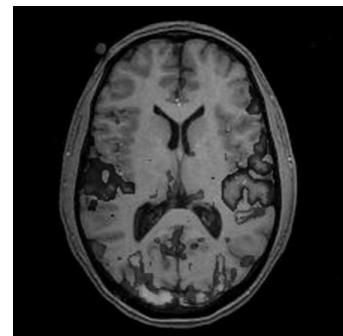
**This is vestibular dysfunction!**



## 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

### Child-SCAT3™

Sport Concussion Assessment Tool for children ages 5 to 12 years

For use by medical professionals only

#### What is childSCAT3?

The Child-SCAT3 is a standardized tool for evaluating injured children for concussion and can be used by medical professionals. It incorporates the original SCAT and the SCAT2 published in 2005 and 2009, respectively. For older persons, ages 12 years and over, please refer to the Child-SCAT3-12+ (Child-SCAT3-12+). The Child-SCAT3 is a computerized version based on the original SCAT3 and is designed to be used by medical professionals.

Specific instructions for use of the Child-SCAT3 are provided on page 1. If you are not familiar with the Child-SCAT3, please refer to the original SCAT3 for more information. The Child-SCAT3 is the current form for distribution to individuals, teams, groups and organizations. Any written and verbal communication regarding the Child-SCAT3 should be done through the official website, [www.icei.org](http://www.icei.org). MORE: The degree of a concussion is a clinical judgment, usually made by a medical professional. A medical professional may determine that an athlete has suffered a concussion even if their Child-SCAT3 is "normal". An athlete may have a concussion even if their Child-SCAT3 is "normal".

#### What is a concussion?

It results in a variety of non-specific signs and symptoms like those listed below and most often occurs without loss of consciousness. Concussion should be suspected in the presence of any one or more of the following:

- Symptoms (e.g., headache, dizziness, nausea, vomiting, fatigue, confusion, or impaired brain function (e.g., difficulty concentrating))

#### SIDELINE ASSESSMENT

##### Indications for Emergency Management:

If a child has suffered a head injury and exhibits any of the following, then do not proceed with the Child-SCAT3, instead activate emergency procedures and urgent transport:

- Glasgow Coma Score less than 15
- Loss of consciousness
- Potential spinal injury
- Persistent vomiting
- Evidence of skull fracture
- Convulsions
- Coma
- Coughing/tightness in the chest (eg Short)
- Multiple injuries

#### 1 Glasgow coma scale (GCS)

Best eye response (E)	1
No eye opening	2
Eye opening to pain	3
Eye opening spontaneously	4
Best verbal response (V)	1
Incomprehensible sounds	2
Inappropriate words	3
Oriented	5
Best motor response (M)	1
No motor response	2
Abnormal gait	3
Abnormal flexion to pain	3
Recoil/Withdrawal to pain	4
Abnormal arm	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, then the child should be evaluated by a medical professional and should not be permitted to return to sport the same day if a concussion is suspected.

**A) Any loss of consciousness?**  
If so, how long? \_\_\_\_\_

N

Y

N

Y

N

**B) Loss of memory?**  
If so, how long? \_\_\_\_\_

N

Y

N

Y

N

**C) Dizziness or confusion leading to repeat responses to questions?**

N

Y

N

Y

N

**D) Headache?**

N

Y

N

Y

N

**E) Nausea or vomiting?**

N

Y

N

Y

N

**F) Balance or coordination problems?**

N

Y

N

Y

N

**G) Visible facial injury in combination with any of the above?**

N

Y

N

Y

N

**H) Any loss of consciousness?**

N

Y

N

Y

N

**I) Headache?**

N

Y

N

Y

N

**J) Nausea or vomiting?**

N

Y

N

Y

N

**K) Balance or coordination problems?**

N

Y

N

Y

N

**L) Visible facial injury in combination with any of the above?**

N

Y

N

Y

N

**M) Any loss of memory?**

N

Y

N

Y

N

**N) Dizziness or confusion leading to repeat responses to questions?**

N

Y

N

Y

N

**O) Headache?**

N

Y

N

Y

N

**P) Nausea or vomiting?**

N

Y

N

Y

N

**2 Sideline Assessment – child-Maddocks Score\***

\*I am going to ask you a few questions, please listen carefully and give your best effort.

Modified Maddocks questions (I point for each correct answer)

Where are we? \_\_\_\_\_

I

N

E

What did you have last lesson/class? \_\_\_\_\_

I

N

E

What is your teacher's name? \_\_\_\_\_

I

N

E

Child-Maddocks score: \_\_\_\_\_

Child-Maddocks score is to obtain degrees of concussion risk and is not used for send home

Any child with a suspected concussion should be REMOVED FROM PLAY, medically assessed and monitored for deterioration. Use caution when returning to play. No child diagnosed with concussion should be returned to sport until participation on the day of injury.

#### BACKGROUND

Name: \_\_\_\_\_ Date/Time of injury: \_\_\_\_\_

Examiner: \_\_\_\_\_ Date of assessment: \_\_\_\_\_

Age: \_\_\_\_\_ Gender: \_\_\_\_\_

Current school year/grade: \_\_\_\_\_

Left/right dominant: \_\_\_\_\_

Mechanism(s)/way("when/he/happened"): \_\_\_\_\_

For Parent/Caregiver to complete:

When was the most recent concussion?

Has the child ever had a head injury? \_\_\_\_\_

Has the child ever had a CT or MRI for a head injury? \_\_\_\_\_

Has the child ever been diagnosed with headaches or migraines? \_\_\_\_\_

Does the child have any other health conditions such as asthma, ADD/ADHD, seizure disorder? \_\_\_\_\_

Has the child ever had a seizure? \_\_\_\_\_

Has the child ever had depression, anxiety or other psychiatric disorder? \_\_\_\_\_

Has anyone in the family ever been diagnosed with any of these conditions? \_\_\_\_\_

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

CHILD-SCAT3 SPORT CONCUSSION ASSESSMENT TOOL 3 / PAGE 1 © 2013 Concussion in Sport Trust

## Computerized Neurocognitive Testing (ie. ImPACT)

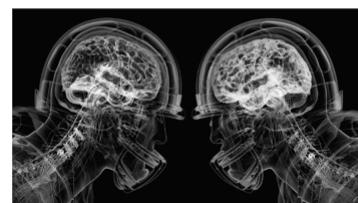
- First used in 1982
- Attempts to measure attention, memory, problem solving, and reaction time
- Baseline? Who? How often?  
False sense of security?
- Validity?
- Not formally recommended
- Comprehensive plan required
- Neuropsychologist evaluation is preferable

### 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



Bryant Christie Design; reference imagery: Purdue Biostatistics Group / Purdue University



## Treatment Options

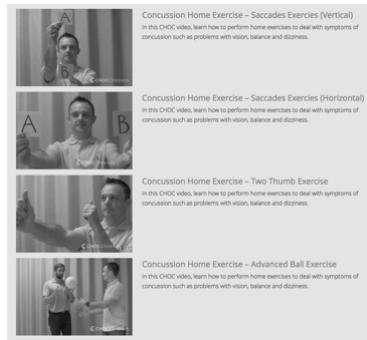
- Physical Rest
- Cognitive Rest
- Vestibular therapy
- Cervical physical therapy
- Speech pathology
- Vision therapy
- Medication
- Exercise
- Coping / Psychology / Cognitive Behavioral Therapy
- Reassurance & Time



## 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



From Children's Hospital of Orange County website

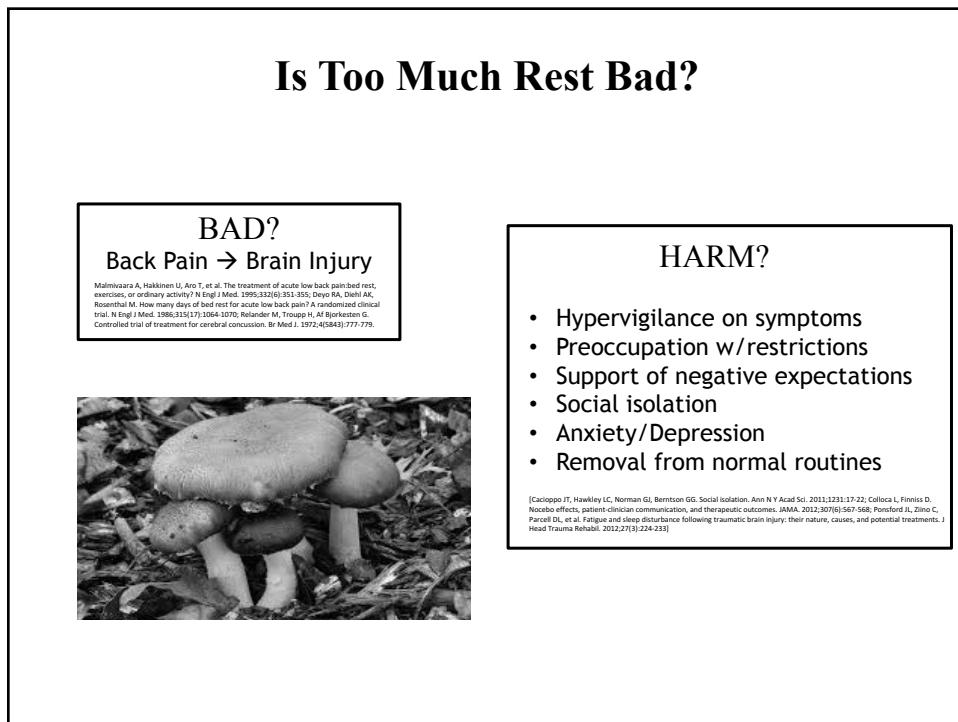
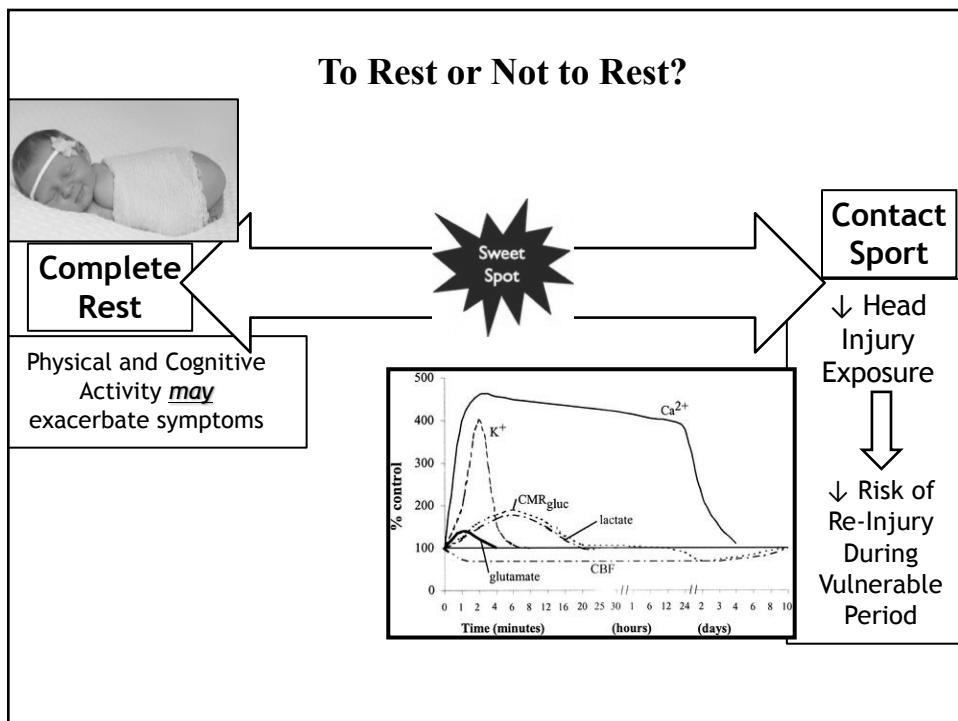
What happened to...



## Concussion Management



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



## 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



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## The Challenge

### Need to Return to School

Minimize disruption

Accumulating  
learning load

Socialization

### Symptoms

Headaches

Anxiety

Sensitivity to  
light/sound

Difficulty  
concentrating



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

## HEADACHES

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**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

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**Limit over-stimulation**

**Avoid rapid transitions**

**Allow to put head down in class**

  
© Alamy

**Avoid crowded hallways**

**Vestibular HEP**

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

 **VISUAL SYMPTOMS**

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Light sensitivity, double vision, blurry vision

**↓ Screen Exposure & Brightness**

**Hat/Sunglasses**

**Use audiobooks**

**Turn off fluorescent lights**



**Double vision: Cover one eye**

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

 **NOISE SENSITIVITY**

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**Limit/Avoid Band, Choir, Shop Classes**

**Lunch in quiet area**

**Avoid noisy gyms, practices & games**

**Avoid crowded hallways**



**Ear plugs**

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

**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!***

**Sports must wake up about depression**

By Reid Forgrave FoxSports

MENTAL HEALTH  
BEST PRACTICES

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

## Speaking of Depression...

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

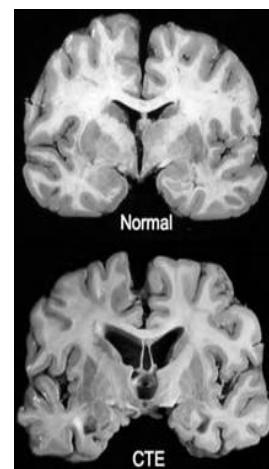
Study: Former NFL Players Who Played Tackle Football Before Age 12 at Increased Risk of Memory and Thinking Problems Later



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.]
  - *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*
- Some athletes with tau changes do not have CTE symptoms

## 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)

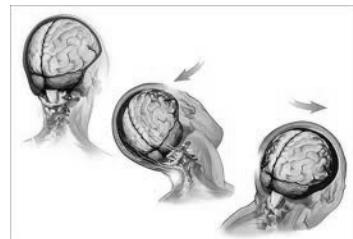
## So... Can We Prevent Concussion?



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**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**



### 3<sup>rd</sup> Party Add-Ons Don't Work

#### Guardian Caps



#### Unequal Technologies



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

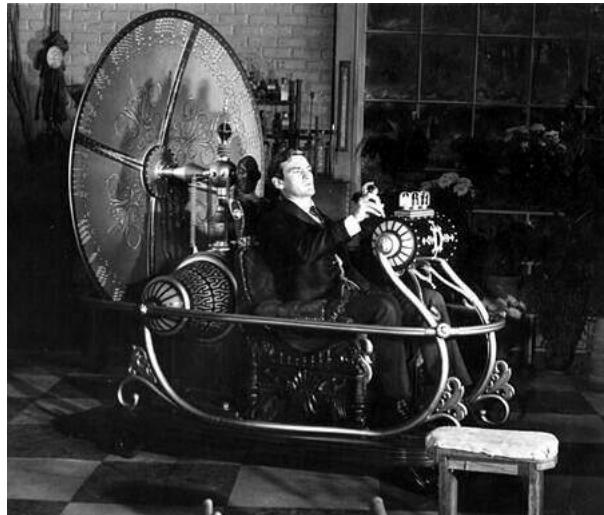
0 COMMENTS | [Tweet](#) 25 | [Share](#) 5 | [Share this](#) 8 | [Email](#) [Print](#)



1 OF 3 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: REUTTERSBIRMAN BY DIER

## The Case of Judo Jane





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



 **Avoid "Playing Through It"**

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Journal of Athletic Training  
doi: 10.4080/jat.2016.325  
© 2016 American Academy of Sports Medicine  
[www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov)

original research

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

Bretton M. Asken, MS, ATC<sup>1</sup>; Michael A. McCrea, PhD, ABPP/CN<sup>2</sup>

- 51.5% did *not* immediately report symptoms**
- 
- ~5 more missed practice days
- 2.2x ↑ prolonged recovery

Abstract: For athletes to receive concussion treatment, DTA group and prolonged (8 or more days) versus normal (7 or fewer days).  
Results: Fifty (51.5%) of the 97 athletes did not immediately report concussion symptoms. The DTA athletes averaged 4.3 days for return to activity compared to 1.8 days for the NTAs.  
Key Points:  
• A substantial number of athletes did not immediately report or report concussion symptoms.  
• Athletes who delay reporting concussion symptoms are at risk for protracted recoveries.  
• Athletes who delay reporting concussion symptoms and continue to participate in athletic activity during the immediate postconcussion period potentially exposes the athlete to already fatigued brain to additional neuronal stress that can compound injury neuropsychological 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.



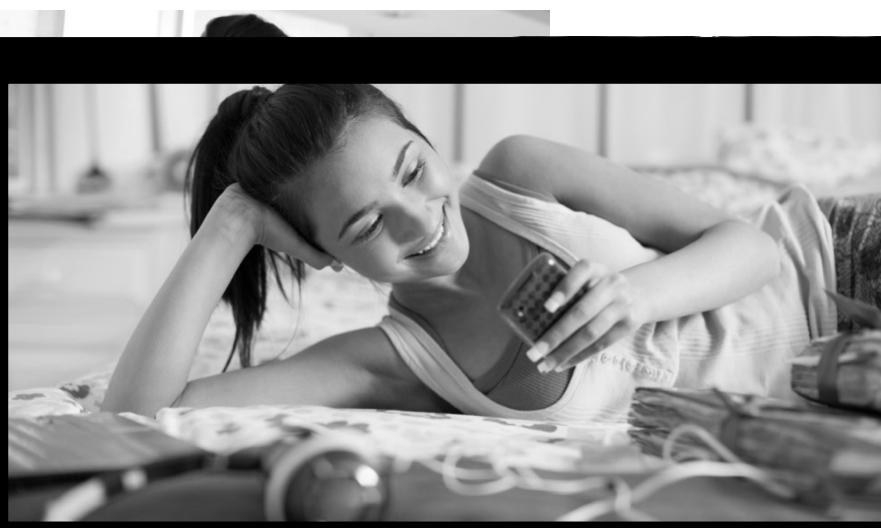
## 2. Earlier referral to appropriate sub-specialists



### 3. Earlier collaboration with school



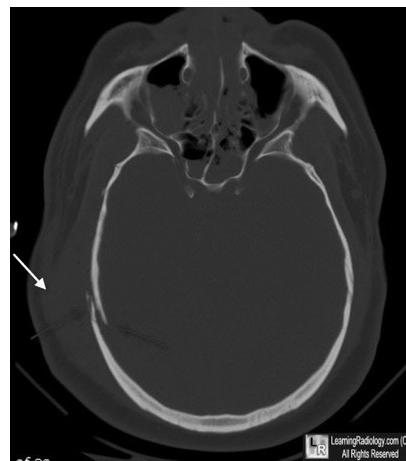
### 4. Earlier return to routines



## 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>



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## THANK YOU!

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