CONCUSSION

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No financial disclosures

Our Team

- Sports Medicine
- TBI/Concussion
- Pediatric Orthopedics/Fractures
- Overuse injuries and rehabilitation
- Dynamic MSK Ultrasound
- Dance Medicine
- Injury Prevention
- Sports Nutrition

SPARCC

Sports Medicine • Rehabilitation • Concussion Care

Outline

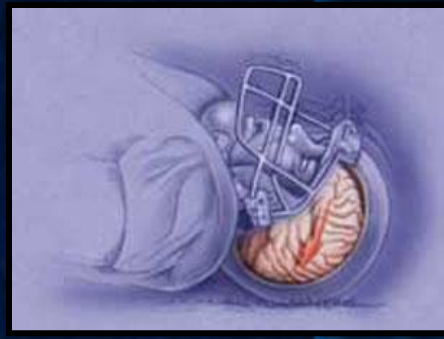
- Background info
- Definition/Diagnosis
- 5th Consensus
- Presentation/Management
- Updates for Return to Learn/Sport
- Conclusion

Case

- 14 year old quarterback
- Sacked in the backfield, severe headache
- Does not tell ATC/Coach
- Mentions it to mom that night
- Has problems concentrating in school
- Returns to play 2 days after event

- Returns to play
- Minor blow to back, head snaps back
- NO LOC
- Appears stunned, tries to play
- Starts walking off field after a minute
- Collapses to ground, semi-comatose
- Dilating pupils, respiratory failure, DEATH
- Remember: **SECOND IMPACT SYNDROME!**

Second Impact Syndrome



- **What is Second Impact Syndrome?**
  - Second-impact syndrome refers to the catastrophic events which may occur when a second concussion occurs while the athlete is still symptomatic and healing from a previous concussion.
- **Risk of "Second Impact Syndrome"**
  - Can cause rapid swelling around the brain often resulting in *severe neurological damage or death!*

Background

- Estimated 1.8 – 3.2 million concussions per year
- 75% of concussions in sports DO NOT involve Loss of Consciousness
- 1 in 5 high school football players will suffer a concussion each year
- Girls have higher rate than boys in same sport

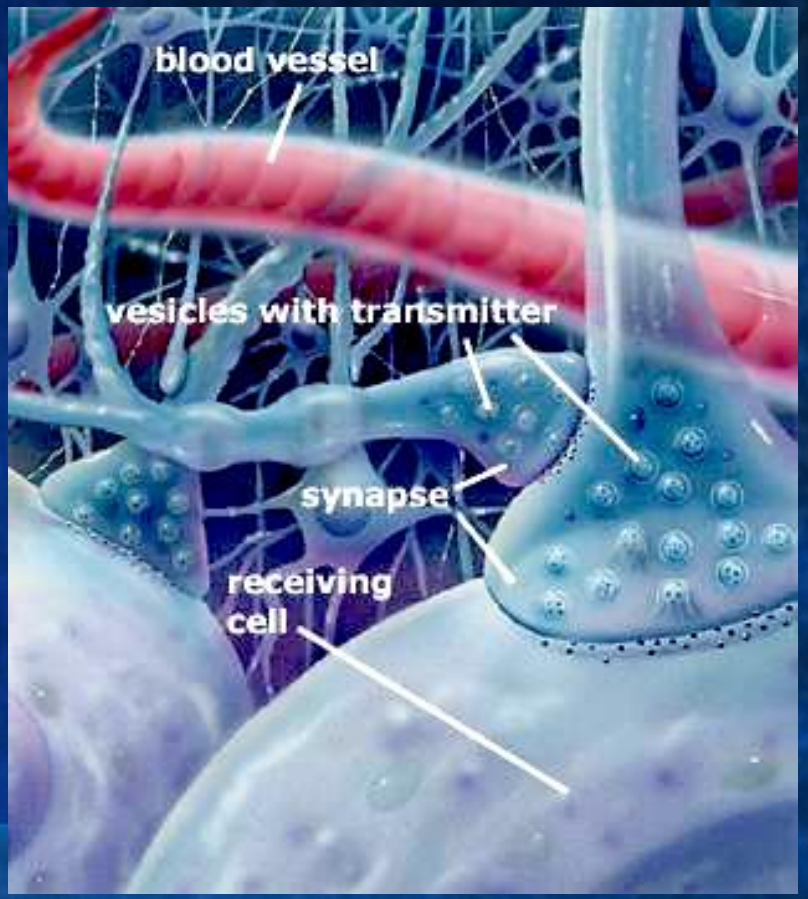
Reasons for Under Reporting

- Player lack of knowledge as to what comprises a concussion
- Concern about being removed from play
- Misperception that just getting your “bell rung” is not a concussion

Concussion - What is It?

NO UNIVERSAL DEFINITION

- Definition:
  - A clinical syndrome characterized by immediate and transient post traumatic impairment of neural function due to CNS involvement



Concussion - What is It?

Trauma to the brain

Impairment in normal brain function because the chemicals have been altered

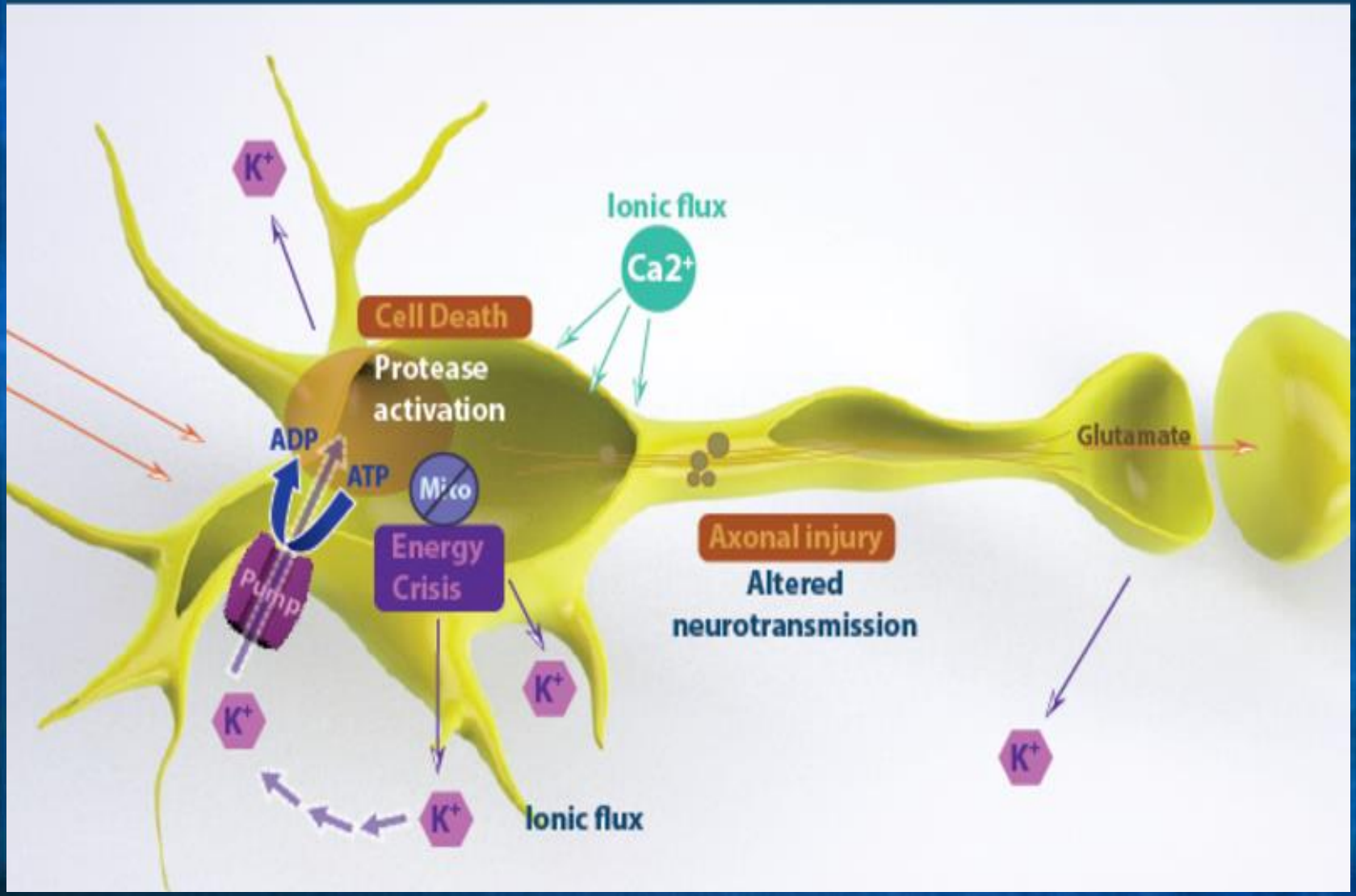
Disturbance in the normal pathways in the neurons

Increased symptoms with daily/school activities

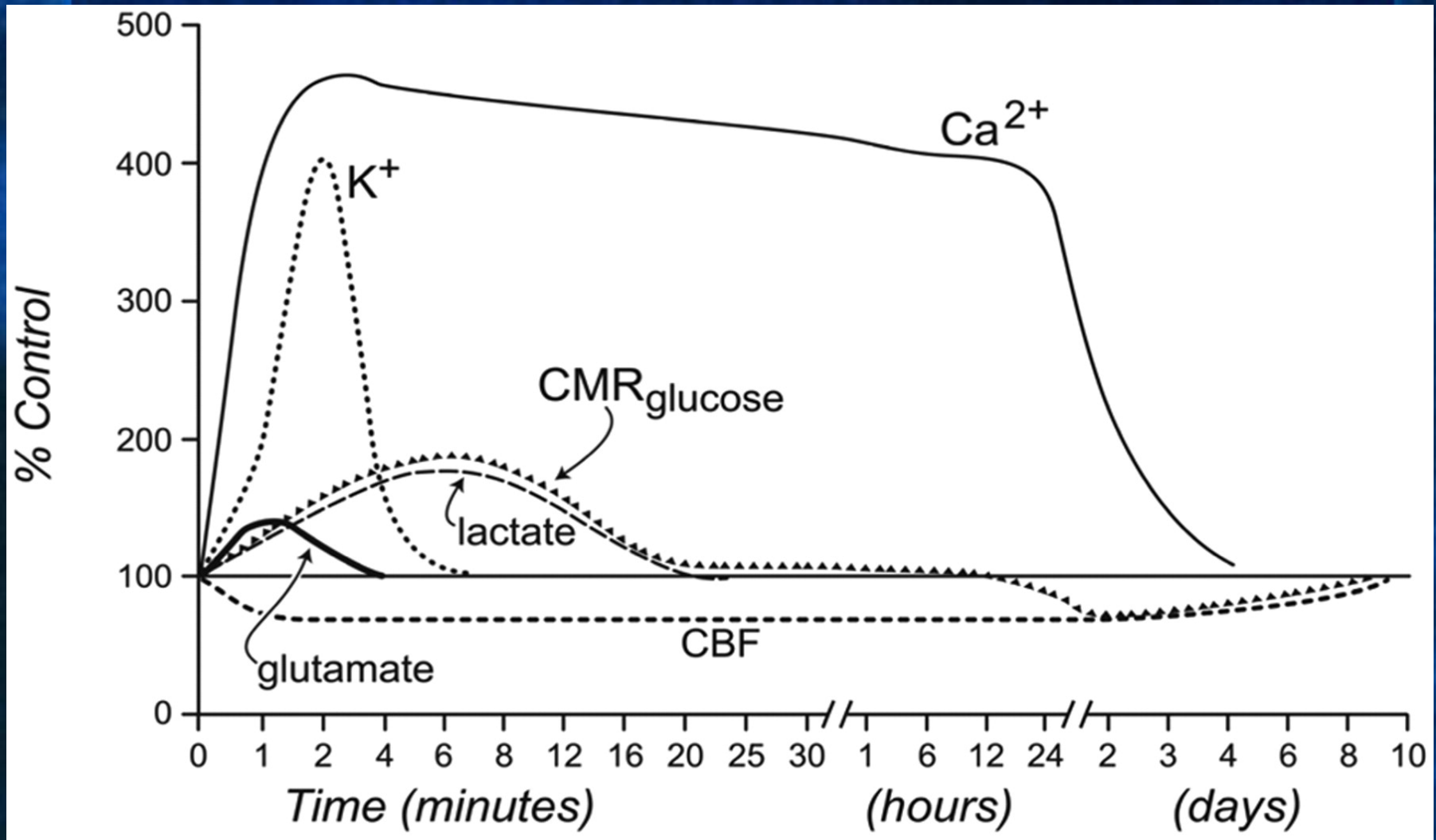
Concussion Analogy

- Old fashion phone switchboards
- Bang the console and all the plugs fall out temporarily
- Slowly put all the plugs back into their proper location
- Service has been temporarily disrupted

Neurometabolic Cascade of mTBI



Concussion Timeline



Concussion Timeline

- **Symptoms resolve in 10-14d (adults)**
  - **Longer adolescents (2-3wks)**
  - **Symptoms may persist up to 4-6 wks**
  - **10-30% have prolonged symptoms**
  - **>4wks should prompt referral**

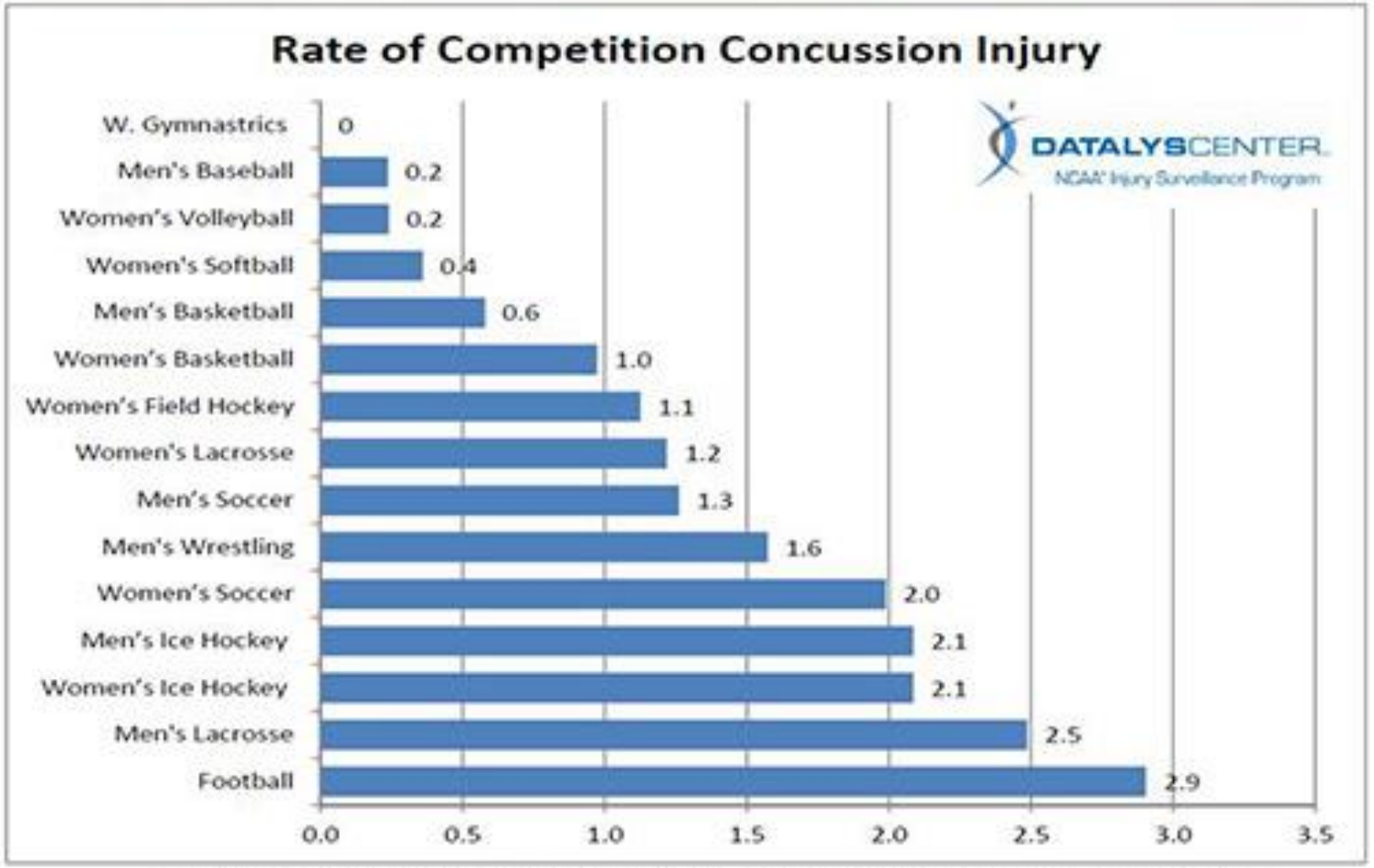
Cumulative effect of multiple concussions

- **Prolonged recovery time**
- **Lowered Concussion threshold**

Sports at High Risk for Concussions

- Football
- Ice Hockey
- Wrestling
- Basketball
- Soccer
- Lacrosse
- Field Hockey
- Softball
- Baseball

Figure 1. Rate of Competition Concussion Injury



BJSM Online First, published on April 26, 2017 as 10.1136/bjsports-2017-097699

Consensus statement on concussion in sport—the 5th international conference on concussion in sport held in Berlin, October 2016

Paul McCrory,[1] Willem Meeuwisse,[2] Jiří Dvorak,[3,4] Mark Aubry,[5] Julian Bailes,[6] Steven Broglio,[7] Robert C Cantu,[8] David Cassidy,[9] Ruben J Echemendia,[10,11] Rudy J Castellani,[12] Gavin A Davis,[13,14] Richard Ellenbogen,[15] Carolyn Emery,[16] Lars Engebretsen,[17] Nina Feddermann-Demont,[18,19] Christopher C Giza,[20,21] Kevin M Guskiewicz,[22] Stanley Herring,[23] Grant L Iverson,[24] Karen M Johnston,[25] James Kissick,[26] Jeffrey Kutcher,[27] John J Leddy,[28] David Maddocks,[29] Michael Makdissi,[30,31] Geoff Manley,[32] Michael McCrea,[33] William P Meehan,[34,35] Sinji Nagahiro,[36] Jon Patricios,[37,38] Margot Putukian,[39] Kathryn J Schneider,[40] Allen Sills,[41,42] Charles H Tator,[43,44] Michael Turner,[45] Pieter E Vos[46]

► Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/bjsports-2017-097699)

For numbered affiliations see end of article.

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PREAMBLE

The 2017 Concussion in Sport Group (CISG) consensus statement is designed to build on the principles outlined in the previous statements[1–4] and to develop further conceptual understanding of sport-related concussion (SRC) using an expert consensus-based approach. This document is developed for physicians and healthcare providers who are involved in athlete care, whether at a recreational, elite or professional level. While agreement exists on the principal messages conveyed by this document, the authors acknowledge that the science of SRC is evolving and therefore individual management and return-to-play decisions remain in the realm of clinical judgement.

articles were screened by the expert panels for the Berlin meeting. The details of the search strategies and findings are included in each of the systematic reviews.

The details of the conference organisation, methodology of the consensus process, question development and selection on expert panellists and observers is covered in detail in an accompanying paper in this issue.[5] A full list of scientific committee members, expert panellists, authors, observers and those who were invited but could not attend are detailed is at the end of the summary document. The International Committee of Medical Journal Editors conflict of interest declaration for all authors is provided in Appendix 1.

Readers are encouraged to copy and freely

Clinical Diagnosis

- **“Concussion should be suspected in the presence of any ONE or more of the following:**
  - **Symptoms (HA, dizzy, fog)**
  - **Physical signs (LOC, unsteadiness)**
  - **Cognitive (amnesia, confusion)**
  - **Mood changes (irritability, labile)**
  - **Sleep disorder**

Clinical Diagnosis

"If any one or more of these components are present, a concussion should be suspected and the appropriate management strategy instituted"

When in Doubt, **SIT IT OUT!**

Diagnosis: 5th Consensus update

- Comprehensive evaluation (SCAT 5): GCS, Red Flags, symptoms, mental status, neurologic, vestibular

- Other useful domains to test include:
  - Reaction time
  - Balance
  - Oculomotor (vision)
  - Cognition
  - Vestibulocular motor screen (VOMS)

BJSM Online First, published on April 26, 2017 as 10.1136/bjsports-2017-097506SCAT5

To download a clean version of the SCAT tools please visit the journal online (http://dx.doi.org/10.1136/bjsports-2017-097506SCAT5)

SCAT5©

SPORT CONCUSSION ASSESSMENT TOOL – 5TH EDITION

DEVELOPED BY THE CONCUSSION IN SPORT GROUP

FOR USE BY MEDICAL PROFESSIONALS ONLY

supported by

Patient details

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date of Injury: _____ Time: _____

WHAT IS THE SCAT5?

The SCAT5 is a standardized tool for evaluating concussions designed for use by physicians and licensed healthcare professionals[1]. The SCAT5 cannot be performed correctly in less than 10 minutes.

If you are not a physician or licensed healthcare professional, please use the Concussion Recognition Tool 5 (CRT5). The SCAT5 is to be used for evaluating athletes aged 13 years and older. For children aged 12 years or younger, please use the Child SCAT5.

Preseason SCAT5 baseline testing can be useful for interpreting post-injury test scores, but is not required for that purpose.Detailed instructions for use of the SCAT5 are provided on page 7. Please read through these instructions carefully before testing the athlete. Brief verbal instructions for each test are given in italics. The only equipment required for the tester is a watch or timer.

Recognise and Remove

A head impact by either a direct blow or indirect transmission of force can be associated with a serious and potentially fatal brain injury. If there are significant concerns, including any of the red flags listed in Box 1, then activation of emergency procedures and urgent transport to the nearest hospital should be arranged.

Key points

- Any athlete with suspected concussion should be REMOVED FROM PLAY, medically assessed and monitored for deterioration. No athlete diagnosed with concussion should be returned to play on the day of injury.
- If an athlete is suspected of having a concussion and medical personnel are not immediately available, the athlete should be referred to a medical facility for urgent assessment.
- Athletes with suspected concussion should not drink alcohol, use recreational drugs and should not drive a motor vehicle until cleared to do so by a medical professional.
- Concussion signs and symptoms evolve over time and it is important to consider repeat evaluation in the assessment of concussion.
- The diagnosis of a concussion is a clinical judgment, made by a medical professional. The SCAT5 should NOT be used by itself to make, or exclude, the diagnosis of concussion. An athlete may have a concussion even if their SCAT5 is "normal".

Remember:

- The basic principles of first aid (danger, response, airway, breathing, circulation) should be followed.
- Do not attempt to move the athlete (other than that required for airway management) unless trained to do so.
- Assessment for a spinal cord injury is a critical part of the initial on-field assessment.
- Do not remove a helmet or any other equipment unless trained to do so safely.

OFFICE OR OFF-FIELD ASSESSMENT

Please note that the neurocognitive assessment should be done in a distraction-free environment with the athlete in a resting state.

STEP 1: ATHLETE BACKGROUND

Sport / team / school: _____

Date / time of injury: _____

Years of education completed: _____

Age: _____

Gender: M / F / Other

Dominant hand: left / neither / right

How many diagnosed concussions has the athlete had in the past?: _____

When was the most recent concussion?: _____

How long was the recovery (time to being cleared to play) from the most recent concussion?: _____ (days)

Has the athlete ever been:

Hospitalized for a head injury?	Yes	No
Diagnosed / treated for headache disorder or migraines?	Yes	No
Diagnosed with a learning disability / dyslexia?	Yes	No
Diagnosed with ADD / ADHD?	Yes	No
Diagnosed with depression, anxiety or other psychiatric disorder?	Yes	No

Current medications? If yes, please list:

_____

_____

_____

_____

_____

_____

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

2

STEP 2: SYMPTOM EVALUATION

The athlete should be given the symptom form and asked to read this instruction paragraph out loud then complete the symptom scale. For the baseline assessment, the athlete should rate his/her symptoms based on how he/she typically feels and for the post injury assessment the athlete should rate their symptoms at this point in time.

Please Check: ☐ **Baseline** ☐ **Post-Injury**

Please hand the form to the athlete

	none	mild		moderate		severe	
Headache	0	1	2	3	4	5	6
"Pressure in head"	0	1	2	3	4	5	6
Neck Pain	0	1	2	3	4	5	6
Nausea or vomiting	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Blurred vision	0	1	2	3	4	5	6
Balance problems	0	1	2	3	4	5	6
Sensitivity to light	0	1	2	3	4	5	6
Sensitivity to noise	0	1	2	3	4	5	6
Feeling slowed down	0	1	2	3	4	5	6
Feeling like "in a fog"	0	1	2	3	4	5	6
"Don't feel right"	0	1	2	3	4	5	6
Difficulty concentrating	0	1	2	3	4	5	6
Difficulty remembering	0	1	2	3	4	5	6
Fatigue or low energy	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
More emotional	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
Nervous or Anxious	0	1	2	3	4	5	6
Trouble falling asleep (if applicable)	0	1	2	3	4	5	6

Total number of symptoms:	of 22
Symptom severity score:	of 132
Do your symptoms get worse with physical activity?	Y N
Do your symptoms get worse with mental activity?	Y N
If 100% is feeling perfectly normal, what percent of normal do you feel?	

If not 100%, why?

_____

_____

_____

Please hand form back to examiner

5th Consensus (Updates)

- **Research supports multi-disciplinary therapeutic approach:**
  - **Return to Learn and cognitive support**
  - **Return to play protocol**
  - **Vestibulocular rehabilitation**
  - **Cervical rehabilitation**
  - **Graded Exertional Rehabilitation (ARP)**

5th Consensus (Updates)

- **Acute Phase Considered first 24-48hrs**
  (as opposed to 2-3 weeks -4th Consensus)
- **Early Intervention > Absolute Rest**
  - **Sub symptom threshold exertional rehab protocol (Revised RTP)**
  - **Vestibulocular/cervical exercises**
  - **Implement Return to Learn**

Reduced recovery time…

Decreased PCS mobidity

Better Outcomes!

Research

JAMA Pediatrics | Original Investigation

Early Subthreshold Aerobic Exercise for Sport-Related Concussion

A Randomized Clinical Trial

John J. Leddy, MD; Mohammad N. Haider, MD; Michael J. Ellis, MD; Rebekah Mannix, MD; Scott R. Darling, MD; Michael S. Freitas, MD; Heidi N. Suffoletto, MD; Jeff Leiter, PhD; Dean M. Cordingley, MSc; Barry Willer, PhD

New Advice to Move More After a Concussion

Phys Ed

By GRETCHEN REYNOLDS MAY 17, 2017

NY TIMES

May, 2017

John McDonnell/The Washington Post, via Getty Images

When young athletes sustain concussions, they are typically told to rest until all symptoms disappear. That means no physical activity, reading, screen time or friends, and little light exposure, for multiple days and, in severe cases, weeks.

Restricting all forms of activity after a concussion is known as "cocooning." But now new guidelines, written by an international panel of concussion experts and published this month in The British Journal of Sports Medicine, question that practice. Instead of cocooning, the new guidelines suggest that most young athletes should be encouraged to start being physically active within a day or two after the injury.

Active Rehab Protocol (ARP)

- **Sub symptom threshold exertion**
- **Monitored exertional tolerance test**
- **Steps 1-5 (light to max exertion)**
- **Establish SAFE exertional step:**
  - **Intensity**
  - **Modality**
  - **Duration**

November 5, 2018

Centers for Disease Control and Prevention Guideline on the Diagnosis and Management of Mild Traumatic Brain Injury Among Children

Angela Lumba-Brown, MD[1]; Keith Owen Yeates, PhD[2]; Kelly Sarmiento, MPH[3]; et al

» Author Affiliations

JAMA Pediatr. 2018;172(11):e182853. doi:10.1001/jamapediatrics.2018.2853

Consensus statement

American Medical Society for Sports Medicine position statement on concussion in sport

Kimberly G Harmon,[1] James R Clugston,[2] Katherine Dec,[3] Brian Hainline,[4] Stanley Herring,[5] Shawn F Kane,[6] Anthony P Kontos,[7] John J Leddy,[8] Michael McCrea,[9] Sourav K Poddar,[10] Margot Putukian,[11,12] Julie C Wilson,[13] William O Roberts[14]

Consensus Summaries

- Avoid routine CTs
- Validated tools
- PCS up to 20-30%
- Refer after 4-6 wks
- Avoid absolute cognitive rest >2-3d
- Rehabilitation>Meds

- ARP after 48hrs
- Vest/cerv rehab
- Multidisciplinary
- Customized RTL
- Validated cognitive and VOM tests
- ID PCS risk factors

CASE 2

- 17 yo female soccer player
- Slide tackled from behind
- Hits her head on the ground
- Laying on her back, not moving

- WHAT DO YOU DO?

On Field Sideline Assessment

- Determine level of consciousness
- Assess ABC's (airway, breathing, circulation)
- Palpate over cervical spine
- Maintain neck in neutral position
- Call 911 and transfer to medical facility if:
  - Tenderness over the C-spine
  - Prolonged loss of consciousness
  - Problems with breathing or circulation

Assessment of Basic Cognitive Function

- **Common Questions:**
  - **What is the name of this field?**
  - **Which team are we playing today?**
  - **Which quarter is it?**
  - **Which team scored the last points?**
  - **Did we win last week?**

On Field Sideline Management

- **NO SAME DAY RETURN TO PLAY!**
- **The player's helmet or other piece of essential equipment should be taken to prevent RTP**
- **The player should not be left alone**
- **The player should not drive home**

Concussion Presentation

- **Multiple manifestations**
- **No two concussions are exactly the same**
- **Physical symptoms and signs**
- **Cognitive symptoms**
- **Psychiatric/behavioral symptoms**

Emergent CT scan?

- Any neurological deficits
- History of prolonged LOC (>1min)
- Deterioration of symptoms
- Severe Headache (9-10/10)
- Persistent Confusion, AMS, or Impaired cognition
- Seizure, Suspicion of Skull Fracture

When to Send Athlete to ED

Subacute (1-5 days)

- **Increasing severity of headache (9-10/10)**
- **Sudden onset of vomiting, especially if headache is relieved by vomiting**
- **Micro hemorrhages can progress over days**

First 24-48 Hours

- No narcotic pain medications
- No alcohol consumption
- No sleeping aids
- No anticoagulants

CONCUSSION EVALUATION: Combination of Measures

- **Detailed history**
  - **Symptom checklist**
  - **Prior concussions**
  - **Red flags/Imaging?**
- **Neurologic exam**
- **Cognitive exam / MMSE**
- **Vestibulocular testing**

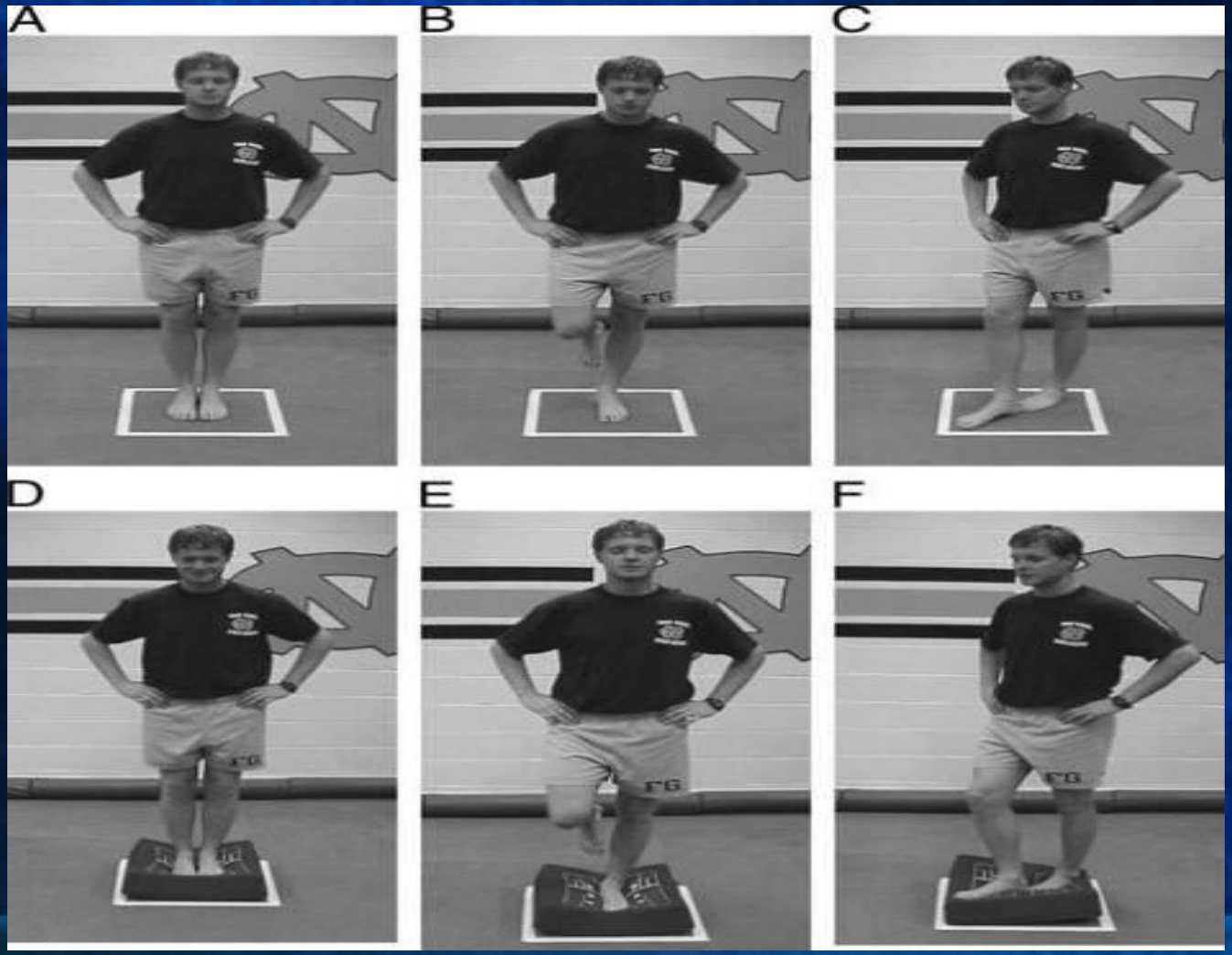
Concussion Symptoms

- **Physical symptoms**
- **Cognitive symptoms**
- **Psychiatric symptoms**
- **Sleep disturbance**

Mini Mental

- Immediate and delayed recall (3 words)
- Serial 7’s or 3’s
- Spell “WORLD” backwards
- Months or weekdays in reverse
- Numbers in reverse

mBESS TESTING



mBESS ERRORS

Document:

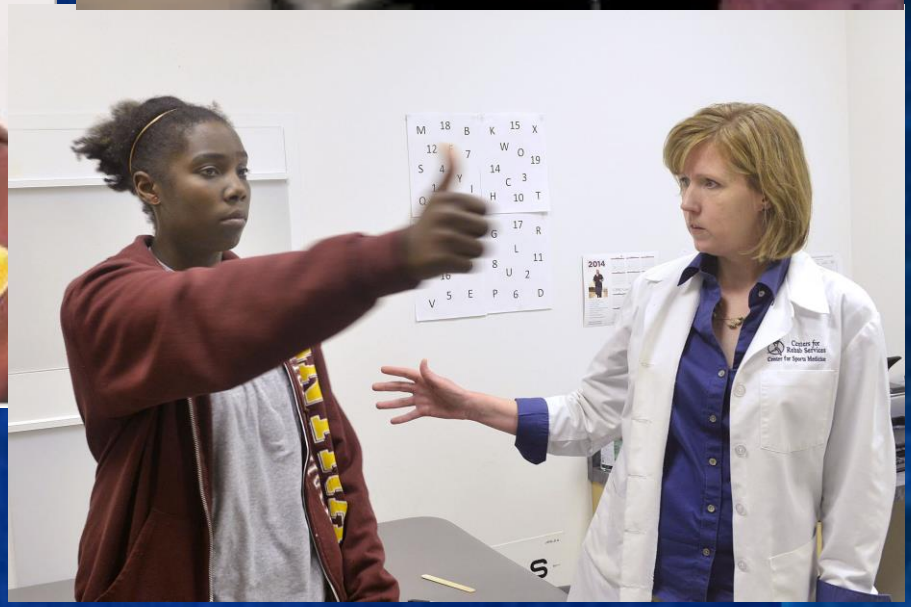
- **Hands lifted off iliac crest**
- **Opening eyes**
- **Step, stumble, or fall**
- **Hip abduction >30 deg**
- **Lifting forefoot or heel**
- **Moving out of test position >5 sec**

“VOMS”

- Smooth Pursuits
- Near Point Convergence (<6-8cm)
- Saccades (V/H)
- VOR/dolls eye (V/H)
- Visual Motor sensitivity

Mucha, AM etal. A Brief Vestibular/Ocular Motor Screening (VOMS) Assessmentto Evaluate Concussions: Preliminary Findings. Investigation performed at the University of Pittsburgh, Pittsburgh, Pennsylvania, USA. 2014.

VOMS



Management

- Tylenol for headaches (trigger avoidance!)
- Optimal nutrition, hydration, sleep
- Relative cognitive rest (RTL)
- Return to play protocol (RTP)
- ALL suspected concussions must be evaluated by a health care professional

Management

- **Discourage excessive brain stimulation:**
  - **Eliminate or limit…**
    - **TEXTING**
    - **VIDEO GAMES**
    - **INTERNET**
    - **T.V.**
    - **LOUD MUSIC**
    - **KNOWN TRIGGERS**

How Concussions Affect Students Academically

When student-athletes sustain a concussion, strict rules govern their return to play, but not their return to school.

BY JULIE RASICOT

Sally Egan, now a sophomore at B-CC High School, was diagnosed with a concussion two years ago after being kicked in the head during a soccer game.

Goalie Sally Egan watched as an opposing player approached her during a Saturday soccer scrimmage in February 2014. Focused on stopping the player from scoring, the 14-year-old dove for the ball just as the other girl swung her foot.

"The forward kicked me in the head," says Sally, now a 16-year-old sophomore at Bethesda-

School Accommodations

Do not go over the symptom threshold!

- **Allows the brain to continue healing without prolonging symptoms**
- **Keeps the student stimulated (avoid potential for increase in depressive symptoms)**

RETURN to LEARN

- Depending on severity of symptoms may need up to 1-2 days off (RED ZONE)
- Part time with maximal individualized accommodations (ORANGE ZONE)
- Full time with partial supports (YELLOW ZONE)
- Gradual return to normal school work as tolerated by symptom threshold (GREEN)
- Back to full academics and sports (BLUE)

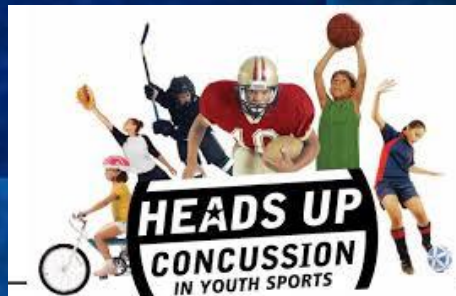
Guidelines for Teachers

RED ZONE
- Student needs total cognitive rest. Should not be in school or doing academic work.

ORANGE ZONE
- Attendance may be inconsistent based on level of symptoms and time of day
- Prioritize and excuse assignments based on most essential goals of course
- If symptoms worsening, send student to the nurse
- Expect limited class participation (more listening than speaking/writing/reading)
- Avoid tests, quizzes, and computer or screen-based assignments
- May need audio books or oral exams
- Be prepared to help student accommodate light and noise sensitivity
- REMEMBER: Student may not be able to self-advocate

YELLOW ZONE
- Excuse past assignments and units as possible
- Student should only take one test or quiz a day
- Anticipate occasional absences due to flares
- Set a schedule for the completion of any work that cannot be excused
- Student may still require accommodations such as audio books, extended time on tests or large assignments, and limited screen-based assignments

GREEN ZONE
- For new work, academic expectations can be back to usual
- Student will be working to complete accommodated work load (according to agreed upon modifications) for all classes.
- REMEMBER: most students can **not** make up every assignment they missed
- Back to usual academic expectations



Neurocognitive Testing

- Degree/type of cognitive impairment
- Targeted accommodations
- Baseline vs normative data
- Sport clearance tool
- Persistent or severe cognitive deficits >> Formal “NP” testing with neuropsychiatrist

ImPACT® Clinical Report

Exam Type	Baseline	Post-Injury 1	
Date Tested	08/19/2014	10/30/2014	
Last Concussion			
Exam Language	English	English	
Test Version	2.1	2.1	

Composite Scores		Percentile scores if available are i		
Memory composite (verbal)	82	31%	**63**	<1%
Memory composite (visual)	45	1%	53	5%
Visual motor speed composite	29	9%	31.28	15%
Reaction time composite	0.52	83%	0.57	58%
Impulse control composite	19		17	
Total Symptom Score	4		**69**	
Cognitive Efficiency Index*	**0.32**		**0.15**	

The Cognitive Efficiency Index measures the interaction between accuracy (percer
(reaction time) in seconds on the Symbol Match test. This score was not develope
decisions but can be helpful in determining the extent to which the athlete tried
match (decreasing accuracy) or attempted to improve their accuracy by taking a mo
approach (jeopardizing speed). Low scores (0 to .20) may in some cases suggest l
this subtest.

Scores in **Bold RED** type exceed the Reliable Change Index (RCI) when compared
However, scores that do not exceed the RCI index may still be clinically significant.
are listed in small type.

Hours slept last night	6		
Medication	singulair		

Return to Play Protocol (RTP)

1. Light exercise: Walking or stationary cycling
2. Moderate sport specific activity with lateral movement
3. Vigorous non contact exertion, resistance training
   Medical Clearance recheck required
4. Practice with body contact and no symptoms
5. Return to game play

Note: If symptoms worsen/return, resume protocol in 24hrs at the previous step.

5th Consensus Statement on Concussion in Sport. BJSM April 2017.

If your teen is well enough to play sports, they are well enough to attend school full-time and to take all tests and do all homework

Additional Points

- Before RTP, most pharmacology medications need to be stopped
- Must be symptom-free off meds
- OK to continue ADHD & antidepressant medications

Sports Clearance?

- **Must meet several requirements:**
  - **Must be symptom free (off meds)**
  - **Normal exam**
  - **Back to full time/workload at school**
  - **Cognitive testing back to BL/norms**
  - **Maximal exercise tolerance**

Who to Refer...

- Prolonged symptoms (PCS) >4 weeks
- Multiple concussions
- Younger age group (pre-teens)
- Structural lesions (skull fx, ICH)
- Symptoms/signs on presentation?

5th Consensus (2016 Updates)

- **Early Risk Factors for prolonged symptoms:**
  - **Severity of initial symptoms**
  - **Migraine type HA (photo/phono)**
  - **Dizziness, VOMS +**
  - **Psychiatric co-morbidity (depression)**
  - **No perfect way to predict**

Investigational

- **Functional Neuroimaging**
  - **Diffusion tensor imaging**
  - **fMRI, SPECT, MR spectroscopy, PET**
  - **Event-related potentials**
- **Serum biomarkers**
  - **SNE, SB100, etc**
- **Genetic Markers**
  - **Apo E gene profiles**

...require further validation to determine their ultimate clinical utility in evaluation of SRC.

- 5th Concussion Consensus

Concussion Prevention

- Properly fitted equipment
- Rules/laws:
  - Limit forceful collisions
  - Senate bill 1521
- Appropriate recognition and diagnosis (Education)
- Age appropriate sporting rules
- Cervical and visual spatial training

Prevention?

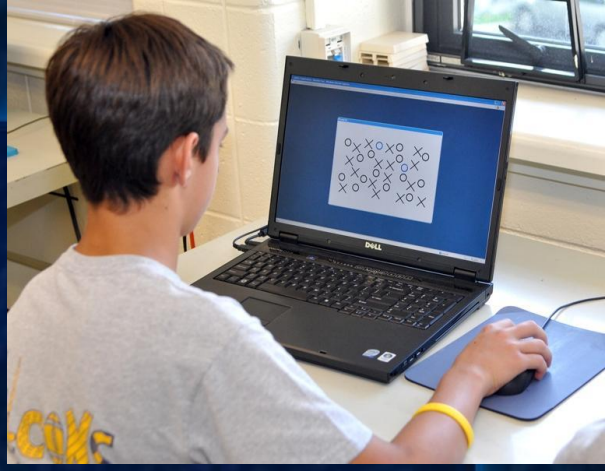
- Helmets?
- Guardian Caps?
- Header bands?
- Sensors?

No Evidence

Do Helmets Protect Against Concussions?

- Research has NOT shown a decrease in rates of concussion with newer helmets
- Decrease in skull fractures

Baseline Testing



- NO UNIVERSAL RECOMMENDATIONS
- Control for variability of normative data
- Cognitive testing most commonly done
- Balance, vision, reaction time other domains with comprehensive BL tests
- Most critical in high risk athletes

ImPACT™

Reminders for Days Following Concussion

- **Majority without LOC**
- **Recovery Can take up to a month**
- **RETURN to LEARN/SPORT**
- **Cognitive Testing**
- **Early Comprehensive Care and Rehabilitation Services**
- **Be conservative with Diagnosis and Return to sport**

Want More…

- 5th Consensus
- SCAT 5 assessment tool
- CDC/AAP/AMSSM
- VOM Screening tool
- Our website:

SPARCCTUCSON.COM

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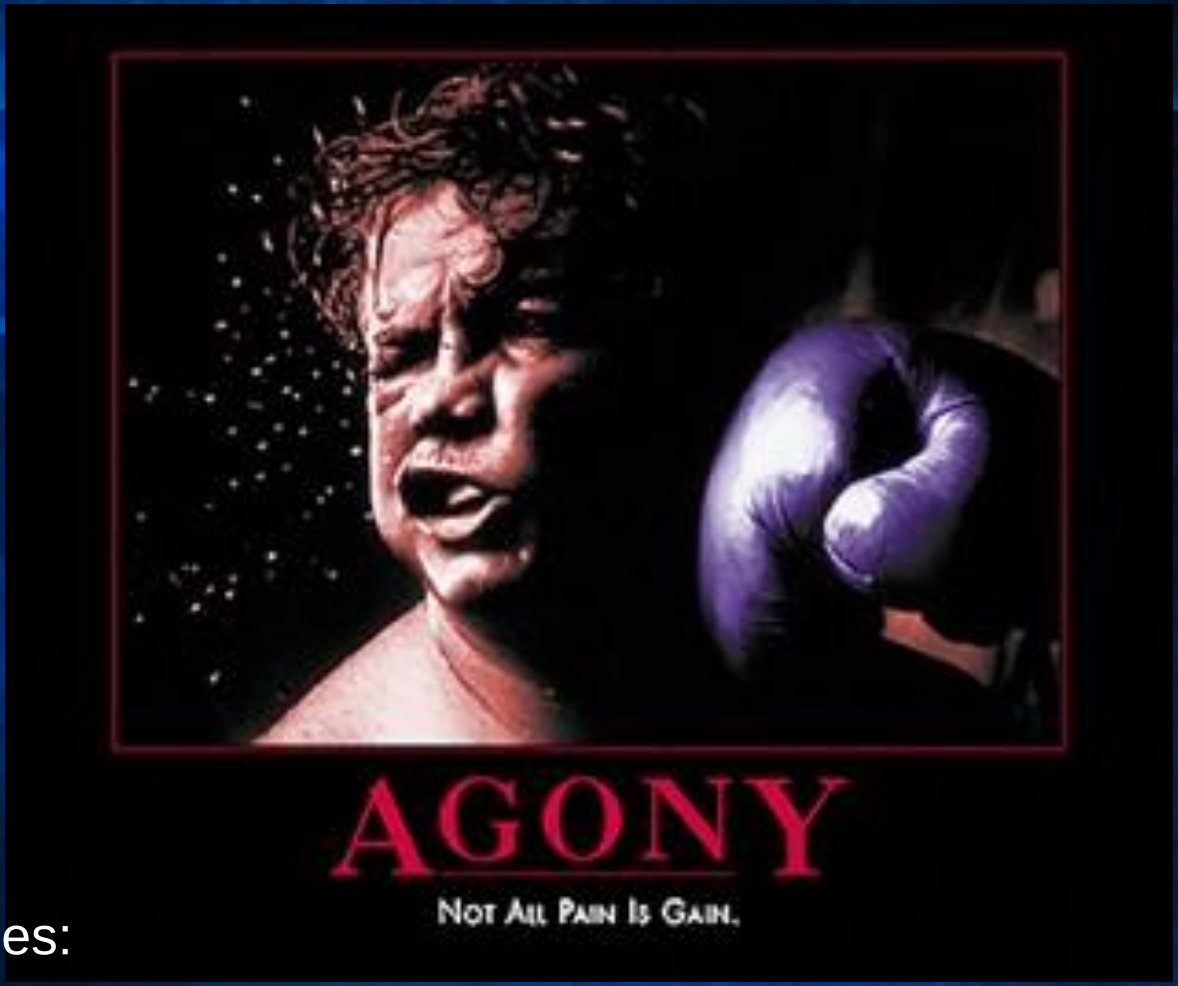
Sports Medicine • Rehabilitation • Concussion Care



References:

1. 5th Consensus Statement on Concussion in Sport. BJSM April 2017.
2. Mucha, AM etal. A Brief Vestibular/Ocular Motor Screening (VOMS) Assessmentto Evaluate Concussions: Preliminary Findings. Investigation performed at the University of Pittsburgh, Pittsburgh, Pennsylvania, USA. 2014.