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**Weill Cornell
Medicine**
Medical College

Concussions: Controversies and Management with Interdisciplinary Team

Emerald Lin, MD

Physical Medicine and Rehabilitation
and Traumatic Brain Injury Board Certified
Assistant Attending Psychiatrist, Hospital for Special Surgery
Assistant Professor of Clinical Rehabilitation Medicine, Weill
Cornell Medicine

Overview

(Mis)diagnosis:

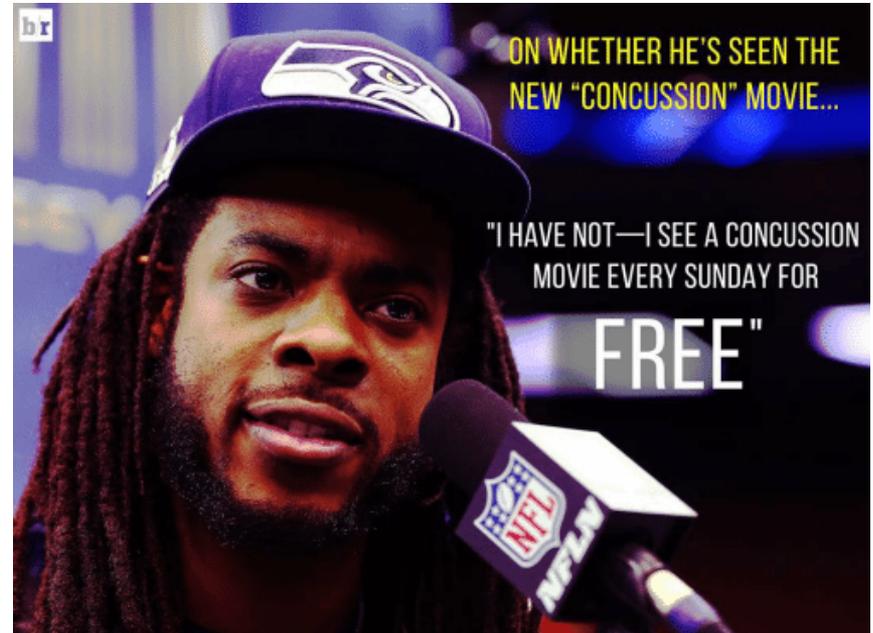
-PCS or somatization

Treatment:

-Exercise versus rest

Berlin Consensus Statement

What is best for our kids?

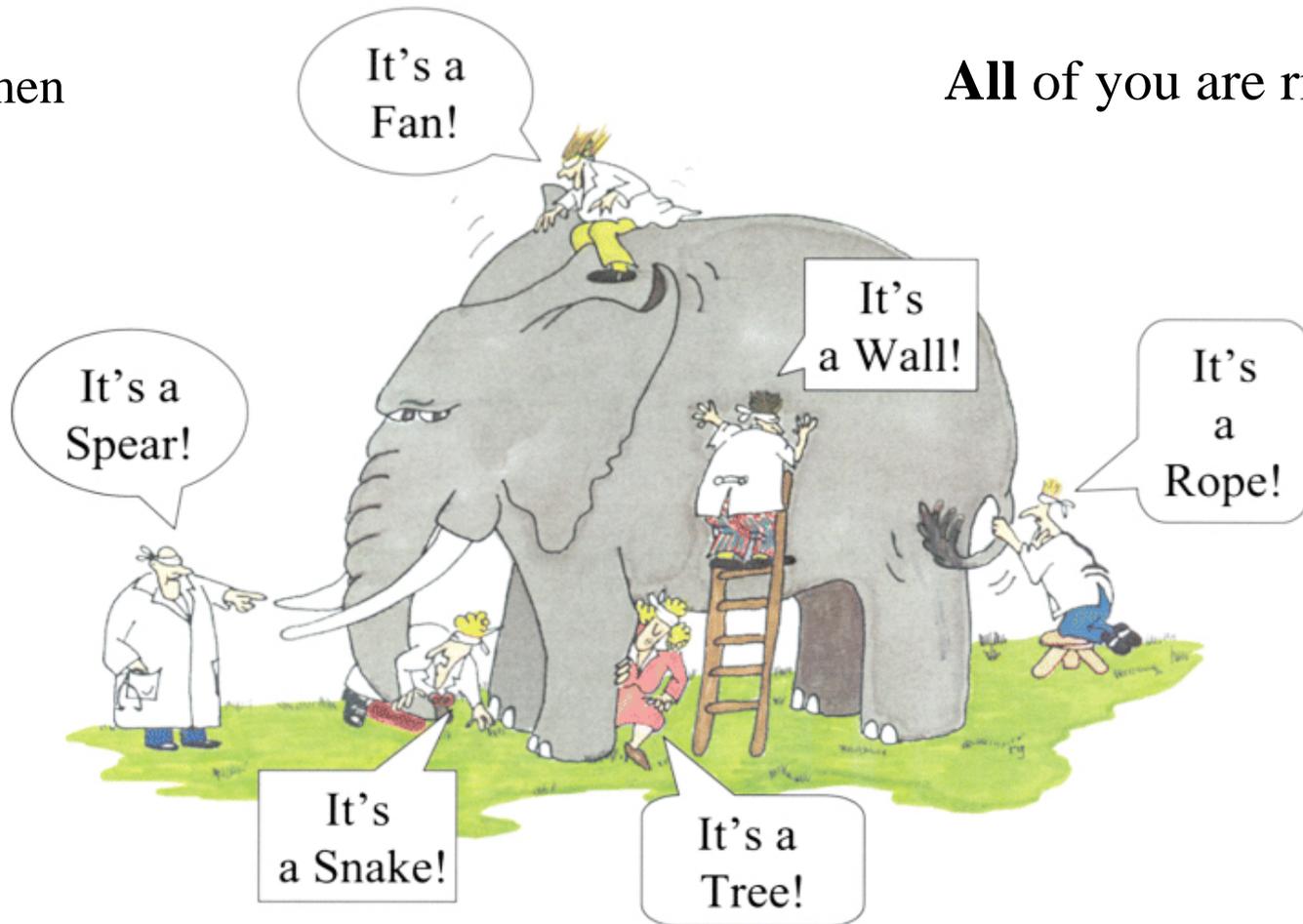


Seahawks' Richard Sherman holds nothing back when asked about the movie "Concussion."

Power of Perspectives

6 blind men

All of you are right!



Concussions varied for individual, #1, #2
Perspective of diagnosis and management

<http://www.pinkconcussions.com/blogreal/2015/12/6/the-6-blind-men-and-the-elephant-the-story-of-concussion>

Diagnosis

Subjective self-symptom reporting

Sideline- SCAT 5

Neurocognitive testing

Labs

Imaging

At present, there is no perfect diagnostic test or marker that clinicians can rely on for an immediate diagnosis of Sports Related Concussion (SRC) in the sporting environment.



(Mis)Diagnosis: Persistent Symptoms

Prolonged Symptoms

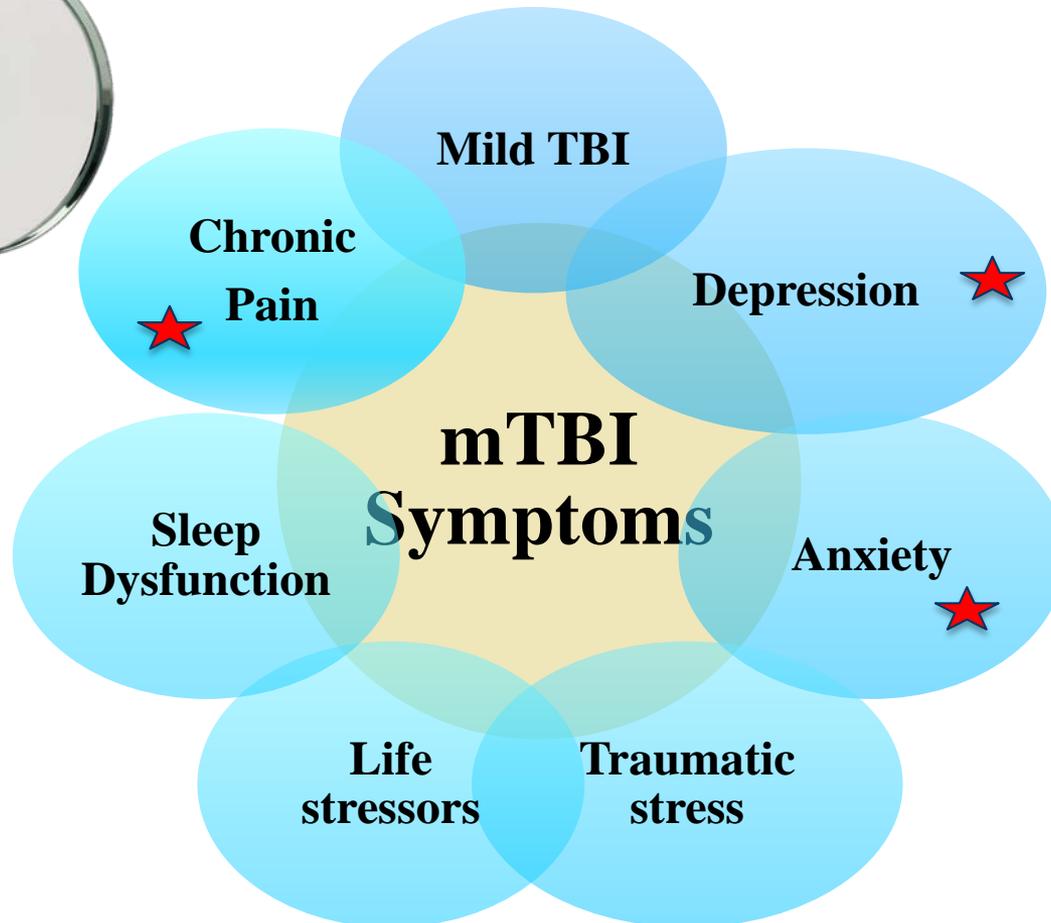
*‘Persistent symptoms’ does not reflect a single pathophysiological entity, but describes a **constellation of non-specific** post-traumatic symptoms that may be linked to coexisting and/ or confounding factors,*

which do not necessarily reflect ongoing physiological injury to the brain.

*A detailed **multimodal clinical assessment** is required to identify specific primary and secondary pathologies that may be contributing to persisting post-traumatic symptoms.*

Berlin Consensus Statement 2016

Is It PCS or Is It Something Else?



Using ICD 10 Diagnostic Criteria

Patients with Depression Only

Mild symptoms

89.1%= PCS

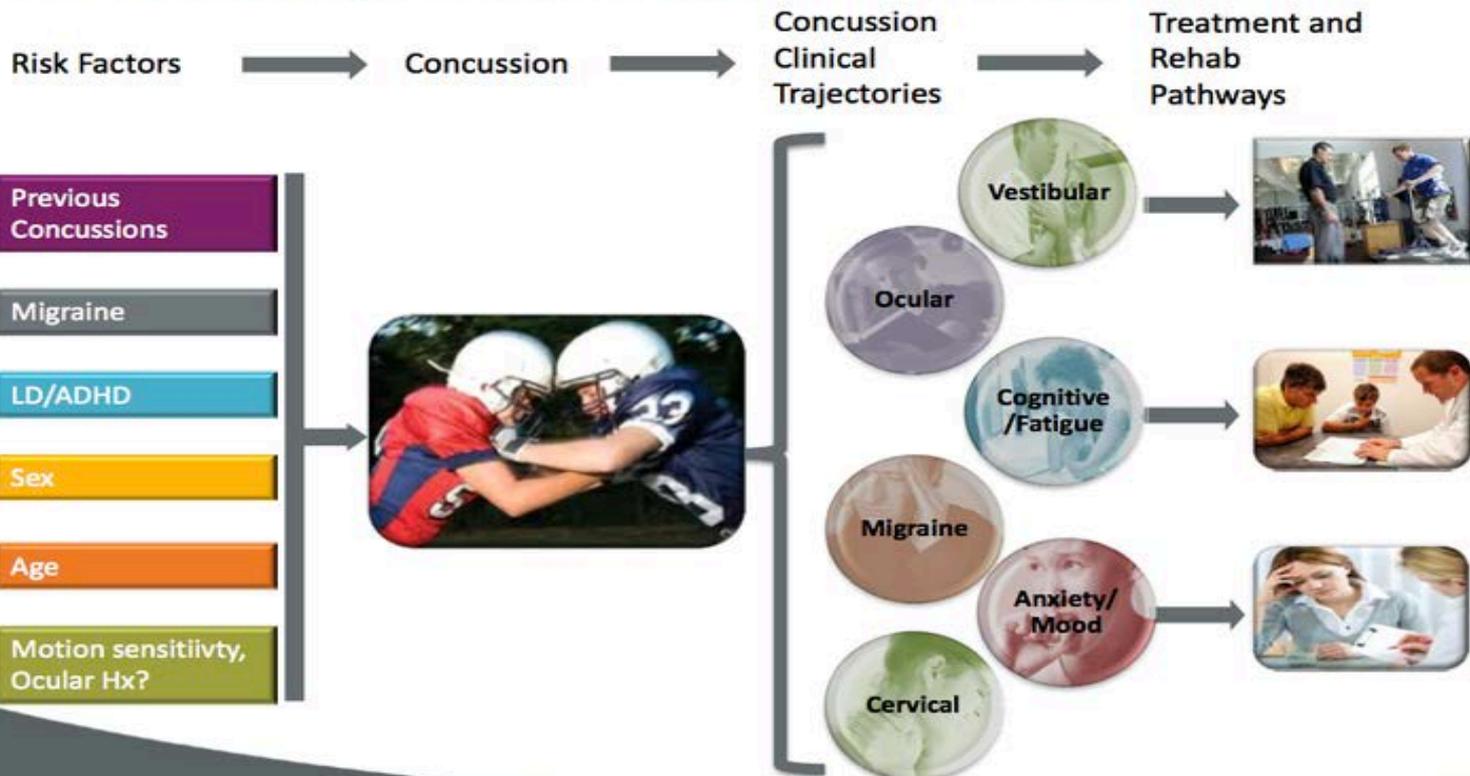
Moderate – Severe Symptom Endorsement

57.8%= PCS



Treatment

Using Concussion Clinical Trajectories to Inform Targeted Treatment Pathways



Most Agreement, Consensus, and Position Statements past 15 Years

Focus on “Management”, not treatment or rehabilitation

Three Components

- Return to school
- Rest
- Gradual, stepwise return to sports

Rest or Exercise/Activity?

What is “rest”?

How long should an athlete rest?

What is “gradual” resumption of activities?

How much rest is **too much** rest?

When should we begin active rehabilitation?



Why is Cognitive and Physical Rest Important?

Concussion may affect cerebral pathophysiology:

- days in animals, weeks in humans
- may be significant changes in cerebral glucose metabolism in those with normal GCS *
- brain may be in neurometabolic crisis.

Therefore, vigorous activity may compound or magnify energy crisis.

Additional mechanical force passing through injured brain may cause magnified pathophysiology.

*Younger brains especially vulnerable- development, “grow into their deficits”

“Playing Through It” Effects on Recovery Time

Asken et al., 2016

97 collegiate athletes with sport-related concussion

- grouped as Immediate Removal (IR) or Delayed Removal (DR) from activity

DR athletes: averaged 4.9 more days missed than IR athletes.

-2.2 times more likely to have prolonged recovery (8+ days)

Elbin et al., 2016; Pediatrics

35 youths removed from play after concussion vs. 35 who continued to play

Neurocognitive and symptom data - baseline, 1-7 days and 8- 30 days post injury.

PLAYED group:

Longer recovery (**44.4** ± 36.0 vs **22.0** ± 18.7 days, (P = .003)

8.80 times more likely to have protracted recovery (≥21 days) (P<.001).

Significantly **worse** neurocognitive testing and greater symptoms than REMOVED group.



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Why Not Rest?

Strict Rest Effect on Symptoms

99 youths, ER 24 hours post concussion, RCT (1)

Usual Care: **1-2 days** of rest followed by gradual return to activities

Prescribed Rest: **5 days of strict rest** (intervention) followed by gradual return to activities.

No clinically significant difference in neurocognitive or balance outcomes.

Intervention group - more daily PC symptoms ($p < .03$) and slower symptom resolution.

Strict rest immediately after concussion had **no added benefit** over usual care. Symptom reporting influenced by recommending strict rest.

Prospective, multicenter cohort, 3063 youths, 5-18 years old, acute concussion (2)

Early physical activity participation within 7 days postinjury.

Early physical activity associated with lower PPCS risk [**28.7%** - early physical activity vs 40.1% - no physical activity]

Physical activity within 7 days of acute injury vs no physical activity **associated with reduced risk of PPCS at 28 days.**



Is Rest After Concussion “The Best Medicine?”:

Reviewed scientific recommendations for activity resumption following concussion in athletes, civilians, and military service members.

Conclusion:

Bed rest surpassing 3 days NOT recommended and gradual resumption of pre-injury activities should start as soon as tolerated.

Possible Harms of Prolonged Rest

Falling behind in school with increased associated stress

Taken away from team sports setting

Physical deconditioning and evolving exercise intolerance

Nocebo effects (expectation of sickness as a cause of sickness)

Somatic preoccupation and Cognitive Hypochondriasis

Depression

- reduction in activities because of physical illness or injury is one of 3/44 variables assessed strongly specific to depression in adolescents (Lewinsohn et al., 1997)

2016 Berlin Consensus Statement

*“There is currently **insufficient evidence** that prescribing complete rest achieves these objectives [ease discomfort, promote recovery].*

*After a **brief period of rest during the acute phase (24–48 hours)** after injury, patients can be encouraged to become gradually and progressively more active while staying below their cognitive and physical symptom-exacerbation thresholds (ie, activity level should not bring on or worsen their symptoms).*

The exact amount and duration of rest is not yet well defined in the literature and requires further study. ”

(McCroory et al., 2016)

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Exercise as Treatment

Exercise as Treatment

Facilitates neuroplasticity molecular markers and promotes neurogenesis in healthy rodent brain and injured brain.

Associated with neurotransmitter system changes

Improved mood and lower stress

Improved sleep quality

Positive responses of self-esteem

Effective treatment or adjunctive treatment for mild anxiety and depression

Associated with reduced pain and disability in patients with chronic low back pain

Regular long-term aerobic exercise reduces migraine frequency, severity, and duration



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Chaoulloff, 1989; Molteni, Ying, & Gomez-Pinilla, 2002), (Callaghan, 2004; Conn, 2010), (Youngstedt, 2005), (Ekeland, Heian, Hagen, Abbott, & Nordheim, 2004), (Daley, 2008; Mead et al., 2009; Rethorst et al, 2009), (Bell & Burnett, 2009; Henchoz & Kai-Lik So, 2008), (Koseoglu, et al, 2003; Lockett & Campbell, 1992),



Exercise for PCS

Adults: Intervention: Subsymptom threshold daily aerobic exercise

6 athletes, 6 non athletes with persistent symptoms post concussion [6 wks-12 months]

-exercised 5–6 times per week until asymptomatic with exhaustive exercise.

Ave time to completion: Athletes: 25 days (sport); Non-Athletes: 75 days (work)

All patients able to return to pre-injury levels of activity. ¹

10 adolescents symptomatic >1 month post injury

Active rehabilitation : 2-15 weeks, including light aerobic exercise, reassurance, normalization of recovery, and stress/anxiety reduction strategy

All with improvement in symptoms and functioning during treatment (after 6 weeks), achieved asymptomatic status, and returned to full activity participation (including sports). ²

2016 Berlin Consensus Statement

“There is currently insufficient evidence that prescribing complete rest achieves these objectives [ease discomfort, promote recovery].

*After a brief period of rest during the acute phase (24–48 hours) after injury, **patients can be encouraged to become gradually and progressively more active while staying below their cognitive and physical symptom-exacerbation thresholds (ie, activity level should not bring on or worsen their symptoms).***

It is reasonable for athletes to avoid vigorous exertion while they are recovering.

The exact amount and duration of rest is not yet well defined in the literature and requires further study. ”

(McCrory et al., 2016)

It Take a Team:

Collaborative Care for Adolescents With Persistent PCS

11-17 y/o with >1 month post SRC randomized to receive collaborative care (CBT, care management and psychopharmacology) or usual care

Collaborative care group- clinically and statistically significant improvements in PC symptoms and functional gains at 6 months compared to controls.

13.0% of intervention patients vs 41.7% of control patients reported high levels of PC symptoms

78% of intervention patients vs 45.8% of control patients reported $\geq 50\%$ reduction in depression symptoms

Collaborative care treatment approaches for slow-to-recover adolescents may be useful given decreased PCS, co-occurring psychological symptoms, and improved quality of life.

Long term sequelae? CTE

Chronic Traumatic Encephalopathy/CTE: Potential chronic neurological issue, but in research in early stages, need more prospective longitudinal studies

-current studies lacking in design, prospective construct, potential of referral and recall bias

- Unclear if pathologic findings post mortem cause presumed neurobehavioral sequelae and whether presumed RF (sports, concussions, subconcussive blows, are sole cause of clinical sign and symptoms]; IOM: (1)

Whether repetitive head impacts and multiple concussions during youth leads to long term neurodegenerative diseases (CTE, AD) unclear.

Subconcussive blows: short term not shown to cause significant clinical effects, likely “small or non existent”. “Longer-term prospective studies are needed to determine if there is a cumulative dose effect.” (2)



Role of Psychiatrist

Psychiatry/PMR- Unique knowledge base, clinical skills and perspective

Our training involves aspects and qualities that apply specifically to management and care of concussion patients:

- Addressing intrinsic complexities of both physical and psychological effects in a patient-centered approach
- TBI knowledge base (neuroanatomy and physiology, neuropsychological testing, and clinical presentation) to effect appropriate care through individualized integration of structural and functional assessment
- Balancing patient needs with various potentially competing parties (ie , parents, coaches, teachers, spouses, agents, and team officials)
- Coordination of care, working as team leader and with interdisciplinary care providers
- Advocacy for disability and injury prevention- Lystedt Law



Consensus Statement on Concussion in Sport

The 5th International Conference on Concussion in Sport

- Recognize
- Remove
- Re-evaluate
- Rest
- Rehabilitation
- Refer
- Recovery
- Return to Sport
- Reconsider
- Residual Effects and Sequelae
- Risk Reduction

Follow concussion guidelines, but keep children active

Originally published May 8, 2017 at 2:36 pm | Updated May 8, 2017 at 2:55 pm

New concussion protocol should not keep kids off play field.

The Seattle Times

NEW research on how young athletes should be treated for concussions on and off the field is welcome news for both parents and coaches.

But a Seattle doctor who was on the international research panel that created the 2017 Consensus Statement on Concussion in Sports hopes parents won't use this information as a reason why their children shouldn't be playing sports.

Dr. Stanley Herring, director of the University of Washington Sports Health and Safety Institute, says **exercise is essential to a child's longterm health**. The concussion protocols published last month in the British Journal of Sports Medicine are **designed to keep athletes as safe as possible and all youth sports programs should adopt them. But parents also need to keep their kids active.**



Important Points from the Berlin Consensus Statement

- Student athletes suspected of sustaining a concussion should be removed from play/practice immediately and be evaluated by a healthcare professional trained in concussion management..
- A brief period of rest (1-2 days) is recommended. Prolonged or intentional rest may paradoxically lengthen symptoms.
- Prolonged symptoms do not necessarily reflect ongoing pathophysiological injury. Further evaluation and management may require a multimodal clinical assessment.
- Schools should have a concussion policy including prevention and management for staff, students, and parents. A short (2-5 day) leave may be needed. Adolescents may require more accommodations.
- Return to school should occur before returning to sport but students should begin symptom- limited physical activity, progressing into non-contact supervised exercise.



Take Home Points

Symptoms of mild TBI can be **mimicked or magnified** by traumatic/psychological stress, anxiety, pain, depression, sleep disturbance, and social psychological factors at **any** point during recovery.

Recently, there has been increasing awareness:

Rest is insufficient for some athletes,

Too much rest and activity restriction can have negative consequences

Active rehabilitation is indicated for some athletes.



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