




Eric J. Freitag, Psy.D.
 Mt. Diablo Memory Center- Executive Director,
 Neuropsychologist, Credentialed ImPACT Consultant™

**Hot Topics In Sport Medicine
 May 7th 2011**

What Every Parent Should Know About Concussions!

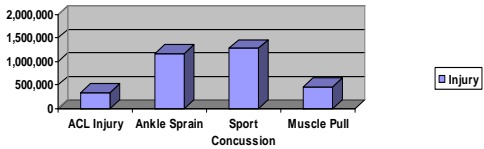
1. Brief overview of concussion diagnosis, facts and data
2. Top 5 Myths of Concussion
3. Top 5 Concussion Management Strategies
4. Where do we go from here?

Why is this Important ?

- ▶ Topics of Concern
 - When to return to play/activity
 - Over reliance on patient self report to guide management
 - Variability in practitioner recommendations
 - Lack of education and awareness of injury

Sport Concussions: A Public Health Crisis?

11/13/2008 Google Term Search



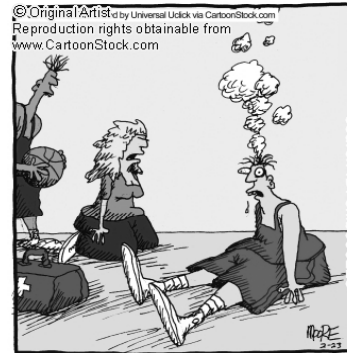
Injury Type	Approximate Search Volume
ACL Injury	400,000
Ankle Sprain	1,200,000
Sport Concussion	1,500,000
Muscle Pull	400,000

Legend: Injury

- Peer Reviewed Research on TBI
 10 Years > 50 Years

What about the numbers?

- ▶ 7.3 Million High School Athletes Nationally
- ▶ Number of TBI per year?
 - CDC estimates 1.7 million – 3.2 million
 - 75% are considered mild
- ▶ Estimated $\approx 10\%$ of contact sport athletes will experience a concussion each season

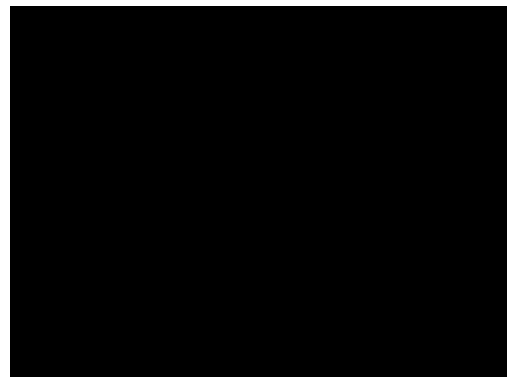


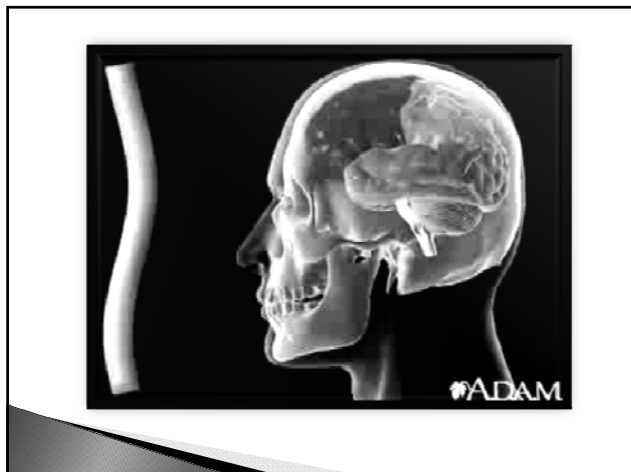
"I don't think it's a concussion ... although the smoke has me a little concerned."

Definition of Mild Traumatic Brain Injury (MTBI or Concussion): (ACRM 1993)

▶ A Traumatically induced physiological disruption of brain function, as manifested by *at least* one of the following:

- Any loss of consciousness
- Any loss of memory for events immediately before or after the injury
- Any alteration in mental state at the time of accident (e.g. feeling dazed, disoriented, confused)
- Focal neurologic deficit(s) that may or may not be transient





What is Happening in the Brain

- ▶ Rotational or linear blow causes brain to impact skull body
- ▶ Damage to axons by stretching, shearing or tearing
- ▶ Axonal trauma causes metabolic pathology and subsequent cascade of changes
- ▶ During time of metabolic abnormalities, brain is at an exceptionally high risk toward further injury
- ▶ Metabolic abnormalities can last days, weeks or months



Female Athletes & Concussions

- ▶ Females in equivalent sports, experience higher rate of concussion injuries
 - Neck Strength
 - Hormonal differences
 - Anatomical Sensitivity
 - Cultural differences



Myth 1: Children bounce back quickly and don't require follow up treatment

- ▶ Developing brains are more sensitive to injury and symptoms
- ▶ Younger children require longer recovery time
- ▶ Behavioral or emotional symptoms may be attributed to acting out

Myth 2: Athlete may return to play 1 week after a concussion

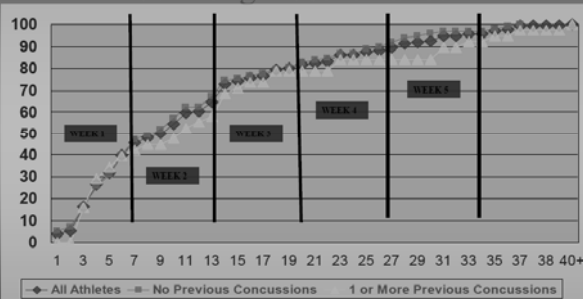
- ▶ How long should an athlete stay out of play?
- ▶ Cookbook approaches put athlete's at risk

Study 1: How long does it take a high school/college athlete to recover from a concussion?

- Memory scores continued to be diminished when compared to controls 8 days after injury
- Reaction time continued to be diminished 5 days post injury when compared to controls
- Scores reflect average time to return to baseline

Lovell MR, Collins MW, Maroon et al. Medicine and Science in Sports Exercise, 34:5;2002

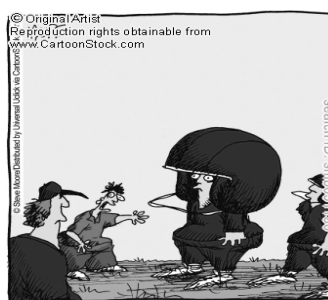
Recovery From Concussion: How Long Does it Take?



N=134 High School athletes

Collins et al., 2006, Neurosurgery

Myth 3: Wearing a helmet will prevent a concussion



"Voilà ... Concussion-proof!"

- ▶ Helmets protect against catastrophic injury (skull fracture, severe trauma)
- ▶ No evidence that any sport helmet (football, soccer, lacrosse, etc.) will prevent concussion
- ▶ Do players adjust play based upon perceived protection?

Myth 4: Athletes can/will accurately report their symptoms

- Measurement of asymptomatic athletes after "Mild Concussion"
- Asymptomatic athletes showed diminished memory, reaction time, and processing speed 4 days post injury
- Are these athletes lying about their symptoms?

Lovell MR, Collins MW, Maroon et al. *Medicine and Science in Sports Exercise*, 34:5;2002

Myth 5: Mental exertion will not do any harm after a concussion

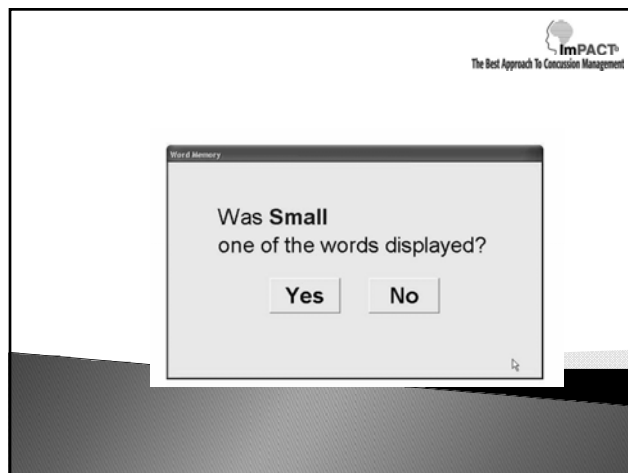
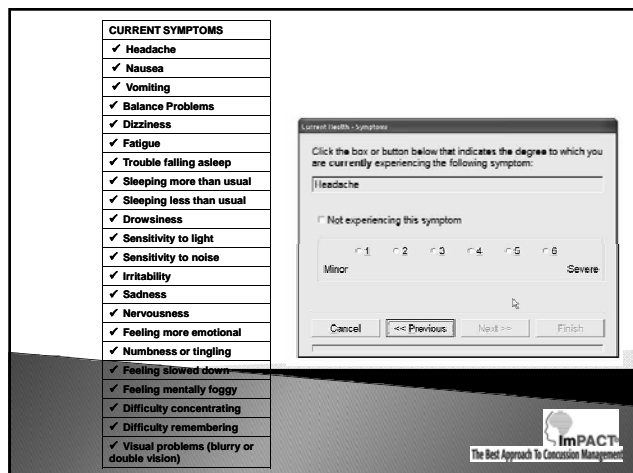
- ▶ Any increase in metabolic demand can increase symptoms
- ▶ Study: Showed H.S. athletes who did not alter activity level had 2x longer to recover
- ▶ Dose dependent response

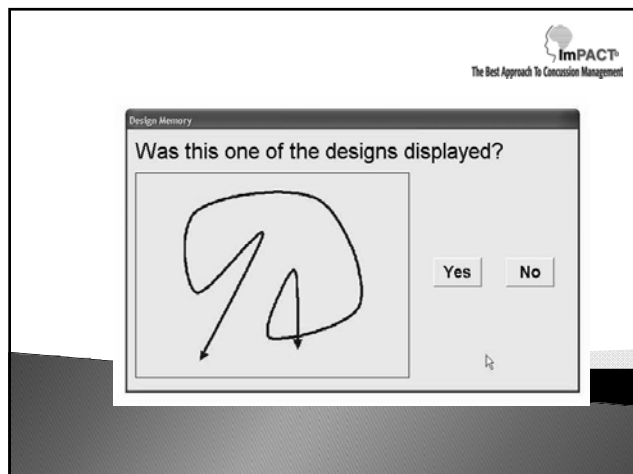
Case Example

- ▶ 13 y.o. Female
 - Hit in head with Soccer Ball (not expecting)
 - Typical symptoms with headache most prominent
 - Did not return to play
 - Continued to go to school while symptomatic
 - One week later item at home slipped off shelf and hit in back of head
 - Symptom severity increased significantly
 - Continued to go to school, with intermittent time off

Case Example

- ▶ Approximately 1.5 months later (still symptomatic, but improving)
 - No P.E., but watching and hit in head by dodgeball
 - Significant increase in symptom severity
 - Continued intermittent school
 - GPA High 3.0s down to mid 2.0s
 - Symptoms continued to persist
- ▶ One month after dodge ball incident patient came to my clinic





Exam Type	Post Injury 1	
Date Tested		
Last Concussion		
Exam Language	English	
Test Version	2.0	
Composite Scores		Percentile scores if available ar
Memory composite (verbal)	71	13%
Memory composite (visual)	42	<1%
Visual motor speed composite	20.4	<1%
Reaction time composite	0.79	16%
Impulse control composite	18	
Total Symptom Score	57	

Top 5 Concussion Management Strategies



► Step 1 : Baseline Concussion Testing

- What is a baseline test?
 - Measure of cognitive functions of a brain pre-injury
 - Computerized version 25–30 minutes
- Why is a baseline important?
 - Apples to Apples Comparison
 - Important in cases of pre-existing condition
- What if there is no baseline and athlete is injured?

Step 2 : Sideline Management

- ▶ If a concussion is suspected, remove athlete from play and do not allow to return until cleared by a medical professional who has expertise in concussion care

- Sideline Concussion Card

Step 3: After a concussion, always error on the side of rest. It is important to rest. You should rest. Did I mention rest!


- Minimal physical exertion
- Minimal cognitive exertion
 - No/modified school schedule
 - Video games, movies, texting, computer
- If athlete is bored, they are doing their job!
- Pretend to have the flu until symptoms subside

**Step 4: Injury must be properly MANAGED**

- ▶ Care from provider knowledgeable in concussion treatment
- ▶ Close monitoring of symptoms by provider and at home
- ▶ Vigilant about activity level (especially in post acute period)
- ▶ Slow introduction of increase in activity
- ▶ School/academic management

**Step 5: Make A Safe Return to Play**

- ▶ Athlete is no longer symptomatic at rest or exertion
- ▶ Post-injury cognitive scores return to baseline or normal
- ▶ Athlete can begin a graduated return to exertion
 - Increasing intensity of exertion, separated by 24 hours of symptom monitoring
 - Graduated return approximately 5-7 days
- ▶ Cognitive scores stable and symptom free= Athlete can return to full participation



ImPACT™ Clinical Report

Exam Type	Post Injury 1	Post Injury 2	
Date Tested			
Last Concussion			
Exam Language	English	English	
Test Version	2.0	2.0	
Composite Scores	Percentile scores if available are listed in small		
Memory composite (verbal)	71 13%	89 78%	
Memory composite (visual)	42 <1%	45 <1%	
Visual motor speed composite	20.4 <1%	27 19%	
Reaction time composite	0.79 16%	0.72 37%	
Impulse control composite	18	5	
Total Symptom Score	57	7	

What Are the Risks of Mismanagement?



- ▶ Second IMPACT Syndrome
 - Consequence of neurometabolic cascade
 - Subsequent brain trauma while recovering from initial trauma
 - Brain edema with significant risk of fatality or serious brain trauma
 - Occurs exclusively in young brains and is very rare

What Are the Risks of Mismanagement?



- ▶ Post Concussion Syndrome
 - Continual irritation of injury due to lack of rest and opportunity for recovery
 - Ongoing increase in metabolic demands extends duration of recovery
 - Brain continues to be very susceptible to re-injury

What Are the Risks of Mismanagement?



- ▶ Early Retirement From Sport
 - Often consequence of PCS and subsequent re-injury
 - **RED FLAG WARNING SIGNS**
 - Less biomechanical force to cause injury
 - Sometimes no contact
 - Extended symptom duration

What Are the Risks of Mismanagement?



- ▶ Long Term Effects of Repetitive Brain Trauma
 - Chronic Traumatic Encephalopathy
 - Youngest case 18 y.o. football player
 - Permanent brain damage with an impact on capacity to learn and function

Where do we go from here?

- ▶ Is utilization of cognitive testing required in management of concussion injury?
- ▶ A concussion affects the way our brain functions
 - Cognitive testing is **OBJECTIVE**
 - Physical signs and symptoms are **SUBJECTIVE**
 - Computerized testing is brief and repeatable
 - CDC, WHO, ISCS, NATA, endorse cognitive testing as an essential **tool** in management of MTBI

Where do we go from here?

- ▶ What if cognitive testing is not available?
 - Continue to manage in same manner
 - Calls for more conservative approach because of uncertainty if athlete has obtained a full recovery
- ▶ If I had a million dollars \$\$\$\$\$
 - \$900,000 should be spent on education for coaches, athletes, providers, parents and administrators
 - Better all around management of injuries = I would happily be out of a job!

Educational Resources

Websites

Coaching Education

<http://activecoach.orcasinc.com/>

Player Education

www.nanonline.org/NAN/Home/FootballVideo.aspx

Mt. Diablo Memory Center –Sport Concussion Program

www.sportconcussion.com

ImPACT Test

www.impacttest.com

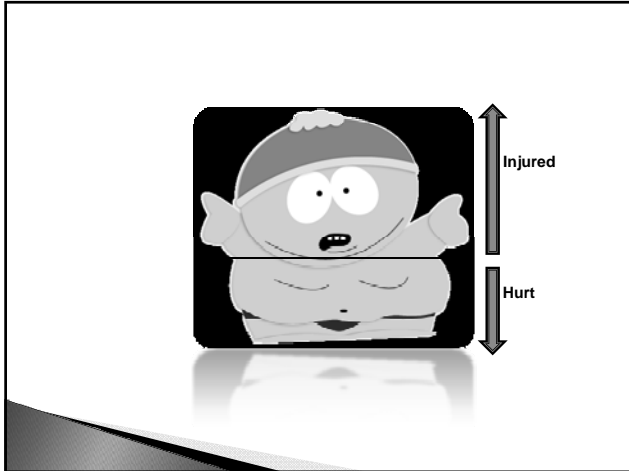
Marin Brain Injury Network

www.mbin.org

Children's Hospital Oakland – Sports Medicine Center

www.childrenshospitaloakland.org





SAVE A TREE!!!!

For a copy of this and Bruce Valentine's presentation :

- ▶ www.sportconcussion.com
 - Look under News & Events tab
- ▶ Additional questions
 - Eric J. Freitag, Psy.D
 - (925) 988-0569

