

Concussion & Post Concussion Syndrome

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6/21/13

Brain Injury in Sports

**Martland H. Punch
Drunk. JAMA. 1928**

Described 23 cases of professional boxers who had behavioral changes, cognitive decrement, slurred speech, and/or ataxia as being "punch drunk" or "slug nutty".



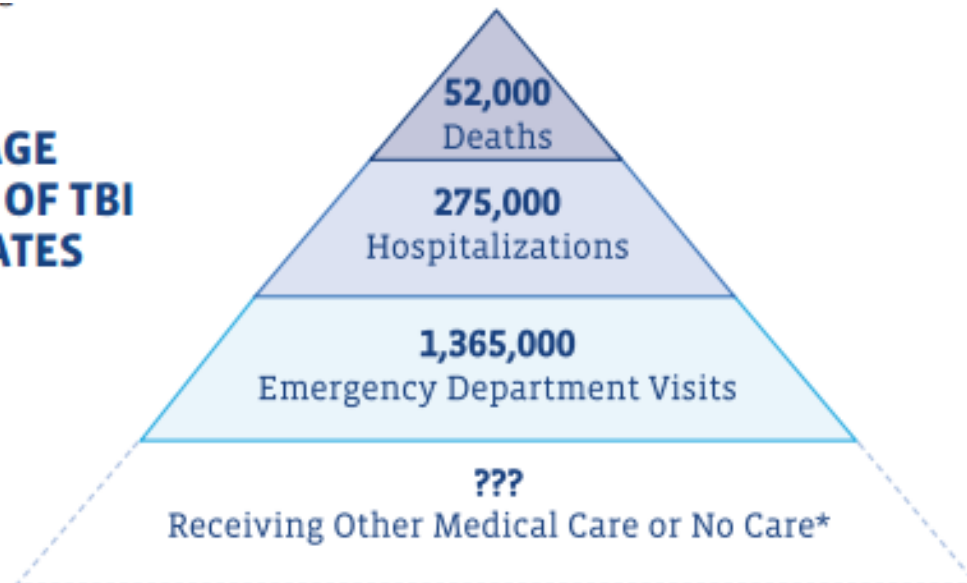
Definition

- a complex pathophysiologic process affecting the brain, induced by traumatic biomechanical forces secondary to direct or indirect forces to the head.
- Brain changes due to a blow/hit/jolt to head

Magnitude of Problem

- Direct medical costs and indirect costs such as lost productivity from MTBI totaled an estimated \$12 billion in the United States in 2000.9

**ESTIMATED AVERAGE
ANNUAL NUMBER OF TBI
IN THE UNITED STATES
2002-2006¹**



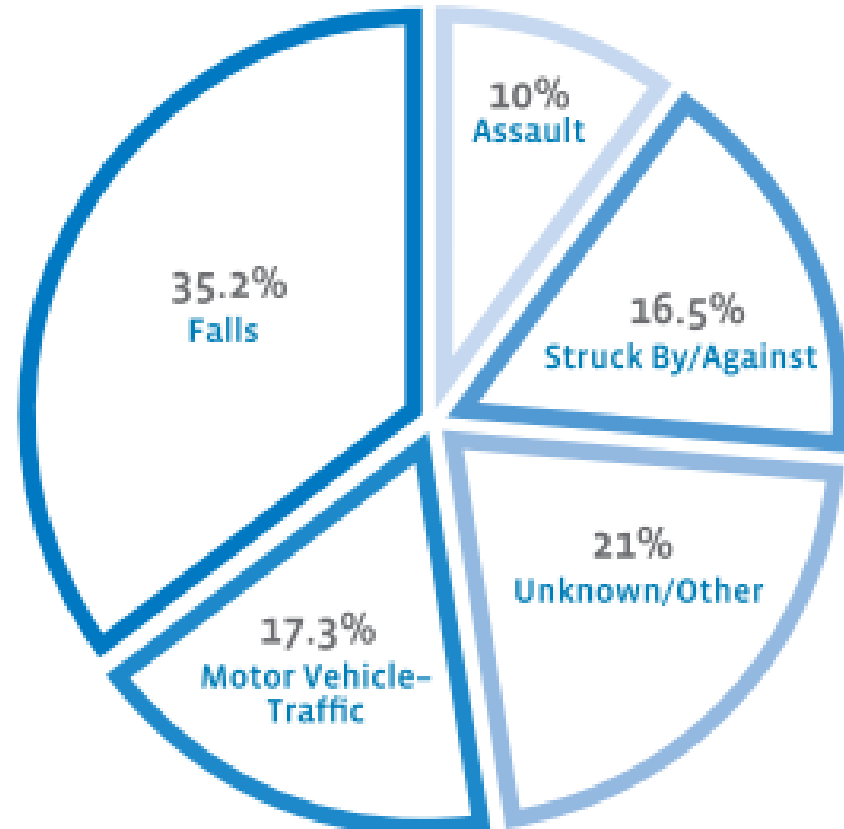
Who gets it?

Groups at highest risk for MTBI¹⁶

- Infants and children (ages 0 to 4);
- Children and young adults (ages 5 to 24); and
- Older adults (ages 75 or older).

How do they get it?

**ESTIMATED AVERAGE
PERCENTAGE OF ANNUAL
TBI BY EXTERNAL CAUSE
IN THE UNITED STATES
2002–2006¹**

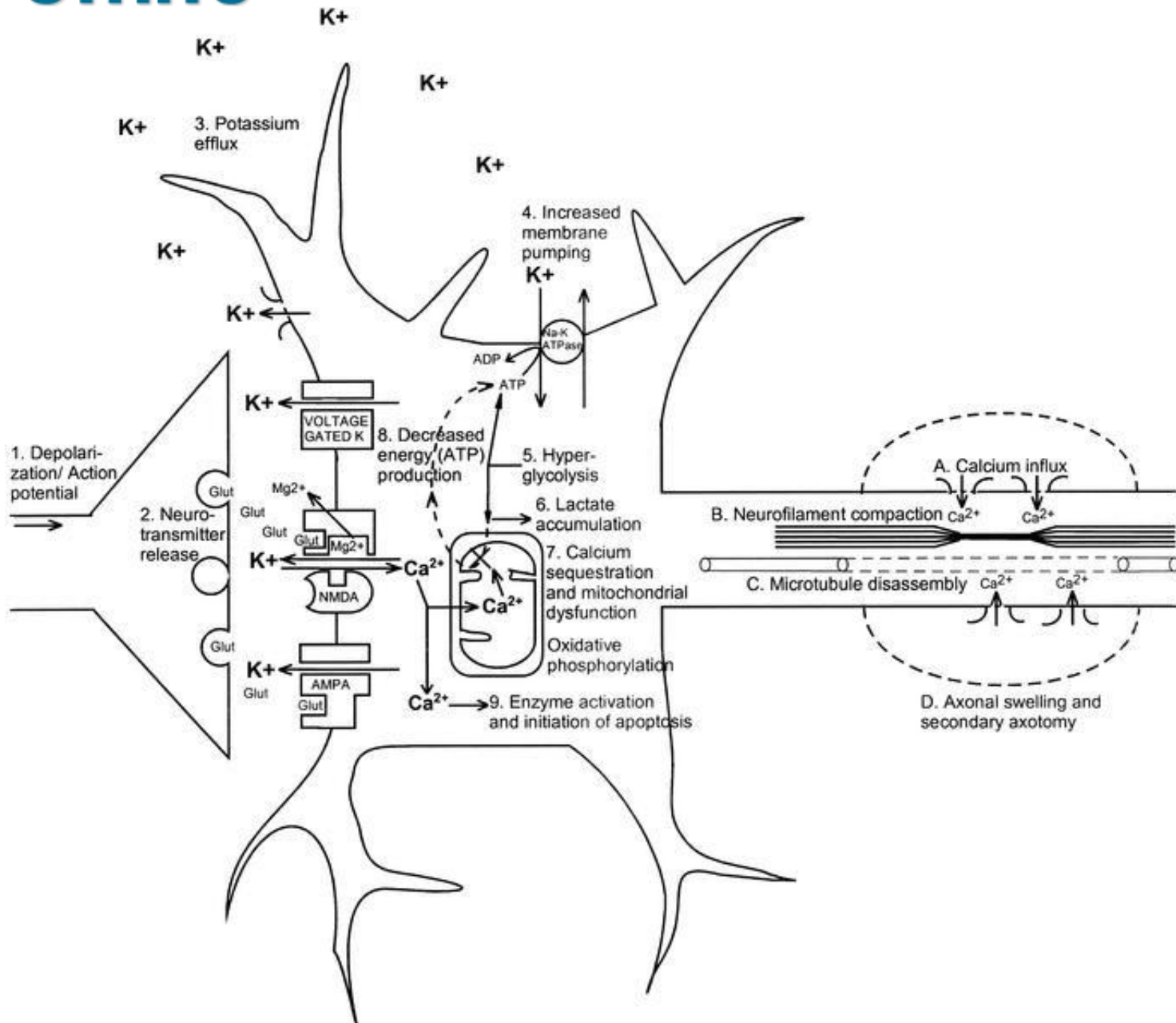


Injury scenarios

- High-speed activities (motor vehicle crashes, bicycle riding, skateboarding)
- Sports and recreation activities
- Falls (including those among older adults), especially from a significant distance (e.g., off a ladder, from a tree)
- Suspected child maltreatment (e.g., shaking, hitting, throwing)
- Exposure to blasts (includes military personnel returning from war zones)
- Injuries to the external parts of the head and/or scalp (e.g., lacerations)

Neuropathophysiology

- Dysfunction of brain metabolism, microscopic structural damage. (damage to network)
- Injury threshold
- Diffuse axonal injury
- Absence of symptom does not mean absence of pathology
- Dynamic injury (sprained ankle – keep running on it – keep using brain)
- Does not have to have big “hit” – repeated small hits



Signs & Symptoms

Physical

- Headache
- Nausea / Vomiting
- Imbalance
- Dizziness / Vertigo
- Visual problems
- Fatigue
- Photophobia
- Phonophobia
- Tingling and numbness

Cognitive

- Feeling “foggy”
- Life in “slow motion”
- Can’t concentrate
- Can’t remember
- Get confused
- Respond slowly (poor reflexes)
- Repeat Questions

Signs & Symptoms

Emotional

- Irritability
- Sadness
- Sensitive
- Nervous

Sleep

- Drowsiness
- Insomnia
- Hypersomnia
- Frequent night time awakening
- Sleeping at the wrong time

Diagnosis

- More art than just Medicine
- Differential: PTSD, depression, headache syndrome, conversion disorder, malingering
- Predisposing factors – migraine, h/o psychiatric problems, learning disability, previous history of concussions

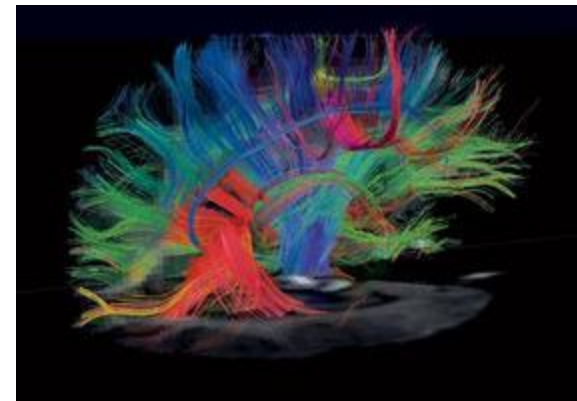
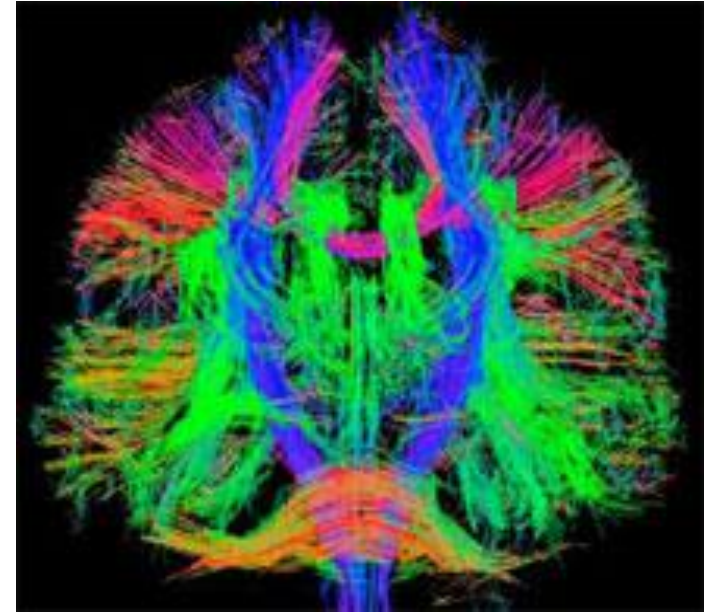
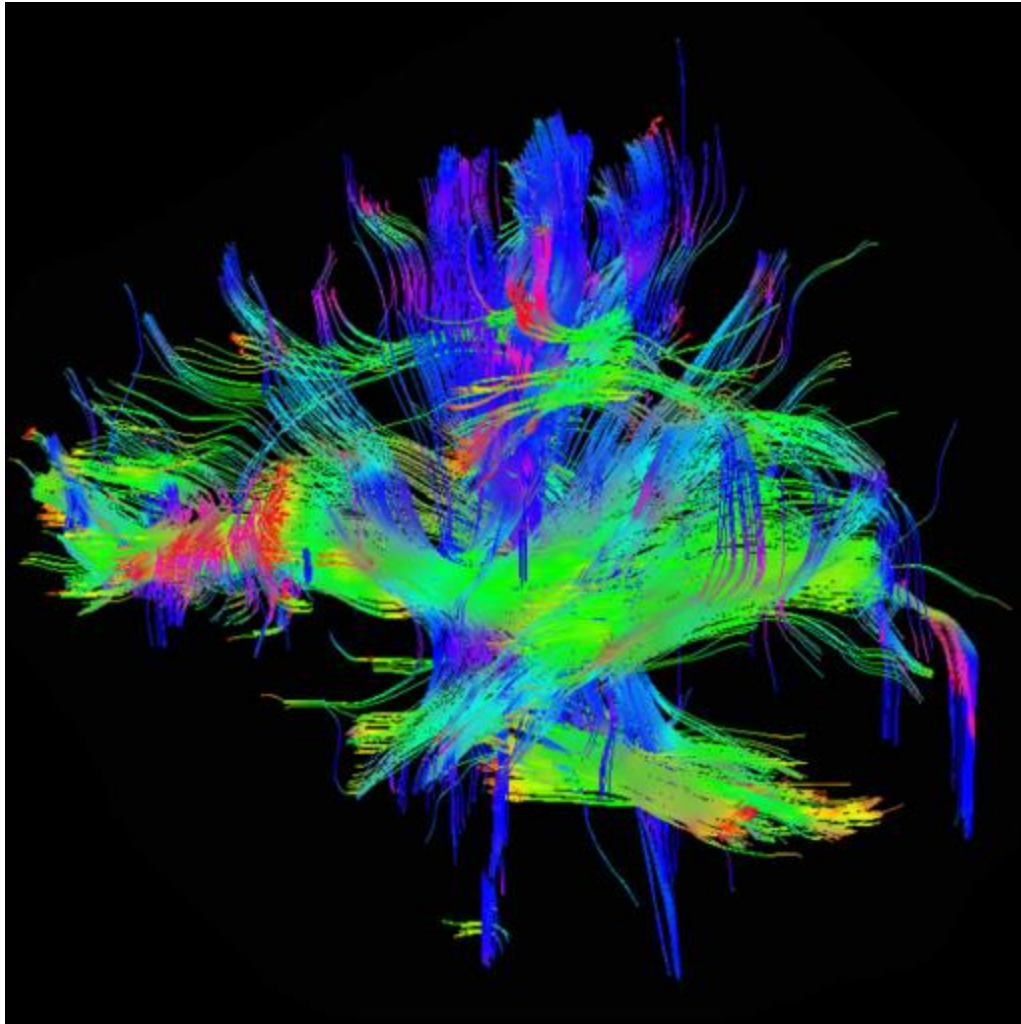
History taking pearls

- Use pre-printed form
- Injury description
- Amnesia (anterograde, retrograde)
- LOC
- Observer account
- Seizure
- Effects of exertion
- “Are you OK/back to yourself?”
- Don’t miss abuse in infants and kids

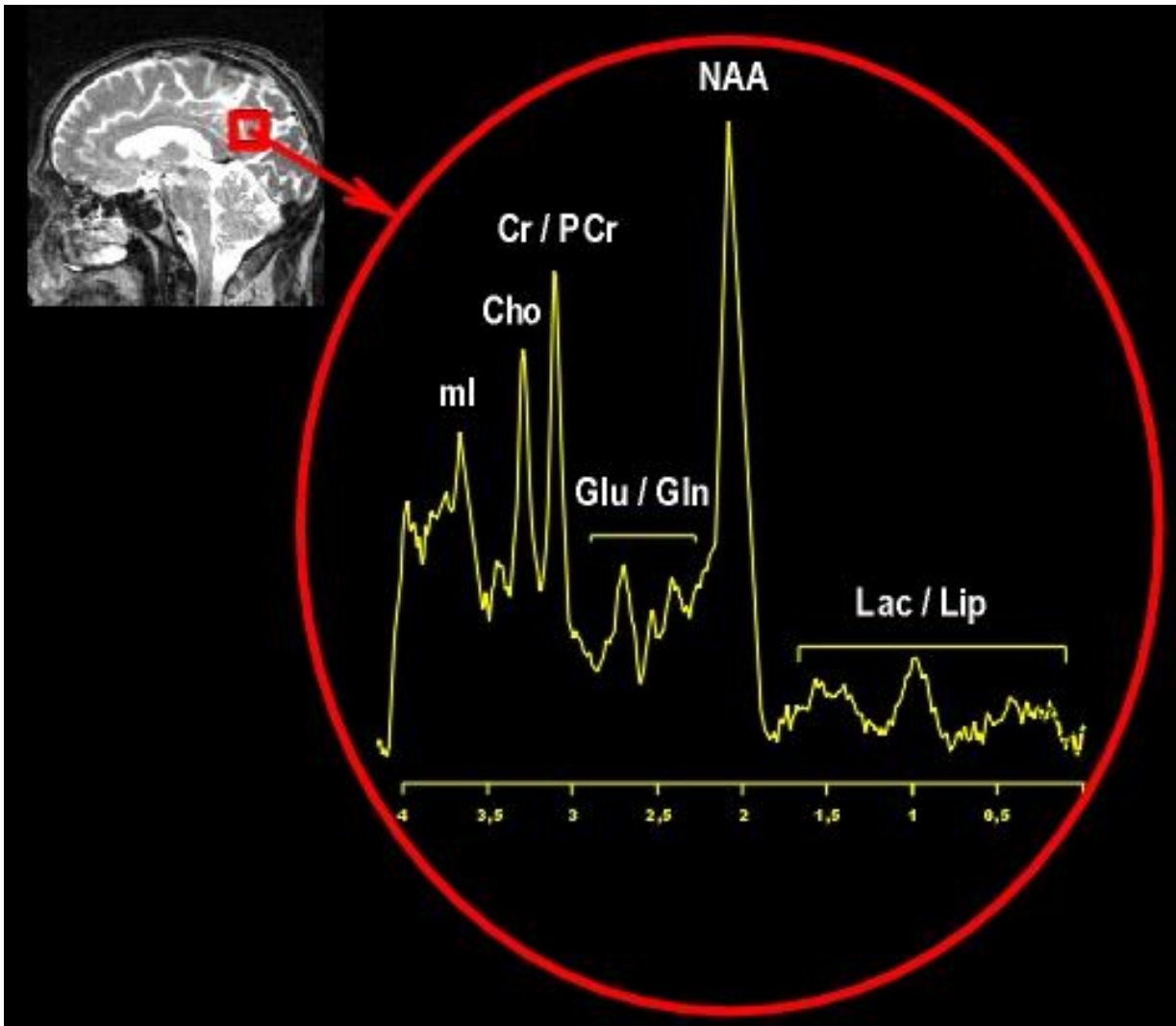
Complications

- Prolonged course
- 2nd impact syndrome
- Post concussion syndrome
- Chronic Traumatic Encephalopathy (changes similar to AD)
- Post traumatic Headache
- Post TBI epilepsy, sleep disturbance etc.

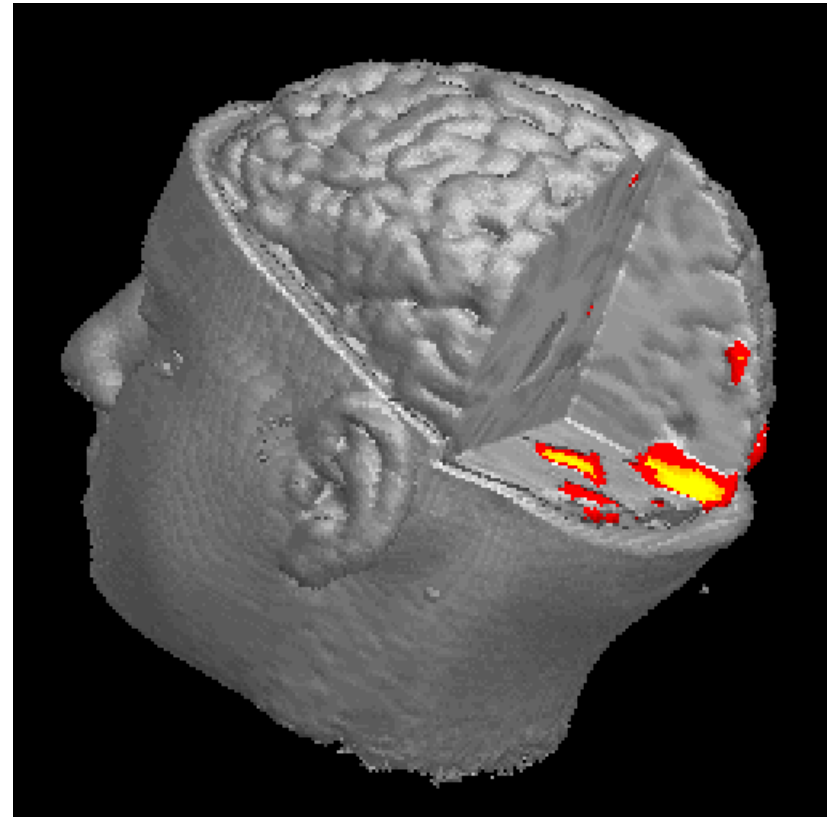
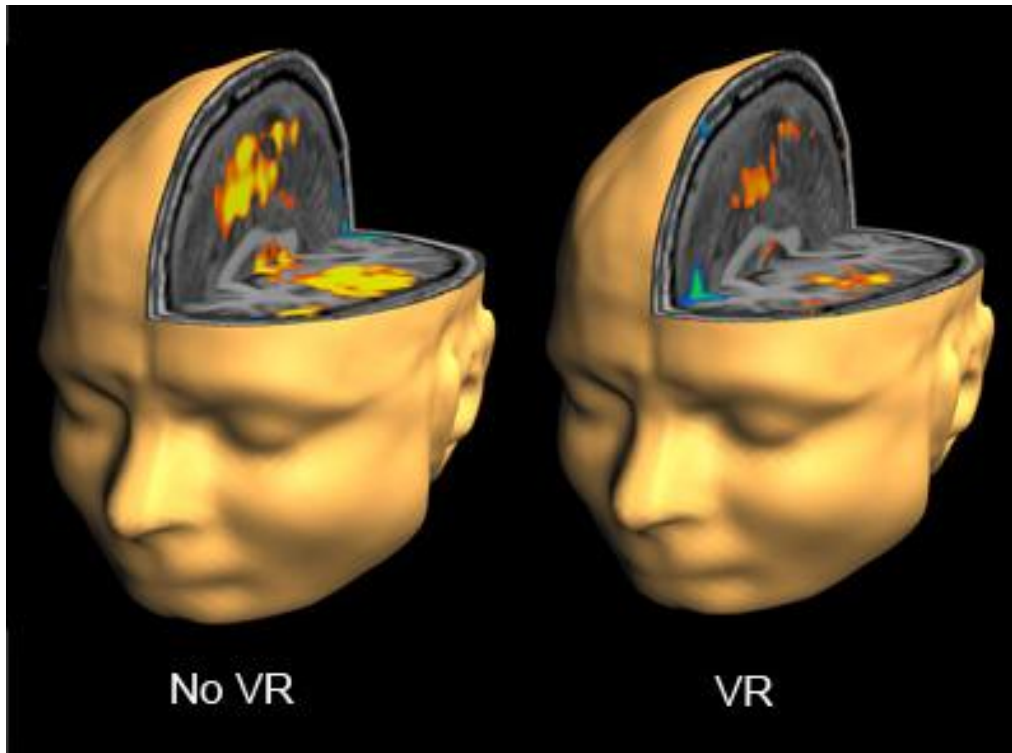
DTI – Diffusion Tensor Imaging



Magnetic Resonance Spectroscopy



fMRI



Treatment

- [The effectiveness of cognitive rehab](#) (brainline video)
- 90% concussion will resolve in 7-10 days (2-4 wks)
- Keep playing prolongs the symptoms
- More severe TIB requires interdisciplinary team approach.
- [Vestibular Exercise](#)

Physical Rest

- Sleep, light foot (live life like an infant)
- high risk activities e.g., sports, physical education (PE), labor work, running, exercise
- high speed activity (riding a bicycle or carnival rides), driving (attention, processing speed, reaction time), skateboarding, jumping,
- Symptoms to be the guide for amount and extend of rest needed after 1-2 wks.

Mental / Cognitive / Cortical Rest

- heavy concentration or focus, memory, reasoning, reading or writing (e.g., homework, classwork, job-related mental activity)
- NO screen time (phone, tablet, computer, TV)
- NO texting, facebook, e-mail, video-games,

Prevention

- Wear a seat belt
- Child safety seat
- Never drive while under the influence (alcohol, drugs, sleep, prescription medication, vision impairment)
- Wear a helmet (sports and work)
- Pay attention (rain, cabinets)

Child Safety

- Window guards
- Safety gates at the top and bottom of stairs
- Keeping stairs clear of clutter;
- Securing rugs and using rubber mats in bathtubs; and
- Not allowing children to play on fire escapes or on other unsafe platforms.
- Make sure playground surfaces are made of shock-absorbing material, such as hardwood mulch or sand, and are maintained to an appropriate depth.
- I am not talking about bubble wrapping your kids

Senior Safety

- Removing tripping hazards such as throw rugs and clutter in walkways; (curled rugs at the edges)
- Using nonslip mats in the bathtub and on shower floors;
- Installing grab bars next to the toilet and in the tub or shower;
- Installing handrails on both sides of stairways;
- Improving lighting throughout the home; and
- Maintaining a regular physical activity program, if their health care provider agrees, to improve lower body strength and balance.

Prevention

Preventing concussion

- technique*
- play by the rules*
- proper equipment*
- consider the dose of impact*



Prevents skull fracture
not concussion

Once concussed, preventing complications

- Recognize*
- Report*
- Remove*
- Recover*



Evolution of Helmet – worthless?





COFFEE



BREAK

