Concussion: Not Just For Athletes

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PRACTITIONER'S DAY

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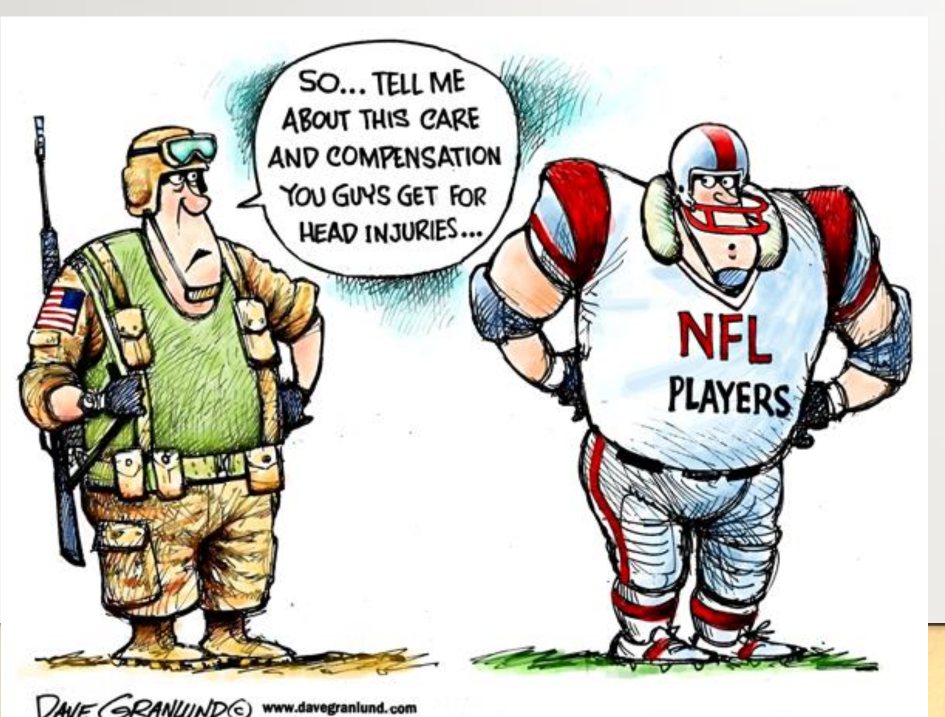
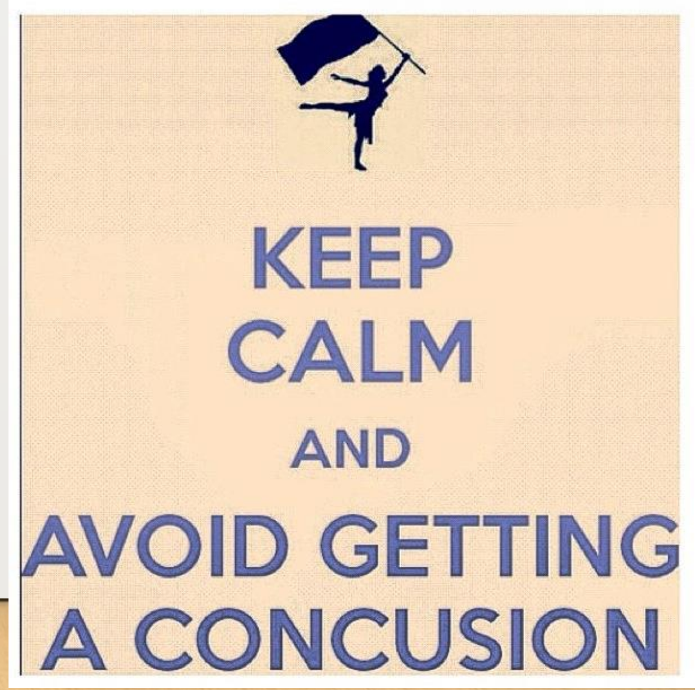
Overview

- Background
  - Epidemiology
  - Definitions
- Clinical Picture
  - Concussion, PCS, CTE
- Concussion Care
- Discussion/Questions

“No head injury is too trivial to ignore”

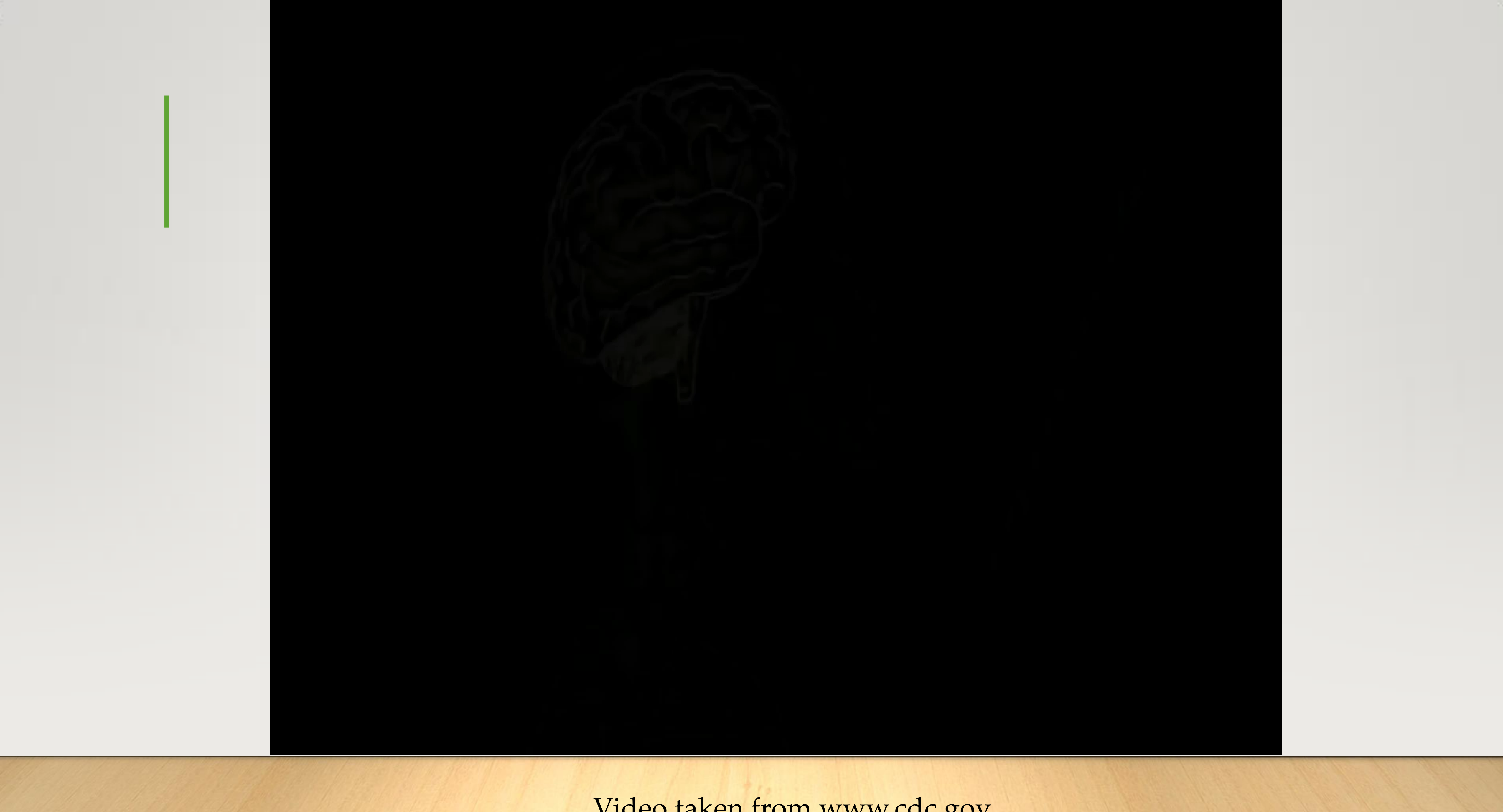
Hippocrates





Pop Quiz

- What is a concussion?
- How often does someone lose consciousness from a concussion (%)
- Helmets prevent concussions. T or F?
- Best treatment is complete rest in a dark room. T or F?
- Effects of concussions are cumulative. T or F?
- If you have repeated head trauma without concussion you are ok. T or F?
- Concussions are diagnosed by MRI or SPECT imaging . T or F?

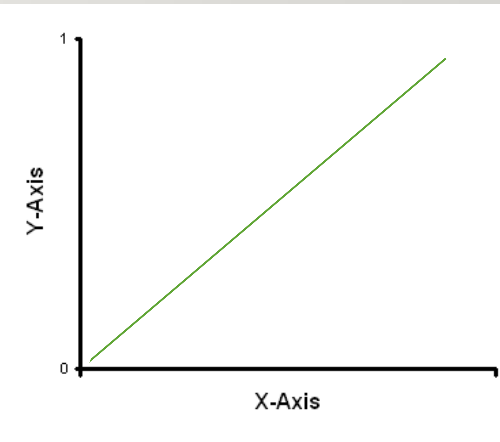


Video taken from www.cdc.gov

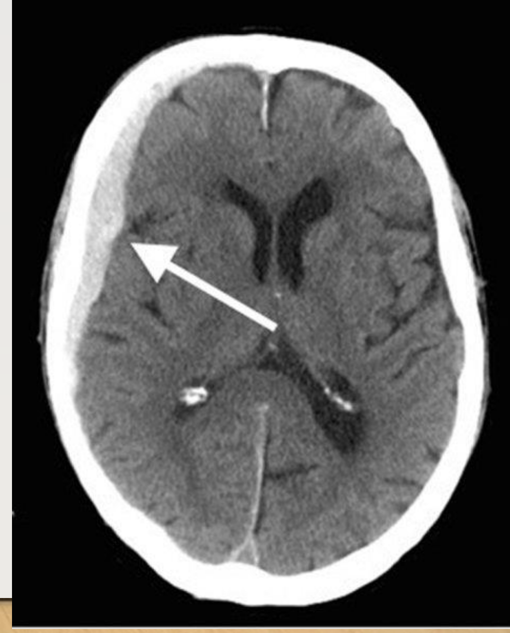
Definitions

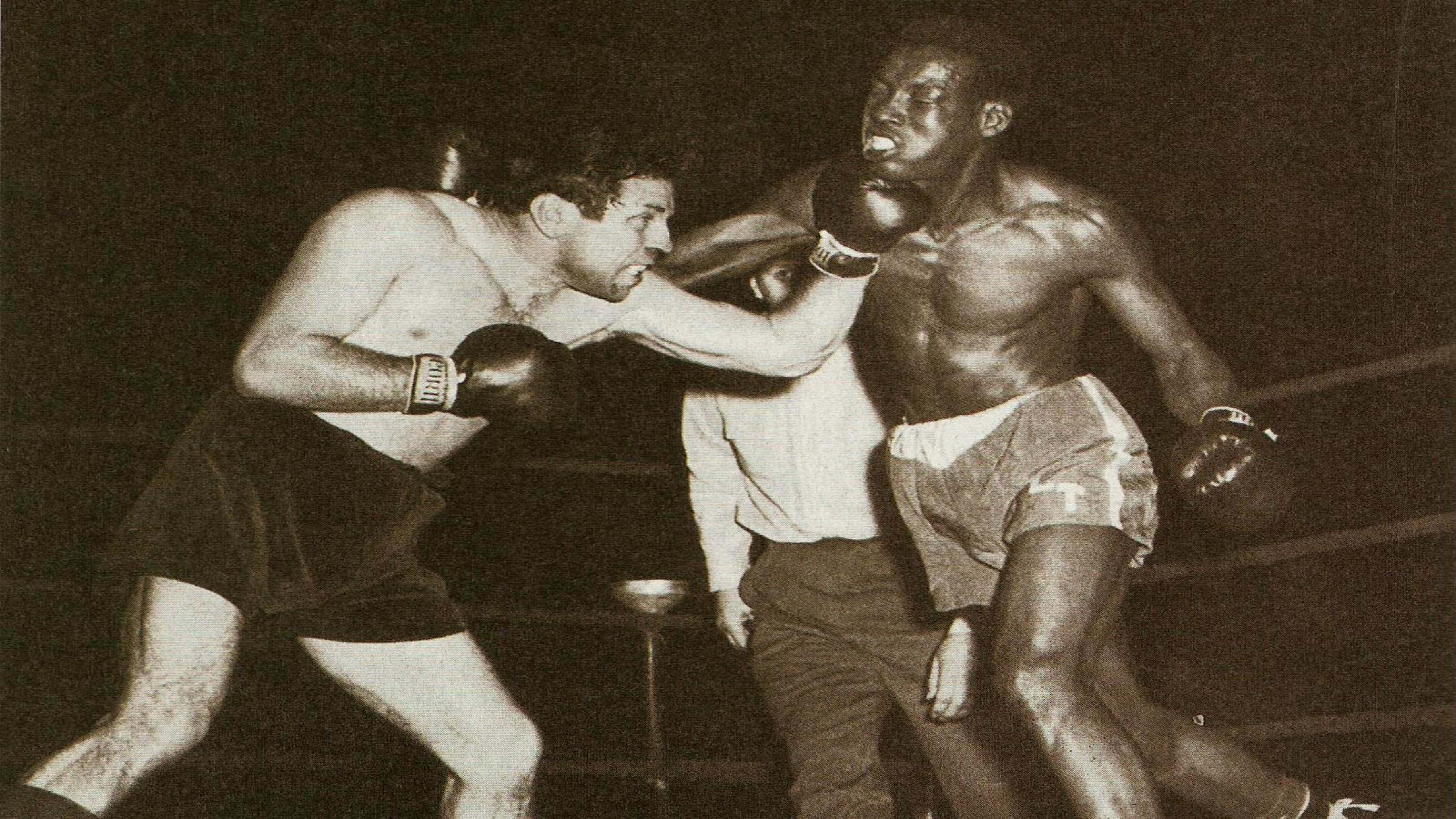
- What is a concussion?
  - Not clear
  - Trauma-induced alteration in mental status that may or may not involve loss of consciousness
  - Trauma to the head or by a hit to the body that causes the head and brain to move rapidly back and forth. - AAN
  - A complex pathophysiologic process affecting the brain induced by biomechanical forces - CISG
  - In practice:
    - Any direct or indirect blow to the head that causes *any* symptom typical of concussion
    - Must have normal imaging (unlike "TBI")
    - Includes "zingers", "ding", "bell ringer", "punch drunk", etc

Dissemination



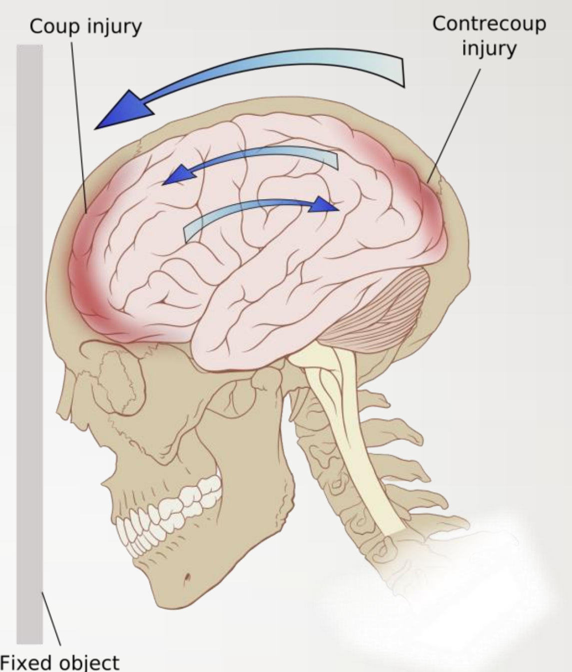
Science

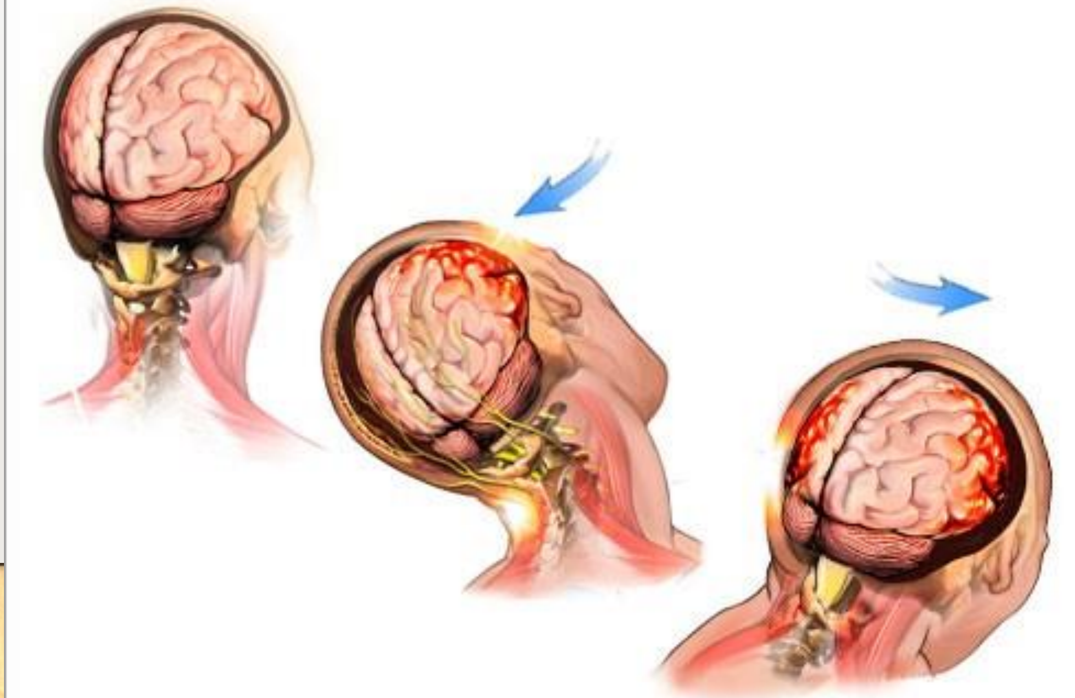




Types of Forces involved

- Direct
  - One plane
- Rotatory
  - Multiple planes





Epidemiology

- Incidence estimated to be 6 per 1,000 people annually
  - Likely much higher
- 70 - 90% of TBIs are concussions
- At least 25% of concussions will not seek medical help
- Est 300,000 sports related concussions occur annually in US
- Due to a lack of standard definition cost estimates are not known
  - Thought to be a leading cause of morbidity and economic burden
  - Typically young otherwise healthy individuals who are unable to return to work or school sometimes for months to years

Cassidy JD, Carroll LJ, Peloso PM, Borg J, von Holst H, Holm L, et al. (2004). "Incidence, risk factors and prevention of mild traumatic brain injury: Results of the WHO Collaborating Centre Task Force on Mild Traumatic Brain Injury". *Journal of Rehabilitation Medicine*. **36**(Supplement 43): 28–60

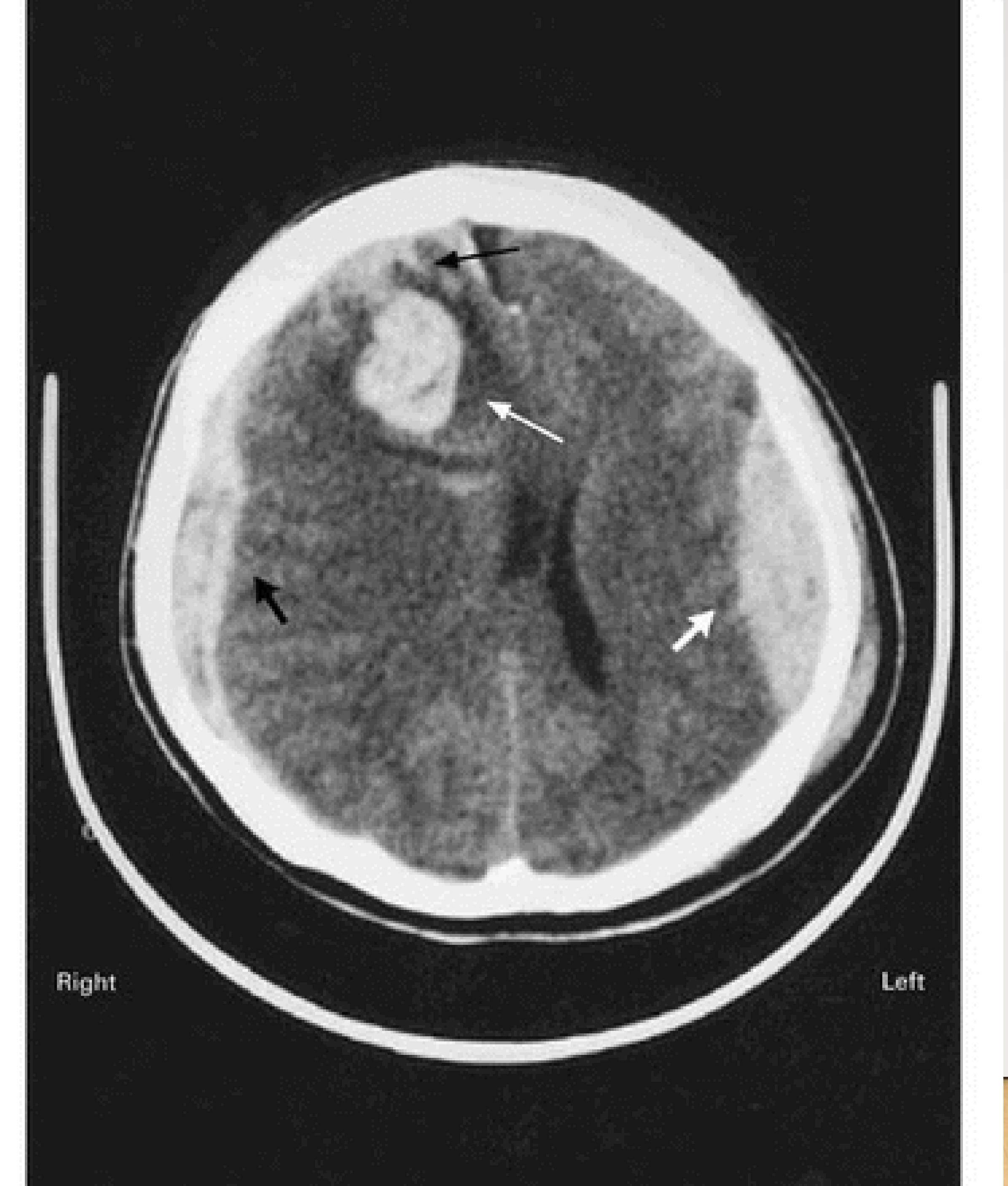
What about the Elderly?

- Less studied; Most data is for all TBI
- Falls cause about 1/3 of TBI in all age groups
  - Causes 60% of TBI in >65 [1]
- TBI in elderly are more likely to require hospital admission or cause significant morbidity or even death [1]
- Concussion symptoms more likely to be attributed to another disorder [2]

1 Faul M, Xu L, Wald MM, Coronado VG *Traumatic Brain Injury in the United States: Emergency Department Visits, Hospitalizations and Deaths 2002-2006*.Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2010
2 William Filer and Matthew HarrisFalls and Traumatic Brain Injury Among Older AdultsNorth Carolina Medical Journal April 2015 76:111-114; doi:10.18043/ncm.76.2.111

Illustrative Case

- 71 year old Male
- History of Atrial Fibrillation (heart murmur)
- On blood thinner
- Slipped backward on ice hitting back of head on cement
- Lossed consciousness for 5 minutes
- Thereafter was extremely drowsy and hard to rouse
- Not moving left side of his body


Right
Left

TBI

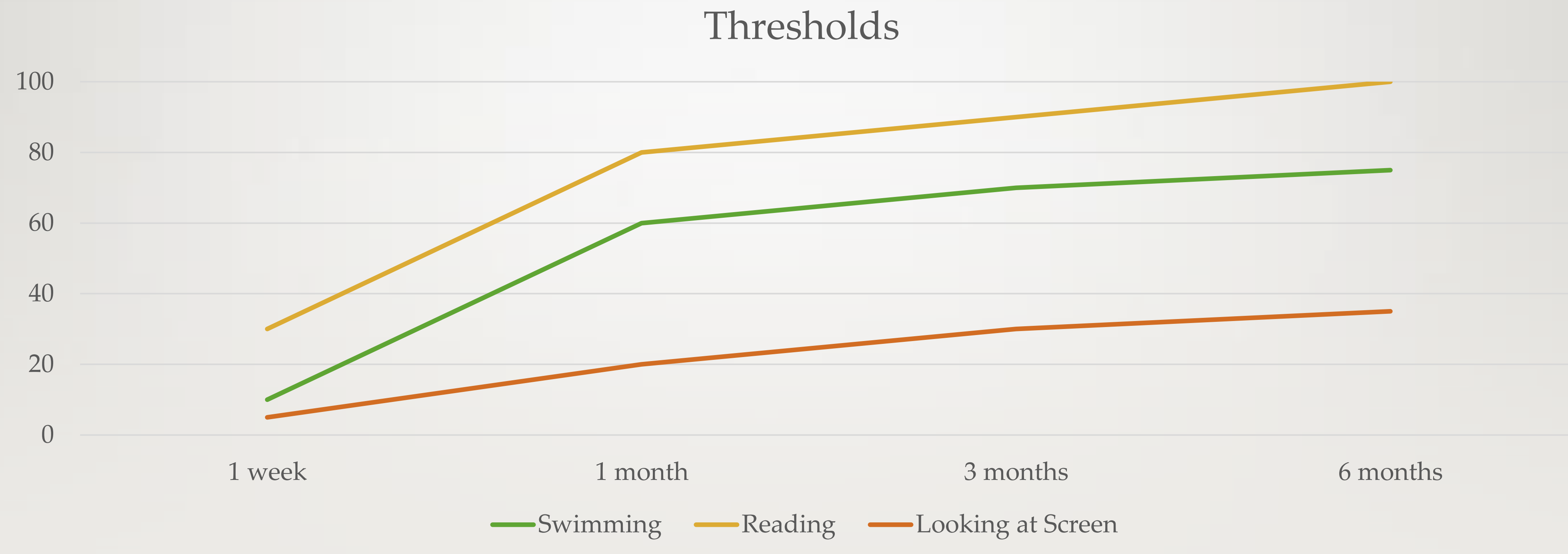
- Elderly more prone to moderate or severe TBI
  - Multiple Factors
    - Medications
    - Osteoperosis
- Signs to look out for:
  - Prolonged Loss of Consciousness
  - Excessive drowsiness (unable to rouse)
  - Vomiting, focal neurological deficit (weakness of one side or one limb)
  - Severe Symptoms
  - If unsure call 811

Acute Concussion - Presentation

- Blow to any part of the body that causes violent shaking of the brain
- Can have Loss of Consciousness or Amnesia of event
- Many will initially feel normal but can develop symptoms minutes to days later
- Common early symptoms include: Dizziness, Nausea, Headache, Irritability, Light and sound sensitivity amongst many others.
- Symptoms often are brought on by some form of exertion

Management - Acute

- Minimal evidence
- Debate has been ongoing regarding rest vs activity
- Excess rest is not good
- Rapid return to activity is not good
- Initial rest for max few days followed by graduated return to activity is likely best
- Thresholds



Thresholds
100
80
60
40
20
0
1 week
1 month
3 months
6 months
Swimming
Reading
Looking at Screen

Clinical course

- 80-85% of concussions fully recover within the first 1-3months
- Hence, definition of Post-concussion Syndrome*
  - Persistent symptoms from a concussion lasting more than 3 months
  - Must have at least 3 symptoms
  - One domain must be psych/cognitive
- Old classification, called mTBI
  - Differs from all other TBI by the fact that there is NO imaging changes
  - Ie absolutely NO blood

*According to DSM Criteria

Why PCS?

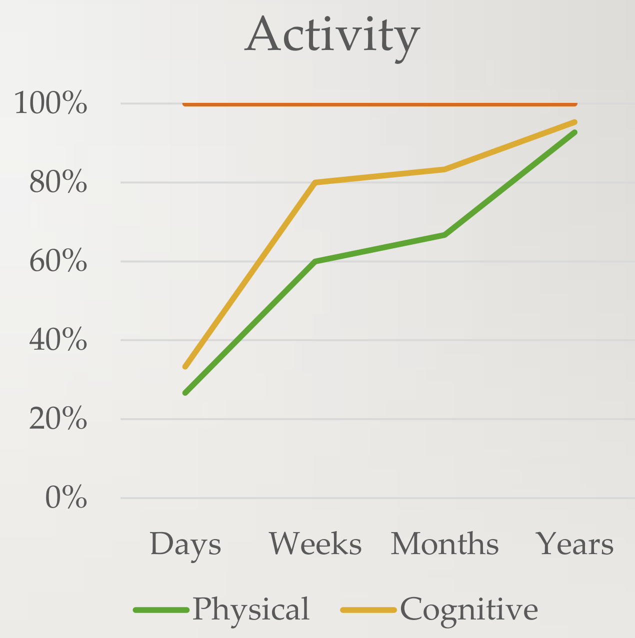
- Unclear why 10-15% have prolonged course
- Thought to be in part related to certain risk factors
- Thusfar, data suggests following risks:
  - Multiple Concussions
  - Previous PCS
  - Concussion without fully recovering from previous
  - Personal or family history of migraines
  - Personal or family history of psychiatric illness
  - Severity of injury, LOC, etc have no correlation

Clinical Picture - PCS

- List of over 140 symptoms associated with concussion
  - (i.e. it can do anything)
- Headache (>80%)
- Sleep disturbance (>50%)
- Cognitive Symptoms (>50%)
- Psychiatric (>50%)
- PTSD
- Pain
- Vertigo
- Light sensitivity
- Sounds sensitivity
- Screen sensitivity
- Vision changes
- Hearing loss
- Tinnitus
- Vertigo
- Imbalance
- Lightheadedness
- Language changes

Clinical Picture - PCS

- Some symptoms are persistent
- Others are brought on by activity
  - Physical
    - Different activities have their own threshold
  - Cognitive
    - Different activities have their own threshold
- Key concept of threshold



Issues patients encounter

- Lack of awareness by the general public – Lack of understanding, empathy
- Lack of awareness from employers/friends/family
- Inability for graduated return (“Don’t return to work until you are 100%)
- Screen sensitivity, headaches, balance can be barriers to RTW.
- Unsure of what is science and what isn’t
- Cognitive difficulties biggest burden to RTW
  - Patients are slower, not their usual selves.
  - Cognitive exertion brings on symptoms
  - Easily irritable, more anxious

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Private concussion clinics called a 'Wild West' of unregulated treatment

As fears about concussions grow, hundreds of clinics are profiting

By Kelly Crowe, CBC News   Posted: Nov 03, 2016 5:00 AM ET | Last Updated: Nov 04, 2016 12:07 PM ET

The Markham Waxers require all players to have baseline tests for use in concussion treatment. But there's no medical consensus the tests have any value. (CBC)

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What is the prognosis of PCS

- Most patients eventually return to 100%
- Can take months to years
- Some patients do not recover
  - Longest 3 years in Toronto cohort
- If patient not recovering, typically a reason
  - Uncontrolled headaches, significant mood issues, PTSD
- General course is gradual improvement
  - Worsening (without further concussion) should raise suspicion of another etiology

Prognosis PCS

- Unmasking effect on previous underlying neurodegenerative disease
  - Bringing out a condition that was already present, but "smoldering under the surface"
  - Parkinsons Disease
  - Alzheimer's Disease
  - Other dementias (Lewy Body, PSP, MSA, FTD)

CTE

- Chronic Traumatic Encephalopathy
- First decribed by Umalo et al (Will Smith) – Pathological entitiy
  - Ie diagnosed currently only by autopsy
- Long-term sequlae of repeated head injury
- Subconcussive blows thought to be an integral part
- Not all head injuries cause this
- Very unclear
- Studies ongoing to better understand this

CTE – all football players?

- Recent Boston University study of autopsied brains from retired NFL players
  - 110/111 had CTE
  - Is this real?
  - UofT did a prospective study on 6 retired CFL players who clinically were possible CTE and found only 3/6 had features consistent with CTE.
  - Most centres around the world reporting closer to 30%

Typical assessment

- 1.5-2 hours long
- Detailed history of all concussions and current complaints with an emphasis on neuropsych symptoms
- Neuropsych assessment – BNA
  - Typical pattern of mild executive dysfunction or Normal
- Neurological Examination
  - Including BESS
- Recommendations based on clinical picture

Typical Recommendations

- Regular aerobic exercise to a level that below the threshold that causes symptoms
- Cognitive stimulation
- Management of headaches (medication overuse is common)
- Management of mood (medical and CBT)
- Management of sleep
- Avoidance of meds with cognitive effects
- Investigations as needed, especially to rule other contributing factors (MRI, Sleep studies, ENT, TSH)
- PCS workshop/Support Group

PCS Workshop/Support Group

- Peer groups, for patients and their loved ones
- Meet people going through similar symptoms
- Educational focus
- Component of CBT and support group
- Q&A session at the end

Evidence?

- There isn't much
- Multiple RCTs ongoing, many completed with no results published others terminated for poor results or lack of enrollment
  - Many testing Hyperbaric Oxygen (1 negative, 2 ended early)
- Some evidence for early rest
- Prevention is key

Thank you

AN OUNCE OF PREVENTION IS WORTH A POUND OF CURE

BENJAMIN FRANKLIN