

NFL Concussions: Long-term Issues

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Disclosures

- I have no disclosures.

Objectives

- Briefly define concussions and how to treat them
- Recap the recent events that have influenced NFL concussion guidelines
- Discuss the potential long term complications of concussions in the NFL

Concussions in NFL

- 1.6 – 3.8 million concussions estimated annually
 - » Hayes (2007)
- More than 61% of former NFL players had concussions
 - » Guskiewicz (2001)



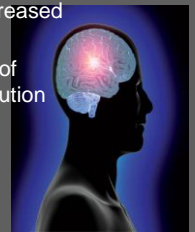
Concussion

- Most common head injury in sports
- Mild trauma-induced alteration of mental status
- May or may not be associated with LOC
- Functional injury
- Acceleration-deceleration, shearing, or impact forces



Pathophysiology of Concussion

- Complete understanding is lacking
- Fuel need to fuel delivery mismatch
- Hypermetabolic state with decreased cerebral blood flow
- Not known whether resolution of mismatch correlates with resolution of symptoms



Hovda et al. J Neurosurg 2003

Treating Concussions

- Rest
- Nutrition
- Hydration
- Medications
- Neuropsych Testing
- Graded RTP



Repetitive Concussions

- How many is too many?
- Are they harmful?



Aikman

- Reported 10 in 12 years
- Retired in April 2001



Young

- Retired in 1999
- Had 4 in 3 years



Depression?

- UNC's Study of Retired Athletes
 - General health survey of 2,552 retired NFL athletes
 - Recurrent sport-related concussion possibly linked to clinical depression
 - 5+ concussions had 3-fold risk of incident depression
 - 3-4 concussions had 2-fold risk of incident depression
 - No significant association b/n football/concussion and Alzheimer's Disease

Guskiewicz KM et al. Medicine and Science in Sports & Exercise. 2003

Depression?

- UNC's Study of Retired Athletes
 - Recurrent concussion and risk of depression in retired professional football players
 - General health survey of 2,552 retired NFL athletes
 - 269 participants (11%) had prior or current depression
 - 3 or more concussions were 3x more likely to have depression dx
 - 1-2 concussions were 1.5x more likely to have depression dx

Guskiewicz KM et al. Medicine and Science in Sports & Exercise. 2007

Neurocognition?

- UNC's Study of Retired Athletes
 - Association b/n recurrent concussion & late-life cognitive impairment in retired professional football players
 - General health survey of 2,552 retired NFL athletes
 - 3 or more concussions
 - Fivefold prevalence of mild cognitive impairment diagnosis
 - Threefold prevalence of reported significant memory problems
 - No association b/n recurrent concussion & Alzheimer's dz

Guskiewicz KM et al. Neurosurgery, 2005

Neurocognition?

- University of Michigan Study of Retired Professional Football Players
 - Phone interviews of 1,063 retired players
 - NFL retirees report higher rates of dementia
 - » Weir DR et al. 9/2009

Memory problems	All US Men		NFL retirees	
	30-49	50+	30-49	50+
Dementia, Alzheimer's disease, or other memory-related disease?	0.1%	1.2%	1.9%	6.1%

Response?

- Dr Ira Casson, co-chairman of NFL's Concussion Committee
 - Denies any relationship
- There is a need for other studies...
- Prior studies are worthless...
- NFL is conducting its own study of 120 retired players.



NFLPA Takes Action

- NFL Players Association starts NFLPA Concussion and TBI Committee (10/2009)
- Headed by Dr Thom Mayer & Sean Morey
- Two main goals:
 - Address diagnosis, treatment, & prevention of concussions & TBI in active players
 - Address the long-term cumulative effects of isolated or repetitive TBI in NFL players

NFLPA Meets with Congress

- October 16 & 17, 2009 in Washington
- Addressed recent UM Report of early onset of dementia in NFL players
- Congressional Hearing in late October



October Congressional Hearing

- Former players gave testimonials
 - Tiki Barber, Merrill Hoge, & George Martin
- Family members of former players talked
- Roger Goodell was challenged
 - Penalizing big hits, caution with concussions, & retirement funding for dementia
- NFL personal study discredited
 - Dr Ira Casson & Dr David Viano were not questioned

Congressional House Judiciary Committee Hearing,
Washington, DC, Oct 28, 2009

Co-chairmen Resign

- Goodell sent memo to all 32 teams on 11/24/09
- Dr. Ira Casson & Dr. David Viano, "have graciously offered to resign..."
- Goodell wrote. "Our goal remains to make our game as safe as possible, to protect the health and safety of our players, and to set the best possible example for players at all levels and in all sports."



Released by AP 11/24/09. Accessed 2/25/10.

NFL Changes RTP Rules

- Players with concussions cannot RTP the same day
- Once removed athlete cannot RTP until:
 - Fully asymptomatic
 - Normal neuro exam
 - Normal neuropsych testing
 - Cleared by team physician & independent neurological consultant
- Players are to be candid with medical staff & disclose any symptoms

Released by AP 12/2/09. Accessed 2/25/10.

January Congressional Hearing

- "Legal Issues Relating to Football Head Injuries"
- Former players gave testimonials
- Dr. Ira Casson present
 - No evidence permanent brain damage & dementia following repetitive concussions
- Dr. Bennet Omalu - links b/n brain injuries, concussions in football, & dementia



Congressional House Judiciary Committee Hearing, Detroit, MI, Jan 4, 2010

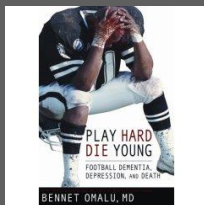
February Congressional Hearing

- Focused on high school & college sports



Congressional House Judiciary Committee Hearing, Houston, TX, Feb 1, 2010

So What's All The Fuss About



Depression

- Previous surveys/questionnaires linking depression & concussions
- Depression symptoms not rare with concussions
- Major depression symptoms must be recognized
- Suicide

Symptom Evaluation	
How do you feel? You should rate yourself on the following symptoms, based on how you feel now.	
Headache	None (0) Mild (1) Moderate (2) Severe (3)
"Pounding" in head	None (0) Mild (1) Moderate (2) Severe (3)
Neck Pain	None (0) Mild (1) Moderate (2) Severe (3)
Nausea or vomiting	None (0) Mild (1) Moderate (2) Severe (3)
Clonus	None (0) Mild (1) Moderate (2) Severe (3)
Ringer vision	None (0) Mild (1) Moderate (2) Severe (3)
Spatial problems	None (0) Mild (1) Moderate (2) Severe (3)
Sensitivity to light	None (0) Mild (1) Moderate (2) Severe (3)
Sensitivity to noise	None (0) Mild (1) Moderate (2) Severe (3)
Feeling slowed down	None (0) Mild (1) Moderate (2) Severe (3)
Feeling like "in a fog"	None (0) Mild (1) Moderate (2) Severe (3)
"Don't feel right"	None (0) Mild (1) Moderate (2) Severe (3)
Difficulty concentrating	None (0) Mild (1) Moderate (2) Severe (3)
Difficulty remembering	None (0) Mild (1) Moderate (2) Severe (3)
Fatigue or low energy	None (0) Mild (1) Moderate (2) Severe (3)
Confusion	None (0) Mild (1) Moderate (2) Severe (3)
Drowsiness	None (0) Mild (1) Moderate (2) Severe (3)
Double vision (only if you're wearing glasses)	None (0) Mild (1) Moderate (2) Severe (3)
Blurred vision	None (0) Mild (1) Moderate (2) Severe (3)
Irritability	None (0) Mild (1) Moderate (2) Severe (3)
Depression or Anxiety	None (0) Mild (1) Moderate (2) Severe (3)
Total number of symptoms (Maximum possible 30)	
Symptom severity score	
Do the symptoms get worse with physical activity? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	
Do the symptoms get worse with mental activity? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	
Overall rating	
If you know the athlete well prior to the injury, how different is the athlete today compared to his/her usual self? Please use the response	
Not different	Very different

Sport Concussion Assessment Tool 2

Mike Webster

- NFL 1974 - 1990
- Pittsburgh Steelers
- NFL Hall of Fame
- "Iron Mike"
- Suicide in Sept of 2002



Andre Waters

- NFL 1984 - 1995
- Philadelphia Eagles & Arizona Cardinals
- "Hardest" hitting defenders
- Suicide in Nov of 2006



Terry Long

- NFL 1984 - 1991
- Pittsburgh Steelers
- Suicide in June 2005
- Prior attempt 1991



Permanent Cognitive Impairment

- Chronic traumatic encephalopathy (CTE)
 - Dementia pugilistica
 - "Punch-drunk" syndrome
- Affected boxers in 1920s



What is CTE?

- Progressive degenerative disease
- Related to repetitive closed head injuries
- Alzheimer's related disease

Symptoms of CTE

- Memory disturbances
- Behavior/personality changes
- Parkinsonism
- Speech abnormalities
- Gait abnormalities



McKee AC et al. J Neuropathol Exp Neurol. July 2009

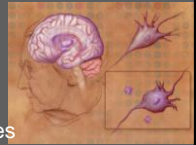
Stages of CTE

- Three Stages of Deterioration
 - 1) Affective changes & psych problems
 - 2) Social issues & erratic behavior with memory loss
 - Early Parkinson's-like symptoms
 - 3) Gross cognitive dysfunction
 - Dementia
 - Late Parkinson's-like symptoms
 - speech & gait abnormalities

<http://braininjuryresearchinstitute.org>. Accessed 2/28/2010.

Pathophysiology of CTE

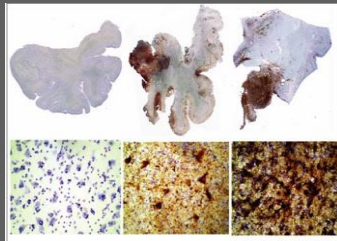
- Repetitive trauma triggers degeneration of brain tissue
- Accumulation of protein, tau
 - Neurofibrillary/astrocytic tangles
 - Spindle-shaped/threadlike neurites
- Different from Alzheimer's Dementia
 - Superficial cortical layers of frontal & temporal lobes w/o beta amyloid



McKee AC et al. J Neuropathol Exp Neurol. July 2009

CTE Microscopically

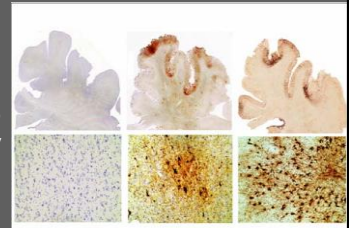
- Tau protein in medial temporal lobe
 - Healthy 65 y/o
 - John Grimsley
 - 73 y/o boxer



Ann McKee, MD, BU Center for the Study of Traumatic Encephalopathy

CTE Microscopically

- Tau protein in frontal cortex
 - Healthy 65 y/o
 - John Grimsley
 - 73 y/o boxer



Ann McKee, MD, BU Center for the Study of Traumatic Encephalopathy

Does CTE Really Exist?

- Boston University – Center for the Study of Traumatic Encephalopathy
 - Partnership with NFL & NFLPA
 - Dr. Ann McKee
- Brain Injury Research Institute (BIRI)
 - Dr. Omalu



What's Next?

- Further research
- Education and training for all involved at all levels
- Collaboration of players, coaches, owners & physicians

Thank You