



Sports Medicine: You Make the Call!

2018 A Call Away Conference

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Disclosure

- Neither I, nor any family member, have any financial interests with products mentioned in this presentation



Boston Globe/Getty Images

The “Game Plan”

1. Recognize symptoms, referral indications, and recommendations for sports-related concussion
2. Discuss sports-related musculoskeletal injuries including the epidemic of overuse injuries

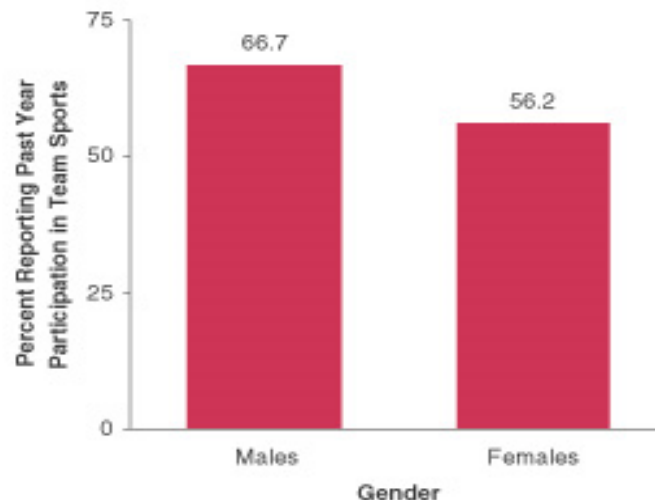


Who Needs Sports Medicine?



Where's the real need?

- 44 million youth participate in organized sports
- > 7.7 million athletes participate in high school
- High school athletes account for >2 million injuries annually
- Athletes < 14 yo are treated yearly for more than 3.5 million sports injuries



“Think Local”

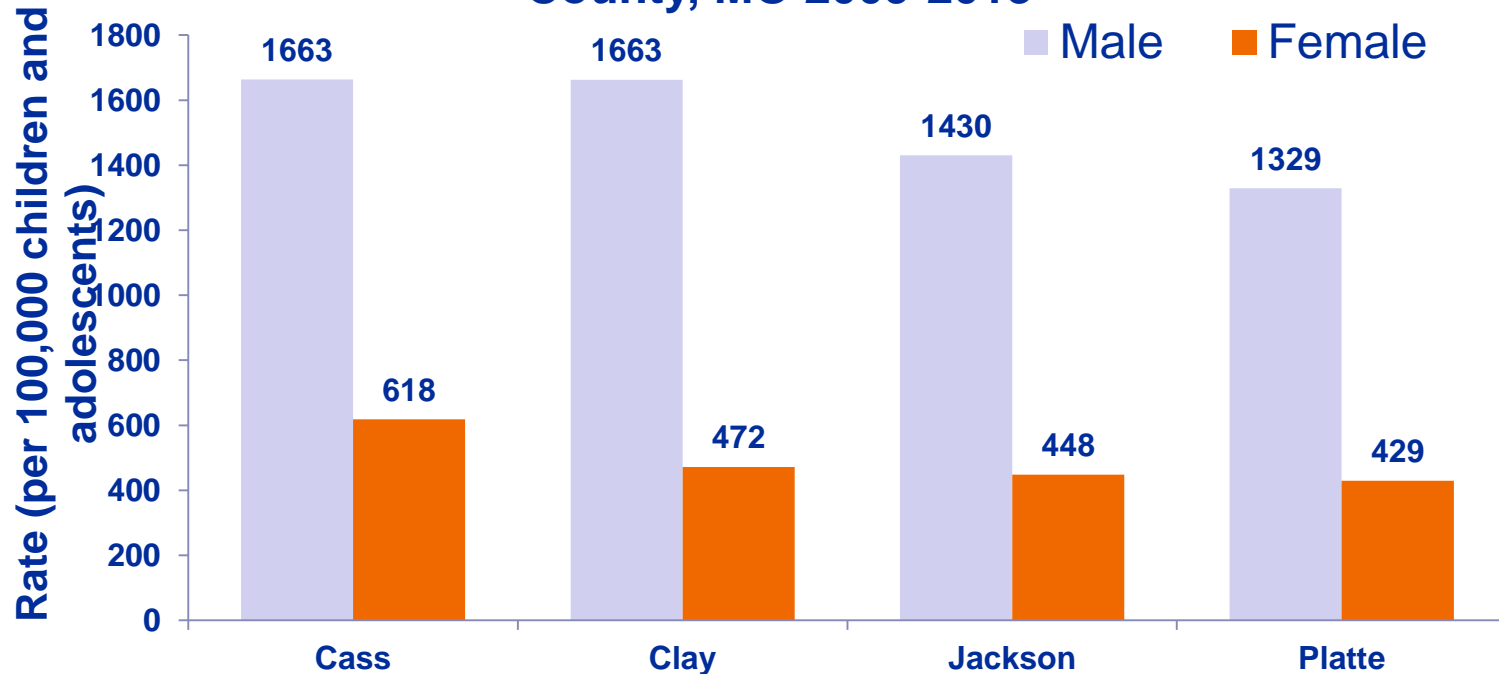
Sports injury in Cass, Clay, Jackson, and Platte County, Missouri

- More than 1900 sports injuries each year in children and adolescents aged 5-17 were treated in hospital emergency department (ED)
- >5 children or adolescents are treated in hospital ED from sports injury every day

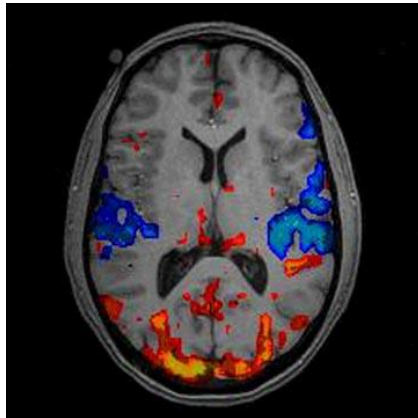
Data source: MDHSS and Kansas City MO Health Department



Emergency department (ED) visit rates due to sports injury in children and adolescents aged 5-17 years by County, MO 2009-2013



Risks of Youth Sports



Nearly **50%** of all injuries sustained by middle school and high school students during sports are overuse injuries.*



Overuse injuries can cause permanent damage and increase the chances of surgeries and arthritis later in life. Keep kids in the game for life by regularly discussing how they feel physically before, during, and after games and practice. Open lines of communication can help keep athletes in top physical condition all year round. Become an advocate for safe sports participation.

For more information, visit www.STOPSportsInjuries.org

*American Academy of Orthopedic Surgeons, AAOS Nov. 2009

Case #1

- 15 year old QB sustains a blow to the head
- The school does not have an ATC available
- After the game he is complaining of a headache, nausea, and sensitivity to light and noise
- They call for advice...



You Make the Call



nbcsports.com



The Concussion Explosion

- CDC data
- 1999 = 300,000/yr
- 2009 = >3.8 million/yr
- 10% all high school athletic injuries



**A PRELIMINARY NOTE ON THE NATURE AND
TREATMENT OF CONCUSSION.**

BY

**T. E. HARWOOD, B.A.Oxon., M.B., CH.B.EDIN.,
RESIDENT OPHTHALMIC OFFICER, THE KING GEORGE HOSPITAL, S.E.**

A patient suffering from head injury or shell shock is usually put to bed and rested in every possible way; almost the only organs of his body upon which any constant voluntary effort falls are his eyes. At first the mere stimulus of light may be intolerable to him, and he lies with his eyes shut as far as possible; later he may be comfortable except when he changes his position. His next step is probably an attempt to read, and the difficulties of near vision are added to those of distant vision; when he gets up more frequent changes of position cause a recrudescence of his giddiness, headache, and nausea.

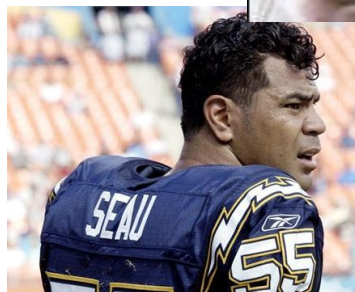
Why such a fuss?

An Ordinary Football Game, Then a Player Dies

- Professional Sports
- Increased concussion awareness...
- Media exposure
- Lawsuits, CTE
- Tragic deaths from head injuries in sport



A sign is suffering
By JOR
Publish



Sports concussion research, chronic traumatic encephalopathy and the media: repairing the disconnect

Andrew W Kuhn,¹ Aaron M Yengo-Kahn,^{1,2} Zachary Y Kerr,³
Scott L Zuckerman^{1,2}



Is it all about football?

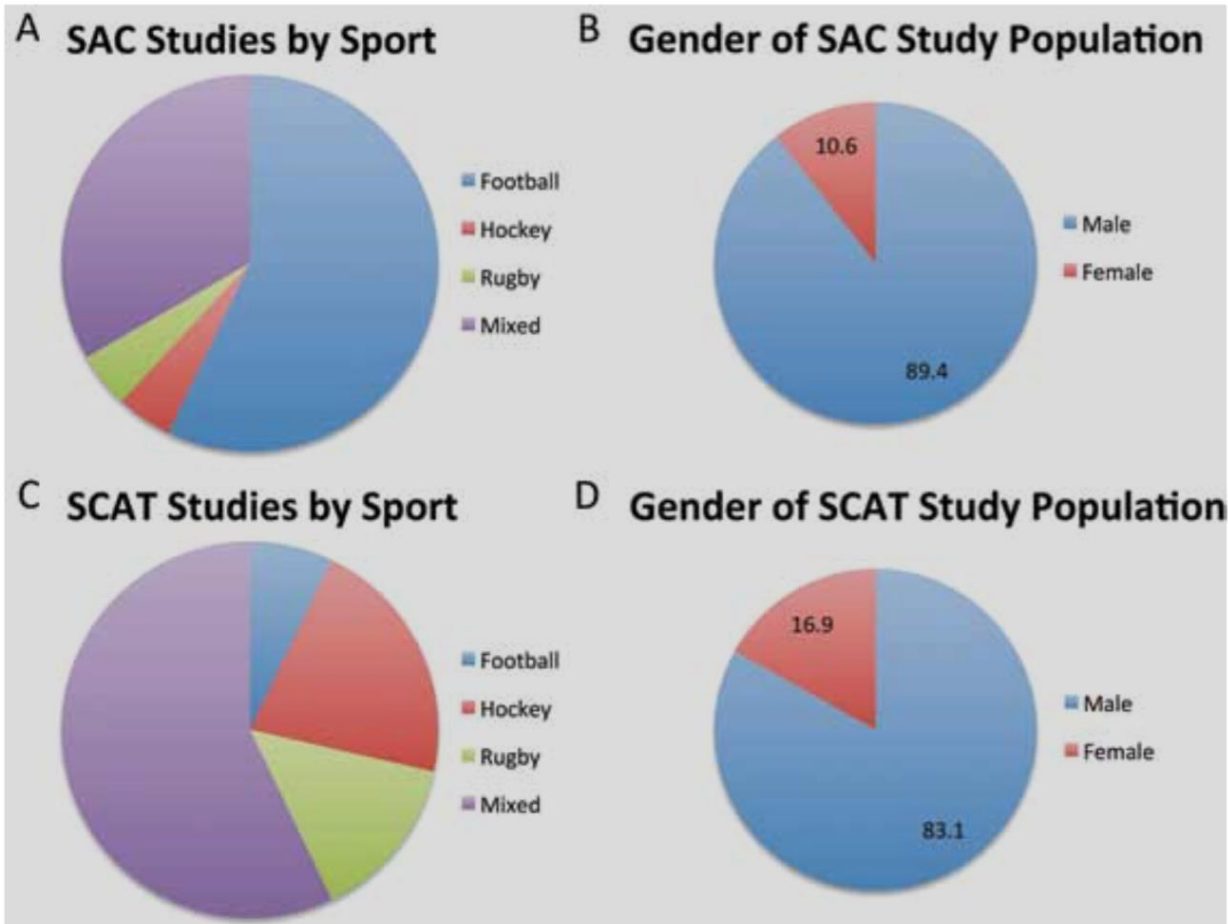
Girls Are Often Neglected Victims of Concussions



Suzy Allman for The New York Times

Hannah Stohler, center, a 16-year-old soccer player for Conard High in Connecticut, at a match Sept. 24. She has sustained three concussions.

SCAT/SAC Studies to Date



Yengo-Kahn AM, et al Neurosurg Focus, 2016.



Survey 2016-17

2016-17	
Top 7 Head Injury Sports/Activities	
Sport/Activity	Number of Head Injuries
Football	1,336
Soccer (G)	336
Sideline Cheerleading	285
Soccer (B)	239
Wrestling	229
Basketball (G)	226
Basketball (B)	149

Sport
Male
Female
Total
Activity
Total
GRAND TOTAL

Dispel the Myths

- Less than 10% of concussions involve loss of consciousness
- Abandon grading scales
- Youth athletes are at more risk of prolonged recovery & risk of catastrophic head injury

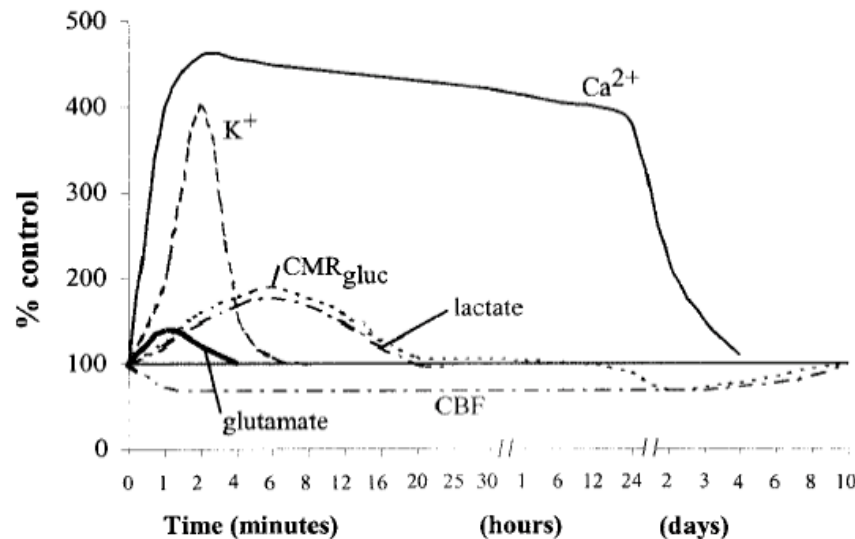


What we know about concussion...



What happens in a concussion?

- Theory of a “Metabolic mismatch”
 - Hovda, 1999
- Higher energy demand and glucose metabolism
- Decrease in energy supply and cerebral blood flow



Second-Impact Syndrome?

- Theory is:
 - Loss of autoregulation, edema, herniation
 - Delayed recovery & more sensitive during this period
 - Almost exclusively adolescent athletes
- 90% of deaths from sports-related head injury occur in high school age athletes or younger
- Catastrophic football head injuries are 3x greater in high school athletes than in college athletes





Concussion Legislation

“Lystedt Laws”

Teen, family reach settlement for brain injury

By Matt Markovich & KOMO Staff



STORY

VIDEO

Story Published: Sep 16, 2009 at 5:55 PM PDT | Story Updated: Sep 16, 2009 at 6:53 PM PDT



MAPLE VALLEY, Wash. -- A teen on a long road to recovery from a debilitating injury has finally reached a settlement to the Tahoma School District.

Nearly three years ago, Zack Lystedt suffered a concussion on the football field while making a tackle for his team at Mount Tahoma Junior High.

Even though the 13 year old grabbed his head in pain, his coaches, who had been hired by the district, put him back in the game several plays later.

Lystedt's brain began bleeding, but no one noticed until he started losing his balance near the end of the game. He eventually collapsed at the end of the game.

Comments (24)

State Concussion Laws



Effective as of: April 28, 2014
Source: Education Week



Initial Symptoms Reported

- Headache
- Nausea/Vomiting
- Dizziness
- Blurry Vision
- Sensitivity to light or noise
- Feels “foggy”
- Trouble concentrating
- Confused
- Does not “feel right”

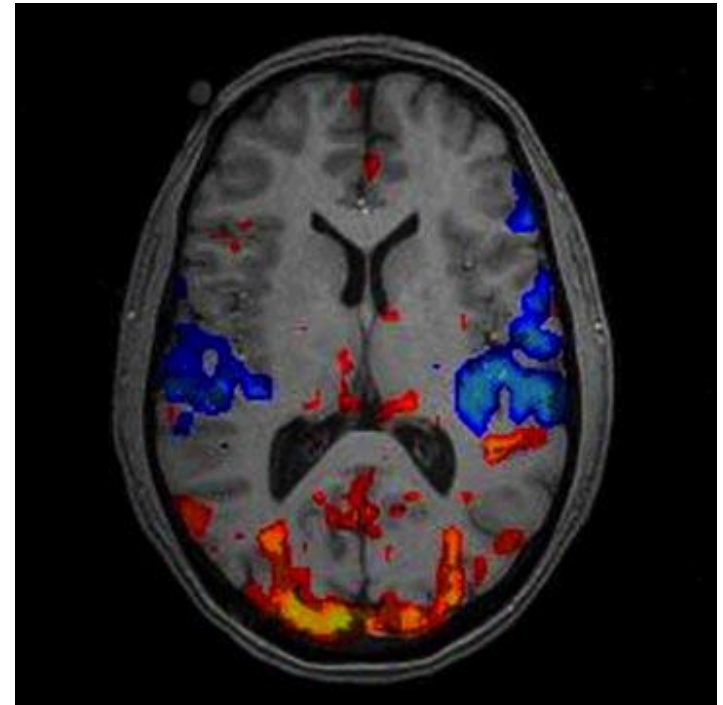
Signs Observed by Others

- Athlete dazed or stunned
- Confusion – plays, etc
- Can't recall game, score or opposing team
- Answers questions slowly
- Loss of consciousness (<10%)
- Avoids eye contact
- Amnesia to event prior or after injury
- Looks clumsy





What do I dream about?



Not ready for Prime Time



Where are we currently?

- History & Symptom Checklists
- Physical Exam
- Balance Testing
- Imaging?
- Computerized neurocognitive testing?



Computerized Neurocognitive Testing

- First used in 1982
- Attempts to measure attention span, memory, problem solving, and reaction time
- Baseline? Who? Often? False security?
- Comprehensive plan required

Concussion test may not be panacea

ImPACT sells tests and training to thousands, but some question program's validity

By Peter Keating | ESPN The Magazine

Updated: August 26, 2012, 11:21 AM ET



reference imagery: Purdue Neurotrauma Group / Purdue University



You Make the Call

- Mom calls wanting to know what she can do to help treat a concussion?
- Medications?
- Sleep?
- Rest?
- School?



Essential Equipment



"Yo, Dewey! Got another one over here when you're done."

My Current Approach...

- Close observation/physical/cognitive rest 48 hrs!
- Limit medications, emphasize sleep hygiene
- After 48-72 hours introduce the concept of gradual aerobic and cognitive activity beneath symptom threshold (20 min/day)
- No contact sports, at-risk activity or provoking symptoms
- ??? Driving
- Review expectations and return-to-play guidelines!



Return-to-Play “Insurance”

Table 1 Graduated return to play protocol

Rehabilitation stage	Functional exercise at each stage of rehabilitation	Objective of each stage
1. No activity	Complete physical and cognitive rest	Recovery
2. Light aerobic exercise	Walking, swimming or stationary cycling keeping intensity <70% maximum predicted heart rate No resistance training	Increase heart rate
3. Sport-specific exercise	Skating drills in ice hockey, running drills in soccer. No head impact activities	Add movement
4. Non-contact training drills	Progression to more complex training drills, eg passing drills in football and ice hockey May start progressive resistance training)	Exercise, coordination, and cognitive load
5. Full contact practice	Following medical clearance participate in normal training activities	Restore confidence and assess functional skills by coaching staff
6. Return to play	Normal game play	



Treatment Options

- Physical Rest
- Exercise?
- Cognitive Rest
- ~~Medications~~
- Vestibular therapy





CrossMark



PM R 8 (2016) S91-S100

www.pmrjournal.org

Advanced Sports Medicine Concepts and Controversies

The Role of Controlled Exercise in Concussion Management

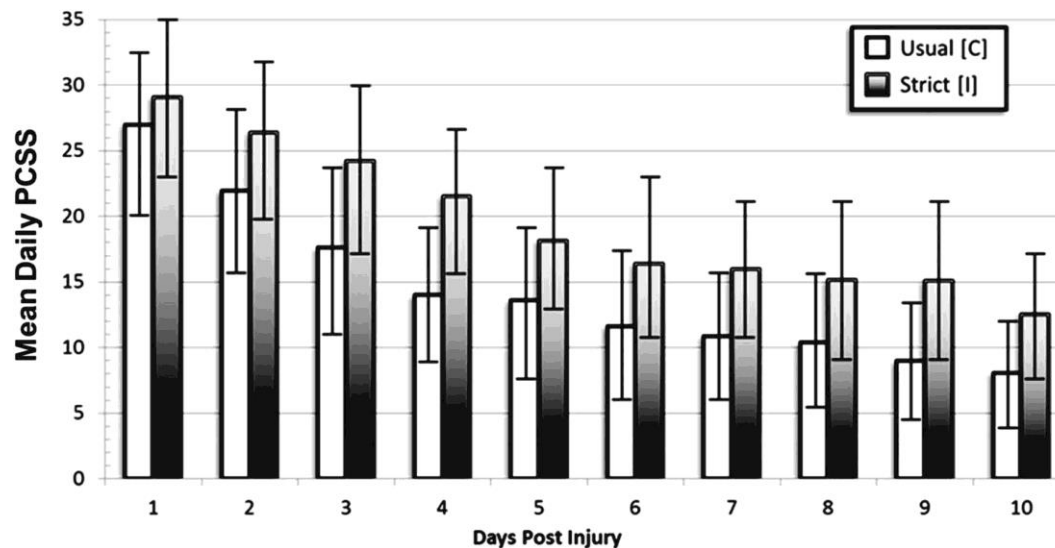
John Leddy, MD, Andrea Hinds, PhD, Dan Sirica, BS, Barry Willer, PhD



Physical Rest

- 88 patients ages 11-22 seen in ED <24 hrs after injury
- Randomized to strict rest for 5 days versus usual care (1-2 days rest, followed by stepwise return to activity).
- Rest group reported more daily symptoms (total symptom score over 10 days, 187.9 vs 131.9, $P < .03$) and slower symptom resolution.

Thomas DG. Benefits of strict rest after acute concussion: a randomized controlled trial. Pediatrics. 2015 Feb.



Physical Activity

JAMA | Original Investigation

Association Between Early Participation in Physical Activity Following Acute Concussion and Persistent Postconcussive Symptoms in Children and Adolescents

At 7 days post-injury

- Early physical activity – 48% with 3 or more symptoms
- No physical activity – 80%

• At 28 days post-injury

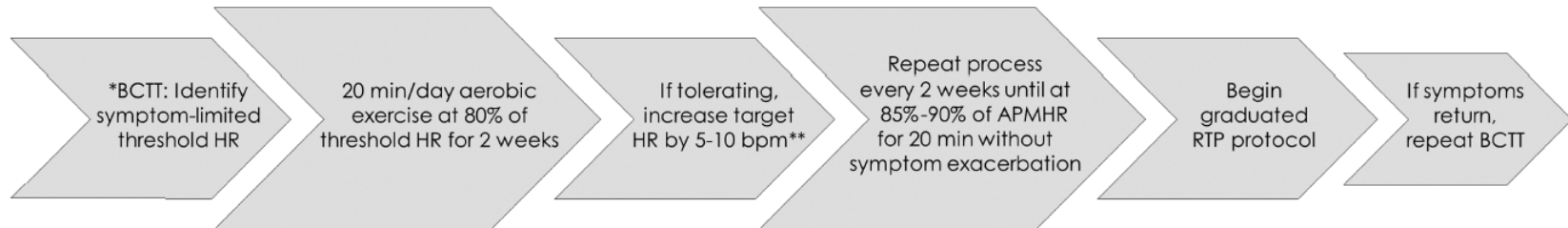
- Early physical activity – 29% symptomatic
- No physical activity – 40%

- Conclusion: Among participants aged 5 to 18 years with acute concussion, physical activity within 7 days of acute injury compared with no physical activity was associated with reduced risk of PPCS at 28 days.

Grool, Meehan, et al. JAMA December 2016



Physical Activity



- Some animal data show that early **forced exercise is detrimental to recovery after concussion**, but other animal data show that **voluntary exercise is not detrimental to recovery**.
- New research suggests that **absolute rest beyond the first few days after concussion may be detrimental to concussion recovery**. However, further research is required to determine the appropriate mode, duration, intensity, and frequency of exercise during the acute recovery phase of a concussion prior to making specific exercise recommendations.

Leddy J. The Role of Controlled Exercise in Concussion Management. PM R. 2016 Mar.

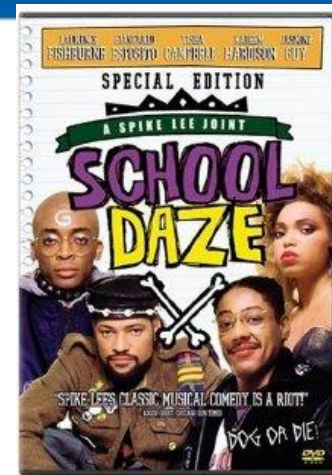
The Million \$\$ Question

- The family calls wanting to know when their child should return to school after a sports-related concussion?



Return to Learn

- Very little evidence
- Open lines of communication with school
- Rest breaks, extra time between classes, shortened classes, etc
- Advance gradually



PEDIATRICS[®]
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Returning to Learning Following a Concussion
Mark E. Halstead, Karen McAvoy, Cynthia D. Devore, Rebecca Carl, Michael Lee,
Kelsey Logan, Council on Sports Medicine and Fitness and Council on School Health
Pediatrics 2013;132;948; originally published online October 27, 2013;
DOI: 10.1542/peds.2013-2867



Chronic Concerns ?

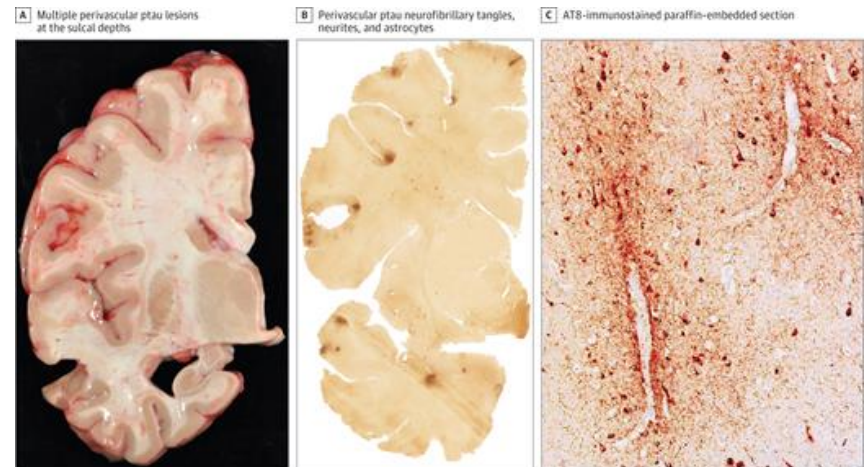
Study: Former NFL Players Who Played Tackle Football Before Age 12 at Increased Risk of Memory and Thinking Problems Later

Mom Suing Pop Warner Wants to Stop Pre-Teen Tackle Football



CTE

- Postmortem finding of increased tau deposition
- Also found in other conditions
- Not always correlated with symptoms
- Direct cause ??
- Relationship overstated?



What happens later in life?

- Study evaluated football players from 1956-1970
 - Rochester, MN
 - Compared to varsity swimmers, wrestlers and basketball players
- Head injury more likely reported in football
- 296 football athletes, 190 other athletes
- No increased risk in football players of neurodegenerative diseases and specifically dementia, parkinsonism, and ALS

Janssen PH, Mayo Clini Proc, 2017



How safe is Football?

- Study evaluated deaths from traumatic brain and spinal cord injuries in HS and college sports from 2005-2014
 - High school – 24 deaths reported
 - 58% of these in last 5 years
 - College -- 4 deaths

MMWR, Jan 2017



Educate, educate...

U.S. athletes still reluctant to admit head injuries: report

BY SUSAN HEAVEY

WASHINGTON | Thu Oct 31, 2013 10:26am EDT

0 COMMENTS



25



5



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8



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1 OF 7. Seventeen year-old Hannah Steenhuysen watches her high school's girls soccer team prepare for a game against Bishop Feehan in Attleboro, Massachusetts October 25, 2013.

CREDIT: REUTERS/BRIAN SNYDER



Removal From Play After Concussion and Recovery Time

R.J. Elbin, PhD,^a Alicia Sufrinko, PhD,^b Philip Schatz, PhD,^c Jon French, PsyD,^b Luke Henry, PhD,^b Scott Burkhardt, PsyD,^d Michael W. Collins, PhD,^b Anthony P. Kontos, PhD^b

- **Optimal Recovery begins at time of injury!**



Removing from Play

- High School Athletes
 - 35 who were immediately removed from play (REMOVE)
 - 34 who continued to play (PLAY)
 - PLAY group took avg 44 days to recover, REMOVE took 22
 - PLAY group 8.8 times more likely to have recovery lasting longer than 21 days
 - PLAY group had worse performance on neurocognitive testing and worse symptoms than REMOVE group

Elbin RJ, Pediatrics



Case #2

- The father of a 14 yo soccer player calls reporting that his daughter has persistent knee pain and swelling
- She had a non-contact injury and recalls a “pop” with her knee buckling



Anterior cruciate ligament tears plague teenage athletes as debilitating knee injuries spike

Shane Friedman, Rebecca Popple and Calvin Fontaine are three kids who have suffered the same knee injury: a tear of their anterior cruciate ligament. The debilitating injury is increasingly common among adolescent athletes, giving pediatric and orthopedic surgeons cause for concern.

BY HEIDI EVANS / NEW YORK DAILY NEWS / Updated: Tuesday, August 20, 2013, 2:30 AM

AAA

115

20



OUCH!

Shane Friedman, 15, of Manhattan, remembers hearing a terrifying crack in his left knee as he came down hard from a layup in a basketball tournament.

Rebecca Popple, 16, of New Jersey, who has been playing competitive soccer since she was just 7, recalls crying in agony as she was carried off the field by her dad — unable to move her right knee.

And 10-year-old Calvin Fontaine of Westchester County remembers zooming downhill on a New Hampshire slope and falling when he went to turn. His leg had gotten stuck in his ski.

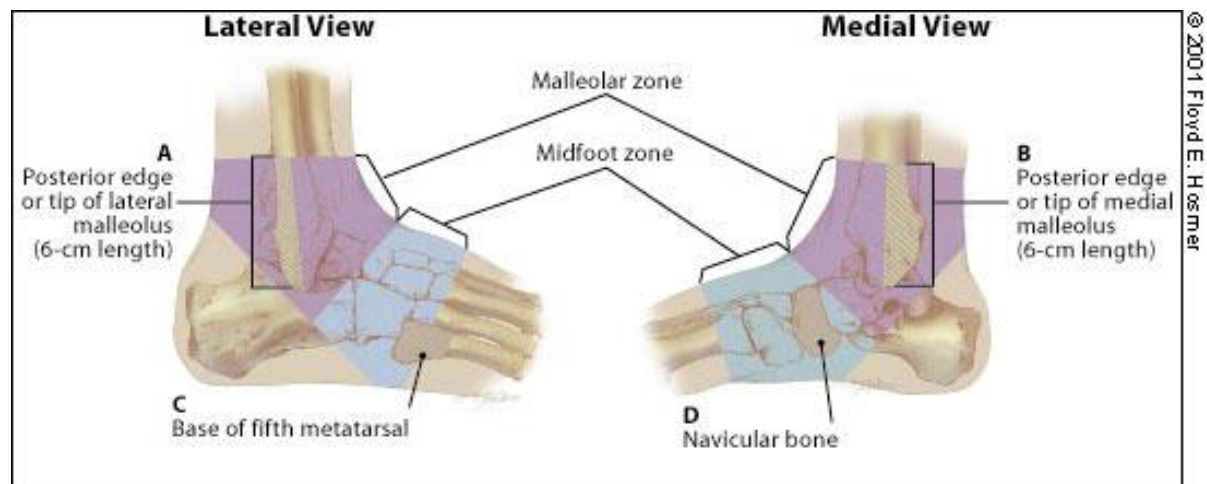
Case #3

- The family of a 15 yo basketball player calls after he “rolled his ankle”
- He was able to limp afterwards but unable to run
- They want to know if they should go to the ED?



Ottawa Ankle Rules

- **Ankle x-rays** if ankle pain with: 1) bony tenderness along the posterior edge/tip of lateral or medial malleolus or 2) **inability to bear weight for 4 steps**
- **Foot x-rays** if foot pain with: 1) bony tenderness at the base of the 5th metatarsal or 2) bony tenderness of the navicular bone or 3) **inability to bear weight for 4 steps**



Case #4

- A 13 y/o gymnast calls after having right hip pain and difficulty walking. She felt a “pop” while doing the splits.



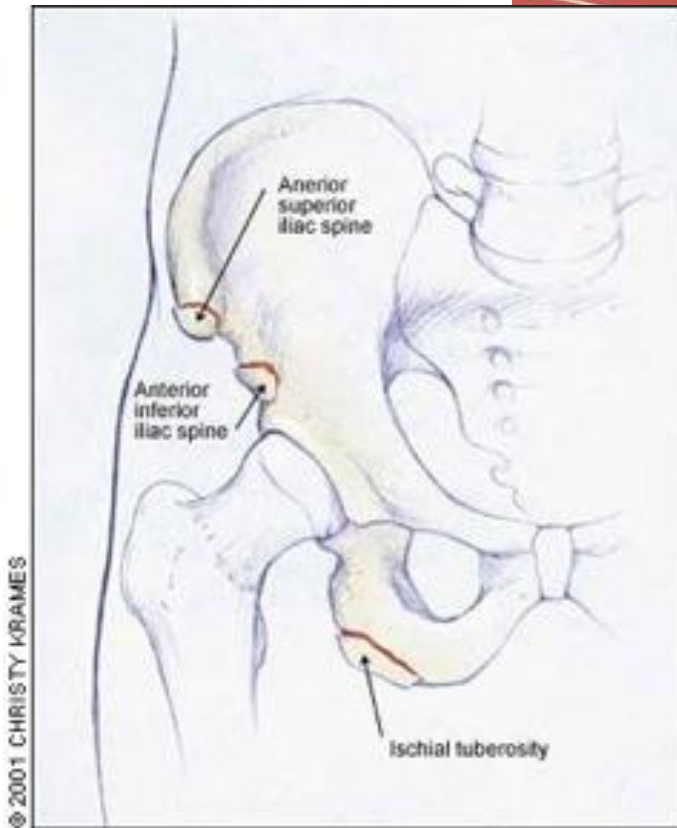
Ischium Avulsion



- On exam she had limited ROM with hip flexion, hip IROM, knee extension.
- She was tender to palpation over the ischium.

Pelvic Avulsion Fractures

- Occur with aggressive, athletic motions
- AIS - soccer/rugby
- ASIS - sprinters/soccer
- Ischium - gymnasts/hurdlers
- Crutches, NWB, pain control



Youth Athletes



Nearly **50%** of all injuries sustained by middle school and high school students during sports are overuse injuries.*



Overuse injuries can cause permanent damage and increase the chances of surgeries and arthritis later in life. Keep kids in the game for life by regularly discussing how they feel physically before, during, and after games and practice. Open lines of communication can help keep athletes in top physical condition all year round.

Become an advocate for safe sports participation.

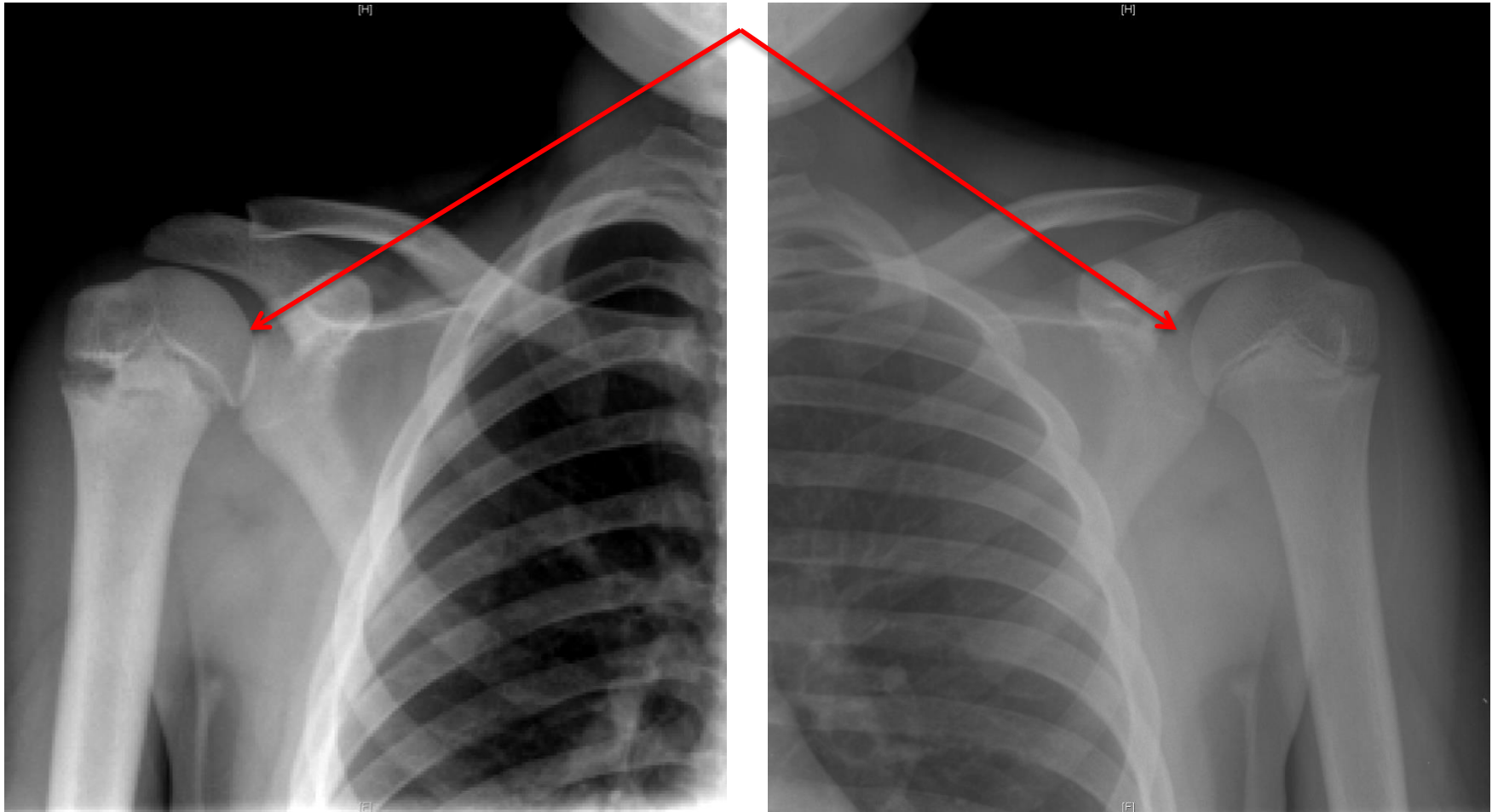
For more information, visit www.STOPSportsInjuries.org

*American Academy of Orthopaedic Surgeons, AAOS News, 2008



Little League Shoulder

Compare



Why so much overuse?

- Increasing levels of participation ~ 44 million
- Competitive nature has led to early specialization and intensity of training
- Repetitive training leads to overuse injuries
- Morbidity in Canada...
Sport > Infectious disease



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Overuse injuries can cause permanent damage and increase the chances of surgeries and arthritis later in life. Keep kids in the game for life by regularly discussing how they feel physically before, during, and after games and practice. Open lines of communication can help keep athletes in top physical condition all year round. Become an advocate for safe sports participation.

For more information, visit www.STOPSportsInjuries.org

* American Academy of Orthopaedic Surgeons, AAOS News, 2009



Not just lil' adults

- Sports specialization at young ages, year round participation
- Immature bones, growing brains, insufficient rest after injury, poor training, poor conditioning
- Lack of high quality medical care directed towards student-athletes



The toughest call?



Should School Boards Discontinue Support for High School Football?


Lewis H. Margolis, MD, MPH,^a Greg Canty, MD,^b Mark Halstead, MD,^c John D. Lantos, MD^b



Benefits of Youth Sports

- ↑ Physical Activity
- ↓ Obesity
- ↑ Academic Success
- ↑ Quality of Life
- Leadership
- Teamwork
- Job opportunities?
- Lifelong habits





“ This year, 5.3 million deaths will be attributed to physical inactivity. Smoking is responsible for 5 million deaths per year. ”

www.designedtomove.org

Choices, Choices



Youth Sports Team

- Coaches
- Teammates
- Health Care Professionals
- Parents
- Physicians
- Community

