2025 CMS COACHES SYMPOSIUM

Protect the Player, Preserve the Game: Understanding Concussion, TBI, & CTE as a Silent Epidemic

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July 29, 2025

EMPOWERING COACHES FOR EXCELLENCE

Serenity Speech Therapy, PLLC

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Adjunct professor

Public speaker

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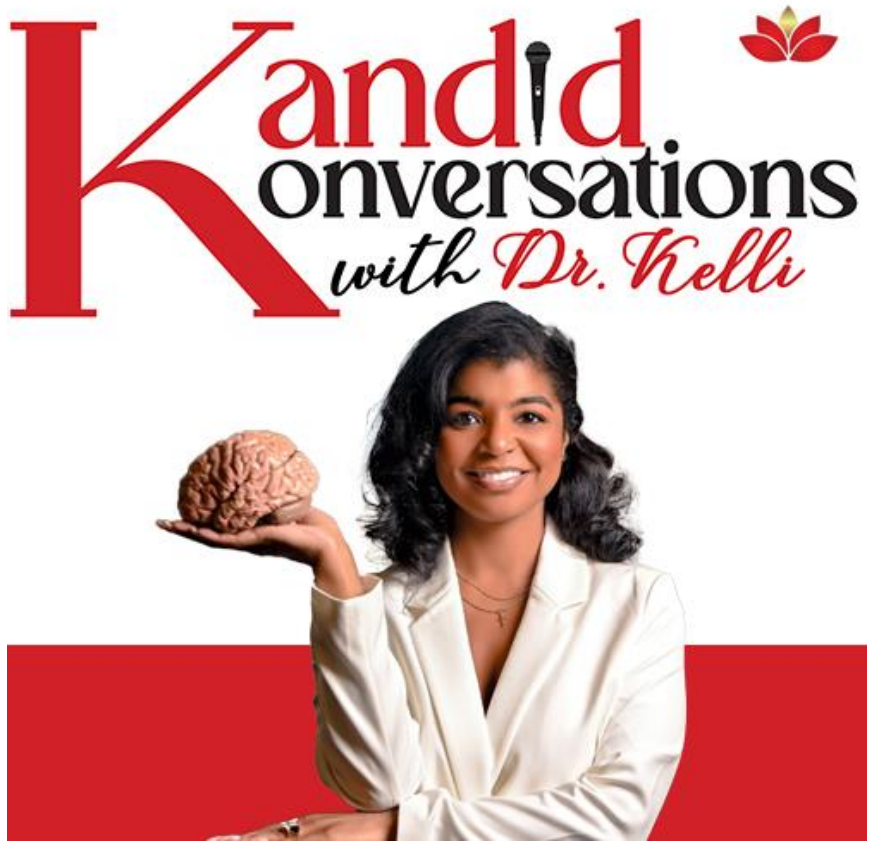
Kandid Konversations with Dr. Kelli



@drkelli.medicalslp

@braintalkfoundation

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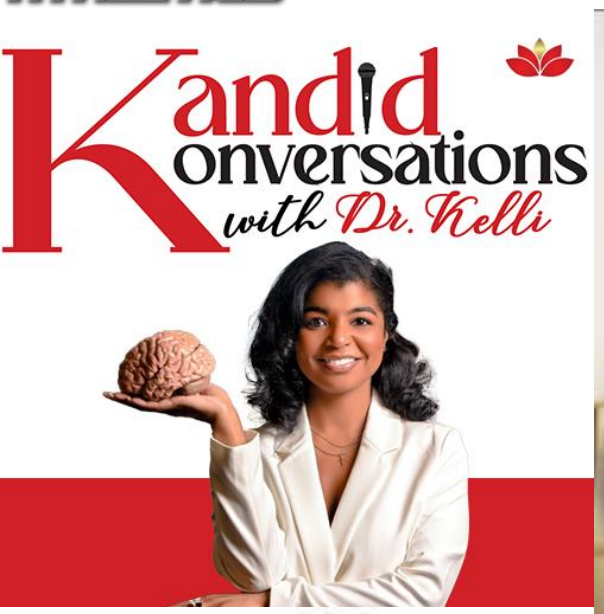
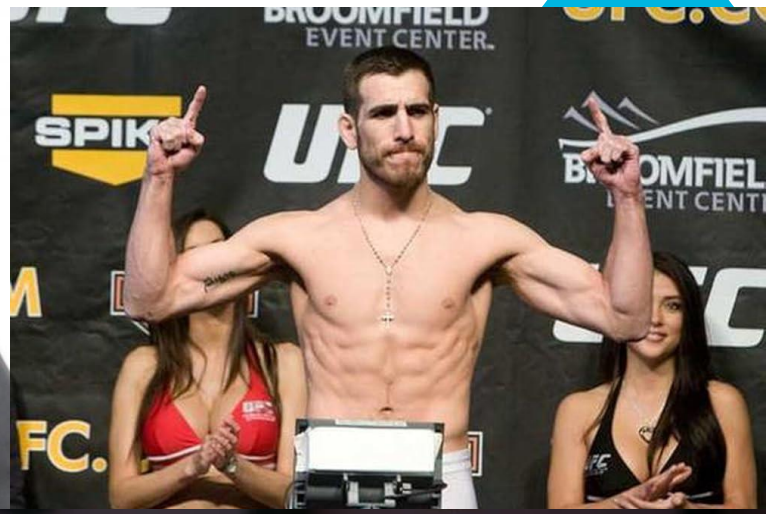
Charlotte-Mecklenburg Schools ATHLETICS



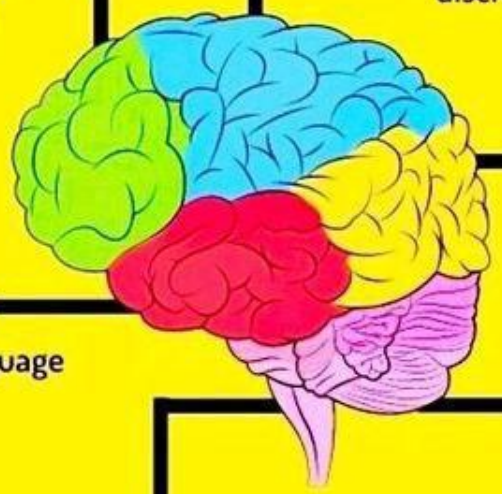


EMPOWERING COACHES FOR EXCELLENCE

DISCLAIMER

- Former athlete
- I come in peace to raise awareness
- No intention to scare
- Comin’ in hot

FUNCTIONS OF THE BRAIN



FRONTAL LOBE

- Movement
- Thinking initiation
- Reasoning (judgement)
- Behaviour (emotions)
- Memory
- Speaking

PARIETAL LOBE

- Knowing right from left
- Sensation
- Reading
- Body orientation and sensory discrimiation

OCCIPITAL LOBE

- Vision
- Visual reception and visual interprtation

TEMPORAL LOBE

- Understanding language
- Behaviour
- Memory
- Hearing

CEREBELLUM

- Balance
- Coordination
- Fine muscle control

BRAIN STEM

- Consciousness
- Breathing
- Blood pressure
- Heartbeat
- Alertness/sleep
- Body temperature
- Digestion
- Swallowing

Traumatic Brain Injury (TBI)

- An injury to the brain caused by a forceful bump, blow, or jolt to the head or body, or from an object that pierces the skull and enters the brain.

Concussion

- A type of TBI caused by a bump, blow, or jolt to the head or by a hit to the body that causes the head and brain to move rapidly back and forth.
- This sudden movement can cause the brain to bounce around or twist in the skull, creating chemical changes in the brain and sometimes stretching and damaging brain cells.

TRAUMATIC

Open

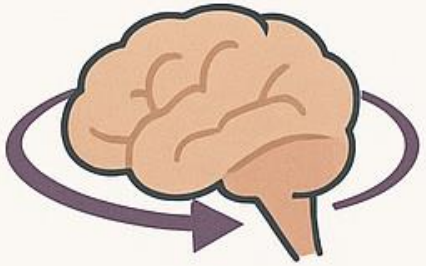
Penetrating injury (e.g. gunshot injury)

Closed

Injury with no skull fracture (e g. fall, motor vehicle accident)

NON-TRAUMATIC

Inertial (Rotational)



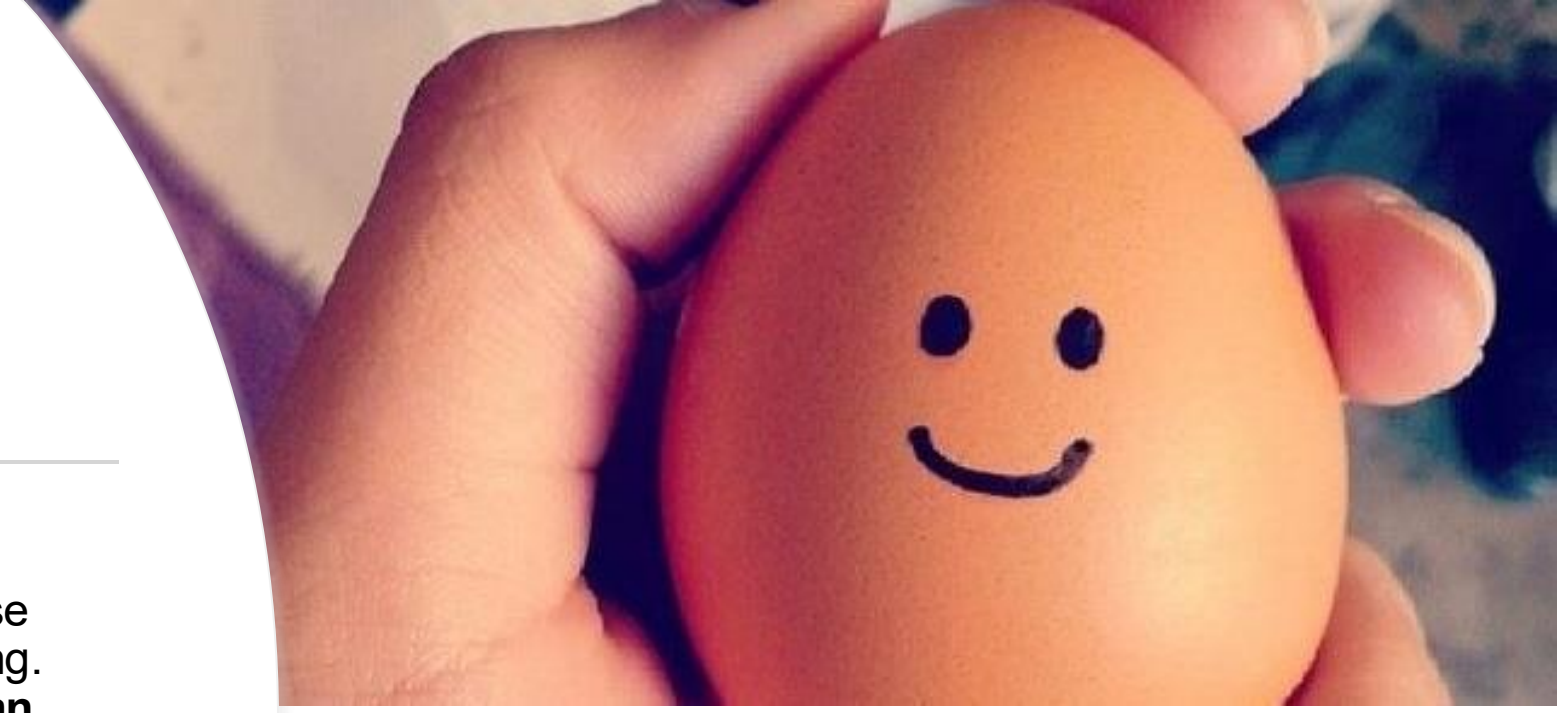
Non-impact injury (e.g. acceleration–-deceleration injury)

Internal Insult

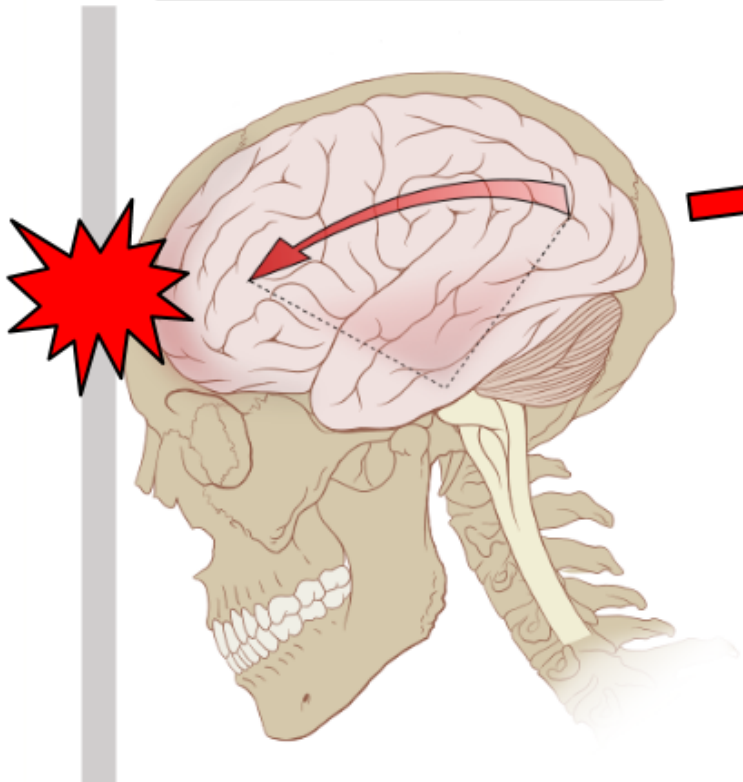
Damage from internal factors (e.g. stroke, tumor, oxygen deprivation)

It’s not “just” a concussion

- Some medical providers may describe a concussion as a “mild” brain injury because concussions are usually not life-threatening. **Even so, the effects of a concussion can be serious and life changing**
- Especially multiple concussions
- Changes how the brain functions or works
- The egg
  - Not connected/fixed to skull/body
  - If you wrap an egg in bubble wrap, the yolk will still move if jostled.
  - Brain inside helmet

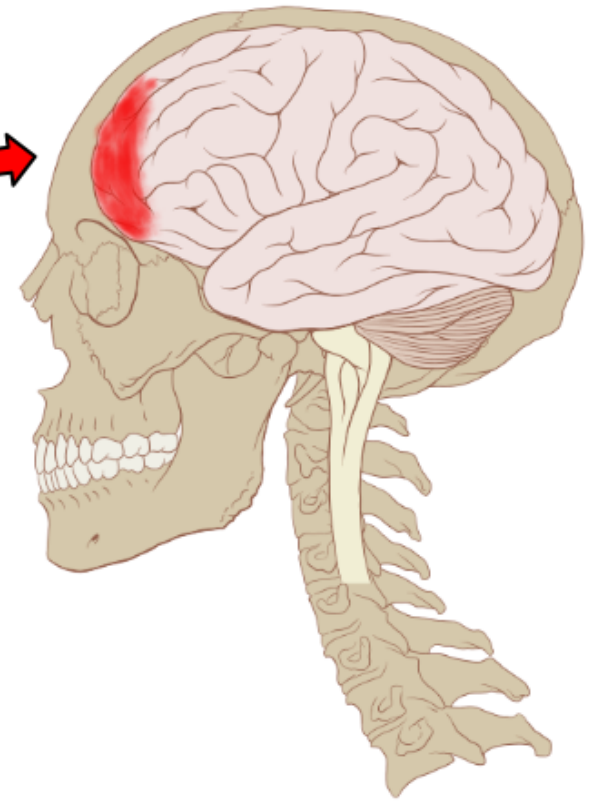


Concussion: A traumatic brain injury that changes the way your brain functions.



The brain is made up of soft tissue and is protected by blood and spinal fluid. When the skull is jolted too fast or is impacted by somthing, the brain shifts and hits against the skull.

This can lead to bruising and swelling of the brain, tearing of blood vessels and injury to nerves, causing the concussion.



Most concussions are mild and can be treated with appropriate care. But left untreated, It can be deadly.

Chronic Traumatic Encephalopathy (CTE)

- A human brain can get concussed with 50-60+ Gs of force.
- Common head-to-head contact on a football field is 100 Gs
  - Being hit on the helmet with a sledgehammer.

Sport	Estimated G-Force Range	Notes
Football (Tackle)	20–120 G	Linemen average 20–30 G per hit; serious collisions can exceed 100 G.
Soccer (Headers)	15–30 G	Repeated headers and accidental collisions carry risk.
Wrestling	20–60 G	Impacts from takedowns, slams, and falls.
Lacrosse	40–90 G	Frequent contact and high-speed ball movement.
Basketball	5–20 G	Falls, elbows, or contact during rebounds can cause head impacts.
Cheerleading	50–150 G	High G-forces from falls during stunts or tumbling.
Baseball / Softball	5–30 G	Hits to the head from balls or collisions at bases.
Track & Field	20–70 G	Injuries occur during hurdles, pole vault, or falls.
Volleyball	5–15 G	Head contact from falls, collisions, or dives.

Persistent Post-Concussion Symptoms (PPCS)

- The majority of patient's symptoms subside
  - **Children/adolescents:** within 2-4 weeks
  - **Adults:** within 10-14 days
- Symptoms that persist beyond expected time frames persistent post-concussion symptoms (PPCS) require rehabilitation

- Physical
  - Headache or "pressure" in the head (most common)
  - Neck pain
  - Sensitivity to light/sound
- Cognitive
  - Memory
  - Attention/Concentration
  - Thought organization
  - Confusion/mentally slower
- Sleep
  - Sleeping more/less than usual
- Mood/Behavioral
  - More irritable
  - New feelings of sadness or depression

Second Impact Syndrome (SIS)

- Second impact syndrome (SIS) occurs when two concussions happen in a relatively short period of time and the second concussion is inflicted before the first has fully healed.

- This causes the brain to “lose its ability to self-regulate pressure and blood volume flowing” and causes rapid and severe brain swelling.

- SIS is rare but often fatal.
  - The mortality rate in confirmed SIS cases is just over 50%
  - Probability of permanent disability nears 100%

Medrick Burnett Jr.
Alabama A&M Football Player

- “He had several brain bleeds and swelling of the brain. He had to have a tube to drain to relieve the pressure, and after two days of severe pressure, we had to opt for a craniotomy, which was the last resort to help try to save his life.”

  ~Burnett Family

Spontaneous Headshake After a Kinematic Event (SHAAKE)

- **SHAAKE** is a potential diagnostic tool used in the assessment of concussions, particularly in sports-related injuries.
- SHAAKE may help clinicians or sideline professionals identify concussions more quickly, even when athletes do not immediately report symptoms.
- The presence of SHAAKE could serve as an additional indicator for removing an athlete from play for further evaluation.
- Research is ongoing to validate the reliability and sensitivity of SHAAKE as a diagnostic marker.

Signs Coaches Should Watch For in Athletes: Immediate Signs of Concussion or TBI

- Dazed or stunned appearance
- Confusion (doesn't know the score, opponent, or position)
- Clumsy movements or balance issues
- Slow to respond to questions
- Personality or behavior changes
- Loss of consciousness (even briefly)
- Amnesia (can’t recall events before or after the hit)
- Headache, dizziness, nausea
- Blurred or double vision
- Sensitivity to light or noise

Signs Coaches Should Watch For

Ongoing Signs of Mild to Moderate TBI (Over Days or Weeks)

- Memory issues (forgetting plays, assignments)
- Trouble focusing in class or practice
- Irritability or mood swings
- Fatigue or sleeping more than usual
- Decline in academic or athletic performance
- Slower reaction time
- Avoidance of physical activity or reporting “just not feeling right”

Long-Term/Repeated Injury: Red Flags for Possible CTE

- Frequent aggression or outbursts
- Depression or anxiety
- Chronic headaches
- Decline in memory or cognitive skills
- Impulsivity or poor judgment
- Sleep disturbances
- Paranoia or delusions (in severe cases)

Time to see a speech language pathologist

Athlete Confessions…

I don't want to lose my spot.

I am depressed.

We made a pact.

I was suffering in silence.

It's hard to remember all the plays.

I can't see straight but I'mma play anyway.

I didn't know there was help.

I can't let my team down.

If I'm not an athlete, then who am I?

After my suicide attempt, I found out my teammates were experiencing the same thing.

It's really easy to beat the protocols.

If I admit something is wrong, I'll look weak.

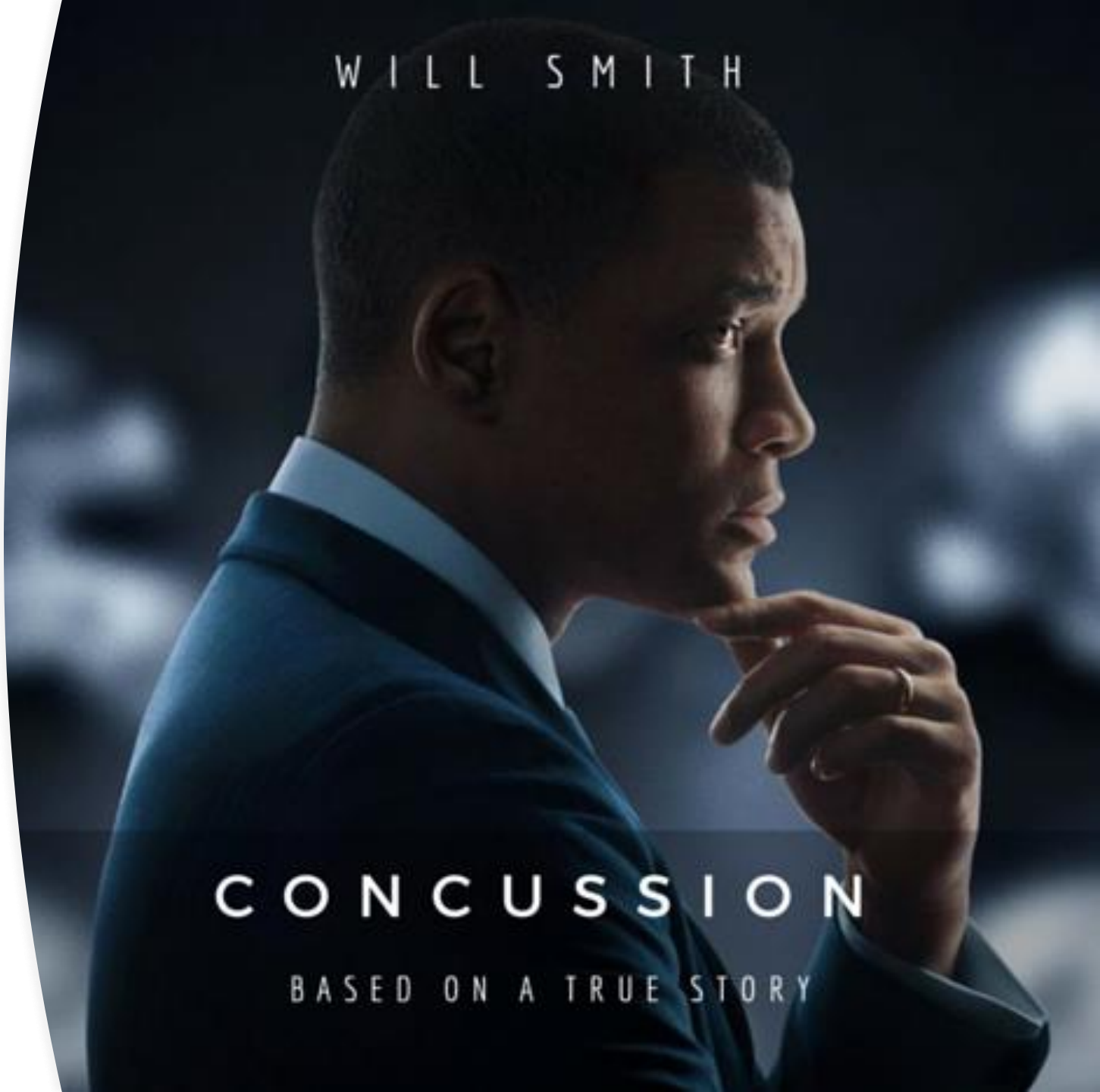
I think I need help, but I don't even know what kind.

Chronic Traumatic Encephalopathy (CTE)

CTE is a degenerative brain disease found in athletes, military veterans, and others with a history of repetitive brain trauma.

Chronic Traumatic Encephalopathy (CTE)

- Concussion film (2015)
- Will Smith depicted Dr. Bennet Omalu, the forensic neuropathologist who made the first discovery of CTE in 2002.
- At the time it was considered a football-related brain trauma.



Chronic Traumatic Encephalopathy (CTE)

- The way Dr. Omalu described it in the film was if wet concrete was poured into kitchen pipes, the concrete hardens and chokes the brain from the inside.
- Condition of brain at time of death equivalent to 25,000 automobile crashes in over 25 years of playing football at the high school, college and professional levels.
- Nearly 1000 NFL players diagnosed with CTE after death.
- Presently, CTE can only be diagnosed after death by postmortem neuropathological analysis.

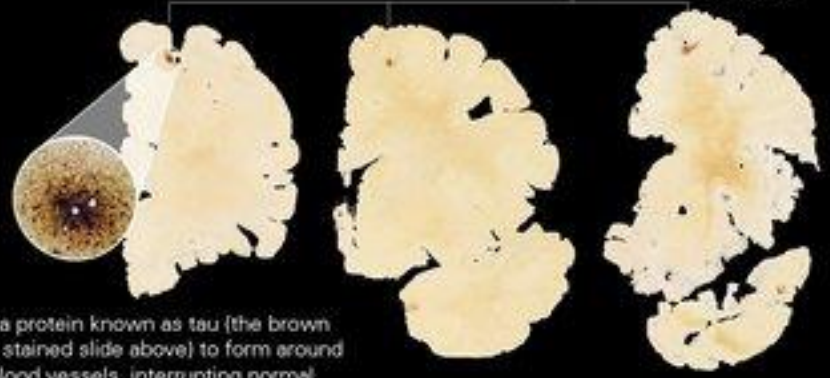
Chronic Traumatic Encephalopathy (CTE)

- A protein called tau - malfunctions, causes other proteins to misfold.
  - **Misfold - Proteins fold within themselves becoming nonfunctional**
- This sets off a chain reaction where this malfunctioning tau slowly spreads throughout the brain, killing brain cells.
- Symptoms do not generally begin appearing until **years** after the onset of head impacts.
- **CTE has been seen in people as young as 17 yo.**

STAGE 1

NO SYMPTOMS

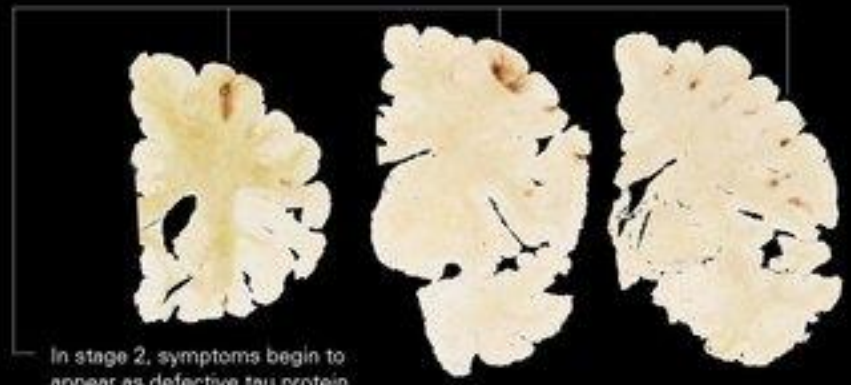
In stage 1, isolated spots of tau build up mostly around the frontal lobe, or the crown of the head.



CTE causes a protein known as tau (the brown spots in this stained slide above) to form around the brain's blood vessels, interrupting normal functioning and eventually killing nerve cells.

STAGE 2

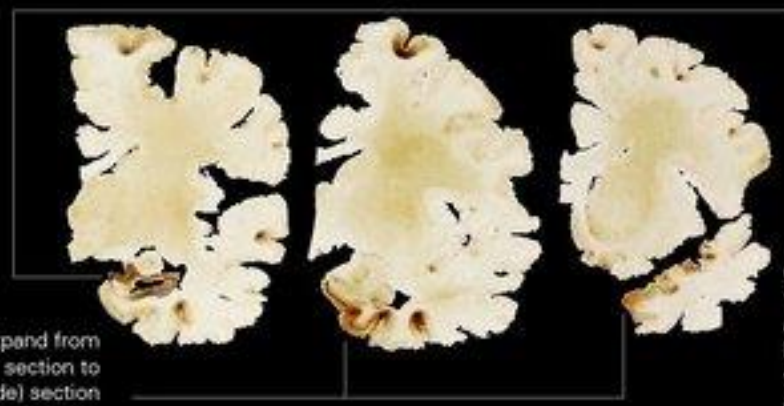
RAGE, IMPULSIVITY, DEPRESSION



In stage 2, symptoms begin to appear as defective tau protein affects more nerve cells in the brain's frontal (top) lobes.

STAGE 3

CONFUSION, MEMORY LOSS



Tau deposits expand from the frontal (top) section to the temporal (side) section of the brain.

Condition begins to affect the amygdala and the hippocampus, which impairs emotion and memory.

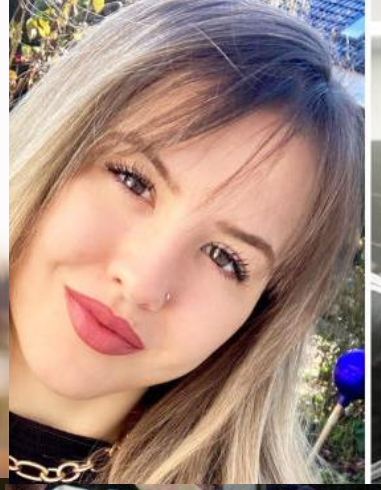
STAGE 4

ADVANCED DEMENTIA

The brain becomes deformed and brittle, and cognitive function is severely limited.

By Stage 4, tau deposits have overwhelmed the brain, killing many nerve cells and shrinking it by roughly half its size.


CASES
Trigger Warning: Graphic images and discussion of violence and suicide




ER ARMOUR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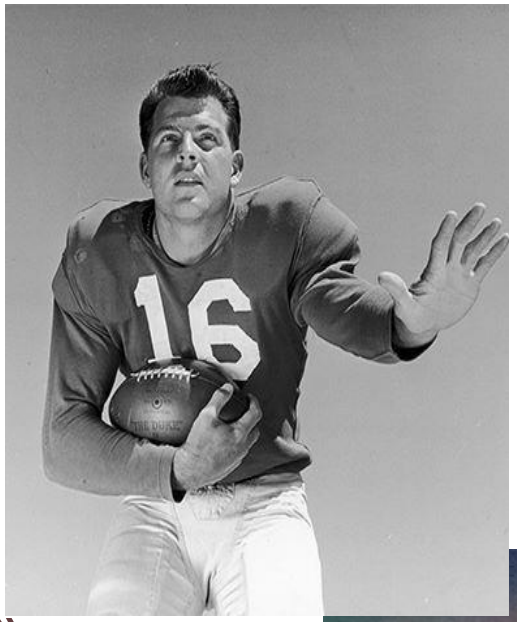
REDS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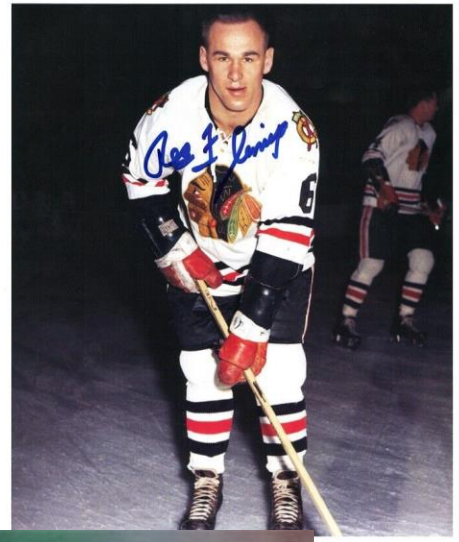

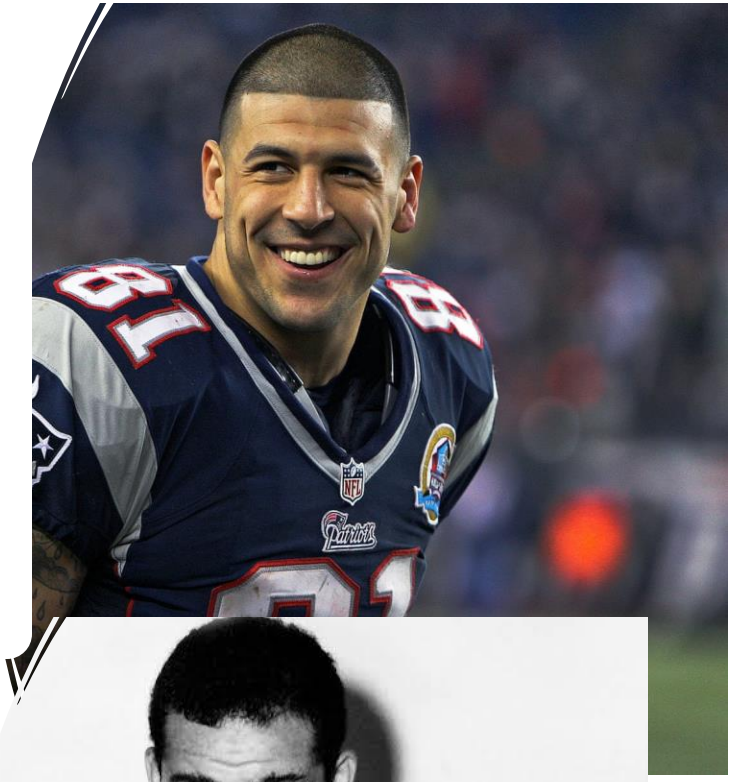
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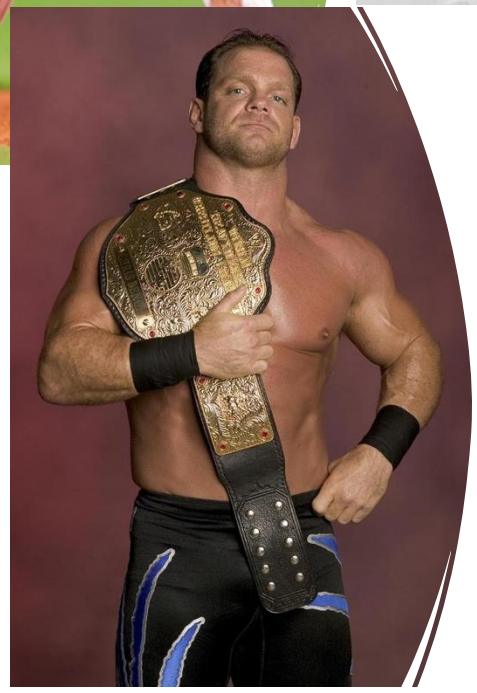

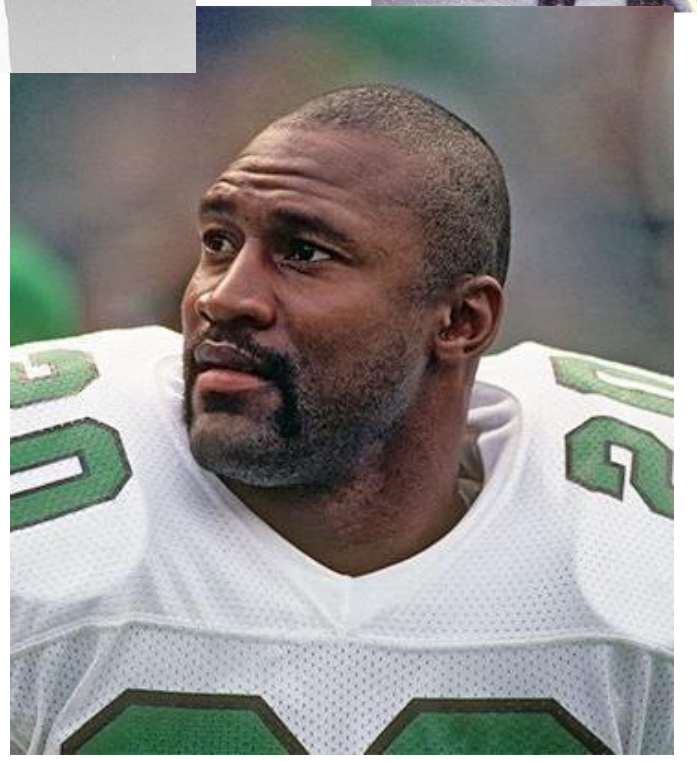

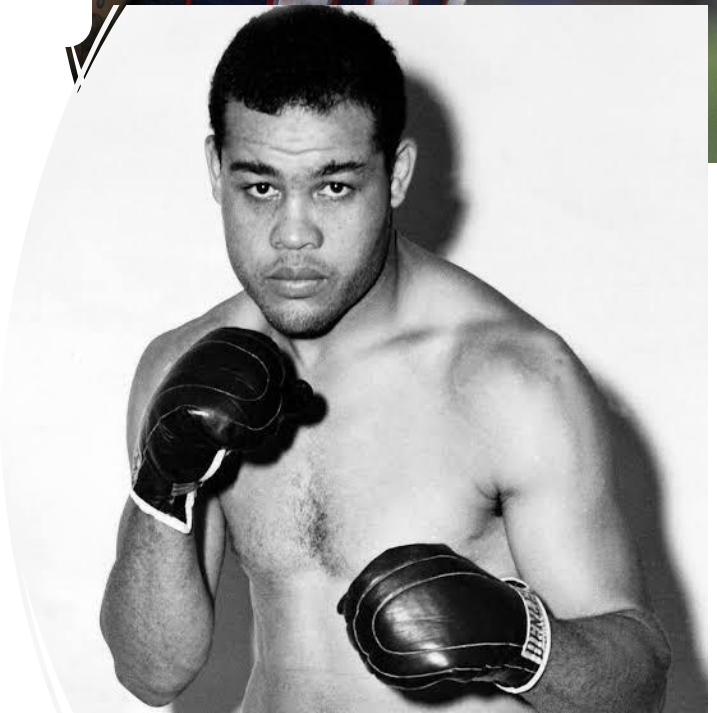

Daniel Carcillo

- Former NHL player
- **Position**: Left Wing
- **NHL Career**: 2006–2015
- **Concussions**: Suffered at least **7 diagnosed concussions** during his career.
- Large advocate **for magic mushrooms** and mental health advocacy work through his clinic **Wesana Health**

James toney

- Retired professional boxer
- Former mixed martial artist
- Known for defensive skills, slick counterpunching style, and longevity in the sport.
- Career spanned nearly three decades, from 1988 to 2017.
- Competed in multiple weight classes:
  - Middleweight up to heavyweight
  - One of the few fighters in history to win major world titles in three different weight divisions:

Young James

James today

Age: More Than a Number

- Neurobiological differences between children and adults may indicate young children are more vulnerable to effects of concussion and TBI
  - Less cerebral blood volume
  - Diminished level of myelination
  - Biomechanical
    - Less well-developed neck and shoulder musculature

High school age or younger should be managed more conservatively

Short Term Considerations

- **Return to play with impairment:**
  - Increased risk for re-injury and SIS
  - Higher risk for long term damage
- **No diagnosis:**
  - Lack of self awareness or ownership for problems/emotions
  - Lack of self advocacy
- **Misdiagnosis**
  - Increased frustration
  - Medication ineffective

- **Behavioral problems at school**
  - Punishment for TBI-related behavior
    - Especially when school/educators are unaware
- **Increasingly impulsive behaviors**
  - Fights
  - Self-medicating (drugs, alcohol, self harm)
  - Anger (Emotional control/poor response inhibition)

TBI to Prison Pipeline

- **TBI to Prison Pipeline** the increased likelihood that individuals, especially youth, with undiagnosed or untreated brain injuries may become involved with the criminal justice system.
- Studies show **50–70% of incarcerated youth** have a history of TBI, compared to ~12% in the general population.
- Many brain injuries go **unidentified and unaddressed**, particularly when symptoms are misinterpreted as behavioral or disciplinary issues.
- **TBI Symptoms Can Lead to Criminalization**
- **Cognitive and behavioral symptoms**:
  - Impulsivity
  - Poor judgment
  - Emotional dysregulation
  - Difficulty with memory, attention, and executive functioning
- In schools and communities lacking support, these symptoms may result in **suspension, expulsion, or arrest** rather than medical evaluation and intervention.

TBI to Prison Pipeline

- **Disproportionate Impact on Vulnerable Youth**
- Youth of color, those from low-income backgrounds, and those in foster care are:
  - More likely to **experience TBI** due to community violence, neglect, or sports injuries.
  - Less likely to receive timely medical care, rehabilitation, or academic accommodations.
- These intersecting inequities exacerbate the risk of involvement in the juvenile justice system.

- **How This Pipeline Operates:**
  - **Injury occurs** (sports, accidents, abuse, violence).
  - **Symptoms manifest** (cognitive delays, behavioral changes).
  - **Misunderstanding in school** (punitive discipline, poor performance).
  - **No proper diagnosis** or interventions.
  - **Escalation to justice system** (truancy, aggression, theft, etc.).
  - **Incarceration with no rehabilitative support**, worsening outcomes.

Misdiagnosis/Lack of Differential Diagnosis with TBI

- Bipolar Disorder
- Emotional Disturbance
- ADHD
- PTSD
- ODD

- Dyslexia
- Depression
- Anxiety
- Impulse Control Issues

Who should keep an eye out?

Advice/Thoughts from Athletes

I actually have tools to help me.

I feel empowered.

Your brain should be priority.

I can't play forever, but I need my brain forever.

I feel my therapist actually cares about me.

The injured athlete is the most important athlete in that moment.

Take the protocols seriously.

I walked away from my contract.

There must be trust and honesty between athlete and coaches.

I can't let my team down.

I didn't want dementia in my 40s or 50s.

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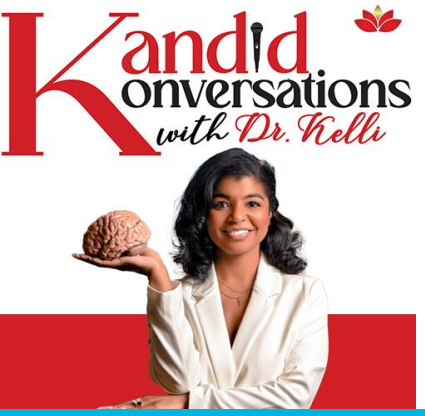

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What Coaches Can Do

- **Report & Refer:** Notify parents, school nurse, and athletic trainers when symptoms are observed.
- **Follow Protocols:** Adhere strictly to return-to-play and return-to-learn protocols.
- **Create a Safe Culture:** Encourage athletes to speak up and report symptoms without fear of losing playtime.
- **Educate the Team:** Share this knowledge with assistant coaches, trainers, and parents.
- **And…**

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THANK
YOU

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