Concussions

Steve Horwitz, CEO TeamSafe™

TeamSafe™

Dr. Steve Horwitz

- 1996 United States Olympic Team Medical Staff
- Former Chairman, Maryland Council on Physical Fitness
- Former Maryland State Director, National Strength and Conditioning Association
- Rowlett Youth Soccer Association Board Member
- RYSA U6 – U9 Coach
- Dad

Weiss vs. Pratt

- A **varsity football game**.
- After a tackle, athlete **could not move** for a few seconds
- He then was able to move his legs and roll over onto his back.
- An orthopaedic physician, attended to the athlete immediately on the field and evaluated him for approximately **15 minutes**….
- The physician, with the assistance of the athletic trainer, **removed his helmet.**
- The athlete was placed in a **seated position and then escorted off the field.**
- On the sideline, the physician removed his shoulder pads.
- The athlete complained of nausea, and the physician decided to **send him to the emergency room** for further evaluation.

Weiss vs. Pratt

- At the hospital the athlete was given pain medication, a cervical soft collar, and an arm sling and directed **to follow up** in the office **3 to 4 days later.**
- Three days later, the plaintiff went to the physician's office but was seen by another provider.
- By then, the plaintiff could **not elevate his arm** or flex his elbow. He had also **lost significant strength** in his arm
- The athlete was referred for magnetic resonance imaging, which revealed an **epidural hematoma** on the right side of the spinal cord at the C1-C4 levels and a nonhemorrhagic **cord contusion** behind the C5 level.
- The team physician admitted in retrospect that he **"would have put [the plaintiff] in a backboard on the field."**
- The athlete sued … the jury awarded the plaintiff $500,000 for past intangible losses and $250,000 for future damages.

"The clue to success following major sports injuries is initial survey and adequate prehospital care. Skill training is essential to optimize patient care rapidly as well as to avoid liability."

— Dr. Nikos Malliaropoulos,

On-field Sports Medicine Emergencies: What's New!

English Professional Football Players Concussion Knowledge And Attitude

- “Appropriate and timely concussion management is critical to reduce both the immediate and long-term effects of concussions.”
- “**Timely recognition** is critical to prevent second impact syndrome which, while rare and debated, is potentially fatal.”

English Professional Football Players Concussion Knowledge And Attitude

- **Multiple misconceptions pe**rsist including not recognizing subtle concussions symptoms, not recognizing a potential concussion, and the risk of potential complications.
- Further, important misconceptions underlie common responses that **athletes continue to participation despite experiencing concussion** related symptoms.
- These misconceptions appear to be similar between the US and UK and are potentially driven by **inaccurate media portrayal of concussions.**

English Professional Football Players Concussion Knowledge And Attitude

- The interview revealed only 28% indicating they would not attempt to play through a concussion with comments including, “I'd try to. If I couldn't then I'd stop, but I'd try to”
- “I've played through a concussion if your vision is fine, **man up and do it**”, and
- “If I felt like I could then yeah” despite each of these specific individuals indicated they would not play through a concussion on the questionnaire.

English Professional Football Players Concussion Knowledge And Attitude

- Two external factors which influenced concussions reporting likelihood was the **substitution rule** and the **match importance**.

Outdated Protocols And Lack Of Preparedness

Current practices in determining return to play following head injury in professional football in the UK

- A questionnaire was sent to Club Medical Officers of all the 92 English Football league teams.
- **Results** The **majority** (55.6%) of teams in the English Football Association (FA) **do not routinely follow** the CIS [Consensus in Sport] **guidelines**.
  - Only 21% of teams routinely record an approved preseason cognitive score and only 42% complete a recommended postconcussion assessment.
  - One-third are still using outdated fixed periods of abstinence following a concussion.

Outdated Protocols And Lack Of Preparedness

[Concussion Symptoms and Return to Play Time in Youth, High School, and College American Football Athletes]

The odds of return to play less than 24 hours after injury were larger in youth athletes than high school athletes

The First 5 to 7 Minutes – Are You Prepared?

- **Response Time**
  - National EMSC Data Analysis Resource Center – **9 minutes**
  - NATA 7.8 minutes
- **Relationship of Training to Outcomes**
  - "The ***National Athletic Trainers Association*** says coaches "*do not have the proper medical education to treat injuries or recognize the common causes of life-threatening medical conditions, which puts the lives of athletes in jeopardy.*"

The First 5 to 7 Minutes – Are You Prepared?

- **Importance of Preparation and Planning (Emergency Action Plan) and Access to Trained Medical Personnel**
  - **63% of high schools do not have even 1 full-time Athletic Trainer** and 30% have no access whatsoever to an Athletic Trainer
  - Only **45%** of schools reviewed and **practiced** their emergency response to SCA at least once annually and only **20%** of schools **posted** their emergency action plan at athletic venues.
  - **Pediatricians noted that they lack up-to-date concussion training and/or resources** needed for timely and accurate diagnosis and ongoing case management.
  - **League Sports ?????????**

Concussions: Lack of Data in Youth Athlete

- "The **incidence** of sports- and recreation-related concussions (SRRCs) in the United States is **unknown**" [1]
- "The most commonly cited estimate is that between 1.6 and 3.8 million sports- and recreation-related TBIs occur annually in the United States." [1]
- "the epidemiology of youth concussion has been limited primarily to those who are high school age or older, participate in organized [high school or collegiate athletics] sports, and/or are treated in EDs." [2]
- "the findings confirmed that concussions occur among children of all ages: approximately one-third of patients (2860/8083) were **younger than 12 years**." [2]

Concussion Knowledge

- The respondents had extensive experience of sustaining or witnessing rugby-related concussion. **Medical staff had the greatest level of concussion knowledge, with coaches having the least**.
- Players and coaches exhibited a disconnection between being "knocked-out" and practically applying this when managing concussion.
- **Almost half of the players and coaches did not indicate concussion could impair performance**. Eighty percent of medical staff had felt pressured to clear a concussed player.
- Most players (82%), coaches (66%), and referees (64%) incorrectly believed protective equipment prevents concussion.
- Players and coaches prefer concussion education from medical staff, whereas medical staff and referees prefer such education from governing body Web sites or training courses.
- Rugby Union, UK

Concussion Knowledge

Implementation of concussion legislation and extent of concussion education for athletes, parents, and coaches in Washington State.

Three years after the passage of a concussion law in Washington State, high school football and soccer coaches are receiving substantial concussion education and have good concussion knowledge. Concussion education for athletes and parents is more limited. **Football players receive more extensive concussion education than do soccer players.**

Concussion Knowledge

Knowledge and management of sports concussions among coaches and certified athletic trainers in Alabama.

- Both coaches and ATCs primarily use physicians to make return-to-play decisions,
- ATCs were more likely to identify symptoms that are positive for concussions (P = 0.04). **Both groups had difficulty recognizing subtle symptoms such as trouble sleeping, personality changes, and dizziness**; they also were unaware that strenuous mental activities could delay concussion recovery, although ATCs scored significantly better than coaches (P < 0.001).
- **Neither coaches nor ATCs consistently use standardized measures such as the Sports Concussion Assessment Tool** 2 (7.5% vs 56.4%) or neuropsychological testing (5.3% vs 14.5%).

Concussion Knowledge

Recognizing the Symptoms of Mental Illness following Concussions in the Sports Community: A Need for Improvement

In our large national [Canadian] survey of athletes, parents, coaches and medical professionals a high number of the physical and cognitive symptoms associated with concussion were identified. However, **significantly fewer respondents associated the mental health symptoms of nervousness or anxiety, sadness or depression, and irritability with concussion**.

Legal Concerns

- “On the youth sports level where you have more dependency on volunteers and less access to medical care. People need to understand that **pamphlets won't do it and laws are not a panacea**… **Somebody has to know when to have the child taken out and evaluated** or the whole thing breaks down.
- "On a national level or even on a statewide level, the people who govern sports can't really be assured that the people who are actually present and coaching, officiating or administrating the particular event will know what to do **unless they have developed policies and protocols and mechanics that people who are involved might actually utilize**.
- “**I see more claims coming down in the near future** and I see more confusion until situations shake out. I hate to say the worst is yet to come, but I think we're still feeling our way.”

— Attorney Alan Goldberger,
Baseball, Basketball, and Football Official

Concussion Knowledge

Keeping our heads up: evolving law and the future of policymaking to address traumatic brain injury in youth sports

Bukal v. IHSA 2014, the first lawsuit brought by a class of former athletes against a state [Illinois] high school association for allegedly inadequate concussion protocols, raises interesting legal questions and implications for implementers. Does existence of statutory provisions protect high school associations from liability? Does a comprehensive law become impracticable and, therefore, less effective (*e.g.,* requiring medical personnel on the sidelines of all high school football games)?

State Concussion Laws

- In less than 5 years, all 50 states and the District of Columbia have passed a similar law. This is the fastest growing public safety initiative to go into law in all states, ever.

Zackery Lystedt Law

On October 12, 2006, Zackery suffered a life-threatening brain injury during a middle school football game.

School coaches returned him to play football after he sustained a concussion, without first obtaining a complete evaluation by a licensed health care professional trained in the evaluation and management of concussions.

The young football star underwent emergency life-saving brain surgery at Harborview Medical Center after he collapsed on the field. Zackery, now spends 40 hours per week working on his rehabilitation and taking college courses.

State Concussion Laws

Why must these laws be named for a child who was injured?

Texas: Natasha's Law

- Natasha Helmick 14 years old was hit in the left temple by an opponent during a soccer game and continued to play despite losing vision in her left eye and seeing floaters and sparkly objects dance in front of the other.
- The new law is named after Ms. Helmick, a former Allen High School star who won a soccer scholarship to Texas State University in San Marcos. Despite her multiple concussions, one of which left her temporarily blinded in one eye, she continued playing soccer without seeking proper treatment. Today Ms. Helmick suffers from memory loss, and reportedly she was forced to surrender her soccer scholarship after her neurologist said her last concussion made it too dangerous for her to play.

Concussions in Soccer

- The majority of concussions occurring in organized sports in the USA are sustained in football, wrestling, girls' **soccer**, boys' **soccer** and girls' basketball.[2]
- In college soccer players, the **mechanism** of concussion was **primarily player contact** and importantly none were related to purposeful heading. [2, 5]
- In both football and soccer, the most frequent injury mechanism was a collision between two players.[4]
- Although it was not important as a sole mechanism**, contact with the ground** was a factor in 15 % of men's and 20 % of women's soccer concussions. [4]
- **Competition** concussion **rates** are consistently **higher** than practice rates. [2]

Concussions in Soccer

- For men's and women's soccer, **goalkeepers** had the **highest incidence** of concussion. [4]
- **Women** had **higher concussion rates** than men. [1]
- **Female** soccer and basketball players also displayed **more time loss** after concussion compared with male basketball and soccer players.[3]
- **Contact with a ball was a frequent mechanism of injury in soccer**; however, we are unable to state what proportion were attempts to head the ball and what proportion were completely unintentional ball contacts to the head. [4]

Is There A Threshold Of Force Below Which A Person Can Safely Head A Ball?

The science isn't there yet. We don't even have a threshold that predicts the linear and rotational accelerations needed to cause a concussion. The linear forces are measured in gravity, and **we've measured hits in various sports as high as 150 *g*'s where people haven't had concussions and we've had other individuals with hits as low as 50 to 60 *g*'s who've had concussions.** The other kind of forces—the rotational or twisting forces—which are measured in radians per seconds squared, we also don't know those forces needed to produce concussions.

We also **don't have a good handle on the threshold** needed to produce **sub-concussive** trauma, which are blows to the head that don't produce symptoms but do produce structural changes observable in neuroimaging.

Concussion — Definition

4th International Conference On Concussion In Sport held in Zurich, November 2012.[1–3]

Panel discussion regarding the definition of **concussion and its separation from mild traumatic brain injury** (mTBI) was held. There was acknowledgement by the Concussion in Sport Group (CISG) that although the terms mild traumatic brain injury (mTBI) and concussion are often used interchangeably in the sporting context and particularly in the US literature, Concussion is a **subset of TBI.**

Concussion - Definition

4th International Conference On Concussion In Sport held in Zurich, November 2012

Concussion is a **brain injury** and is defined as a complex pathophysiological process affecting the brain, induced by biomechanical forces.

- **Direct blow to the head, face, neck or elsewhere on the body with an "impulsive" force transmitted to the head**.
- Typically results in the rapid onset of short-lived impairment of neurologic function that resolves spontaneously
- A functional disturbance rather than a structural injury and, as such, no abnormality is seen on standard structural neuroimaging studies.
- Results in a graded set of clinical symptoms that may or may not involve loss of consciousness.

Concussion Symptoms

The majority (80%-90%) of concussions resolve in a short (7-10 day) period, although the recovery time frame may be longer in children and adolescents.

The suspected diagnosis of concussion can include one or more of the following clinical domains:

(a) Symptoms - somatic (eg, headache), cognitive (eg, feeling like in a fog) and/or emotional symptoms (eg, lability)

(b) Physical signs (eg, loss of consciousness, amnesia)

(c) Behavioural changes (eg, irritability)

(d) Cognitive impairment (eg, slowed reaction times)

(e) Sleep disturbance (eg, insomnia)

How Did We Get Here?

- *Mehr v. Fèdèration Internationale de Football Association* (FIFA) [U.S. Soccer, U.S. Youth Soccer, American Youth Soccer, US Club Soccer, California Youth Soccer Association]
- The suit called on these soccer governing organizations to raise the bar and alleged they had failed to incorporate up-to-date guidelines into their concussion policies and failed to protect players from head injuries.
- The settlement will affect all levels from U-18 down and will eliminate heading for U.S. soccer players U-10 and younger and will limit heading for U-11 to U-13
- New Remove from Play and Return to Play protocols

What Has Changed For The Referee In 2016 As A Result Of The Guidelines?

1. All players, including goalkeepers, who leave the field for serious injury, possible concussion, MUST be evaluated by a Health Care Professional (HCP) before being allowed to return to play (RTP)
2. Prior to the match referees must ask if an HCP is present. (A specific introduction may be needed if a League or Association has not already defined the procedure for requesting the HCP's services.)

What Has Changed For The Referee In 2016 As A Result Of The Guidelines?

3. Once the Referee determines that a player must be evaluated for a serious injury, with the possibility of concussion, there are two options if that player seeks to RTP.

    a. The designated HCP present gives the player clearance to return and the referee may allow player re-entry at an appropriate time. (Allowing RTP does not mean that the referee crew should not continue to observe the player for any of the 9 triggers. Observation of any of the signs means play is stopped and the evaluation process/treatment starts over.)

    b. **Without an HCP present, if the player enters the field to RTP, the referee must stop play and require the player to again leave the field.** (Do not deny re-entry because technically until the player steps onto the field, s/he is not again a player.)

What Has Changed For The Referee In 2016 As A Result Of The Guidelines?

Referees must know the local Rules of Competition for all affiliated games. For example, is there a form to be filled out by the designated HCP and presented to the referee allowing RTP? **Even with a signed release the referee crew is still responsible to monitoring the behavior of the player for signs of possible concussion.**

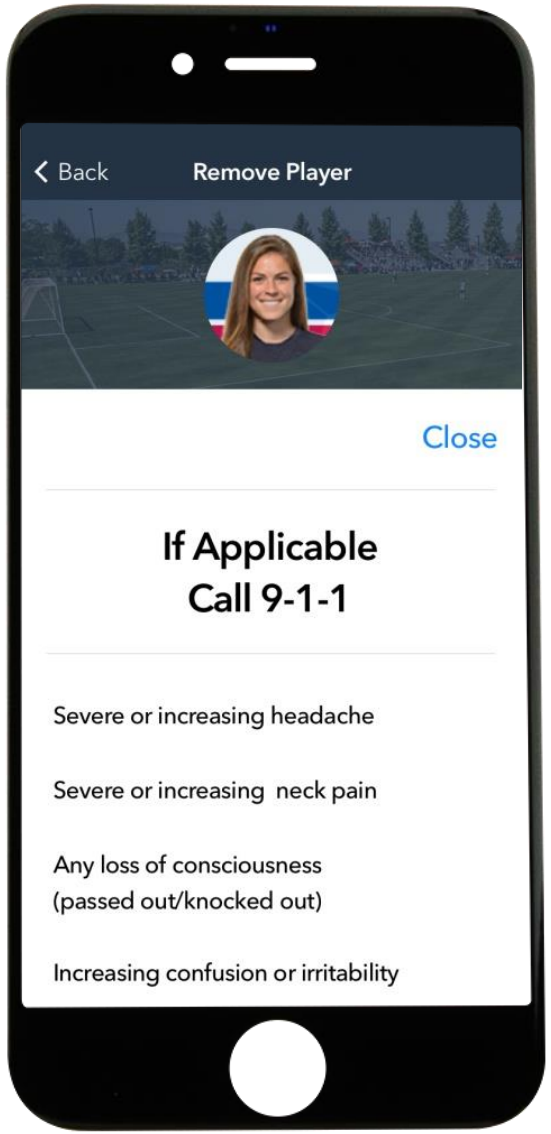
Regardless of the HCP requirements, **the referee should include a report of any serious injury. Full details would include what was observed, time in the match and all actions taken. Specify whether the player did or did not RTP. Report if and when the player does RTP and any subsequent decision to require the player to leave the field again.**

CONCUSSIONS

Any athlete with a suspected concussion should be IMMEDIATELY REMOVED FROM PLAY, urgently assessed medically, should not be left alone and should not drive a motor vehicle.

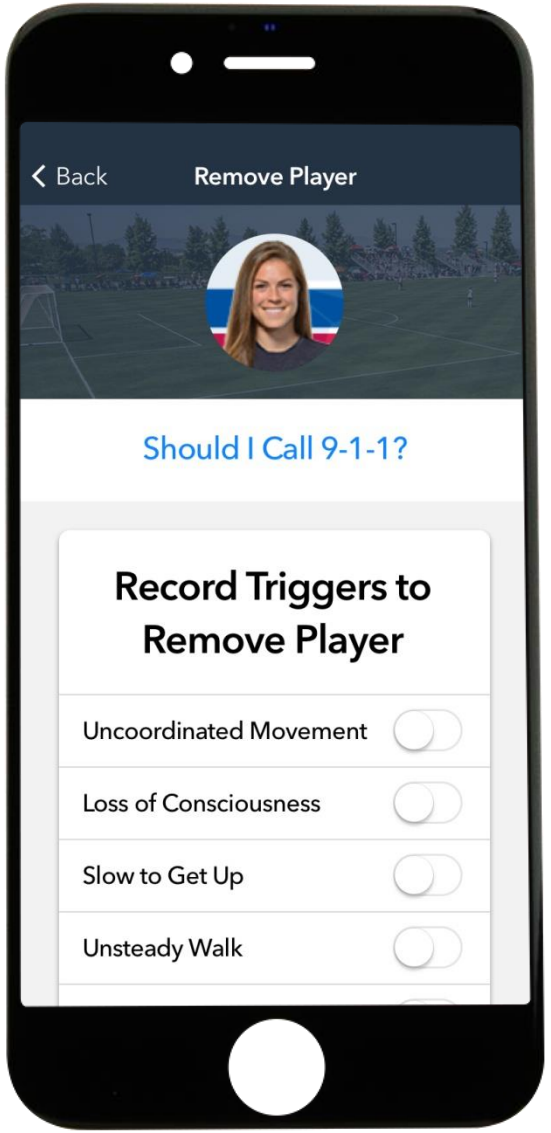
9-1-1 When to Call

- Severe or increasing headache
- Severe or increasing neck pain
- Any loss of consciousness (passed out/knocked out)
- Increasing confusion or irritability
- Repeated vomiting, nausea
- Drowsiness or inability to wake up
- Unusual behavior change
- Seizure or convulsion (shaking or twitching)
- Double vision
- Weakness or tingling / burning in arms or legs
- Inability to stop crying



9 Triggers

1. Motor un-coordination
2. Loss of consciousness or lying motionless on field
3. Slow to get up
4. Unsteady walk
5. Falling to the ground
6. Grabbing or clutching the head
7. Dazed or confused
8. Blank or vacant look
9. Facial cut in association with any of the above



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RECOGNIZE TO RECOVER

Concussion – Return to Play

- The Return To Play (RTP) decision-making process after concussion is one of the most complicated in sports medicine.
- Despite ongoing research, the current assessment of concussion relies on clinical evaluations of symptoms, cognitive function, and balance.
- Of significance is our current understanding from the research literature that the signs and symptoms of concussion are dynamic, often non-specific, and evolve over time.

Concussion – Return to Play

- Rest (cognitive and physical) until asymptomatic at rest (24hours);
- Light aerobic exercise (e.g. stationary bicycle) for 15-20 minutes.
- Moderate intensity aerobic exercise (30 minutes).
- Sport-specific training (ball handling, passing, light running, NO HEADING).
- Non-contact training drills, including full exertion interval training (may start resistance training).
- Begin Heading Training (steps 1 & 2 below)
- Full contact training with heading (steps 3 & 4)

Concussion – Return to Play

HEADING

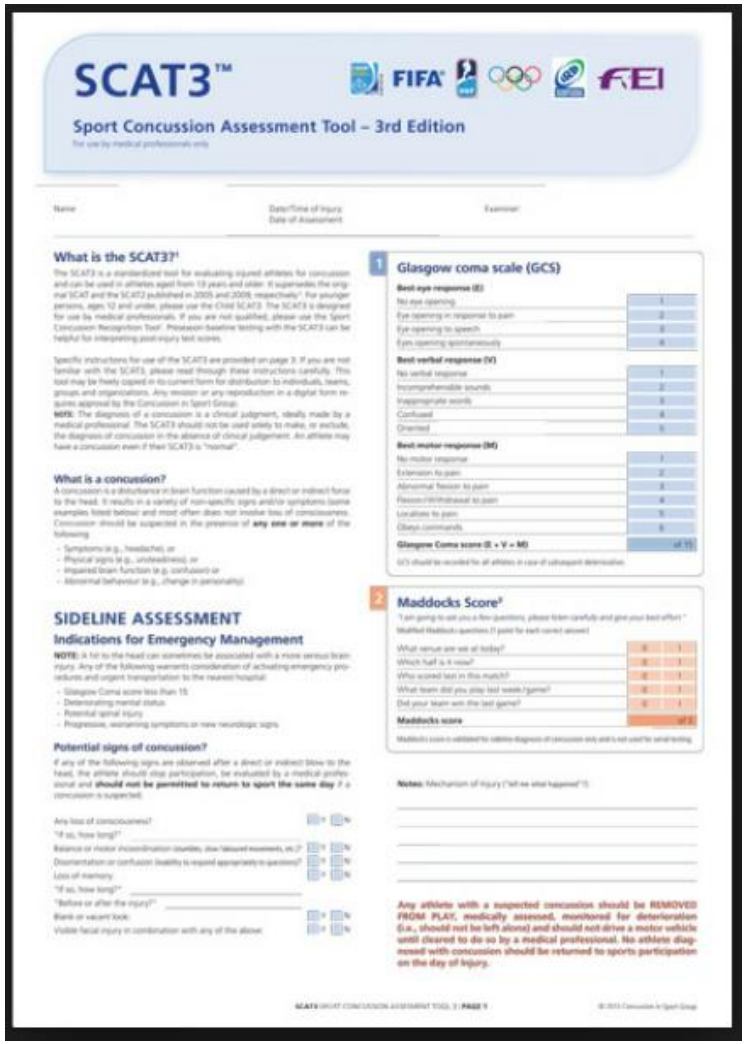
Partner and player inside 6-yd box. Partner tosses ball softly to player; controlled, straight header, within box, appropriate technique. Five tosses straight ahead, then five to the left, and five to the right. If no symptoms occur then proceed to step 2 the NEXT DAY.

Repeat step 1 to start. After an active rest period (run, ball work with feet), partner and player within 18yd box. Partner tosses ball (longer distance, slightly harder), player does controlled header with good technique within box. Five each straight, left, right. If no symptoms occur then proceed to step 3 the NEXT DAY.

Same as Step 2 with Partner and Player outside 18yd box (longer distance, harder throw). If player remains sx-free then move to step 4 the following day.

Full practice with more dynamic, unpredictable heading.

Sports Concussion Assessment Tool



SCAT3™

Sport Concussion Assessment Tool – 3rd Edition

FIFA FEI

Name: Date/Time of Injury: Examiner: Date of Assessment:

What is the SCAT3?[1]

The SCAT3 is a standardized tool for evaluating injured athletes for concussion and can be used in athletes aged from 13 years and older. It supersedes the original SCAT and the SCAT2 published in 2005 and 2009, respectively[1]. For younger persons, ages 12 and under, please use the Child SCAT3. The SCAT3 is designed for use by medical professionals. If you are not qualified, please use the Sport Concussion Recognition Tool[1]. Preseason baseline testing with the SCAT3 can be helpful for interpreting post-injury test scores.

Specific instructions for use of the SCAT3 are provided on page 3. If you are not familiar with the SCAT3, please read through these instructions carefully. This tool may be freely copied in its current form for distribution to individuals, teams, groups and organizations. Any revision or any reproduction in a digital form requires approval by the Concussion in Sport Group.

NOTE: The diagnosis of a concussion is a clinical judgment, ideally made by a medical professional. The SCAT3 should not be used solely to make, or exclude, the diagnosis of concussion in the absence of clinical judgement. An athlete may have a concussion even if their SCAT3 is "normal".

What is a concussion?

A concussion is a disturbance in brain function caused by a direct or indirect force to the head. It results in a variety of non-specific signs and/or symptoms (some examples listed below) and most often does not involve loss of consciousness. Concussion should be suspected in the presence of **any one or more** of the following:

- Symptoms (e.g., headache), or
- Physical signs (e.g., unsteadiness), or
- Impaired brain function (e.g. confusion) or
- Abnormal behaviour (e.g., change in personality).

SIDELINE ASSESSMENT

Indications for Emergency Management

NOTE: A hit to the head can sometimes be associated with a more severe brain injury. Any of the following warrants consideration of activating emergency procedures and urgent transportation to the nearest hospital:

- Glasgow Coma score less than 15
- Deteriorating mental status
- Potential spinal injury
- Progressive, worsening symptoms or new neurologic signs

Potential signs of concussion?

If any of the following signs are observed after a direct or indirect blow to the head, the athlete should stop participation, be evaluated by a medical professional and **should not be permitted to return to sport the same day** if a concussion is suspected.

Any loss of consciousness? Y N

"If so, how long?"

Balance or motor incoordination (stumbles, slow/laboured movements, etc.)? Y N

Disorientation or confusion (inability to respond appropriately to questions)? Y N

Loss of memory: Y N

"If so, how long?"

"Before or after the injury?"

Blank or vacant look: Y N

Visible facial injury in combination with any of the above: Y N

1 Glasgow coma scale (GCS)

Best eye response (E)	
No eye opening	1
Eye opening in response to pain	2
Eye opening to speech	3
Eyes opening spontaneously	4
Best verbal response (V)	
No verbal response	1
Incomprehensible sounds	2
Inappropriate words	3
Confused	4
Oriented	5
Best motor response (M)	
No motor response	1
Extension to pain	2
Abnormal flexion to pain	3
Flexion/Withdrawal to pain	4
Localizes to pain	5
Obeys commands	6
Glasgow Coma score (E + V + M)	of 15

GCS should be recorded for all athletes in case of subsequent deterioration.

2 Maddocks Score[2]

"I am going to ask you a few questions, please listen carefully and give your best effort."

Modified Maddocks questions (1 point for each correct answer)

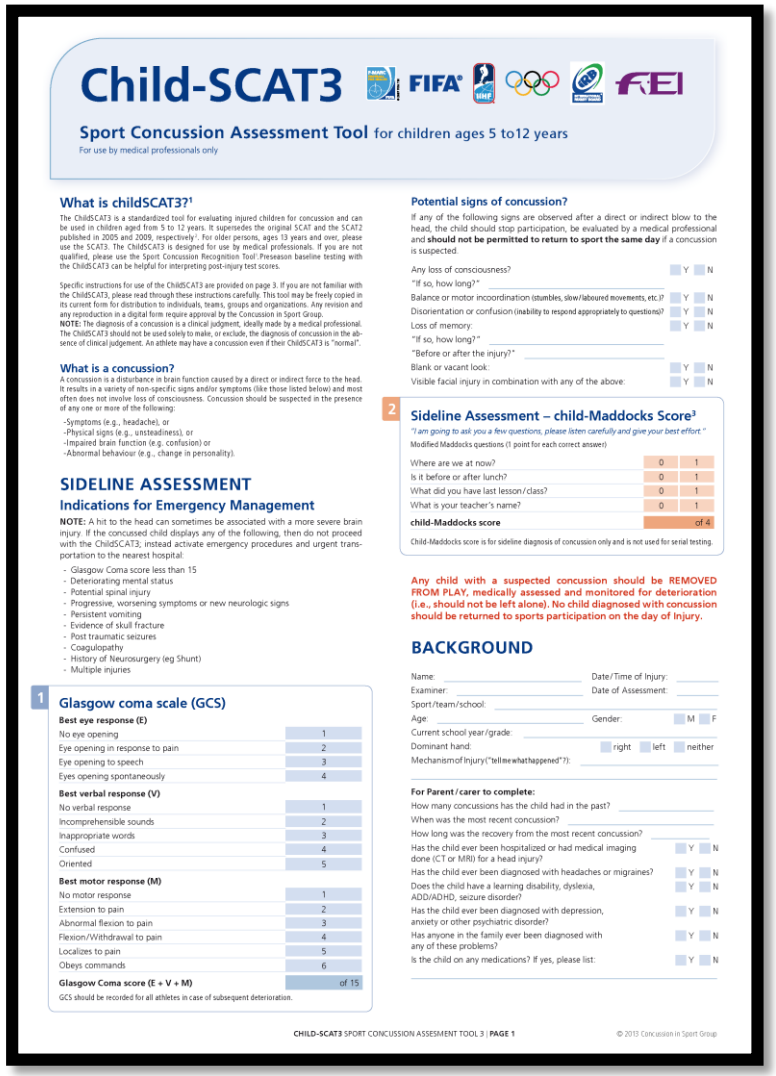
What venue are we at today?	0	1
Which half is it now?	0	1
Who scored last in this match?	0	1
What team did you play last week/game?	0	1
Did your team win the last game?	0	1
Maddocks score		of 5

Maddocks score is validated for sideline diagnosis of concussion only and is not used for serial testing.

Notes: Mechanism of Injury ("tell me what happened"?):

Any athlete with a suspected concussion should be REMOVED FROM PLAY, medically assessed, monitored for deterioration (i.e., should not be left alone) and should not drive a motor vehicle until cleared to do so by a medical professional. No athlete diagnosed with concussion should be returned to sports participation on the day of injury.

SCAT3 SPORT CONCUSSION ASSESSMENT TOOL 3 | PAGE 1



Child-SCAT3

FIFA FEI

Sport Concussion Assessment Tool for children ages 5 to12 years

For use by medical professionals only

What is childSCAT3?[1]

The ChildSCAT3 is a standardized tool for evaluating injured children for concussion and can be used in children aged from 5 to 12 years. It supersedes the original SCAT and the SCAT2 published in 2005 and 2009, respectively[1]. For older persons, ages 13 years and over, please use the SCAT3. The ChildSCAT3 is designed for use by medical professionals. If you are not qualified, please use the Sport Concussion Recognition Tool[1]. Preseason baseline testing with the ChildSCAT3 can be helpful for interpreting post-injury test scores.

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What is a concussion?

A concussion is a disturbance in brain function caused by a direct or indirect force to the head. It results in a variety of non-specific signs and/or symptoms (like those listed below) and most often does not involve loss of consciousness. Concussion should be suspected in the presence of any one or more of the following:

- Symptoms (e.g., headache), or
- Physical signs (e.g., unsteadiness), or
- Impaired brain function (e.g. confusion) or
- Abnormal behaviour (e.g., change in personality).

SIDELINE ASSESSMENT

Indications for Emergency Management

NOTE: A hit to the head can sometimes be associated with a more severe brain injury. If the concussed child displays any of the following, then do not proceed with the ChildSCAT3, instead activate emergency procedures and urgent transportation to the nearest hospital:

- Glasgow Coma score less than 15
- Deteriorating mental status
- Potential spinal injury
- Progressive, worsening symptoms or new neurologic signs
- Persistent vomiting
- Evidence of skull fracture
- Post traumatic seizures
- Coagulopathy
- History of Neurosurgery (eg Shunt)
- Multiple injuries

1 Glasgow coma scale (GCS)

Best eye response (E)	
No eye opening	1
Eye opening in response to pain	2
Eye opening to speech	3
Eyes opening spontaneously	4
Best verbal response (V)	
No verbal response	1
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Inappropriate words	3
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Localizes to pain	5
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Glasgow Coma score (E + V + M)	of 15

GCS should be recorded for all athletes in case of subsequent deterioration.

Potential signs of concussion?

If any of the following signs are observed after a direct or indirect blow to the head, the child should stop participation, be evaluated by a medical professional and **should not be permitted to return to sport the same day** if a concussion is suspected.

Any loss of consciousness? Y N

"If so, how long?"

Balance or motor incoordination (stumbles, slow/laboured movements, etc.)? Y N

Disorientation or confusion (inability to respond appropriately to questions)? Y N

Loss of memory: Y N

"If so, how long?"

"Before or after the injury?"

Blank or vacant look: Y N

Visible facial injury in combination with any of the above: Y N

2 Sideline Assessment – child-Maddocks Score[3]

"I am going to ask you a few questions, please listen carefully and give your best effort."

Modified Maddocks questions (1 point for each correct answer)

Where are we at now?	0	1
Is it before or after lunch?	0	1
What did you have last lesson/class?	0	1
What is your teacher's name?	0	1
child-Maddocks score		of 4

Child-Maddocks score is for sideline diagnosis of concussion only and is not used for serial testing.

Any child with a suspected concussion should be REMOVED FROM PLAY, medically assessed and monitored for deterioration (i.e., should not be left alone). No child diagnosed with concussion should be returned to sports participation on the day of injury.

BACKGROUND

Name: Date/Time of Injury:

Examiner: Date of Assessment:

Sport/team/school:

Age: Gender: M F

Current school year/grade:

Dominant hand: right left neither

Mechanism of Injury ("tell me what happened"?):

For Parent/carer to complete:

How many concussions has the child had in the past?

When was the most recent concussion?

How long was the recovery from the most recent concussion?

Has the child ever been hospitalized or had medical imaging done (CT or MRI) for a head injury? Y N

Has the child ever been diagnosed with headaches or migraines? Y N

Does the child have a learning disability, dyslexia, ADD/ADHD, seizure disorder? Y N

Has the child ever been diagnosed with depression, anxiety or other psychiatric disorder? Y N

Has anyone in the family ever been diagnosed with any of these problems? Y N

Is the child on any medications? If yes, please list: Y N

CHILD-SCAT3 SPORT CONCUSSION ASSESSMENT TOOL 3 | PAGE 1

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Concussion Examination

- Not meant to replace comprehensive neuropsychological testing
- Nor should it be used as a stand-alone tool for the ongoing management of sports concussions. ***SCAT 3***

Symptom Checklist — Child

Score daily at the same time of day 0 - 3 based on frequency

- has trouble sustaining attention
- Is easily distracted
- has difficulty concentrating
- has problems remembering what he/she is told
- has difficulty following directions
- tends to daydream
- gets confused
- is forgetful
- has difficulty completing tasks
- has poor problem solving skills
- has problems learning
- has headaches
- feels dizzy
- has a feeling that the room is spinning
- feels faint
- has blurred vision
- has double vision
- experiences nausea

Symptom Checklist — Adult

Score daily at the same time of day 0 - 3 based on frequency

- Headache
- “Pressure in head”
- Neck Pain
- Nausea or vomiting
- Dizziness
- Blurred vision
- Balance problems
- Sensitivity to light
- Sensitivity to noise
- Feeling slowed down
- Feeling like “in a fog“
- “Don’t feel right”
- Difficulty concentrating
- Difficulty remembering
- Fatigue or low energy
- Confusion
- Drowsiness
- Trouble falling asleep
- More emotional
- Irritability
- Sadness
- Nervous or Anxious

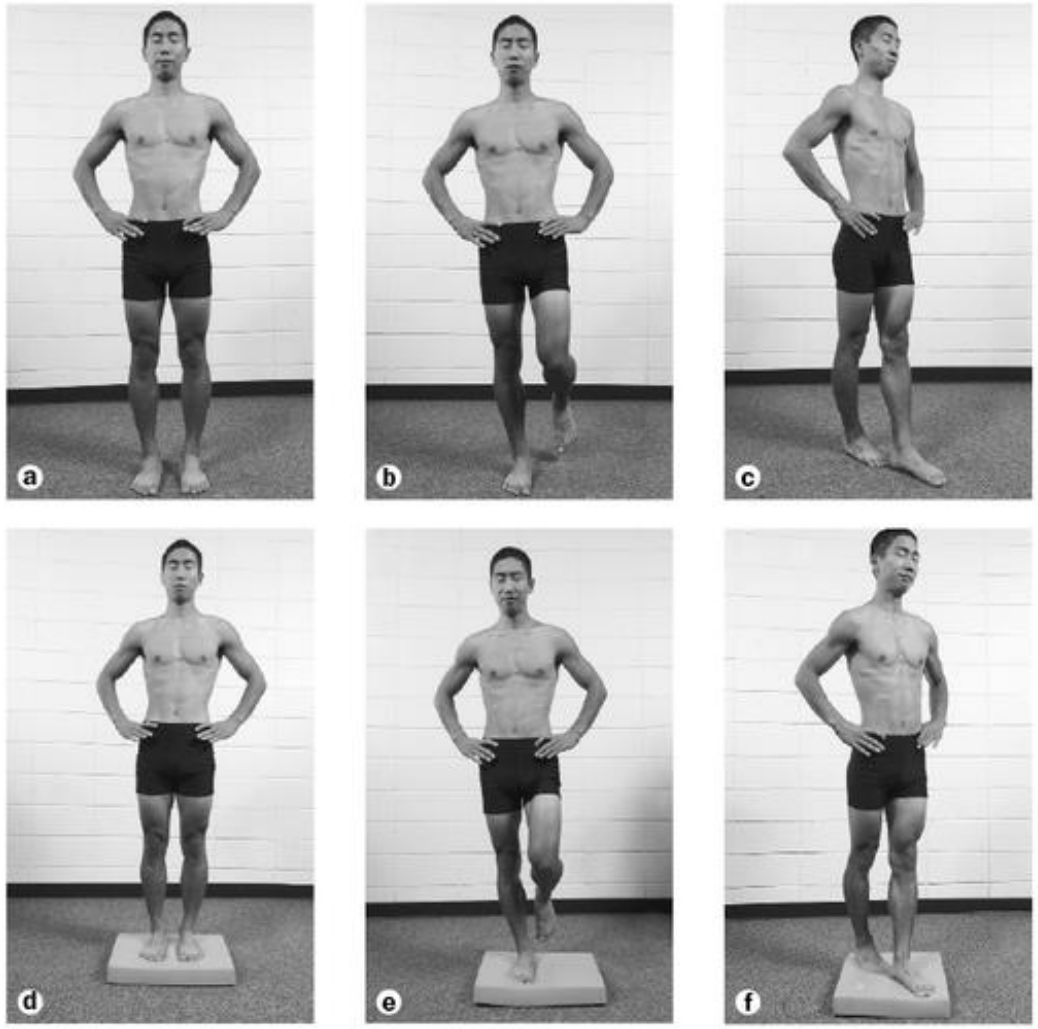
Pre and Post "Baseline" Testing

A baseline test is a series of objective measures taken on a healthy person, BEFORE the injury happens.

- Cognitive
- Visual
- Balance

- SCAT 3
- ImPACT
  - Cognitive Only
  - Baseline and Post-test
  - Used to help determine Return to Play readiness
- King Devick
  - Eye tracking only
  - Baseline and post-test
  - Remove-from-play sideline concussion screening test
  - Not used for Return to Play readiness
- BESS – Balance Error Scoring System

BESS: Balance Error Scoring System



- The six positions are held for 20 seconds on two surfaces
- Subjects are told to keep as steady as possible, and if they lose their balance, they are to try to regain the initial position as quickly as possible.
- The numbers of errors for all six conditions are summed into a single score

Concussions DFW

In 2014 the UIL reported 295 football concussions from 263 schools that were sampled. But **NBC 5 Investigates** learned that in that same year there were a greater number of concussions reported by high school football players in just the DFW Metroplex compared to the UIL's state sample.

NBC 5 Investigates found ***more than 2,500 concussions*** in one school year in all sports combined at high schools and middle schools in those 41 North Texas districts.

223 concussions were reported in boy's high school soccer and 145 concussions in boy's high school basketball with another **183 in girl's high school soccer**, 121 in girls softball and 62 concussions in cheerleading.

1 Year Post-Concussion

- How did the sport-related concussion influence your child's ability to engage in physical activity?
- In what ways did the sport-related concussion affect your child's feelings or emotions?
- Tell me about the impact of the sport-related concussion on your child's interpersonal relationships and interactions with others.
- How did the sport-related concussion affect your child's academic performance?
- Is there anything else related to your concussion experience that you feel is important to share?

1 Year Post-Concussion

The emergent theme of *significant effect of symptoms* reflected the **effect of post-concussion physical symptoms on multiple aspects of adolescents' daily lives.**

Fatigue, headaches, forgetfulness, and nausea affected their ability to function in school, complete daily tasks, and interact with others. Post-concussion physical symptoms directly affected the themes of ***feelings of frustration*** and *influence on school attendance and activities*. The final theme, ***nature of interpersonal and team relationships***, was linked to the physical symptoms of concussion and also affected adolescent participants' social interactions.

NFL – Retirements Due to Concussions

Chris Borland: San Francisco 49ers Linebacker, age 24

"I just honestly want to do what's best for my health," Borland told "Outside the Lines." "From what I've researched and what I've experienced, I don't think it's worth the risk."

The third-round draft pick, who starred at the University of Wisconsin, said he has had two diagnosed concussions: one while playing soccer in the eighth grade, the other while playing football as a sophomore in high school.

Adrian Coxson: Green Bay Packers Wide Receiver, age 23

"I'm retiring because I'm still having symptoms and my health is more important to me than the game of football," Coxson said in a telephone interview. "It's been recommended to me by two neurologists and two doctors to retire from football."

Anthony Davis: San Francisco 49ers OT, age 25

"After a few years of thought, I've decided it will be best for me to take a year or so away from the NFL. This will be a time for me to allow my Brain and Body a chance to heal."

Soccer – Retirements Due to Concussions

Davy Arnoud: DC United, age 36

- He was “unable to shake the “drunk, dizzy feeling” of a head injury suffered heading the ball in practice last summer” “I had to start to think about the big picture,” he said, citing his wife and two children, a 7-year-old daughter and 4-year-old son. “If my head’s not right, I have more to think about than just myself. It’s just too risky to play.”

Andy Wilkinson: Stoke, age 31

In an FA Cup match against Blackburn last year, Wilkinson was struck on the head by a football which caused brain damage, causing him to feel sick during training and affecting his vision. ''Over a year on from the injury there are still a lot of things going on with my brain, my vision, my neck - all sorts of different symptoms.''

Taylor Twellman: New England Revolution

Multiple concussions during MLS career. "I hate the fact that my career has ended on a brain injury." However, he added that he viewed this as an opportunity to educate others about concussions and raise awareness.

Neck Strength and Concussions

Where the head goes, the body will follow.

The Importance of Training the Head and Neck

Females have weaker necks and demonstrate “greater angular acceleration and displacement of the head and neck.”

"Did the athlete see the blow coming?" For the athletes who saw the blow coming – those who had a chance to activate their neck muscles – experienced less severe concussion.

To help lower subconcussive forces, protect the student-athlete returning to play, maximize performance and fitness, strength training of the head, neck and jaw must be inclusive when designing exercise programs.

CTE: Chronic Traumatic Encephalopathy

Chronic Traumatic Encephalopathy in Athletes: Progressive Tauopathy following Repetitive Head Injury

Since the 1920s, it has been known that the repetitive brain trauma associated with boxing may produce a progressive neurological deterioration, originally termed “dementia pugilistica” and more recently, chronic traumatic encephalopathy (CTE).
punch drunk

TeamSafe™ What's Your Plan?

In 2002, a rare disease was discovered in the brain of football legend Mike Webster:

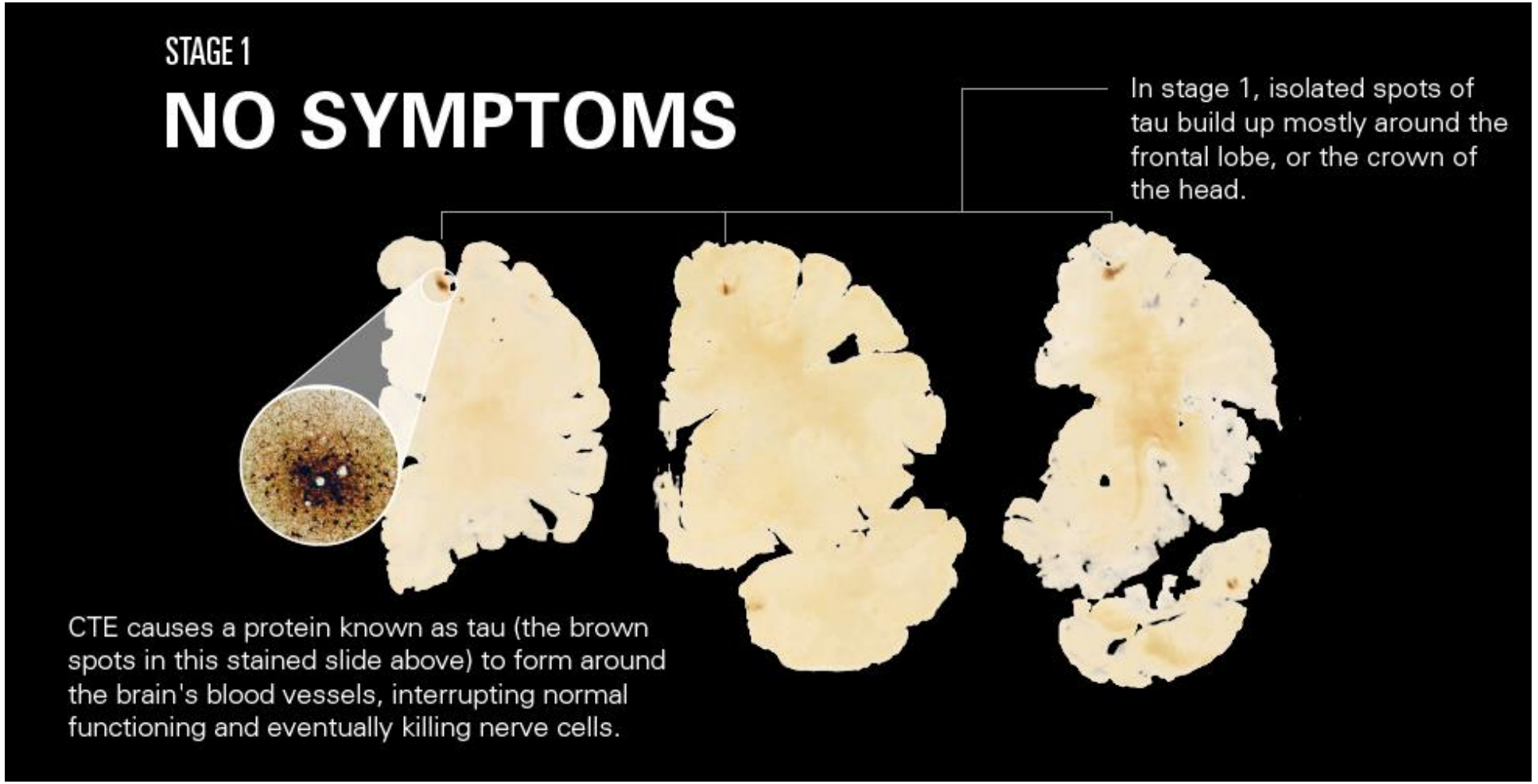
Chronic Traumatic Encephalopathy (CTE)

TeamSafe™ What's Your Plan?

Since then, researchers at Boston University have found the disease in 50 additional players, one as young as 17.

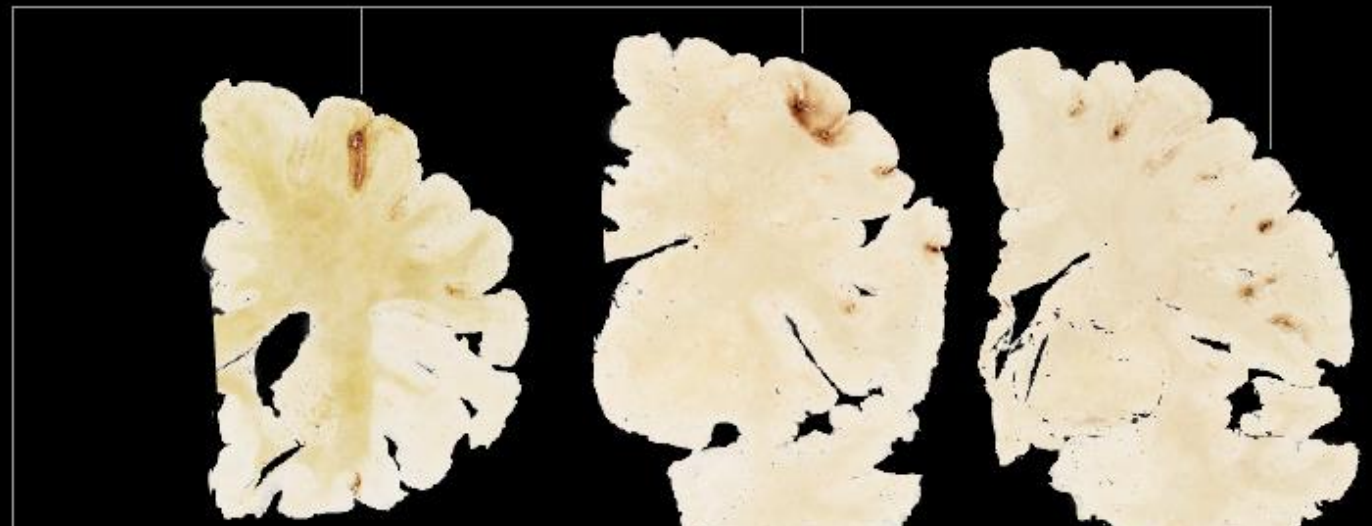
TeamSafe™ What's your plan?

Neuropathologist Dr. Ann McKee has identified four stages of the degenerative disease.


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

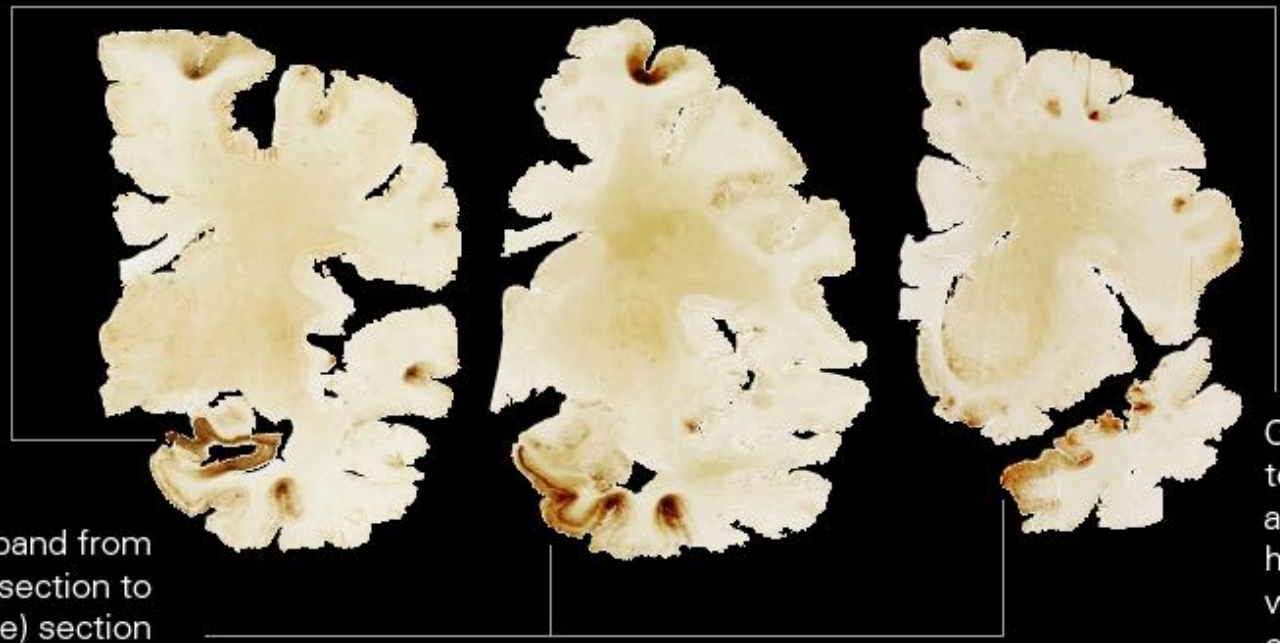


In stage 2, symptoms begin to appear as defective tau protein affects more nerve cells in the brain's frontal (top) lobes.

TeamSafe™ What's your plan?

STAGE 3

CONFUSION, MEMORY LOSS



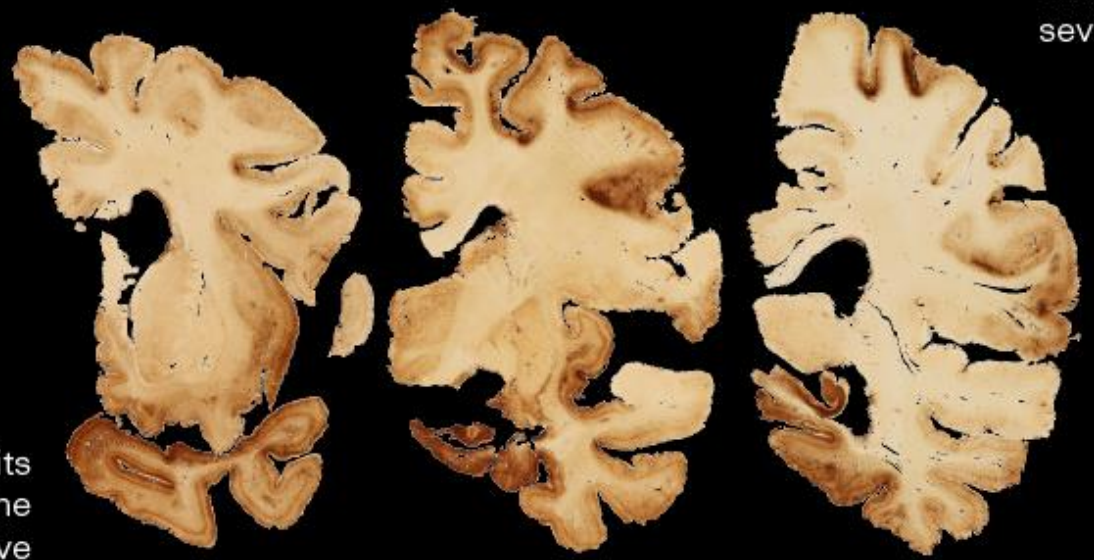
Tau deposits expand from the frontal (top) section to the temporal (side) section of the brain.

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

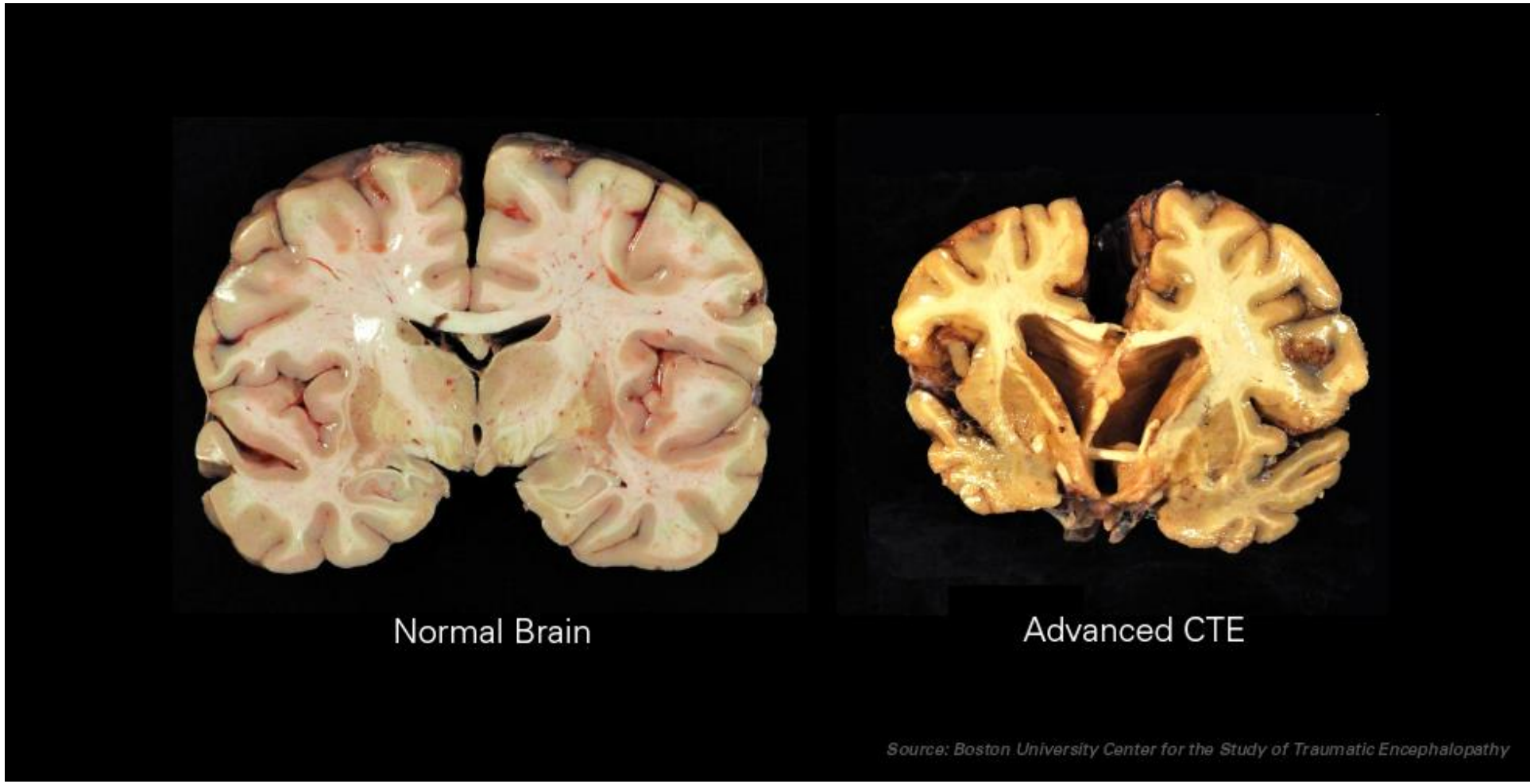
STAGE 4

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.

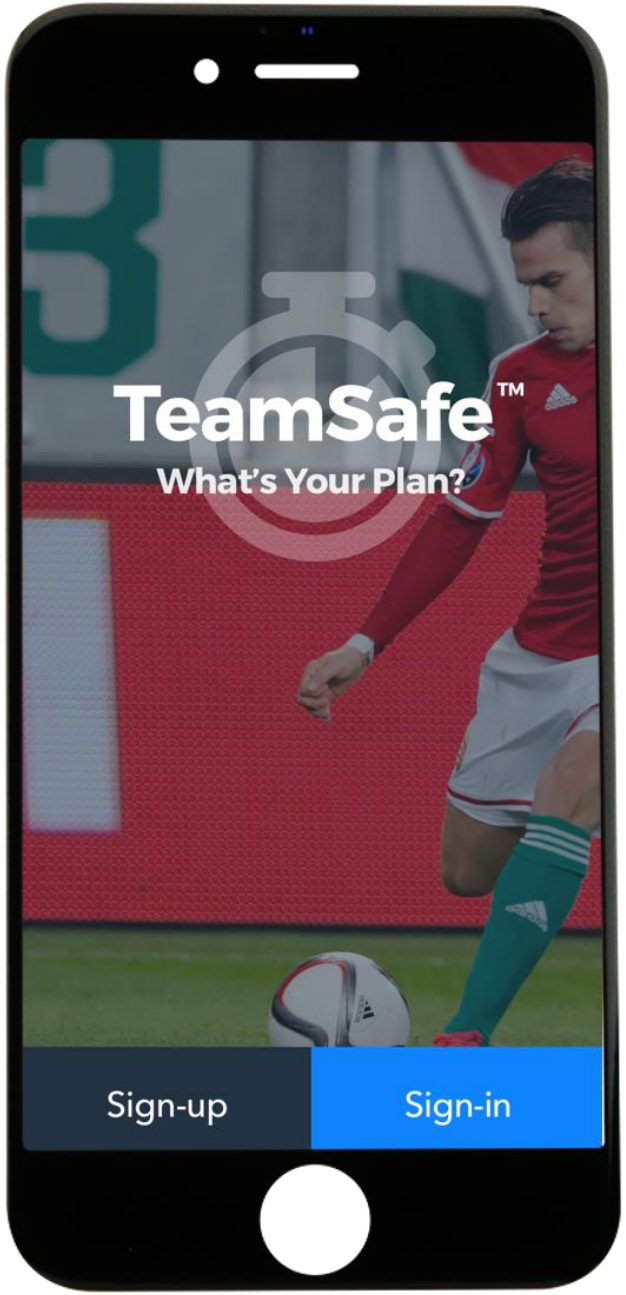

Normal Brain
Advanced CTE
Source: Boston University Center for the Study of Traumatic Encephalopathy

N.Y. Times Editorial: Don't Let Kids Play Football

Our children are minors who have not reached the age of consent. It is our moral duty as a society to protect the most vulnerable of us. The human brain becomes fully developed at about 18 to 25 years old. We should at least wait for our children to grow up, be provided with the information and education on the risk of play, and let them make their own decisions. No adult, not a parent or a coach, should be allowed to make this potentially life-altering decision for a child.

— Bennet Omalu,
December 7, 2015

TeamSafe™ What's Your Plan?



TeamSafe™ is the premier approach to app-based sports safety and injury reporting during on-the-field emergency situations. Using a proprietary protocol, uniquely designed by Olympic and NFL medical advisers, 911 operators, trauma experts, coaches, and parents, TeamSafe™ is committed to the prevention and reduction of injuries in youth sports.

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RECOGNIZE TO RECOVER