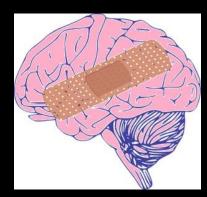
Recognition, Evaluation and Treatment of Concussion in Athletes



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Clinical Assistant Professor

October 3, 2018





Objectives



- Review updates to concussion management
- Identify signs and symptoms necessitating advanced imaging
- Recognize factors that contribute to an increased symptom burden and prolong concussion recovery and incorporate screening of them in your clinical practice.
- Prescribe a return to play and return to learn/work plan for all patients in your clinical practice



Outline

- Concussion Statistics
- Pathophysiology of Concussion



- Incidence of concussion and associated risk factors
- Diagnosing concussions
- Managing concussions
- Common Pitfalls



Concussion Rate Per Sport

per 10,000 athlete exposures





Females 9.10/ Males 3.03



Males 4.00



Females 4.23/ Males 0.95



Females 1.83/ Males 1.35





college athletes in past 5 years

3.8 million

recreation-related concussions annually

1.6%

MSHAA athletes in 2016-17

28%

RTP after 6 to 10 days

20%

RTP after 11 to 15 days



Concussion

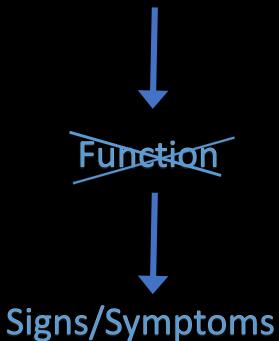
- Mild traumatic brain injury
- Complex pathophysiological process induced by biomechanical forces



Concussion

- Mild traumatic brain injury
- Complex pathophysiological process induced by biomechanical forces
- Physical forces acting on the brain
- Disrupts brain function usually without structural injury
- Causes one or more signs & symptoms, typically resolves spontaneously within daysweeks
- May or may not involve loss of consciousness







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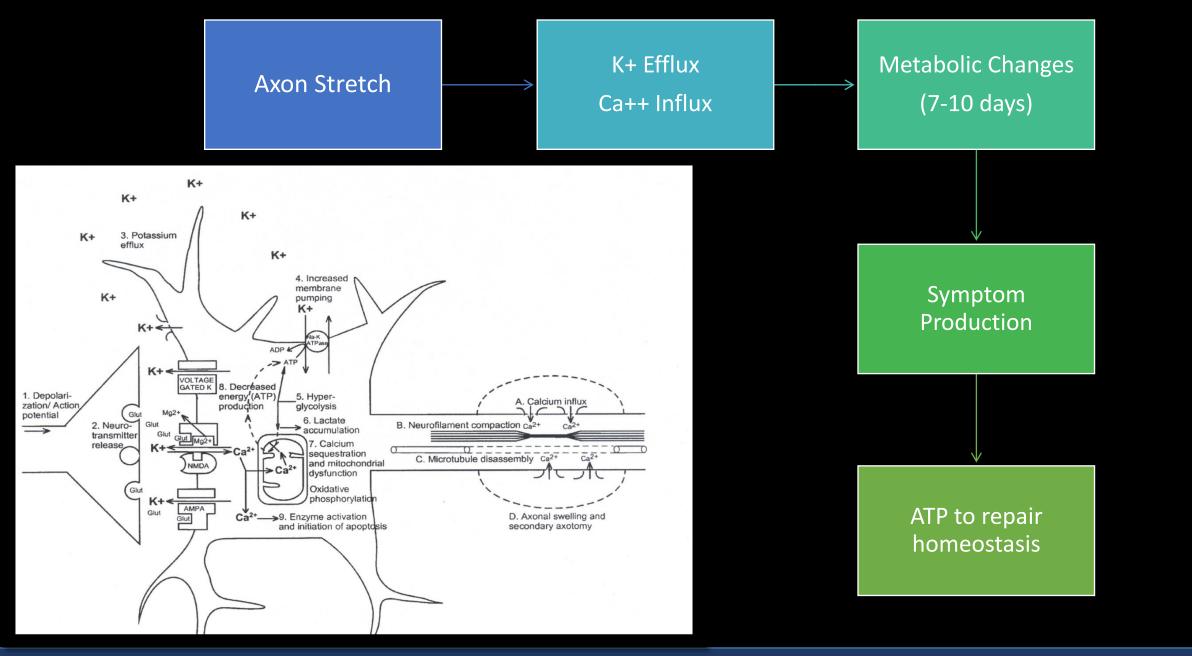




Concussion Pathophysiology

- Physical forces disrupts brain function
- Cascade for ionic, metabolic, and pathophysiological events
- Microscopic axonal injury
- Mitochondrial dysfunction

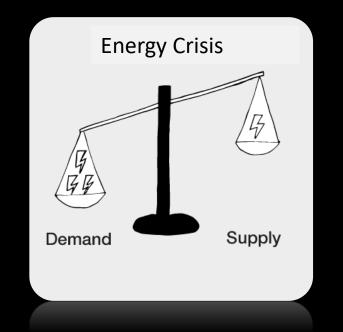






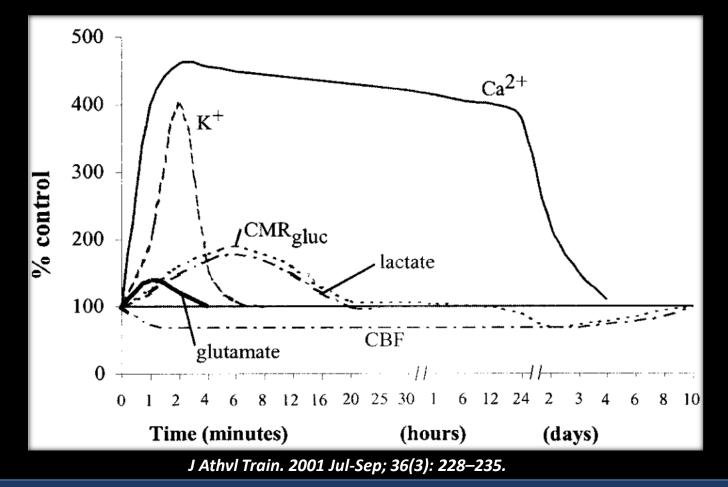
Concussion Pathophysiology

- Physical forces disrupts brain function
- Cascade for ionic, metabolic, and pathophysiological events
- Microscopic axonal injury
 - \rightarrow Increased energy demand
- Decreased cerebral blood flow
 - ╋
- Mitochondrial dysfunction
 →decreased energy supply



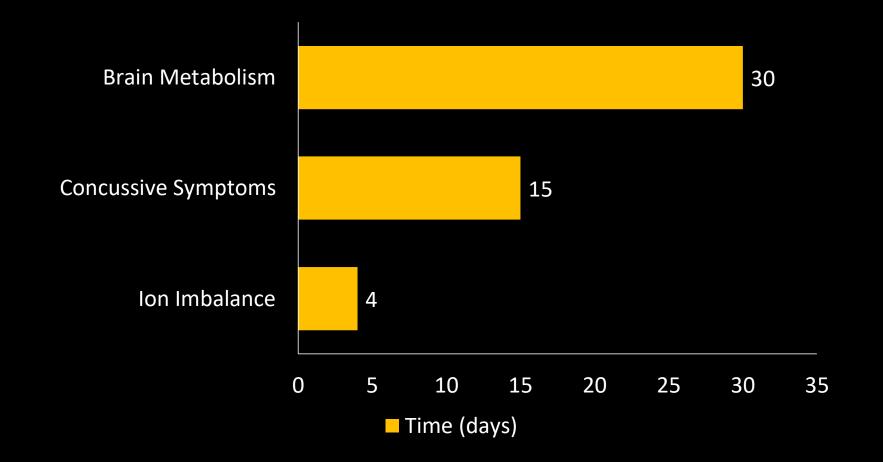


Ionic Imbalance from Neurometabolic Cascade





Concussion Recovery





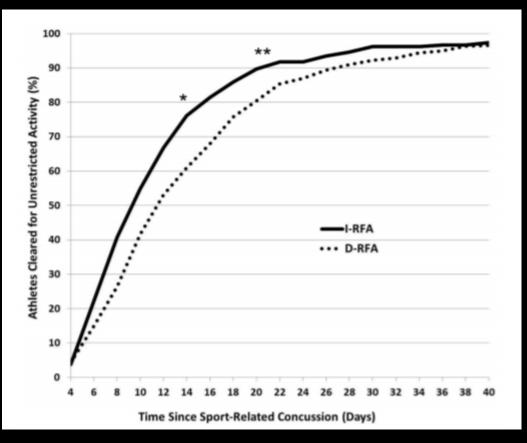
Case: 16 y/o M soccer player

- Head to head impact when heading soccer ball.
- Immediately felt "stunned" and a little unsteady that quickly resolved.
- Continued to play for remainder of quarter.
- Developed headache and mild nausea at sideline between periods.
- ATC and coach removed player from game





Delayed Removal from Sport



AJSM Vol. 46, No. 6, 2018

*IRFA group at 39% lower likelihood of missing <u>></u>14 days

**I-RFA at 47% lower
likelihood of missing >
21 days

Immediate removal from Sport → 3 fewer days until return to sport



Immediate Removal from Activity Decreases Injury Duration

- Asken et al: 506 collegiate athletes (18 sports at 22 institutions)
 - Immediately removed → 3 fewer days to return to sport than those with delayed removal
- Asken et al: 97 collegiate athletes
 - immediately removed → 5 fewer days to return to sport (6.8 vs 12.3 days).
- Elbin et al: Prospective study of 64 adolescents
 - immediately removed → recovered 22 days sooner than those with delayed removal



Sideline Assessment and Management

- Remove from play and assessed by a licensed healthcare provider trained in the evaluation and management of concussions. (Michigan Law)
- No same day return to play.
- Monitored for deteriorating physical or mental status
- Symptoms checklist
- Cognitive evaluation
- Balance tests
- Neurological physical examination





Case: Sideline Assessment

Symptom Evaluation

- SCAT Symptoms= 12
- SCAT Severity Score= 21

	none	mild	moderate	se	vere
Headache	0	1 2	3 4	5	6
"Pressure in head"	0	1 2	3 4	5	6
Neck Pain		1 2	3 4	5	6
Nausea or vomiting	0	1 2	3 4	5	6
Dizziness	0	1 2	3 4	5	6
Blurred vision		1 2	3 4	5	6
Balance problems	0	1 2	3 4	5	6
Sensitivity to light	0	1 2	3 4	5	6
Sensitivity to noise		1 2	3 4	5	6
Feeling slowed down	0	1 2	3 4	5	6
Feeling like "in a fog"	0	7 2	3 4	5	6
"Don't feel right"	0	1 2	3 4	5	6
Difficulty concentrating		1 2	3 4	5	6
Difficulty remembering		1 2	3 4	5	6
Fatigue or low energy	0	1 2	3 4	5	6
Confusion	o 🤇	2	3 4	5	6
Drowsiness	0	1 2	3 4	5	6
Trouble falling asleep		1 2	3 4	5	6
More emotional		1 2	3 4	5	6
Irritability		1 2	3 4	5	6
Sadness	0	1 2	3 4	5	6
Nervous or Anxious	0	1 2	3 4	5	6







Case: Sideline Assessment

• ATC evaluated at sideline with SCAT 3

Scoring	Summa	ry:
---------	-------	-----

Test Domain		Score	
	Date:	Date:	Date:
Number of Symptoms of 22	12		
Symptom Severity Score of 132	21		
Orientation of 5	5		
Immediate Memory of 15	13		
Concentration of 5	2		
Delayed Recall of 5	2		
SAC Total			
BESS (total errors)	9		
Tandem Gait (seconds)	8		
Coordination of 1	1		



Symptom burden and duration of Concussion

Potential predictor variable	Participants with symptoms ≤28 days (n = 296)	Participants with symptoms >28 days (n = 235)	p Value
Continuous variables			
Mean age, y	14.5	14.6	0.671
Mean initial PCSS score	16	40	<0.01
Mean number of prior concussions	0.79	0.82	0.837
Participants with computerized neurocognitive testing at initial visit	No. = 86	No. = 43	
Mean verbal memory	84.05	75.47	0.004
Mean visual memory	71.16	61.40	0.002
Mean visual motor speed	35.53	30.58	0.005
Mean reaction time	0.60	0.68	0.003
Mean symptom score ^a	8.78	27.50	<0.01
Categorical variables, n/N (%) ^b			
Male sex	194/296 (65.5)	135/235 (57.5)	0.059
Loss of consciousness at time of injury	60/268 (22.4)	52/220 (23.6)	0.747
Amnesia at time of injury	85/278 (30.6)	95/221 (43.0)	0.005
History of prior concussion	131/295 (44.4)	87/235 (37.0)	0.092
Prior treatment for headaches	30/291 (10.3)	43/230 (18.7)	0.007
History of migraines	20/291 (6.9)	22/227 (9.7)	0.259
Family history of concussion	97/286 (33.9)	90/226 (39.8)	0.196

PCSS score \geq 13 are more likely to have symptoms beyond 28 days

Abbreviation: PCSS = Post-Concussion Symptom Scale.

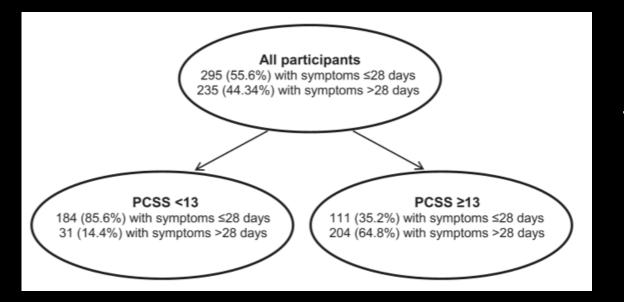
^aSymptom scale from computerized neurocognitive assessment.

The denominator for comparisons varies, as not all participants answered every question.

Neurology 83 Dec 9, 2014



Symptom burden and duration of Concussion



PCSS score \geq 13 are more likely to have symptoms beyond 28 days

Neurology 83 Dec 9, 2014



Diagnosis of Concussion

- Clinical Diagnosis
- Graded Symptom checklists

- Objective tool for assessing a variety of concussive symptom

- Track the severity of symptoms over serial evaluations.
- Standardized assessment tools / Neurologic and vestibular examination
 - Provides a helpful structure for the evaluation
 - Limited validation of tools
- No tools/tests have 100% sensitivity or specificity





2018 CDC Pediatric Guidelines

Should

- combination of tools to assess recovery
- age-appropriate, validated, symptom rating scale as a component of the diagnostic evaluation and to assess recovery

May

- validated cognitive testing (including measures of reaction time) to assess recovery.
- balance testing to assess recovery
- validated, age-appropriate computerized cognitive testing in the acute period of injury as a component of the diagnosis
- Standardized Assessment of Concussion (SAC) <u>should not</u> be exclusively used to diagnose mTBI in children 6-18 years.







Back to the Case: Symptoms

- 16 year old with headache, mild nausea following head to head impact in soccer.
- Symptoms worsened that evening and the next day
- Nausea ↑
- Photophobia
- Headache ↑

- Blurry vision
- Drowsy
- Slowed thinking







Signs and Symptoms of Concussion





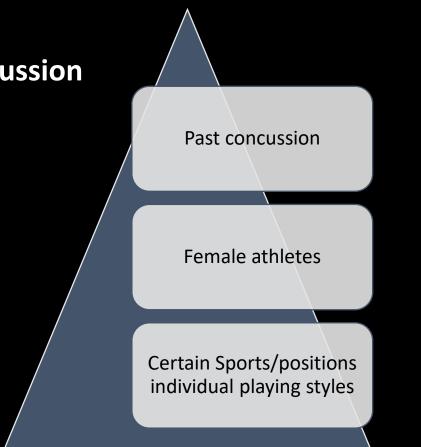
Case: Clinical History

- Injury Mechanism: *head to head impact*
- Detailed Symptom Inventory (number, severity and duration of symptoms)
- Recall/memory of injury: *full memory*
- Past concussions or head injuries: 1 prior concussion, recovered in 2 weeks, no residual symptoms, 1 year ago.
- Sports, positions and individual playing style: *forward*
- Pre-injury mood disorders, learning disorders, attention deficit disorders (ADD/ADHD) and migraines: ADHD

	none	n	nild	mod	lerate	se	vere
Headache	0	1	2	3	4	5	6
"Pressure in head"	0	1	2	3	4	5	6
Neck Pain		1	2	3	4	5	6
Nausea or vomiting	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Blurred vision	0	1	2	3	4	5	6
Balance problems	0	1	2	3	4	5	6
Sensitivity to light	0	1	2	3	4	5	6
Sensitivity to noise	0	1	2	3	4	5	6
Feeling slowed down	0		2	3	4	5	6
Feeling like "in a fog"		1	2	3	4	5	6
"Don't feel right"	0	1	2	3	4	5	6
Difficulty concentrating	0		2	3	4	5	6
Difficulty remembering		11	2	3	4	5	6
Fatigue or low energy	0	1	2	3	4	5	6
Confusion	0		2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
Trouble falling asleep	0	1	2	3	4	5	6
More emotional	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
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Risk Factor for Sports Concussions



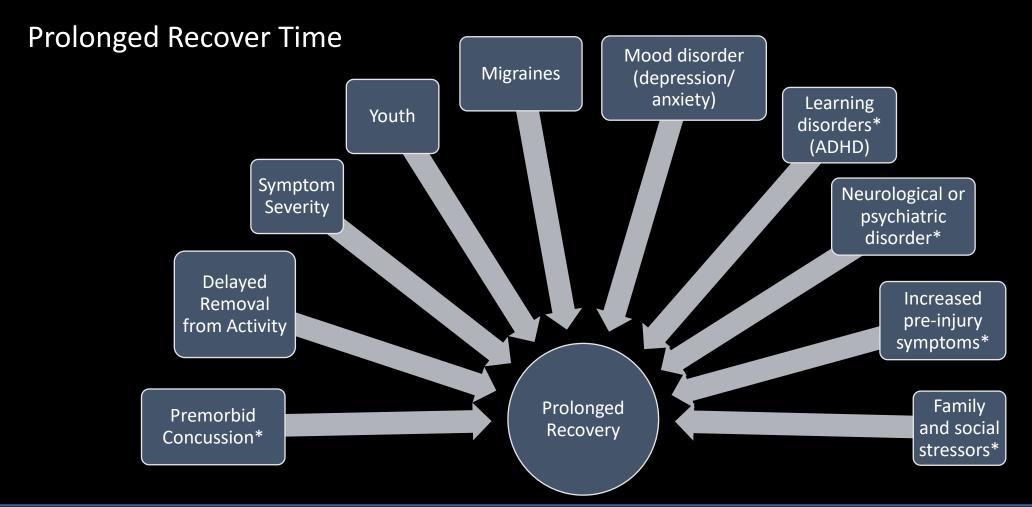
Increased Risk of Concussion

Harmon KG, et al. Br J Sports Med 2013;47:15–26

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Risk Factors for Sports Concussion





Goals of Physical Examination

- Establish current mental status and degrees of impaired coordination/balance
- Rule out more serious neurologic injury
- Evaluate spine for associated injury
- Identify impairments for individualized treatment



Head and Neck Examination

Head Examination

Facial tenderness

Skull bony tenderness

Inspect detention

Lacerations/swelling

TM rupture

Neck Examination

Palpate for bony tenderness

Neck ROM

Suboccipital/ paraspinal muscles

Isometric Neck Strength

Spurling's maneuver

UE/LE Strength, Pronator Drift



Neurologic Examination

Concentration/Mental Status

Orientation (day, date, time, month, year)

Immediate memory (5 items, 3 trials)

Delayed recall (5 items after 5 minutes)

Concentration (digits backwards, months/WORLD backwards, serial sevens)

Cranial Nerve Testing

EOM evaluation (nystagmus, convergence insufficiency)

VOMS (Vestibular/Ocular-Motor Screening)

Speech

Visual Fields

Pupils



Neurologic Examination

Coordination

Finger-nose-finger/finger-tonose

Heel-to-shin

Rapid finger movements

Reaction Time Testing

Balance

Modified BESS/ single leg stance Tandem gait Rhomberg test



Vestibular/Oculo-motor Screen

Smooth Pursuit	• Follow a moving target while seated (3 ft from pt)
Saccades	• Quickly follow a target between two points (3ft away, 1.5 ft to right/left OR above/below eye level)
Convergence	• View a near target without double vision (target at arms length moving toward nose, >5cm is abnormal)
Vestibulo-ocular reflex	 Ability to stabilize vision as the head moves (focus on object 3 ft away while moving head)
Visual Motion Sensitivity	• Ability to inhibit vestibular –induced eye movements using vision (rotate head and arm focus on thumb)

(Mucha, Collins et al. 2014)

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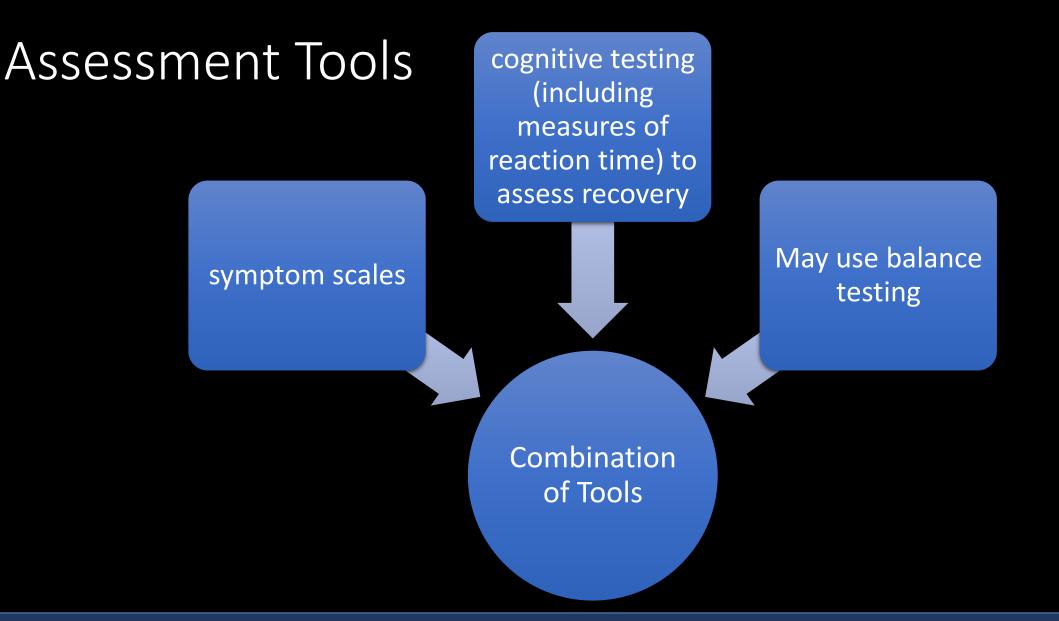
Balance Evaluation



BESS Balance testing errors:

- Hands lifted off iliac crest
- Opening eyes
- Step, stumble, or fall
- Moving hip into > 30 degrees abduction
- Lifting forefoot or heel
- Remaining out of test position > 5 s







Common Concussion Signs

Mental Status: +/- impairments

Balance: Impaired tandem gait or single leg balance, abnormal BESS

CN: nystagmus, saccades

Strength: Normal, symmetric

DTR: normal

FTN: may be slightly abnormal

GAIT: +/- ataxia



Signs that may indicate more serious injury

Mental Status: significantly impaired Balance: Rhomberg, postural instability CN: unequal or fixed pupils, visual field deficit, abnormal EOM Strength: asymmetric, focal weakness DTR: hyper-reflexia, Babinski, clonus, Hoffman's reflex **FTN:** discoordination GAIT: ataxic



Red Flags for ED referral / Urgent work up

Glascow Coma Score < 14

Concern for intracranial process

Evidence of a skull fracture (bruising under eyes, behind ears, or swelling of the head)

Concern symptoms are not related to recent minor head trauma

CLIN PEDIATR October 2015 vol. 54no. 11 1031-1037



Indications for Neuroimaging Rule Out Intracranial Process

Glasgow Coma Score < 15 Signs of basilar skull fracture Altered mental status/ Focal neurologic findings on examination Combination of the following factors: Loss of consciousness (>30 s) Vomiting Severe mechanism of injury Severe/worsening headache/symptoms Amnesia Non-frontal scalp hematoma

Significant drowsiness/difficulty waking



Neuroimaging

Computed Tomography (CT)	Magnetic Resonance Imaging (MRI)			
Not for routine concussions	Not for routine concussions			
Sensitive for skull fracture, intracranial hemorrhage	Sensitive for cerebral contusion, petechial hemorrhage, white matter injury, posterior fossa abnormalities			
Best for first 24-48 hours after injury	Gradient Echo and perfusion and diffusion tensor imaging may detect white matter injury**			
Will NOT r/o rule out chronic subdural or neurobehavioral dysfunction				



Neurocognitive Testing

- Objective measure for subtle cognitive impairments
- More sensitive than office examination
- Not required for most concussions
- Should NOT be used in isolation
- Helpful in the post concussion management of patients with persistent symptoms and/or a more complicated course.
- *may* be used in acute period of injury as a component of the diagnosis (typically computerized)



Neurocognitive Testing



Computerized testing compares to individual's preseason baseline



Paper and pencil NP testing is more comprehensive (assess for other conditions such as ADHD, Depression)

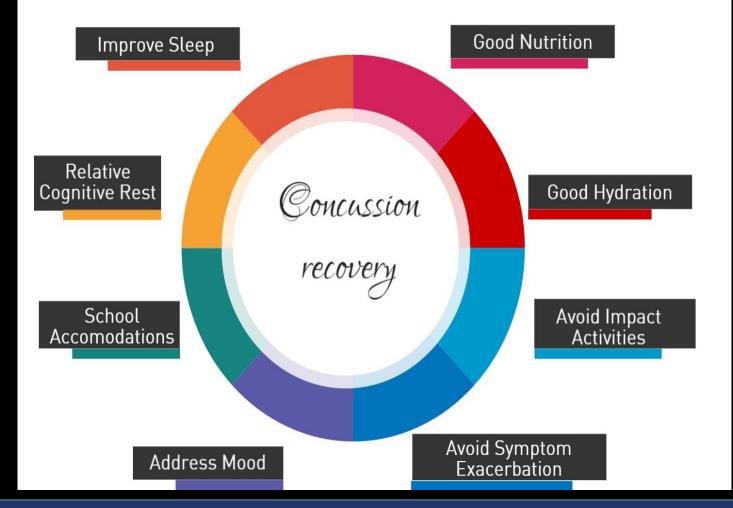


Acute Concussion Management

- Remove from Play/sports
- Rest → *Relative* Rest first several days post injury
- Decrease symptom burden
- Treat impairments found on examination
- Return to activity that does not increase symptoms
- Return to non-contact aerobic activity that does not exacerbate symptoms, with close monitoring of symptom expression (number, severity).
- Gradual return to learn /school
- Return to full activity when returns to premorbid performance and symptomfree at rest and with increasing levels of physical exertion



Concussion Management





Case: Decrease the symptom burden

- Nausea \rightarrow avoid reading or looking at phone in the car
- Photophobia→ sun glasses, adjust seating away from windows in class, turn out lights when possible
- Blurry vision→ limit reading to small amounts. Listen in class. Limit computer/ gaming
- Vestibular Ocular Motor Impairment, nystagmus → Vestibular PT, Limit reading homework until improves, provide class notes to avoid looking up/down in class
- Drowsy \rightarrow allow naps as needed if not affecting sleep overnight.
- Neck spasms → Physical Therapy, neck stretching
- Impaired Concentration/Memory→ No testing/exams in school, May need accommodations to repeat assignments/instructions, may need repetition/assistance
- Impaired Balance → Balance training, avoid bike riding, elevated surfaces



Patient/Family Eduction

- Warning signs of more serious injury
- Description of injury and expected course of symptoms and recovery
- Instructions on how to monitor post-concussive symptoms
- Prevention of further injury
- Management of cognitive and physical activity/rest
- Instructions regarding return to play/recreation and school
- Clear clinician follow-up instructions.



Return to Learn:

- Medical and school-based teams should counsel the student and family*
- Gradually increase the duration and intensity of academic activities as tolerated, with the goal of increasing participation without significantly exacerbating symptoms.*
- Return-to-school protocols should be customized based on the severity of postconcussion symptoms and determined jointly by medical and school-based teams.*
- Quite home environment for short periods of time (15-20 minutes)
- Start with core subjects if able, but may tolerate some subjects better than others
- When tolerating 30-45 minutes of studying without symptom escalation, may begin returning to school



Return to Learn: Back to School

- Shortened days with rest breaks, core classes. Avoid symptom exacerbation
- Alternative or shortened assignments/homework or forgive assignments
- Provide student with written instructions, class notes, recordings, additional instruction when needed.
- Avoid noisy environments such as hallways, cafeteria, recess, gym, band, movies
- Encourage rest breaks whenever symptoms increase. Put head down, leave class, lay down, return home if needed
- Avoid testing until recovered



Return to Learn: Prolonged Symptoms CDC Pediatric Concussion Guidelines

- Prolonged symptoms that interfere with academic performance, school-based teams should assess the educational needs of that student and determine the student's need for additional educational supports (504 Plan)
- Postconcussion symptoms and academic progress in school should be monitored collaboratively by the student, family, health care, provider(s), and school teams, who jointly determine what modifications or accommodations are needed to maintain an academic workload without significantly exacerbating symptoms
- The provision of educational supports should be monitored and adjusted on an ongoing basis by the school-based team until the student's academic performance has returned to preinjury levels.
- For students who demonstrate prolonged symptoms and academic difficulties despite an active treatment approach, health care providers should refer the child for a formal evaluation by a specialist in pediatric mTBI.



Support for Transition to Classroom

Initial transitional support
School personnel alerted to injury and potential consequences
Reintegration into school occurs gradually
Student not expected to do all work completed in absence
Extra assistance provided to facilitate completion of makeup work
General school-based support
Monitor student carefully for a period of 2-3 mo
Ensure rest time and breaks available as needed
Reduce overall homework and class workload
Reduce cognitively demanding in-school tasks (eg, no more than 1 test each day)
Specific classroom-based support
Delay standardized and classroom tests
Waive time constraints for tests
Increase flexibility for assignment due dates
Provide preferential seating to allow for closer monitoring and decreased distractions
Allow access to a model peer's or teacher's notes

PEDIATRICS April 2006



Sample School Accommodations Note

To whom it may concern:

This patient is currently under my medical care for treatment of a concussion. Please make school accommodations to assist with his/her recovery process. These may include, but are not limited to, rest breaks during class, homework, and examination as dictated by symptoms exacerbation; repetition and written instructions for assignments/instructions; extended time for assignments and examinations and/or forgiveness of projects or assignments; providing class notes; allow to wear sunglasses and provide seating away from bring lights and noisy environments; lighter workload; and/or shortened school day as necessary. Please forgive any non-essential homework/assignments. He/She should not return to gym class or sports at this time and should not have additional coursework to make up for missed gym class.



Returning to Play

Requirements to begin RTP Progression:

- Normal neurologic examination
- Full resolution of all symptoms and off of all analgesic medications for at least 24 hours.
- Back to full school without symptoms exacerbation or cognitive difficulties
- Back to academic baseline (pass computerized NP testing if performed)



RTP Considerations

- Evaluate prior to beginning return to play protocol and re-evaluate athlete prior to return to full contact competition.
- Must complete each stage without symptoms returning during activity or for the following 24 hours.
- May perform one stage for multiple days for younger athletes or more complex cases.
- If symptoms return the progression should be stopped until symptom free again and then return to the previous phase



Graduated RTP Protocol (Zurich 2012)

Rehabilitation Stage	Functional Exercise at each stage	Objective of Each Stage
No Activity	Physical and Cognitive Rest	Recovery
Light Aerobic Exercise	Walking, swimming, stationary bike, <70% maximum MR. No resistance training.	Increase HR
Sports Specific Exercise	Skating drills in ice hockey, running drills, No head impact activities	Add Movement
Non-contact training drills	Progression to more complex training drills. May start progressive resistance training	Exercise, coordination and cognitive load
Full-contact practice	Full practice (following medical clearance)	Restore confidence and assess functional skills by coaching staff
Return to Play	Normal game play	



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Legislature

Michigan Legislature (June 30, 2013):

- Immediately remove from activity if suspected of sustaining a concussion
- He/she shall not return to physical activity until he or she has been evaluated by an "appropriate health professional" and receives written clearance authorizing the youth athlete's return to physical

MHSAA Concussion Protocol:

- Only an M.D., D.O., Physician's Assistant or Nurse Practitioner
- Must be in writing and must be unconditional
- Clearance may not be on the same date on which the athlete was removed from play.



Approach to Prolonged Recovery

- Forced exercise in *acute* stages is detrimental in animal studies (animal studies)
- Voluntary exercise shortens recovery (animal studies)
- Early exercise (with in 1 week) may decreases PCS
- Sub symptom threshold is treatment for exercise intolerant patients with PCS (4-6 weeks post injury)

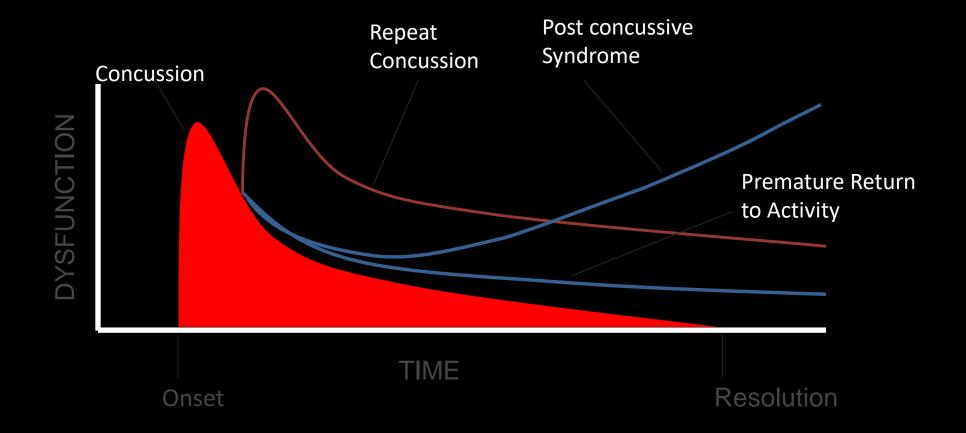


When to start exercise?

- Symptom free patients (acute concussion)—graduated return to play protocol
- Patients with symptoms at 4-6 weeks (PCS)—sub symptom threshold exercise
- POSSIBLY after ~48 hrs in all patients?--LIGHT exercise (no collision risk). Preliminary research at this time.



Concussion Recovery Timeline



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Post Concussive Syndrome

<u>Diagnosis</u>

- Cognitive deficits in attention or memory
- Three of the following:
 - Fatigue
 - Sleep disturbances
 - Headache
 - Dizziness
 - Irritability
 - Affective disturbance
 - Apathy
 - Personality changes

- Treadmill testing
 - Should have reproduction or exacerbation of symptoms
 - If no symptoms occur with exercising to exhaustion, other causes are likely
- Repeated neurocognitive testing is widely used

Treatment:

• Multidisciplinary treatment



Summary

- Sport-related concussions are common.
- Immediate removal from play following concussion decreases duration of symptoms and time from sport
- Some athletes may take weeks to months to recover and may benefit from a concussion specialist
- Concussion has many signs and symptoms. Some overlap with other medical conditions.
- Results of CT or MRI are generally are normal with a concussion.



Summary

- Neuropsychological testing can provide objective data and is one tool in the complete management of a sport-related concussion.
- Athletes with concussion should follow relative rest, both physically and cognitively, until their symptoms have resolved.
- Follow a return to play progression once symptom free.
- Early exercise may be considered after acute period.
- Teachers and school administrators should work with students to modify workloads to avoid exacerbation of symptoms.



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Questions?



Resources

• SCAT3

http://bjsm.bmj.com/content/47/5/259.full.pdf

• Child SCAT3

http://bjsm.bmj.com/content/47/5/263.full.pdf

Child-S Sport Concussion For use by medical professionals only											2 1	ΓE	1	aluating injured athletes for concu 3 years and older. It supersetes the 505 and 2009, respectively For you the Child SCAT3. The SCAT3 is desi i are not qualified, please use the 1 ine testing with the SCAT3 of
Child report						nitive a								provided on page 3. If you ar
lame:	nover rarely sametimes aftern Standardized Assessment of Concussion – Child Version (SAC-C) ⁴							these instructions carefully. r distribution to individuals, te						
have trouble paying attention			2		Orient	Orientation () point for each connect answer()						reproduction in a digital for		
get distracted easily have a hard time concentrating			2			ionth is it?						0	1	up. ical judgment, ideally made
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SCAT3[™]

Sport Concussion Assessment Tool – 3rd Edition

Date/Time of Injury: Date of Assessment:

Examiner

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Best eye response (E)		
No eye opening	1	1
Eye opening in response to pain	2	2
Eve opening to speech	3	
Eyes opening spontaneously	4	1
Best verbal response (V)		
No verbal response (V)	1	1
Incomprehensible sounds		,
Inappropriate words	-	
Confused	-	1
Oriented		5
Best motor response (M)		
No motor response (W)	1	
Extension to pain		
Abnormal flexion to pain		
Flexion/Withdrawal to pain		
Localizes to pain		•
Obeys commands	6	·
		_
Glasgow Coma score (E + V + M)		of 1
GCS should be recorded for all athletes in case of subsequent dete	rioration.	
Modified Maddocks questions (1 point for each correct answer) What venue are we at today?	0	1
Modified Maddocks questions (1 point for each correct answer) What venue are we at today? Which half is it now?	0	1
Modified Maddocks questions (1 point for each correct answer) What venue are we at today? Which half is it now? Who scored last in this match?	0	1
Medified Maddocks questions (I point for each correct answer) What venue are we at today? Which half is it now? Who scored last in this match? What team did you play last week/game?	0 0 0	1 1 1
7 am going to ask you a few questions, please listen conefully Modified Maddeds questions (1 point fer each correct answer) What verune are we at today? Which half is it now? Who scored last in this match? Muta team did you play last week/game? Did your team win the last game?	0	1
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Patient Instructions

ACE Care Plan

HEADS UP	ACUTE CONCUSSION EVALUATION (ACE)	Patient Name;	
CONCUSSION		DOB:	Age:
```	Gerard Gioia, PhD' & Micky Collins, PhD' Children's National Medical Center	Date:	ID/MR#
	³ University of Pittaburgh Medical Center	Date of Injury:	

You have been diagnosed with a concussion (also known as a mild traumatic brain injury). This personal plan is based on your symptoms and is designed to help speed your recovery. Your careful attention to it can also prevent further injury.

You should not participate in any high risk activities (e.g., sports, physical education (PE), riding a bike, etc.) if you still have any of the symptoms below. It is important to limit activities that require a lot of thinking or concentration (homework, job-related activities), as this can also make your symptoms worse. If you no longer have any symptoms and believe that your concentration and thinking are back to normal, you can slowly and carefully return to your daily activities. Children and teenagers will need help from their parents, teachers, coaches, or athletic trainers to help monitor their recovery and return to activities.

Today the following symptoms are present (circle or check).								
Physical		Thinking		Emotional	Sleep			
Headaches	Sensitivity to light	Feeling mentally foggy		Irritability	Drowsiness			
Nausea	Sensitivity to noise	Problems concentrating		Sadness	Sleeping more than usual			
Fatigue	Numbness/Tingling	Problems remembering		Feeling more emotional	Sleeping less than usual			
Visual problems	Vomiting	Feeling more slowed down		Nervousness	Trouble falling asleep			
Balance Problems	Dizziness							
RED FLAGS: Call your doctor or go to your emergency department if you suddenly experience any of the following								
Headaches that worsen	Look very drowsy, ca	ok <u>very</u> drowsy, can't be awakened		<u>gnize</u> people or places	Unusual behavior change			
Soizuros	es <u>Repeated</u> vomiting		Increasing	confusion	Increasing irritability			
Neck pain	Slurred speech		Weakness	or numbness in arms or legs	Loss of consciousness			
	Phys Headaches Nausea Fatigue Visual problems Balance Problems RED FLAGS: Call yo Headaches that worsan Seizures	Physical           Headaches         Senativity to light           Nausea         Senativity to noise           Fatgue         Numbness/Tingling           Visual problems         Vomiting           Balance Problems         Disziness           RED FLAGS: Call your doctor or go to yo         Headaches that anota look yazy drows, or Sources           Biornes         Bapated vomiting	Physical         Thinking           Headaches         Senstivity to light         Feeling mertally           Nausea         Senstivity to noise         Problems concert           Fatigue         Numbress/Tinging         Problems remert           Visual problems         Vomiling         Feeling more slow           Balance Problems         Diziness         Interview           RED FLACS: Call your doctor or go to your emergency deg         Seizues         Look yazy drowy, can't be seeland           Seizues         Bageaded voming         Bageaded voming         Bageaded voming	Physical         Thinking           Headaches         Senstivity to light         Feeling mentally foggy           Nausea         Senstivity to noise         Problems concentrating           Fatigue         NumbnessTrigling         Problems concentrating           Visual problems         Vomiting         Feeling more slowed down           Balance Problems         Dizziness         Image: Second Sec	Physical         Thinking         Emotional           Headaches         Sensitivity to light         Feeling mentally toggy         Irritability           Nausea         Sensitivity to noise         Problems concentrating         Sadness           Fatigue         Numbress/Triging         Problems concentrating         Sadness           Balance Problems         Uniting         Feeling more slowed down         Nervousness           Balance Problems         Dizziness         Intrability         Intrability           RED FLAGS: Call your doctor og to your emergency department if you suddenly experience         Intrability experience           Headaches that azzar         Look azz drows, can't be avelaned         Can't azcogaiza people or places           Seizures         Bagaadad vorning         Intrability         Intrability			

### Returning to Daily Activities

Get lots of rest. Be sure to get enough sleep at night- no late nights. Keep the same bedtime weekdays and weekends
 Take daytime naps or rest breaks when you feel tired or fatigued.

 Limit physical activity as well as activities that require a lot of thinking or concentration. These activities can make symptoms worse.

- Physical activity includes PE, sports practices, weight-training, running, exercising, heavy lifting, etc.
   Thinking and concentration activities (e.g., homework, classwork load, job-related activity).
- 4. Drink lots of fluids and eat carbohydrates or protein to main appropriate blood sugar levels.

5. As symptoms decrease, you may begin to <u>gradually</u> return to your daily activities. If symptoms worsen or return, lessen your activities, then try again to increase your activities gradually.

6. During recovery, it is normal to feel frustrated and sad when you do not feel right and you can't be as active as usual.
7. Repeated evaluation of your symptoms is recommended to help guide recovery.

Repeated evaluation of your symptoms is recommended to help guide recovery.

### Returning to School

 If you (or your child) are still having symptoms of concussion you may need extra help to perform school-related activities. As your (or your child's) symptoms decrease during recovery, the extra help or supports can be removed gradually.
 Inform the teacher(s). school prexchologist or counselor, and administrator(s) about your (or your child's)

- injury and symptoms. School personnel should be instructed to watch for:
- Increased problems paying attention or concentrating
- Increased problems remembering or learning new information
- Longer time needed to complete tasks or assignments
   Greater irritability, less able to cope with stress
- Greater initiability, less able to cope with stress
   Symptoms worsen (e.g., headache, tiredness) when doing schoolwork
  - ~Continued on back page-

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This form is part of the "Heads Up: Emin Injury in Your Precision" itsel for developed by the Centers for Disease Control and Prevention (CDC)

### Returning to School (Continued)

Until you (or your child) have fully recovered, the following supports are recommended: (check all that apply)
No return to school. Return on (date)

- school with following supports. Review on (date)_
  - I day. Recommend ____ hours per day until (date)_____
  - I classes (i.e., rest breaks during classes). Maximum class length: _____ minutes.
  - a time to complete coursework/assignments and tests.
  - mework load by _____%. Maximum length of nightly homework: _____ minutes.
  - ant classroom or standardized testing at this time.
  - the return of symptoms (use symptom table on front page of this form) when doing activities that require a tion or concentration

### breaks during the day as needed

neeting of 504 or School Management Team to discuss this plan and needed supports.

### Returning to Sports

Id NEVER return to play if you still have ANY symptoms – (Be sure that you do not have any symptoms i while doing any physical activity and/or activities that require a lot of thinking or concentration.)

- at the PE teacher, coach, and/or athletic trainer are aware of your injury and symptoms.
- il to feel frustrated, sad and even angry because you cannot return to sports right away. With any injury, a full vill reduce the chances of getting hurt again. It is better to miss one or two games than the whole season.

### ig are recommended at the present time:

eturn to PE class at this time

- o PE class
- eturn to sports practices/games at this time
- I return to sports practices under the supervision of an appropriate health care provider.

to play should occur in <u>gradual steps</u> beginning with aerobic exercise only to increase your heart rate stationary cycle); moving to increasing your heart rate with movement (e.g., running); then adding controlled stif appropriate; and finally return to sports competition.

areful attention to your symptoms and your thinking and concentration skills at each stage of activity. Move next level of activity only if you do not experience any symptoms at the each level. If your symptoms return, nese activities and let your health care professional know. Once you have not experienced symptoms for a um of 24 hours and you receive permission from your health care professional, you should start again at the us step of the return to play plan.

### Gradual Return to Play Plan

al activity

of physical activity (i.e., ). This includes walking, light jogging, light stationary biking, light weightlifting (lower the reps, no bench, no squat).

levels of physical activity with body/head movement. This includes moderate jogging, brief running, moderatelationary biking, moderate-intensity weightlifting (reduced time and/or reduced weight from your typical routine), i-contact physical activity. This includes sprinting/running, high-intensity stationary biking, regular weightlift-, non-contact sport-specific drills (in 3 planes of movement).

ct in controlled practice. ct in game play.

gical testing can provide valuable information to assist physicians with treatment planning, such as return to play decisions.

### plan is based on today's evaluation:

t this office. Date/Time______Neurology_____Sports Medicine____ Physiatrist____ Psychiatrist____ Other_____ neuropsychological testing

MD BN NP PhD ATC

n Completed by:_____

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https://www.cdc.gov/headsup/providers/discharge-materials.html



