Sideline Evaluation of Concussion

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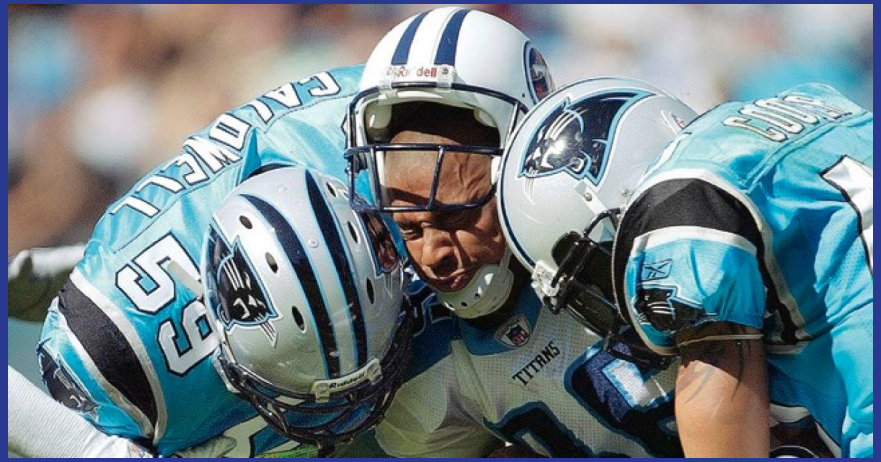


Objectives

- Know what to look for from the sidelines
- Know when to send athlete to emergency department (ED)
- Know the common symptoms of concussion
- Know the key components of a sideline evaluation of concussion
- Know a quick way to assess memory and cognition on the sideline
- Learn how to assess balance on the sideline
- Learn various ways that vision is tested
- Learn when it is safe to put an athlete back in the game

Pre-participation exams

- Concussion history
- Presence of mood disorders, learning disorders, migraines
- Baseline symptom score
- Baseline balance testing (BESS)
- Baseline sideline evaluation tool
  - SCAT
  - NFL Sideline Concussion Assessment Tool
- Baseline neuropsych testing
  - ImPACT © , COGSTATE ©

Know your athletes!

Familiarity with athlete is key to recognizing signs of concussion and evaluating the athlete on the sidelines

- **Athletic trainers**
- **Coaches**
- **Team physicians**
- **Parents**

Spotting Concussion from the Sidelines

- No “typical” mechanism of injury
- Direct blow to head
- Blow to body transmits force to head → concussion without a blow to the head
- Common biomechanical forces-- acceleration/deceleration, shearing, rotation
- High risk mechanisms
  - “Double hit”
  - Trauma with shearing force from rotational blow to head
  - Second hit-- hit twice in same game
- Accelerometer studies: higher rates of concussion:
  - Linear acceleration >100 G
  - Rotational acceleration >5500 m/sec

What to look out for

Red flags:

- Seizure
- Extreme drowsiness
- Repeated vomiting
- Slurred speech
- Confusion which progresses
- weakness/numbness of extremities
- Neck pain
- Change in level of consciousness
- LOC> 1 minute (?)

Pocket CONCUSSION RECOGNITION TOOL

To help identify concussion in children, youth and adults

RECOGNIZE & REMOVE

Concussion should be suspected **if one or more** of the following visible clues, signs, symptoms or errors in memory questions are present.

1. Visible clues of suspected concussion

Any one or more of the following visual clues can indicate a possible concussion:

Loss of consciousness or responsiveness
Lying motionless on ground / Slow to get up
Unsteady on feet / Balance problems or falling over / Incoordination
Grabbing / Clutching of head
Dazed, blank or vacant look
Confused / Not aware of plays or events

2. Signs and symptoms of suspected concussion

Presence of any one or more of the following signs & symptoms may suggest a concussion:

- Loss of consciousness
- Dizziness
- Nausea or vomiting
- "Pressure in head"
- Irritability
- Amnesia
- Nervous or anxious
- Sensitivity to noise
- Headache
- Balance problems
- Feeling slowed down
- More emotional
- Sensitivity to light
- Fatigue or low energy
- Neck Pain
- Difficulty remembering
- Seizure or convulsion
- Confusion
- Drowsiness
- Blurred vision
- Sadness
- Feeling like "in a fog"
- "Don't feel right"
- Difficulty concentrating

3. Memory function

Failure to answer any of these questions correctly may suggest a concussion.

"What venue are we at today?"
"Which half is it now?"
"Who scored last in this game?"
"What team did you play last week / game?"
"Did your team win the last game?"

Any athlete with a suspected concussion should be IMMEDIATELY REMOVED FROM PLAY, and should not be returned to activity until they are assessed medically. Athletes with a suspected concussion should not be left alone and should not drive a motor vehicle.

It is recommended that, in all cases of suspected concussion, the player is referred to a medical professional for diagnosis and guidance as well as return to play decisions, even if the symptoms resolve.

RED FLAGS

If ANY of the following are reported then the player should be safely and immediately removed from the field. If no qualified medical professional is available, consider transporting by ambulance for urgent medical assessment:

- ► Athlete complains of neck pain
- ► Increasing confusion or irritability
- ► Repeated vomiting
- ► Seizure or convulsion
- ► Weakness or tingling / burning in arms or legs
- ► Deteriorating conscious state
- ► Severe or increasing headache
- ► Unusual behaviour change
- ► Double vision

Remember:

- In all cases, the basic principles of first aid (danger, response, airway, breathing, circulation) should be followed.
- Do not attempt to move the player (other than required for airway support) unless trained to do so.
- Do not remove helmet (if present) unless trained to do so.

from McCrory et. al, Consensus Statement on Concussion in Sport. Br J Sports Med 47 (5), 2013

Sideline Evaluation -- Outline

- ABCs
- Rule out C-spine and serious brain injury
- Criteria for transfer to ER
- Sideline Concussion assessment
  - Symptom evaluation
  - Memory
  - Cognitive assessment
  - Quick neuro exam
  - Balance
  - Oculomotor function / visual testing
  - Coordination
  - Exertional testing??

On-field Assessment-- Athlete Down

- Airway - Breathing - Circulation
- ? Cervical spine injury → neck immobilization, transfer to ED
- Focal neurological findings (unequal pupils, abnormal motor/sensory exam, unable to move limbs, deteriorating mental status) → transfer to ED
- Exclude c-spine and serious brain injury?

  → remove from field, assess on sideline

Early Signs and Symptoms

- **Physical**
  - **Headache**
  - **Dizziness**
  - nausea/vomiting
  - Balance problems / incoordination
  - Vision changes
  - Sensitivity to light/noise
  - Dazed / stunned
- **Cognitive**
  - Foggy, slow, confused
  - Difficulty concentrating / remembering
  - Forgetful of recent events
  - Repeats questions

“When in doubt, sit them out”

Any athlete suspected of having a concussion should be removed from play and assessed by a licensed healthcare provider trained in the evaluation and management of concussion

Gross exam / Observation

- “Doesn’t look right”
- Out of it
- Not paying attention
- Acting slow

“Talk to me”

“Tell me what happened”

Cognitive Assessment / Memory

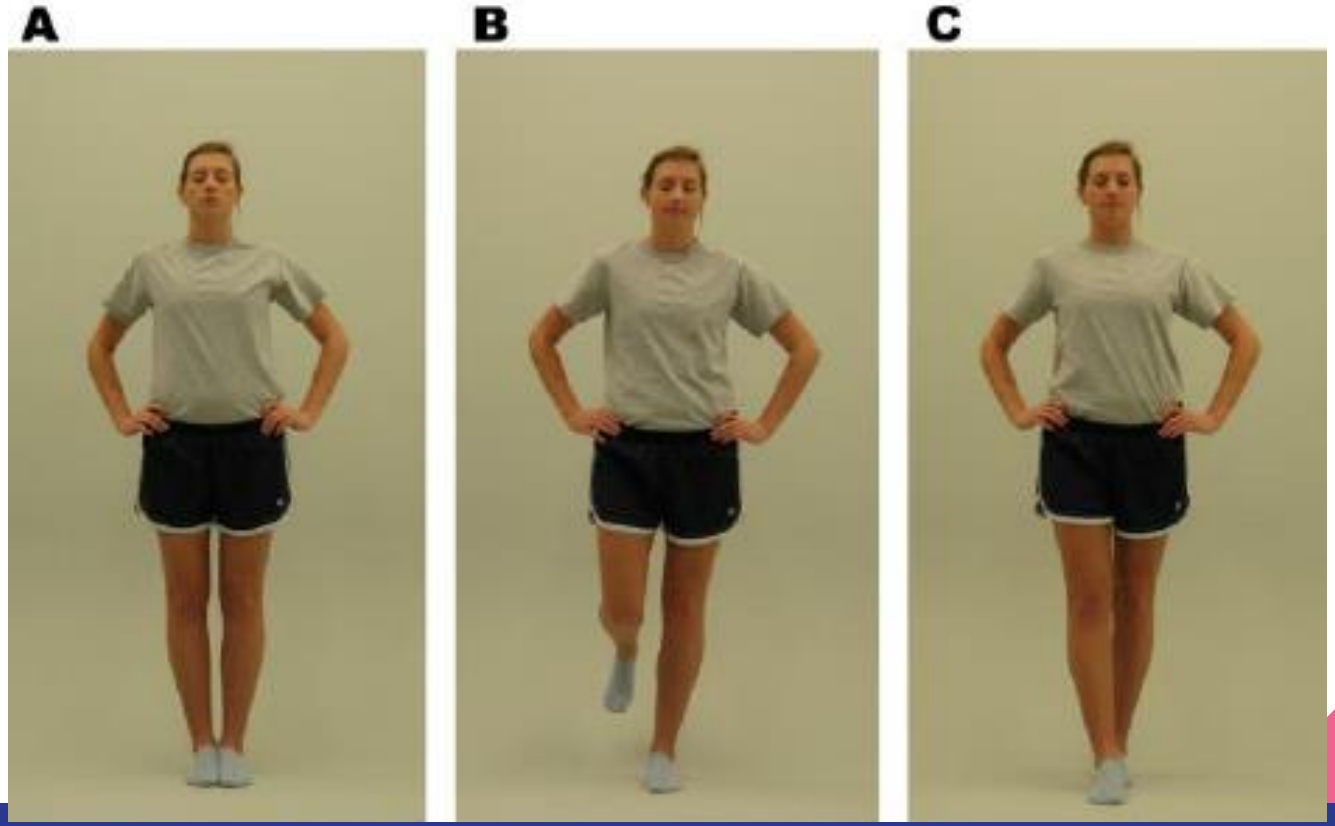
Maddocks' Questions

- Where are we today? (venue, school, etc)
- Which half is it?
- Who scored last?
- What team did we play last game?
- Did we win our last game?

Physical exam

- Quick cranial nerve exam
- Upper and lower extremity strength/sensation
- Rule out focal neurologic deficit
- Visual saccades / tracking
  - Ocular pursuits (H test)
  - horizontal/vertical saccades
  - horizontal /vertical gaze stability
  - accommodation/convergence
- Coordination
  - Finger to nose: 5x back and forth quickly on each side

Balance testing-- “BESS”



BESS: Balance Error Scoring System

- Balance best assessed in acute period -- gets better after 3 days
- Useful as sideline test but not as good for tracking
- Three stances
- Eyes closed
- 20 seconds each
- Points off for errors (opening eyes, foot down, hands off hips…)
- Average 17 errors for concussed athletes; 10 for controls
- Need a pre-season baseline
- Baseline in “game conditions”

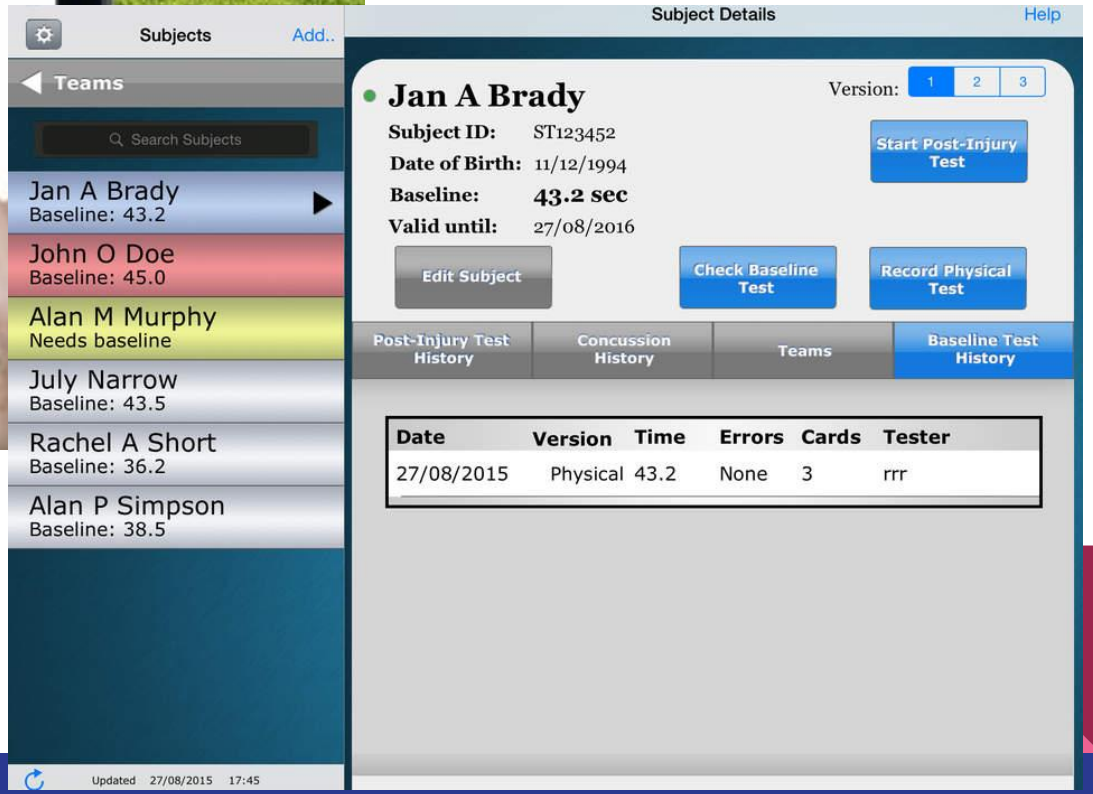
Visual testing

King Devick (KD) Test:

Test based upon the speed of random number naming that captures impairments in eye movements, attention, language and other areas that correlate with suboptimal brain functioning

- 2 minute administration by anyone
- Valid starting at age 5
- Good rapid sideline screening test for concussion
- Worsening score suggests 5x elevated risk for concussion
- Aids in diagnosis of unwitnessed concussion
- **NEEDS BASELINE TESTING


KING-DEVICK TEST
Mayo Clinic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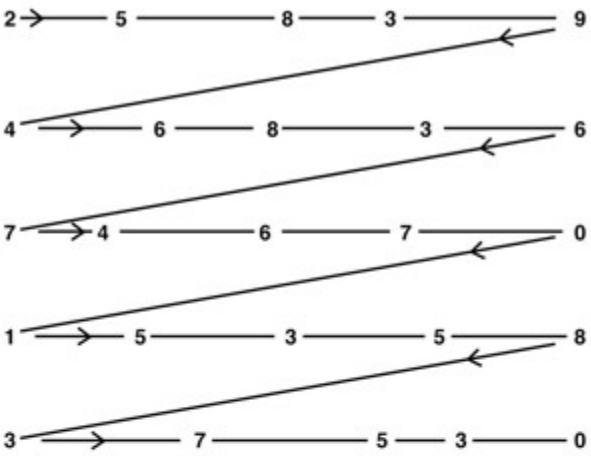
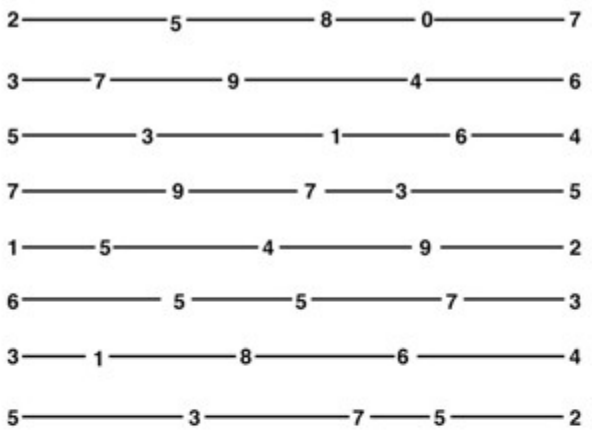
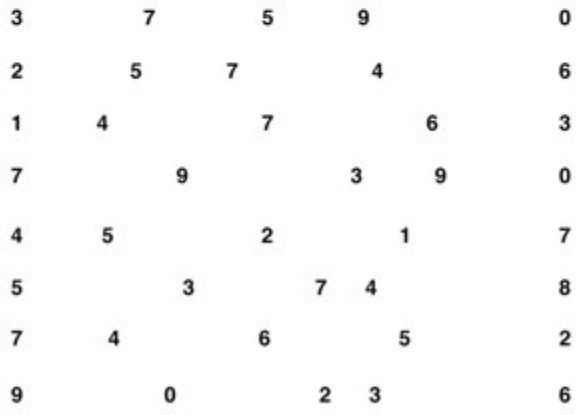
John O Doe
Baseline: 45.0
Alan M Murphy
Needs baseline
July Narrow
Baseline: 43.5
Rachel A Short
Baseline: 36.2
Alan P Simpson
Baseline: 38.5
Updated 27/08/2015 17:45
Subject Details
Help
Jan A Brady
Version: 1 2 3
Subject ID: ST123452
Date of Birth: 11/12/1994
Baseline: 43.2 sec
Valid until: 27/08/2016
Start Post-Injury Test
Edit Subject
Check Baseline Test
Record Physical Test
Post-Injury Test History
Concussion History
Teams
Baseline Test History
Date Version Time Errors Cards Tester
27/08/2015 Physical 43.2 None 3 rrr



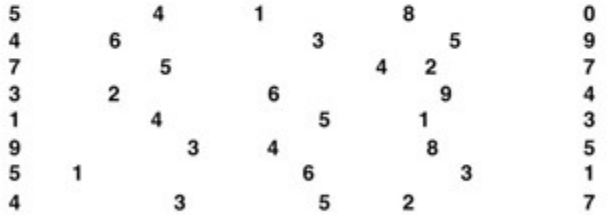
DEMONSTRATION CARD



TEST I



TEST II



TEST III

SCAT5- Putting it all together

BJSM Online First, published on April 28, 2017 as 10.1136/bjsports-2017-097506SCAT5

SCAT5© SPORT CONCUSSION ASSESSMENT TOOL – 5TH EDITION
DEVELOPED BY THE CONCUSSION IN SPORT GROUP
FOR USE BY MEDICAL PROFESSIONALS ONLY

supported by

FIFA

Patient details

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date of Injury: _____ Time: _____

WHAT IS THE SCAT5?

The SCAT5 is a standardized tool for evaluating concussions designed for use by physicians and licensed healthcare professionals[1]. The SCAT5 cannot be performed correctly in less than 10 minutes.

If you are not a physician or licensed healthcare professional, please use the Concussion Recognition Tool 5 (CRT5). The SCAT5 is to be used for evaluating athletes aged 13 years and older. For children aged 12 years or younger, please use the Child SCAT5.

Preseason SCAT5 baseline testing can be useful for interpreting post-injury test scores, but is not required for that purpose.Detailed instructions for use of the SCAT5 are provided on page 7. Please read through these instructions carefully before testing the athlete. Brief verbal instructions for each test are given in italics. The only equipment required for the tester is a watch or timer.

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Recognise and Remove

A head impact by either a direct blow or indirect transmission of force can be associated with a serious and potentially fatal brain injury. If there are significant concerns, including any of the red flags listed in Box 1, then activation of emergency procedures and urgent transport to the nearest hospital should be arranged.

Key points

- Any athlete with suspected concussion should be REMOVED FROM PLAY, medically assessed and monitored for deterioration. No athlete diagnosed with concussion should be returned to play on the day of injury.
- If an athlete is suspected of having a concussion and medical personnel are not immediately available, the athlete should be referred to a medical facility for urgent assessment.
- Athletes with suspected concussion should not drink alcohol, use recreational drugs and should not drive a motor vehicle until cleared to do so by a medical professional.
- Concussion signs and symptoms evolve over time and it is important to consider repeat evaluation in the assessment of concussion.
- The diagnosis of a concussion is a clinical judgment, made by a medical professional. The SCAT5 should NOT be used by itself to make, or exclude, the diagnosis of concussion. An athlete may have a concussion even if their SCAT5 is "normal".

Remember:

- The basic principles of first aid (danger, response, airway, breathing, circulation) should be followed.
- Do not attempt to move the athlete (other than that required for airway management) unless trained to do so.
- Assessment for a spinal cord injury is a critical part of the initial on-field assessment.
- Do not remove a helmet or any other equipment unless trained to do so safely.

1

Name: _____
DOB: _____
Address: _____
ID number: _____
Examiner: _____
Date: _____

IMMEDIATE OR ON-FIELD ASSESSMENT

The following elements should be assessed for all athletes who are suspected of having a concussion prior to proceeding to the neurocognitive assessment and ideally should be done on-field after the first first aid / emergency care priorities are completed.

If any of the "Red Flags" or observable signs are noted after a direct or indirect blow to the head, the athlete should be immediately and safely removed from participation and evaluated by a physician or licensed healthcare professional.

Consideration of transportation to a medical facility should be at the discretion of the physician or licensed healthcare professional.

The GCS is important as a standard measure for all patients and can be done serially if necessary in the event of deterioration in conscious state. The Maddocks questions and cervical spine exam are critical steps of the immediate assessment; however, these do not need to be done serially.

STEP 1: RED FLAGS

RED FLAGS:

- **Neck pain or tenderness**
- **Double vision**
- **Weakness or tingling/ burning in arms or legs**
- **Severe or increasing headache**
- **Seizure or convulsion**
- **Loss of consciousness**
- **Deteriorating conscious state**
- **Vomiting**
- **Increasingly restless, agitated or combative**

STEP 2: OBSERVABLE SIGNS

Witnessed ☐ Observed on Video ☐

	Y	N
Lying motionless on the playing surface		
Balance / gait difficulties / motor incoordination: stumbling, slow / laboured movements		
Disorientation or confusion, or an inability to respond appropriately to questions		
Blank or vacant look		
Facial injury after head trauma		

STEP 3: MEMORY ASSESSMENT MADDOCKS QUESTIONS[2]

"I am going to ask you a few questions, please listen carefully and give your best effort. First, tell me what happened?"

_____

_____

Mark Y for correct answer / N for incorrect

	Y	N
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?		
Did your team win the last game?		

Note: Appropriate sport-specific questions may be substituted.

STEP 4: EXAMINATION GLASGOW COMA SCALE (GCS)[3]

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

CERVICAL SPINE ASSESSMENT

	Y	N
Does the athlete report that their neck is pain free at rest?		
If there is NO neck pain at rest, does the athlete have a full range of ACTIVE pain free movement?		
Is the limb strength and sensation normal?		

In a patient who is not lucid or fully conscious, a cervical spine injury should be assumed until proven otherwise.

3

Name: _____
DOB: _____
Address: _____
ID number: _____
Examiner: _____
Date: _____

STEP 3: COGNITIVE SCREENING

Standardised Assessment of Concussion (SAC)[4]

ORIENTATION

What month is it?	0	1
What is the date today?	0	1
What is the day of the week?	0	1
What year is it?	0	1
What time is it right now? (within 1 hour)	0	1
Orientation score		of 5

IMMEDIATE MEMORY

The Immediate Memory component can be completed using the traditional 5-word per trial list or optionally using 10-words per trial to minimise any ceiling effect. All 3 trials must be administered irrespective of the number correct on the first trial. Administer at the rate of one word per second.

Please choose EITHER the 5 or 10 word list groupe and circle the specific word list chosen for this test.

I am going to test your memory. I will read you a list of words and when I am done, repeat back as many words as you can remember, in any order. For Trials 2 & 3: I am going to repeat the same list again. Repeat back as many words as you can remember in any order, even if you said the word before.

List	Alternate 5 word lists					Score (of 5) Trial 1	Trial 2	Trial 3
A	Finger	Penny	Blanket	Lemon	Insect			
B	Candle	Paper	Sugar	Sandwich	Wagon			
C	Baby	Monkey	Perfume	Sunset	Iron			
D	Elbow	Apple	Carpet	Saddle	Bubble			
E	Jacket	Arrow	Pepper	Cotton	Movie			
F	Dollar	Honey	Mirror	Saddle	Anchor			
						Immediate Memory Score		of 15
						Time that last trial was completed		

List	Alternate 10 word lists					Score (of 10) Trial 1	Trial 2	Trial 3
G	Finger	Penny	Blanket	Lemon	Insect			
	Candle	Paper	Sugar	Sandwich	Wagon			
H	Baby	Monkey	Perfume	Sunset	Iron			
	Elbow	Apple	Carpet	Saddle	Bubble			
I	Jacket	Arrow	Pepper	Cotton	Movie			
	Dollar	Honey	Mirror	Saddle	Anchor			
						Immediate Memory Score		of 30
						Time that last trial was completed		

CONCENTRATION

DIGITS BACKWARDS

Please circle the Digit list chosen (A, B, C, D, E, F). Administer at the rate of one digit per second reading DOWN the selected column.

I am going to read a string of numbers and when I am done, you repeat them back to me in reverse order of how I read them to you. For example, if I say 7-1-9, you would say 9-1-7.

Concentration Number Lists (circle one)					
List A	List B	List C			
4-9-3	5-2-6	1-4-2	Y	N	0
6-2-9	4-1-5	6-5-8	Y	N	1
3-8-1-4	1-7-9-5	6-8-3-1	Y	N	0
3-2-7-9	4-9-6-8	3-4-8-1	Y	N	1
6-2-9-7-1	4-8-5-3-7	4-9-1-5-3	Y	N	0
1-5-3-8-6	6-1-8-4-3	6-8-3-5-1	Y	N	1
7-1-8-4-6-2	8-3-1-9-6-4	3-7-6-5-1-9	Y	N	0
5-3-9-1-4-8	7-2-4-8-5-6	9-2-6-5-1-4	Y	N	1
List D	List E	List F			
7-8-2	3-8-2	2-7-1	Y	N	0
9-2-6	5-1-8	4-7-9	Y	N	1
4-1-8-3	2-7-9-3	1-6-8-3	Y	N	0
9-7-2-3	2-1-6-9	3-8-2-4	Y	N	1
1-7-9-2-6	4-1-8-6-9	3-4-7-5-8	Y	N	0
6-1-7-5-2	9-4-1-7-5	8-3-9-6-4	Y	N	1
3-5-4-8-1-7	6-9-7-3-8-2	5-8-6-2-4-9	Y	N	0
8-4-1-9-3-5	6-2-7-9-3-8	3-1-7-8-2-6	Y	N	1
			Digits Score:		of 4

MONTHS IN REVERSE ORDER

Now tell me the months of the year in reverse order. Start with the last month and go backward. So you'll say December, November. Go ahead.

Dec - Nov - Oct - Sept - Aug - Jul - Jun - May - Apr - Mar - Feb - Jan 0 1

Months Score of 1

Concentration Total Score (Digits + Months) of 5

Put me in, coach!

Asymptomatic AND sideline assessment normal??

- Exertional testing:
  - Sprints
  - Cuts, figure eights
  - High knees
  - Push ups
- Still symptom free? → consider returning to game
- But remember…

WHEN IN DOUBT, SIT THEM OUT!

References

Bloom, Josh er al. “Sideline Evaluation of Concussion.” *Uptodate*

Echemendia RJ, Meeuwisse W, McCrory P*, et al.* The Sport Concussion Assessment Tool 5th Edition (SCAT5)
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McCrory P, Meeuwisse W, Dvorak J*, et al.* Consensus statement on concussion in sport—the 5th international conference on concussion in sport held in Berlin, October 2016. *Br J Sports Med* Published Online First: 26 April 2017. doi: 10.1136/bjsports-2017-097699