

FIGURE 1. Sport Concussion Assessment Tool (SCAT)

This tool represents a standardized method of evaluating people after concussion in sport. This tool has been produced as part of the Summary and Agreement Statement of the Second International Symposium on Concussion in Sport, Prague 2004.

Sport concussion is defined as a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces. Several common features that incorporate clinical, pathological, and biomechanical injury constructs that may be utilized in defining the nature of a concussive head injury include:

1. Concussion may be caused either by a direct blow to the head, face, neck, or elsewhere on the body with an "impulsive" force transmitted to the head.
2. Concussion typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously.
3. Concussion may result in neuropathological changes, but the acute clinical symptoms largely reflect a functional disturbance rather than structural injury.
4. Concussion results in a graded set of clinical syndromes that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course.
5. Concussion is typically associated with grossly normal structural neuroimaging studies.

Postconcussion Symptoms

Ask athletes to score themselves based on how they feel now. It is recognized that a low score may be normal for some athletes, but clinical judgment should be exercised to determine if a change in symptoms has occurred following the suspected concussion event.

It should be recognized that the reporting of symptoms may not be entirely reliable. This may be due to the effects of a concussion or because the athlete's passionate desire to return to competition outweighs the natural inclination to give an honest response.

If possible, ask someone who knows the athlete well about changes in affect, personality, behavior, etc.

Remember, concussion should be suspected in the presence of ANY ONE or more of the following:

- Symptoms (such as headache), or
- Signs (such as loss of consciousness), or
- Memory problems.

Any athlete with a suspected concussion should be monitored for deterioration (ie, should not be left alone) and should not drive a motor vehicle.

For more information see the "Summary and Agreement Statement of the Second International Symposium on Concussion in Sport" in:

Clinical Journal of Sport Medicine 2005;15(2):48-55
British Journal of Sports Medicine 2005;39(4):196-204
Neurosurgery 2005, in press
The Physician and Sportsmedicine 2005;33(4):29-44
 This tool may be copied for distribution to teams, groups, and organizations.

The SCAT Card

(Sport Concussion Assessment Tool)
 Athlete Information

What is a concussion? A concussion is a disturbance in the function of the brain caused by a direct or indirect force to the head. It results in a variety of symptoms (like those listed below) and may, or may not, involve memory problems or loss of consciousness.

How do you feel? You should score yourself on the following symptoms, based on how you feel now.

Postconcussion Symptom Scale

| | None | | Moderate | | | Severe | |
|-----------------------------|------|---|----------|---|---|--------|---|
| Headache | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| "Pressure in head" | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Neck pain | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Balance problems or dizzy | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Nausea or vomiting | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Vision problems | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Hearing problems/ringing | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| "Don't feel right" | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Feeling "dinged" or "dazed" | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Confusion | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Feeling slowed down | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Feeling like "in a fog" | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Drowsiness | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Fatigue or low energy | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| More emotional than usual | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Irritability | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Difficulty concentrating | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Difficulty remembering | 0 | 1 | 2 | 3 | 4 | 5 | 6 |

(Follow-up symptoms only)

| | | | | | | | |
|--------------------------|---|---|---|---|---|---|---|
| Sadness | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Nervous or anxious | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Trouble falling asleep | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Sleeping more than usual | 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 |
| Other: | 0 | 1 | 2 | 3 | 4 | 5 | 6 |

What should I do?

Any athlete suspected of having a concussion should be removed from play, and then seek medical evaluation.

Signs to watch for:

Problems could arise over the first 24-48 hours. You should not be left alone and must go to a hospital at once if you:

- Have a headache that gets worse
- Are very drowsy or can't be awakened (woken up)
- Can't recognize people or places
- Have repeated vomiting
- Behave unusually or seem confused; are very irritable
- Have seizures (arms and legs jerk uncontrollably)
- Have weak or numb arms or legs
- Are unsteady on your feet; have slurred speech.

Remember, it is better to be safe. Consult your doctor after a suspected concussion.

What can I expect?

Concussion typically results in the rapid onset of short-lived impairment that resolves spontaneously over time. You can expect that you will be told to rest until you are fully recovered (that means resting your body and your mind). Then, your doctor will likely advise that you go through a gradual increase in exercise over several days (or longer) before returning to sport.

FIGURE 1. Sport Concussion Assessment Tool (SCAT) continued

The SCAT Card
(Sport Concussion Assessment Tool)
Medical Evaluation

Name: _____ Date _____

Sport/Team: _____ Mouth guard? Y N

1) SIGNS
 Was there loss of consciousness or unresponsiveness? Y N
 Was there seizure or convulsive activity? Y N
 Was there a balance problem/unsteadiness? Y N

2) MEMORY
 Modified Maddocks questions (check correct)
 At what venue are we? __; Which half is it? __; Who scored last? __
 What team did we play last? __; Did we win last game? __

3) SYMPTOM SCORE
 Total number of positive symptoms (from reverse side of the card) = _____

4) COGNITIVE ASSESSMENT

| 5 word recall | (Examples) | Immediate | Delayed |
|---------------|------------|-----------|-----------------------------|
| | | | (after concentration tasks) |
| Word 1 _____ | cat | ___ | ___ |
| Word 2 _____ | pen | ___ | ___ |
| Word 3 _____ | shoe | ___ | ___ |
| Word 4 _____ | book | ___ | ___ |
| Word 5 _____ | car | ___ | ___ |

Months in reverse order:
 Jun-May-Apr-Mar-Feb-Jan-Dec-Nov-Oct-Sep-Aug-Jul (circle incorrect)
 or
 Digits backward (check correct)
 5-2-8 3-9-1 _____
 6-2-9-4 4-3-7-1 _____
 8-3-2-7-9 1-4-9-3-6 _____
 7-3-9-1-4-2 5-1-8-4-6-8 _____

Ask delayed 5-word recall now

5) NEUROLOGICAL SCREENING

| | Pass | Fail |
|-----------------------|------|------|
| Speech | ___ | ___ |
| Eye motion and pupils | ___ | ___ |
| Pronator drift | ___ | ___ |
| Gait assessment | ___ | ___ |

Any neurological screening abnormality necessitates formal neurological or hospital assessment

6) RETURN TO PLAY
 Athletes should not be returned to play the same day of injury. When returning athletes to play, they should follow a stepwise symptom-limited program, with stages of progression. For example:
 1. Rest until asymptomatic (physical and mental rest)
 2. Light aerobic exercise (eg, stationary cycling)
 3. Sport-specific exercise
 4. Non-contact training drills (start light resistance training)
 5. Full contact training after medical clearance
 6. Return to competition (game play)

There should be approximately 24 hours (or longer) for each stage, and the athlete should return to stage 1 if symptoms recur. Resistance training should only be added in the later stages. **Medical clearance should be given before return to play.**

Instructions:
 This side of the card is for the use of medical doctors, physical therapists, or athletic trainers. In order to maximize the information gathered from the card, it is strongly suggested that all athletes participating in contact sports complete a baseline evaluation prior to the beginning of their competitive season. This card is a suggested guide only for sport concussion and is not meant to assess more severe forms of brain injury. **Please give a COPY of this card to athletes for their information and to guide follow-up assessment.**

Signs:
 Assess for each of these items and circle Y (yes) or N (no)

Memory: If needed, questions can be modified to make them specific to the sport (eg, "period" versus "half").

Cognitive Assessment:
 Select any 5 words (an example is given). Avoid choosing related words such as "dark" and "moon," which can be recalled by means of word association. Read each word at a rate of one word per second. The athlete should not be informed of the delayed testing of memory (to be done after the reverse months and/or digits). Choose a different set of words each time you perform a follow-up exam with the same candidate. Ask the athlete to recite the months of the year in reverse order, starting with a random month. Do not start with December or January. Circle any months not recited in the correct sequence. For digits backward, if correct, go to the next string length. If incorrect, read trial 2. Stop after incorrect on both trials.

Neurological Screening:
 Trained medical personnel must administer this examination. These individuals might include medical doctors, physical therapists, or athletic trainers. Speech should be assessed for fluency and lack of slurring. Eye motion should reveal no diplopia in any of the 4 planes of movement (vertical, horizontal, and both diagonal planes). The pronator drift is performed by asking patients to hold both arms in front of them, palms up, with eyes closed. A positive test is pronating the forearm, dropping the arm, or drifting away from midline. For gait assessment, ask the patient to walk away from you, turn, and walk back.

Return to Play:
 A structured, graded exertion protocol should be developed and individualized on the basis of sport, age, and the concussion history of the athlete. Exercise or training should be commenced only after the athlete is clearly asymptomatic with physical and cognitive rest. Final decision for clearance to return to competition should ideally be made by a medical doctor.

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