



NEW ZEALAND RUGBY LEAGUE

CONCUSSION / HEAD INJURY POLICY

Amended April 2010
New Zealand Rugby League Medical panel

INTRODUCTION

The potential for concussions / head injuries to occur in rugby league is fully recognised. As a result of this recognition, due consideration should be undertaken by all who partake, administer or manage rugby league activities in both the training and match environments.

There has long been a perception that a concussion occurs only when there is a loss of consciousness. This perception is incorrect as concussions can occur without loss of consciousness and range in severity from brief periods of confusion through to a significant loss of consciousness.

WHAT IS A SPORTS CONCUSSION?

Several common features incorporating clinical, biomechanical and pathological injury may be utilized in defining the nature of a concussion, in that a concussion:

The official consensus definition for a concussion is a *“complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces”*^{1, 2}. More simply, a concussion may be defined as an alteration in the mental state of the player for a variable period of time, that may, or may not, result in a loss of consciousness. There are several features that are able to define the nature of a concussion. These are:

- (1) A concussion may be caused by a direct blow to the head, face, neck, or elsewhere on the body with an “impulsive” force transmitted to the head.
- (2) A concussion typically results in the rapid onset of short lived impairment of neurological function that resolves spontaneously.
- (3) A concussion may result in neuropathological changes, but the acute clinical symptoms largely reflect a functional disturbance rather than structural injury.
- (4) A 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, and
- (5) A concussion is typically associated with grossly normal structural neuroimaging studies.

Therefore whenever a sports person has an injury to the head and becomes confused or acts abnormally or they lose consciousness, even for a few seconds, they have been concussed. Associated with the injury to the head is typically a period of amnesia (memory loss).

Concussed athletes are often described as “stunned”, “dazed” or “star struck”. The cause of this amnesia is typically a sudden violent movement of the head due to a collision or a direct or indirect impact, resulting in an acceleration or deceleration of the brain within the skull. The result is damage to the brain. This is almost always slight and recovery from a single injury is the rule. However, in the period healing

(usually 2 to 3 weeks), the brain is sensitive and another injury may occasionally result in a serious or even fatal reaction.

In the long term, the damage from further concussions may cumulate enough to impair performance. After the impact, there is usually a period of unresponsiveness or confusion, and amnesia. The memory loss usually spans the time from just before the injury occurred to the moment of injury itself, and a period of time following the injury (post-traumatic amnesia) which may be permanent. The memory loss can extend to include previous days or weeks (retrograde amnesia).

REMEMBER: Serious and sometimes fatal results can follow an injury what at first seems trivial. Approximately 3% of patients, who have had concussion, will have bleeding inside the skull or into the brain (intracranial haemorrhage). The key signs of a haemorrhage include worsening headache, increasing confusion and continued vomiting. if there is any presence of these symptoms the player must receive immediate medical care.

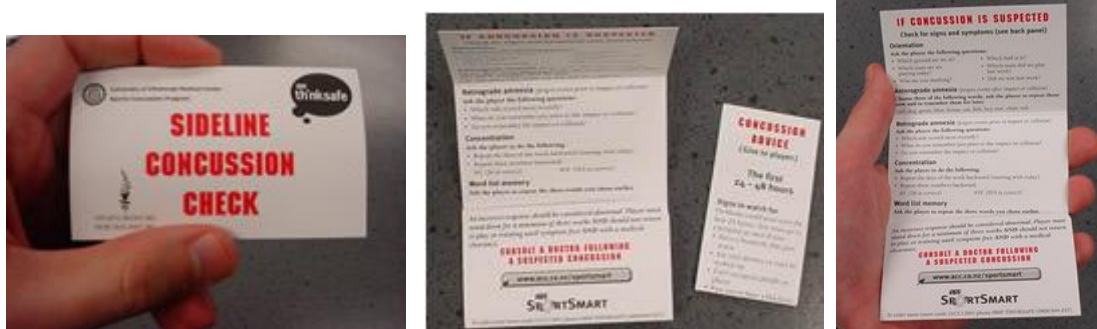
TYPES OF CONCUSSION

The classification of concussions has been disbanded. Each concussion should be managed individually as it is impossible to predict the clinical course of a particular concussion from a group of signs and symptoms. Onset of symptoms may occur over hours or days later. The majority (80-90%)² of concussions progressively resolve over 10 - 21 days without complications. This represents the most common form of concussion seen in sports activities. These concussions can be appropriately managed by primary care medical practitioners. The cornerstone of the management of a simple concussion is rest until ALL symptoms resolve and then undertaking a graduated return to play protocol.

Some concussions result in persistent symptoms occurring (including those symptoms that reoccur when participating in sporting activity). These types of concussions may result from players who have had consecutive concussions over time, or where the player is repeatedly concussed with less and less impact force. Formal neuropsychological investigations should be considered for concussions with ongoing symptoms.

ASSESSMENT OF THE CONCUSSED PLAYER

When assessing an injured player on the sports field, it is important that a quick and accurate assessment is made. This is where the use of the sideline concussion checklist is recommended:



If there is any doubt, use the questions in the sideline concussion check of the following questions based on Maddock's questions³ can be useful:

1. What ground are we at?
2. What team are we playing today?
3. Who is your opponent at present?
4. What quarter/half is it?
5. How far into the quarter/half is it?

6. Which side scored last?
7. Which team did we play last week?
8. Did we win last week?
9. Count pre-determined numbers backwards
10. Months of the year in reverse

These questions can be found in the sideline concussion check provided by your local district or the ACC. Failure to successfully and accurately answer any of the above questions in conjunction with **ANY** signs or symptoms of an acute concussion (see below) indicates that the player has been concussed and must stop playing and be removed from the field. The player should be accompanied from the field and taken to a doctor or the local emergency department for assessment as soon as possible.

It is recommended that the player should then see appropriate medical professional for their opinion as to the best future management. If the player is obviously unconscious, then the first priority is to evaluate and protect the airway and cervical spine, and to then remove the player from the field. The player must be watched closely and carefully monitored until consciousness returns. Convulsions may sometimes occur.

SIGNS AND SYMPTOMS OF ACUTE CONCUSSION¹

If any one of the following symptoms or problems is present, a head injury should be suspected and appropriate management instituted.

- (a) Cognitive features
 - Unaware of period, opposition, score of game
 - Confusion
 - Amnesia
 - Loss of consciousness

- (b) Typical symptoms: (As per the sideline concussion check or see the SCAT2 card in the appendices)
 - Headache or pressure in the head
 - Balance problems or dizziness
 - Nausea
 - Feeling “dinged”, “foggy”, stunned, or “dazed”
 - Visual problems—for example, seeing stars or flashing lights, double vision
 - Hearing problems—for example, ringing in the ears
 - Irritability or emotional changes

Other symptoms such as a subjective feeling of slowness and fatigue after an impact may indicate that a concussion has occurred or has not fully resolved.

- (c) Physical signs
 - Loss of consciousness/impaired conscious state
 - Poor coordination or balance
 - Concussive convulsion/impact seizure
 - Gait unsteadiness/loss of balance
 - Slow to answer questions or follow directions
 - Easily distracted, poor concentration
 - Displaying inappropriate emotions—for example, laughing, crying

- Vomiting
- Vacant stare/glassy eyed
- Slurred speech
- Personality changes
- Inappropriate playing behaviour—for example, running in the wrong direction.
- Significantly decreased playing ability

Only those personnel trained to carry out sideline assessment should utilize the SCAT2 card for primary assessments. This SCAT card should accompany the injured player to the emergency department / sports physician / players health professional wherever possible.

MANAGEMENT OF THE CONCUSSED PLAYER

The concussion management protocol for the New Zealand Rugby League is:

CONCUSSION MANAGEMENT¹	
Acute injury	
When a player shows any symptoms or signs of a concussion, the following should be applied.	
(1)	The player should not be allowed to return to play in the current game or practice.
(2)	The player should not be left alone, and regular monitoring for deterioration is essential over the initial few hours after injury.
(3)	The player should be medically evaluated after the injury.
(4)	Return to play must follow a medically supervised stepwise process.
A player should never return to play while symptomatic.	
“When in doubt, sit them out!”	

MANAGEMENT OF THE UNCONSCIOUS PLAYER

If the player is obviously unconscious, the first priority is to evaluate and protect the airway and the cervical spine. The player must be watched closely and carefully monitored until consciousness returns. Should breathing stop, appropriate resuscitation is necessary, following the “Airways, Breathing, Circulation” guidelines. Always remember the possibility of an associated spinal (neck) injury, and if the player must be moved, do so carefully and appropriately. **DO NOT MOVE THE PLAYER FROM THE FIELD WHILE THEY ARE UNCONSCIOUS.** This should be left to appropriate medical or ambulance personnel. When the player has regained consciousness and their breathing is regular and unobstructed, the player should be carried from the field and allowed to recover fully. Such incidents require immediate review by a doctor. The player should then see appropriate medical professional for their opinion as to the best future management.

POST-CONCUSSION SYNDROME

It is quite common following concussion, for players to continue to experience problems after their apparent recovery from the initial injury. These problems are collectively referred to as the post-concussion syndrome. Coach, parents, family members and team members should look for the following

Signs and symptoms:

- sleep disturbance;
- difficulty in concentrating;
- difficulty in applying themselves to tasks;
- lack of attention span;
- irritability, intolerance in general and to noises in particular;
- dizziness on turning of the head;
- recurrent headaches;
- frustration doing tasks;
- any symptoms provided by activities such as sprints or sit-ups;
- Anxiety and/or depression

If any of these symptoms are present, then it is **mandatory that the player is assessed by a qualified neurologist, neurosurgeon or sports medicine physician before they recommence any sporting activity.**

The player is potentially prone to develop more symptoms if they continue in the sport, or to be concussed again, and they may also need special assistance to aid their recovery and return not only to sport but to their normal life.

SECOND IMPACT SYNDROME

If a player receives a second injury to the head before the injury has completely recovered, the chances of the player suffering brain swelling, heavy bleeding and increased pressure within the head dramatically increases that can result in permanent brain damage or death.

THE RECOVERY PERIOD

Perhaps the most contentious issue surrounding head injury is the decision regarding the length of time a player should stay away from participation in any sporting activity. No simple way exists to determine the seriousness of a concussion or whether a player has fully recovered. The main reason for the mandatory stand-down times for a player following concussion is related to reaction times. In the period following a concussion, the player's reaction times and decision-making abilities are likely to be less than optimal and the player is at an increased risk of further accident and injury, especially to the head. The risk of second impact syndrome is increased

Despite the fact that a player may seem to be physically fit and outwardly unaffected, coaches and administrators must be aware of this and support the decision to stand a player down.

It is well-documented that repeated episodes of concussion produce lasting effects and, after a number of concussions, a player may suffer permanent changes of character and ability. A player who has had a number of concussions should, therefore, consider whether they should withdraw from all contact sport.

STAND DOWN PERIOD AND RETURN TO PLAY

The majority of concussions will recover spontaneously over several days. It is important though that the first few days after a concussion has occurred that complete physical AND cognitive rest is required. The player should avoid all activities that require concentration or attention. This includes watching television, DVD's, computers, using the cell phone, reading or driving. Failure to do this may exacerbate the symptoms resulting in a delay to the recovery of the player from the concussion.

It is the mandatory policy of the New Zealand Rugby League that where a concussion is suspected for players over the age of 16, a 21 day stand down period is observed by the player concerned following the return to play guidelines detailed below.

Players at the age of 16 or under shall observe a 28 day stand down period as in adolescent and youth the developing brain takes longer to recover from the damage and symptoms of a brain injury.

A return to play protocol has been developed that follows a step wise process. This should be used in conjunction with the team doctor or the players own general practitioner / sports doctor / sports physician. The duration times are estimated times from the date of the concussion occurring and are for reference only.

Players at or under 16 years of age need to take an even more precautionous return to play, starting with a week of rest before commencing the return to play protocol as detailed below.

Level	Activity undertaken	Time post concussion (approximate) Guidelines
1	No activity, complete rest. Once symptom free and cognitive recovery is demonstrated, proceed to level 2.	2 – 3 days
2	Light aerobic exercise such as walking or stationary cycling	4 – 10 days
3	Sport specific training (e.g. running drills, ball handling skills)	11 – 15 days
4	Non-contact training drills	16 – 20 days
5	Full contact training after medical clearance	21 days
6	Game play	21 + days

A player should be able to progress through each step towards the next level without any symptom occurring. If any post concussion symptoms occur, the player should drop back to the previous symptom free level and try to progress again in the next 24 hrs.

CHILD AND ADOLESCENT PLAYERS

The management and return to play procedures identified in this policy can be applied to players as young as 10 years old. Below that age, the symptoms of concussion are reported differently from adults necessitating a full medical clearance **BEFORE** undertaking the return to play protocol.

Players under the age of 16 years old also require a cautious approach for return to play activities necessitating an even longer stand down period of 28 days be observed by the player concerned following the return to play guidelines identified.

Return to play prior to the minimum stand down periods identified can only occur with an appropriate neurological specialist assessment and clearance.

Acknowledgements:

The NZRL acknowledges the valued support and collaboration of the Brain Injury Association New Zealand and to the members of the NZRL Medical Council for their input into this policy, with special mention to Mr. Doug King.



References:

1. McCrory PR, Johnston K, Meeuwisse W, et al. Summary and agreement statement of the 2nd international conference on concussion in sport, Prague 2004. *Br J Sports Med* 2005; **39**(4):196 - 204.
2. McCrory P, Meeuwisse W, Johnston KM, et al. Consensus statement on concussion in sport - the 3rd international conference on concussion in sport held in Zurich, November 2008. *J Sci Med Sport*. 2009; doi: 10.1016/j.jsams.2009.02.004.
3. Maddocks DL, Dicker GD, Saling MM. The assessment of orientation following concussion in athletes. *Clin J Sports Med* 1995; **5**(1):32 - 35.

APPENDIX

Sport Concussion Assessment Tool (SCAT2)²

SCAT2



Sport Concussion Assessment Tool 2

Name _____

Sport/team _____

Date/time of injury _____

Date/time of assessment _____

Age _____ Gender M F

Years of education completed _____

Examiner _____

What is the SCAT2?

This tool represents a standardized method of evaluating injured athletes for concussion and can be used in athletes aged from 10 years and older. It supersedes the original SCAT published in 2005². This tool also enables the calculation of the Standardized Assessment of Concussion (SAC)^{3,4} score and the Maddocks questions⁵ for sideline concussion assessment.

Instructions for using the SCAT2

The SCAT2 is designed for the use of medical and health professionals. Preseason baseline testing with the SCAT2 can be helpful for interpreting post-injury test scores. Words in italics throughout the SCAT2 are the instructions given to the athlete by the tester.

This tool may be freely copied for distribution to individuals, teams, groups and organizations.

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 symptoms (like those listed below) and often does not involve loss of consciousness. Concussion should be suspected in the presence of **any one or more** of the following:

- Symptoms (such as headache), or
- Physical signs (such as unsteadiness), or
- Impaired brain function (e.g. confusion) or
- Abnormal behaviour.

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.

Symptom Evaluation

How do you feel?

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

	none	mild	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
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	1	2	3	4	5	6
Feeling like "in a fog"	0	1	2	3	4	5	6
"Don't feel right"	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
Fatigue or low energy	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
Trouble falling asleep (if applicable)	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
Nervous or Anxious	0	1	2	3	4	5	6

Total number of symptoms (Maximum possible 22) _____

Symptom severity score

(Add all scores in table, maximum possible: 22 x 6 = 132)

Do the symptoms get worse with physical activity? Y N

Do the symptoms get worse with mental activity? Y N

Overall rating

If you know the athlete well prior to the injury, how different is the athlete acting compared to his / her usual self? Please circle one response.

no different

very different

unsure

Cognitive & Physical Evaluation

1 Symptom score (from page 1)
22 minus number of symptoms of 22

2 Physical signs score
Was there loss of consciousness or unresponsiveness? Y N
If yes, how long? _____ minutes
Was there a balance problem/unsteadiness? Y N
Physical signs score (1 point for each negative response) of 2

3 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.

4 Sideline Assessment – Maddocks Score
"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)

At 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 included in SCAT 2 summary score for serial testing.

¹ This tool has been developed by a group of international experts at the 3rd International Consensus meeting on Concussion in Sport held in Zurich, Switzerland in November 2008. The full details of the conference outcomes and the authors of the tool are published in British Journal of Sports Medicine, 2009, volume 43, supplement 1. The outcome paper will also be simultaneously co-published in the May 2009 issues of Clinical Journal of Sports Medicine, Physical Medicine & Rehabilitation, Journal of Athletic Training, Journal of Clinical Neuroscience, Journal of Science & Medicine in Sport, Neurosurgery, Scandinavian Journal of Science & Medicine in Sport and the Journal of Clinical Sports Medicine.

² McCrory P et al. Summary and agreement statement of the 2nd International Conference on Concussion in Sport, Prague 2004. British Journal of Sports Medicine. 2005; 39: 196-204

5 Cognitive assessment
Standardized Assessment of Concussion (SAC)

Orientation (1 point for each correct answer)

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
"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."

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."

Complete all 3 trials regardless of score on trial 1 & 2. Read the words at a rate of one per second. Score 1 pt. for each correct response. Total score equals sum across all 3 trials. Do not inform the athlete that delayed recall will be tested.

List	Trial 1	Trial 2	Trial 3	Alternative word list
elbow	0	1	0	candle baby finger
apple	0	1	0	paper monkey penny
carpet	0	1	0	sugar perfume blanket
saddle	0	1	0	sandwich sunset lemon
bubble	0	1	0	wagon iron insect
Total				

Immediate memory score of 15

Concentration
Digits Backward:
"I am going to read you a string of numbers and when I am done, you repeat them back to me backwards, in reverse order of how I read them to you. For example, if I say 7-1-9, you would say 9-1-7."
If correct, go to next string length. If incorrect, read trial 2. One point possible for each string length. Stop after incorrect on both trials. The digits should be read at the rate of one per second.

	0	1	Alternative digit lists
4-9-3	0	1	6-2-9 5-2-6 4-1-5
3-8-1-4	0	1	3-2-7-9 1-7-9-5 4-9-6-8
6-2-9-7-1	0	1	1-5-2-8-6 3-8-5-2-7 6-1-8-4-3
7-1-8-4-6-2	0	1	5-3-9-1-4-8 8-3-1-9-6-4 7-2-4-8-5-6

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"

1 pt. for entire sequence correct
Dec-Nov-Oct-Sept-Aug-Jul-Jun-May-Apr-Mar-Feb-Jan 0 1
Concentration score of 5

³ McCrea M. Standardized mental status testing of acute concussion. Clinical Journal of Sports Medicine. 2001; 11: 176-181

⁴ McCrea M, Randolph C, Kelly J. Standardized Assessment of Concussion: Manual for administration, scoring and interpretation. Waukesha, Wisconsin, USA.

⁵ Maddocks, DL; Dickett, GD; Saling, MM. The assessment of orientation following concussion in athletes. Clin J Sport Med. 1995;5(1):32-3

⁶ Guskiewicz KM. Assessment of postural stability following sport-related concussion. Current Sports Medicine Reports. 2003; 2: 24-30

6 Balance examination

This balance testing is based on a modified version of the Balance Error Scoring System (BESS). A stopwatch or watch with a second hand is required for this testing.

Balance testing

"I am now going to test your balance. Please take your shoes off, roll up your pant legs above ankle (if applicable), and remove any ankle taping (if applicable). This test will consist of three twenty second tests with different stances."

(a) Double leg stance:

"The first stance is standing with your feet together with your hands on your hips and with your eyes closed. You should try to maintain stability in that position for 20 seconds. I will be counting the number of times you move out of this position. I will start timing when you are set and have closed your eyes."

(b) Single leg stance:

"If you were to kick a ball, which foot would you use? [This will be the dominant foot] Now stand on your non-dominant foot. The dominant leg should be held in approximately 30 degrees of hip flexion and 45 degrees of knee flexion. Again, you should try to maintain stability for 20 seconds with your hands on your hips and your eyes closed. I will be counting the number of times you move out of this position. If you stumble out of this position, open your eyes and return to the start position and continue balancing. I will start timing when you are set and have closed your eyes."

(c) Tandem stance:

"Now stand heel-to-toe with your non-dominant foot in back. Your weight should be evenly distributed across both feet. Again, you should try to maintain stability for 20 seconds with your hands on your hips and your eyes closed. I will be counting the number of times you move out of this position. If you stumble out of this position, open your eyes and return to the start position and continue balancing. I will start timing when you are set and have closed your eyes."

Balance testing – types of errors

1. Hands lifted off iliac crest
2. Opening eyes
3. Step, stumble, or fall
4. Moving hip into > 30 degrees abduction
5. Lifting forefoot or heel
6. Remaining out of test position > 5 sec

Each of the 20-second trials is scored by counting the errors, or deviations from the proper stance, accumulated by the athlete. The examiner will begin counting errors only after the individual has assumed the proper start position. The modified BESS is calculated by adding one error point for each error during the three 20-second tests. The maximum total number of errors for any single condition is 10. If a athlete commits multiple errors simultaneously, only one error is recorded but the athlete should quickly return to the testing position, and counting should resume once subject is set. Subjects that are unable to maintain the testing procedure for a minimum of five seconds at the start are assigned the highest possible score, ten, for that testing condition.

Which foot was tested: Left Right
(i.e. which is the non-dominant foot)

Condition	Total errors
Double Leg Stance (feet together)	of 10
Single leg stance (non-dominant foot)	of 10
Tandem stance (non-dominant foot at back)	of 10
Balance examination score (30 minus total errors)	of 30

7 Coordination examination

Upper limb coordination

Finger-to-nose (FTN) task: "I am going to test your coordination now. Please sit comfortably on the chair with your eyes open and your arm (either right or left) outstretched (shoulder flexed to 90 degrees and elbow and fingers extended). When I give a start signal, I would like you to perform five successive finger to nose repetitions using your index finger to touch the tip of the nose as quickly and as accurately as possible."

Which arm was tested: Left Right

Scoring: 5 correct repetitions in < 4 seconds = 1

Note for testers: Athletes fail the test if they do not touch their nose, do not fully extend their elbow or do not perform five repetitions. Failure should be scored as 0.

Coordination score of 1

8 Cognitive assessment

Standardized Assessment of Concussion (SAC)

Delayed recall

"Do you remember that list of words I read a few times earlier? Tell me as many words from the list as you can remember in any order."

Circle each word correctly recalled. Total score equals number of words recalled.

List	Alternative word list		
elbow	candle	baby	finger
apple	paper	monkey	penny
carpet	sugar	perfume	blanket
saddle	sandwich	sunset	lemon
bubble	wagon	iron	insect

Delayed recall score of 5

Overall score

Test domain	Score
Symptom score	of 22
Physical signs score	of 2
Glasgow Coma score (E + V + M)	of 15
Balance examination score	of 30
Coordination score	of 1
Subtotal	of 70
Orientation score	of 5
Immediate memory score	of 5
Concentration score	of 15
Delayed recall score	of 5
SAC subtotal	of 30
SCAT2 total	of 100
Maddocks Score	of 5

Definitive normative data for a SCAT2 "cut-off" score is not available at this time and will be developed in prospective studies. Embedded within the SCAT2 is the SAC score that can be utilized separately in concussion management. The scoring system also takes on particular clinical significance during serial assessment where it can be used to document either a decline or an improvement in neurological functioning.

Scoring data from the SCAT2 or SAC should not be used as a stand alone method to diagnose concussion, measure recovery or make decisions about an athlete's readiness to return to competition after concussion.

Athlete Information

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.

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 (e.g. stationary cycle)
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.

Tool	Test domain	Time	Score			
		Date tested				
		Days post injury				
SCAT2	Symptom score					
	Physical signs score					
	Glasgow Coma score (E + V + M)					
	Balance examination score					
	Coordination score					
SAC	Orientation score					
	Immediate memory score					
	Concentration score					
	Delayed recall score					
	SAC Score					
Total	SCAT2					
Symptom severity score (max possible 132)						
Return to play			<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N

Additional comments

Concussion injury advice (To be given to concussed athlete)

This patient has received an injury to the head. A careful medical examination has been carried out and no sign of any serious complications has been found. It is expected that recovery will be rapid, but the patient will need monitoring for a further period by a responsible adult. Your treating physician will provide guidance as to this timeframe.

If you notice any change in behaviour, vomiting, dizziness, worsening headache, double vision or excessive drowsiness, please telephone the clinic or the nearest hospital emergency department immediately.

Other important points:

- Rest and avoid strenuous activity for at least 24 hours
- No alcohol
- No sleeping tablets
- Use paracetamol or codeine for headache. Do not use aspirin or anti-inflammatory medication
- Do not drive until medically cleared
- Do not train or play sport until medically cleared

Clinic phone number

Patient's name

Date/time of injury

Date/time of medical review

Treating physician

Contact details or stamp