# Information and Policy for Concussion Management

Includes

1. **Concussion Kit - Basic information for parents and coaches**
2. **Scat 3**
3. **Medical Concussion Assessment**
4. **Return to Play and Snow Guidelines**
5. **Suggested dry land physical and cognitive programme**
6. **Email letter to be cut and pasted to support parents /guardians regarding today's concussion event**

# Concussion Kit- Guidelines for Parents and Coaches

Concussion signs and symptoms can be different between athletes; if someone has a fall in which they hit their head, or receive any facial abrasions, you need to be suspicious of a concussion. Previous history of concussions will also pre-dispose athletes to subsequent concussions. Look for signs and symptoms such as: headache, blurry vision, nausea, concentration, erratic behaviour, behaviour out of character or memory issues.

The 'Pocket Concussion Recognition Tool' is a good resource to have on hand to help you make an initial assessment.

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

- Have a headache that gets worse
- Are very drowsy or can't be awakened (woken up)
- Can't recognise 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 their feet; have slurred speech

Remember, it is better to be safe.

If someone has a suspected concussion, get them to undertake the SCAT 3. The SCAT 3 includes a balance and co-ordination section, for our athletes, this is not always applicable. The SCAT 3 can then be used to re-test to monitor progress and return to play.

## Return to play (a more detailed progression id included later in document)

Athletes should not be returned to play the same day of injury. Every athlete will have a different recovery to their individual concussion, so use this as a **guide** only. When returning athletes to play, they should follow a stepwise symptom-limited programme, with stages of progression.

Our basic progression is: Symptom free in daily life to train
Symptom free training to competition

## SCAT 3 recommends 6 stages:

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. NB resistance training should only be added in the later stages.

Medical clearance should be given before return to play/sport by a Medical Doctor.

Two days symptom free at one stage, allows the athlete to move to the next stage.

REMEMBER: Concussions are tricky and hard to predict which makes it hard to have a concrete return to play plan, use the symptoms as your guideline rather than following a set timeline.

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# SCAT 3

The Scat 3 is carried out by Dr or Scat trained physio (not coach or non-medical personnel)
PDF link here (please note there are paper copies of these in the Physio kit)

# WHAT IS CONCUSSION?

Injury to the brain is the most common cause of death observed in skiing and snowboarding. Any athlete with a hit to the head or face with or without the use of a helmet is at risk of developing an injury to the brain. Even a blow to the body can induce a brain injury if such a blow causes the head to move quickly enough. Any trauma resulting in a change in mental status, somatic, cognitive or emotional symptoms or clinical signs of disorientation, imbalance, amnesia or a loss of consciousness may indicate an injury to the brain.

Acute injury to the brain can be divided into two general categories: mild traumatic brain injury (mTBI), often called concussion, and more emergent injuries such as skull fracture or intracranial haemorrhage. The purpose of this article is to describe the clinical approach that is to be taken with Snow Sports NZ athletes who are suspected to have a concussion.

Concussion is often described as being caused by an energy crisis that is the result of increased energy needed by neurons that are trying to reset to normal physiological parameters and a decreased energy supply due to changes in circulatory flow. This energy crisis creates neuronal dysfunction that creates the signs and symptoms of concussion that typically lasts 7-10 days but can be quite variable.

The clinical management of the injury can be broken down into three phases:

- Initial assessment for acute injury. The purpose of the initial or on-hill evaluation is to screen for concussion and make a go/no-go decision.

- Symptom management. Once diagnosed, the management of concussion includes addressing symptoms and minimising exacerbating factors.

- Return to participation. The decision to return an athlete to participation.

This policy for management of concussion in "Consensus Statement on Concussion in Sport: 4th International Conference on Concussion in Sport held in Zurich Nov 2012 (Available through the BJSM 2013;47:250-258) document, including the Sport Concussion Assessment Tool -3 (SCAT3) forms the foundation of our concussion policies and procedures.

# CONCUSSION MEDICAL ASSESSMENT

## INITIAL ASSESSMENT FOR ACUTE INJURY

It is expected that primary and secondary surveys of the athlete's condition have been completed prior to focusing on concussion. Initial evaluation for concussion can be thought of as making a go/no-go decision as well as establishing a diagnosis of concussion. Additionally, the initial on-hill assessment creates a benchmark for serial testing and is an essential component of good management. It is often unnecessary to complete all parts of the SCAT 3 in order to come to a no-go decision or to make a diagnosis of concussion. In general, after a trauma any of the following clinical findings should result in the athlete not participating for the remainder of the day:

- Loss of consciousness or progressively decreasing level of consciousness
- Disorientation or confusion
- Amnesia
- Focal signs of neurological dysfunction (hemiparesis, facial droop, etc.)
- Seizure
- Progressive or worsening symptoms (if occurring, should reconsider the possibility of cervical spine or more serious brain injury)

If none of these are present or obvious, the doctor should continue the evaluation by completing the SCAT 3 (attached). In addition, a more comprehensive neurological examination should be performed as soon as time and circumstance allow. This examination should include:

1. Vision, Eyes and Eye Movements:
    - Confrontational Vision Testing
        - Athlete covers one eye.
        - Examiner holds one finger up, equidistant between them and the athlete, while covering their own eye (such that both individuals are looking at the same field) and then moves the finger around the edge of the field on all sides. In this way, the examiner can verify at what point the finger should be seen in the visual field – assuming the examiner has normal visual fields.
    - Pupils
        - Size, shape, equality
        - Response to light

    - Smooth Pursuit
        - While the head is kept still, follow finger or object in an H pattern to ends of gaze.
        - Eye movement should be smooth with no or few corrective saccades.
        - Observe for nystagmus (more than 2-3 beats).

- Gaze Stability:
    - Focus on stationary object while moving head side to side at least six times. Repeat with up and down movements.
    - Look for any break of fixation and ask the athlete about symptoms of dizziness and vertigo.
    - Re-test smooth pursuit.

- Convergence
    - Focus on object in midline.
    - Bring closer.
    - At point where they see two of the object is convergence <6-8 cm is normal.

- Saccades
    - Look at nose then finger to left, back to nose, finger to right
    - Repeat looking up and down
    - Movement should be accurate
    - There should be few or no over/undershoot or corrective saccades

2. Motor and Motor Control:
- Pronator drift
    - Arms outstretched with palms up.
    - Pronation is suggestive of an UMN lesion.

- Finger – nose –finger
    - Athlete moves repetitively between touching their nose and the examiner's finger.
    - The examiner should move the target (their finger) to challenge all directions
    - Look for dysmetria

- Crossed arm rise from sitting
    - Athlete stands from seated with arms crossed

3. Balance, Gait and Proprioception
- Single leg balance with eyes closed.
- Romberg.
- Fukuda stepping test.
- Any deficit lasting greater than 72 hours is a red flag.

Following this initial evaluation, it is required that the athlete be reassessed both for mental status and the development of any new neurological signs or symptoms.

Serial evaluations should be complete every 30 min. x 3, and then every hour x 3 for a total of 4.5 hours. Serial evaluation components should include observation, conversing with the athlete, balance and eye movement evaluation.

When to refer for further evaluation:

- Loss of consciousness
- Amnesia >15 min
- GCS <13 or abnormal verbal score below 4
- Seizure activity
- Symptomatic at the end of the day
- Decreased neuro-function
- Decreased pulse
- Increased pulse pressure
- Cranial nerve deficits
- Unequal or non-reactive pupils
- Repeating questions
- Associated injuries that need attention

| USSA Concussion Evaluation Recording Sheet | | | | | | |
|---|---|---|---|---|---|---|
| On-Hill testing | | Results test 1 | Repeat Test | Repeat test | Repeat Test | Repeat Test |
| Complete SCAT-3 | either online or paper | please forward to USSA medical or upload to Presagia | | | | |
| CN Exam | Note deficits | | | | | |
| Follow Up Testing | | Results test 1 | Repeat Test | Repeat test | Repeat Test | Repeat Test |
| Eye and Eye Movements | | | | | | |
| Confrontational Testing | visual field assessment | | | | | |
| Pupils | Size, shape, equality | | | | | |
| | Response to Light | | | | | |
| Smooth Pursuit | H or X pattern | | | | | |
| Gaze Stability | Vertical | | | | | |
| | Horizontal | | | | | |
| Convergence | Distance | | | | | |
| Saccades | Horizontal | | | | | |
| | Vertical | | | | | |
| Motor and Motor control | | | | | | |
| Pronator Drift | | | | | | |
| Finger - Nose - Finger Test | | | | | | |
| Crossed Arm Rise from Sitting | | | | | | |
| Balance, Gait and Proprioception | | | | | | |
| Single leg balance with Eyes Closed | | | | | | |
| Romberg | | | | | | |
| Fukuda Stepping Test | | | | | | |
| ** Repeat testing every 30 min x 3, then every 60 min x 3 | | | | | | |

*SYMPTOM MANAGEMENT*

In the case of a diagnosed concussion, medications should be avoided initially and for at least four hours following the injury event.

Environmental considerations should be made, however, such as removing the athlete from a crowded, bright or loud environment.

No athlete diagnosed with concussion should be left unattended during this time period and serial neurological evaluations should be made as discussed above.

Symptomatic treatment after the four-hour period is typically centred on treating headache, sleep and nausea.

Medications can be used for these symptoms but should be tapered in a fashion as to not cloud the clinical picture as the athlete is being considered for beginning the return to participation protocol outlined below.

# RETURN TO PARTICIPATION

## RECOVERY STAGES:

**Stage 1.** Rest (physical and mental), Eat (nutritious foods), Sleep, Hydrate

- Cognitive and physical rest with no activity until all symptoms are cleared at rest.
- Activities of Daily Living (ADL's), generally walking, going out to store, light activity, tolerate computer/reading/television.

Basic requirements to begin a return to exercise and sport progression:

- Asymptomatic at rest.

**Stage 2**. Progressive return to activity

Step 1: Walking for 20–30 minutes (<50% effort)
Step 2: Spinning on bike for 20–30 minutes (50-60% effort)
Step 3: Running or resisted spinning for 20–30 minutes (70-80% effort)
Step 4: Running or resisted spinning for 20–30 minutes (90-100% effort),
Step 5: 20 min of strength training followed by 15 mins of plyometrics
Step 6: Return to Snow – Practice
Step 7: Return to Competition

- If symptoms return at any level of the progression, then the athlete returns to step where they were symptom free.
- Each step may take a minimum of one day and should in theory have 24 hours between each progression

**Return to Training**: When athlete has been returned to training they have been released to be on snow, and to work through a progression of skills toward full practice under supervision of a snows sports coach or physio/support person This progression will be unique within our disciplines due to the varied nature of our sports.

## Return to Competition:

Will have successfully completed return to snow process with medical clearance to return to competition.

## *POST-CONCUSSIVE SYNDROME (PCS)*

PCS refers to lingering neurological or psychiatric symptoms that continue once the concussion itself is thought to have resolved. There is no specific timing that is agreed upon, but PCS should be considered if symptoms are present three weeks out from the original injury. Determining if PCS is present, versus a prolonged concussion, can be difficult and consultation with a neurologist is highly suggested. Making this determination often requires careful observation of the athlete and the careful use of physical exertion as a diagnostic aide. In general, if symptoms are not improving despite significant and prolonged physical rest, or if symptoms are made better with exertion, PCS should be expected.

The proximal cause of PCS symptoms is highly varied and often multifactorial. Mechanisms such as mood, sleep, earache, attention deficit and cranio-cervical pathology are all common. Seen in the clear majority of PCS cases are symptoms that can be attributed to a relative lack of activity. Dramatically decreasing activity levels can alter brain physiology, providing challenges to sleep, mood, cognitive function and headache. This effect is especially pronounced in elite athletes.

## PREPARTICIPATION CONCUSSION EVALUATION

In addition to these tests, a detailed concussion history and Scat 3 should be carried out each year.

## WHEN TO RETIRE

Recommend the athlete retire from sport in the following circumstances:

- Concussions occur with less force.
- Symptom severity increases or become a functional burden.
- There is change from baseline that is not resolving with resolution of symptoms.

## HELMET REMOVAL

Generally, if a helmet fits well and prevents the head from moving it should be left on as long as:

1. There is access to treatment for airway compromise.
2. The individual is exhibiting no sign of breathing difficulty.
3. The spine can be properly immobilized. If the helmet includes a face mask or a shield, these must be removed to have immediate access to airway management. If removal is necessary the suggested steps are as follows:

- Two rescuers work together to remove helmet.
- First rescuer stabilizes head in helmet by providing constant in-line support of the head and neck placing one hand on the jaw angle and the other at the head and neck junction. Second rescuer removes facemask, goggles and chin strap.
- Second rescuer removes helmet slowly, pausing to allow first rescuer to reposition hands to maintain neutral alignment.
- First rescuer ensures that extension of the neck is prevented, supporting back of head and neck in neutral as necessary.

# CONCUSSION - RETURN TO PLAY

## Dry land training following concussion

For Physio and S/C as example of some dry land training protocols using the return to play guidelines following concussion-includes cognitive guidelines.

Remember these are guidelines only and may need to be adjusted for individual athletes.

## DRYLAND TRAINING PROTOCOL

### STAGE 1

Complete physical and cognitive rest

### STAGE 2

Biking 30 minutes (50-60% MHR)

### STAGE 3

Biking 45 minutes (70% MHR)

Circuit x 2 (70% max effort)
Body weight walking lunges x 20
Rest 20 seconds
Standing cable or tubing row x 20
Rest 20 seconds
Side plank x 20 seconds each side
Rest 20 seconds
Lateral shuffle 5 x 10 meters
Rest 20 seconds
Push-ups x 15
Rest 2 minutes

## STAGE 4

Biking 90 seconds @ 80-90% HRM by 2 minutes @ 60% HRM x 5

Circuit x 3 (90% max effort)
Jumping jacks x 40
Body weight alternating lunge x 15ea
Body weight jump squat x 10
Rest 60 seconds

Circuit x 3 (90% max effort)
Squats x 15
Single arm cable row x 12 ea
Swiss ball leg curl x 12
Med ball push up x 15
Med ball diagonal chop x 10 ea

## STAGE 5

Biking 45 seconds @ 90-100% HRM by 45 seconds @ 50-60% HRM x 8

Circuit x 4
Forward jump x 5
Lateral hop x 5 ea
Split squat jump x 5 ea
Rest 60 seconds

Circuit x 3
Squats x 8
Rest 30 seconds
Chin up or pull down x 8
Rest 30 seconds
Swiss ball single leg curl x max
Rest 30 seconds
Dumbbell chest press x 8
Rest 30 seconds
Pike up x 10
Rest 3 minutes

## STAGE 6

Resume strength and conditioning programme

## ON HILL PROTOCOL

### Stage 4:
Free skiing, GS radius, usually on SL or GS skis max 4 runs

### Stage 5:
This stage may be broken up into a couple of days depending on the athlete. Start with drills within free skiing, can do some gates, preferably stubbies, may be able able to go right into gate, volume is reduced in comparison to normal days. If there is time before a race then we can progress through Stage 5 in a stepwise fashion.

### Stage 6:
Back into racing.

## COGNITIVE PROTOCOL

### Stage One:
Complete rest

### Stage Two:
30 minutes of chosen cognitive activity

### Stage Three:
3 x 30 minutes of chosen cognitive activity with hour rest in between

### Stage Four:
3 x 60 minutes of chosen cognitive activity with 30 minutes rest in between

### Stage Five:
Half day of chosen cognitive activity

### Stage Six:
Return to full cognitive activities

# Email to emergency contact following a concussion

To whom it may concern

*Athlete* sustained a concussion during *training/comp* today. Due to the possible serious and long term side effects that can come from concussions if not managed properly, our team policy is to bring the athlete's emergency contact into the loop as early as possible.

*Athlete* has been placed on the Return to Play programme (RTP), which is a stepwise progression to get them back into everyday life and snow. The RTP has 6 stages. To move onto the next stage you need to be symptom free for 24 hours at the current stage.

The six stages are:

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 at any time on the RTP.

As *athlete* has just sustained the concussion they are on Stage 1. This means that they are to refrain from any and all sensory and physical stimuli.

-The athlete should rest for at least 24 hours.
-The athlete should avoid any computer, internet or electronic gaming activity if these activities make symptoms worse.
-The athlete should not be given any medications, including pain killers, unless prescribed by a medical practitioner.
-The athlete must not return to school until medically cleared.
-The athlete must not return to sport or play until medically cleared.

They get to sit in a dark quiet room and chill out for 24 hours, at which time hopefully they are symptom free and can move onto Stage 2, if not they will remain in this stimuli free environment until they symptom free.

Hopefully this all makes sense. Please feel free to communicate with myself and *anyone else that may be able to help.*

Kind regards,

*Your Name*