

“Current Concept”

Concussion in Sport - Return to Sports following Concussion



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 **Concussions (MTBI) in sport**
What do we know?
Where do we go?

INTRODUCTION

- The diagnosis and management of concussion during sports activity is since years one of the most challenging endeavours for all sports physician working on the field.
- In the last years, more than 20 management guidelines regarding return to play issues have been published. Current research has prompted a reevaluation and revision of prior guidelines with the aim to create an “unité de doctrine” in concussion management strategies.

International Symposium on Concussion in Sport (CIS Group)

Vienna-2001
Prague-2004
Zurich-2008
Concussion Management
New grading system
Return to play guidelines
Investigation
Guidelines

INTERNATIONAL SYMPOSIUM ON CONCUSSION IN SPORT

- November 2-3, 2001
- Vienna, Austria
- IIHF, FIFA, IOC



SECOND INTERNATIONAL SYMPOSIUM ON CONCUSSION IN SPORT

Prague, Czech Republic
November 5 & 6, 2004



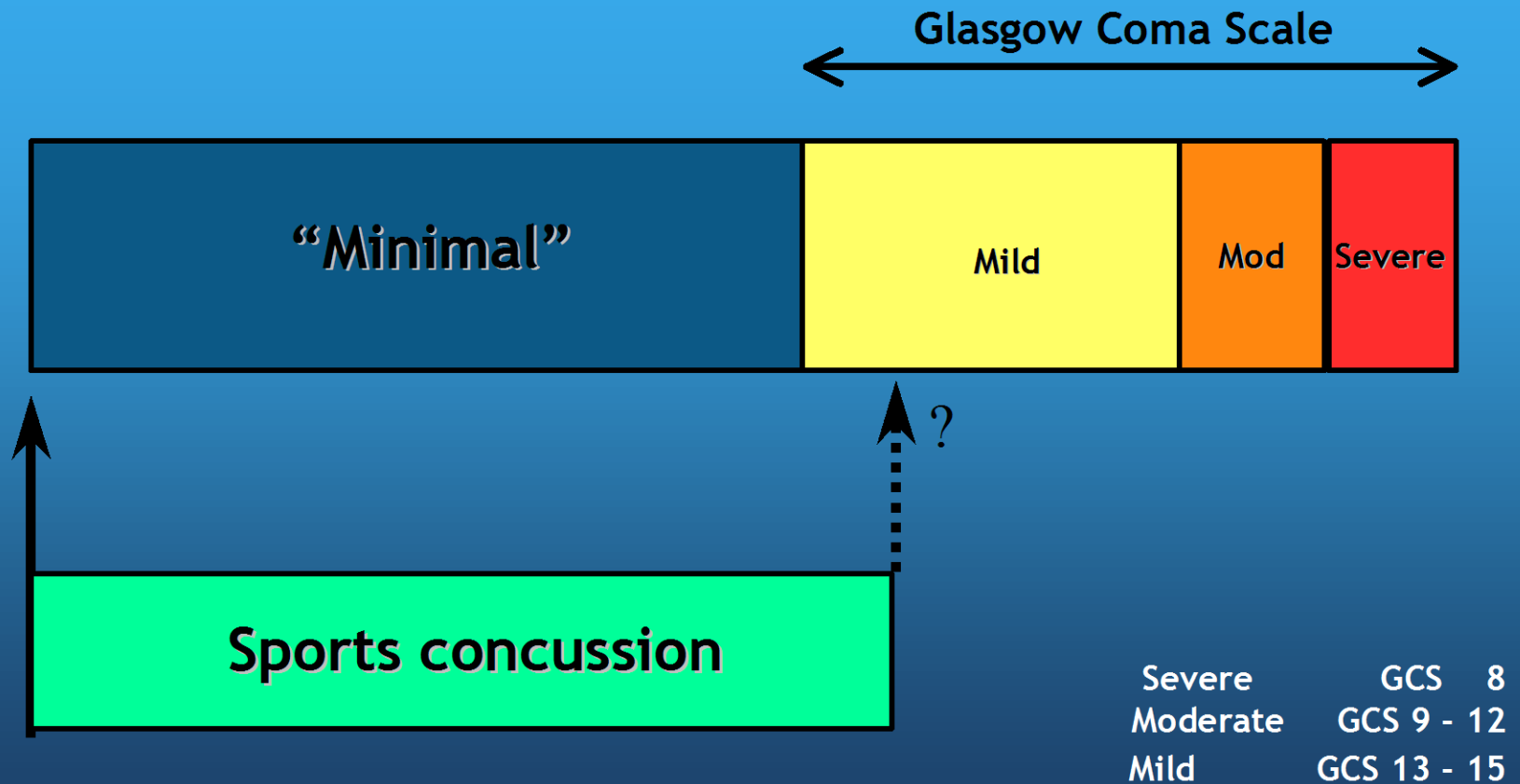
FIFA



Consensus Statement on Concussion in Sport

3rd International Conference on Concussion in Sport
held in Zurich, November 2008

Traumatic Brain Injury



Definition of concussion in sports

- ✦ **Change in mental state from a blow to the head, face or neck**
- ✦ **Short lived impairment of neurological function**
- ✦ **Functional disturbance**



Definition of concussion in sports

- Concussion may result in neuropathological changes but the acute clinical symptoms largely reflect a functional disturbance rather than structural injury.
- 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.
- Concussion is typically associated with grossly normal structural neuroimaging studies.

Injury grading scales

- **CIS: The injury grading scales be abandoned in favor of combined measures of recovery, in order to determine injury severity and prognosis, and individually guide return to play decisions**
- **Concussion severity could only be determined in retrospect when all concussion symptoms have cleared the neurological examination is normal cognitive function has returned to baseline**

Loss of consciousness (LOC)

- **Loss of consciousness (LOC) as a primary and important symptom has well known limitations in assessing the severity of sporting concussive injury.**
- **Severity: Finding in this field describe loss of consciousness (LOC) association with specific early deficits but does not predicate the severity of the injury.**
- **Low incidence of LOC in concussion in sports:
9.3 % NFL, 10 % IIHF, 4-12% soccer**

ANTEROGRADE AND RETROGRADE AMNESIA

- There is renewed interest in the role of amnesia (anterograde/retrograde) and its manifestation of injury severity.
- Published evidence suggests that the nature, burden, and duration of the clinical post-concussive symptoms may be more important than the presence or duration of amnesia alone .
- Retrograde amnesia varies with the time of measurement post-injury and is in fact a poor parameter of injury severity .

Severity of concussion

◆ No grading scale

◆ Simple

◆ Complex



Classification

- Abandoned the Simple vs Complex terminology
- Retained the concept that the majority (80-90%) of concussions resolve in a short (7-10 day) period
 - May be longer in children and adolescents

Simple concussion 1

✦ Usually settles within 7-10 days

✦ Continued improvement

✦ Symptoms disappear within a few days



Simple concussion 2

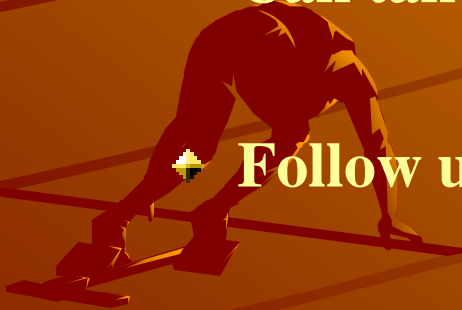
- **Injury, which symptoms resolve progressively without complications over 7 – 10 days.**
- **Treatment = Rest: apart for limiting playing or training whilst symptomatic, no further treatment is required during the period of recovery**
- **Return to Play: The athlete typically resumes sport without further problems.**
- **Mental status screening would be one of the most important assessment step of these injured athletes.**

Simple concussion 3

- **Further Evaluation:** The more expensive and time intensive neuropsychological screenings are not necessary.
- **Management:** Simple concussion represents the most common form of injury and can be appropriately managed by primary care physicians or by an experienced team medical staff under medical supervision.
- The most important step of treatment remains rest until all symptoms resolve and then a graded program of exertion before return to sport.

Complex concussion

- ◆ Usually drags on
- ◆ Can take months to years to settle
- ◆ Follow up by group of specialists



Complex concussion 1

- **Complex concussion is defined as an injury where athletes suffer persistent symptoms, including recurrence with exertion, specific sequelae, as e.g. concussive convulsion or prolonged cognitive impairment following the injury.**
- **In this group, one may include all athletes who had history of multiple concussions.**

Complex concussion 2

• **Formal neuropsychological testing as cornerstone of an appropriated investigation should be considered in complex concussion.**

• **This athletes would be managed by an interdisciplinary team of physicians such as sport medicine doctor, neurologist, rehabilitator, and neurosurgeon if necessary.**

Epidemiology 1

- **USA: > 300 000 concussions/a in athletic activity (number certainly underestimated).**
- **USA Consumer Product Safety Board (1990-1999):**
 - Concussions increased by**
 - 250% in soccer**
 - 269% in ice hockey**
 - 77% in football**
- **NCAA: Concussion: Percentage of total injuries (Season 2005/2006):**
 - 12 % in ice hockey**
 - 8 % in football**
 - 4,8% in soccer**

Epidemiology 2

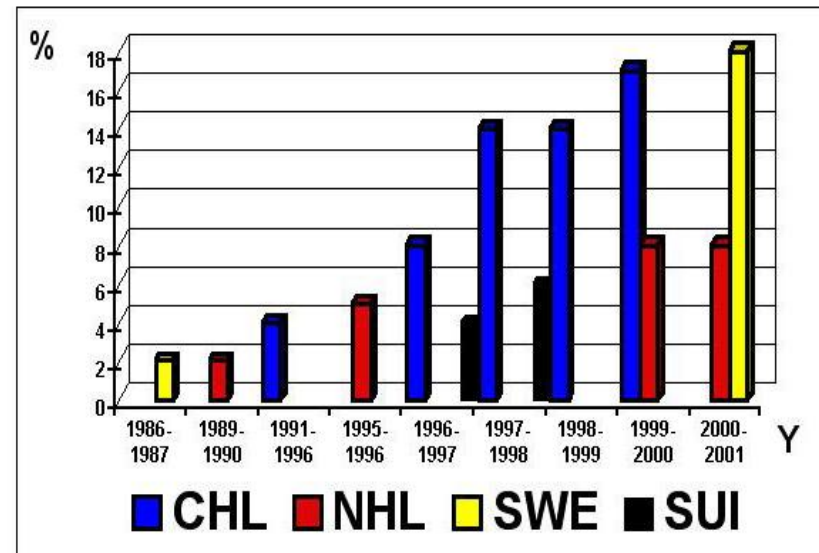
Concussion: increasing incidence ?

CHL: Concussion Incidence
% of all reported injuries

Clayton P., Pashby T., 2005

1991 - 95	4%
1996 - 98	8%
1998 - 99	14%
1999 - 00	17%

Percent of concussion

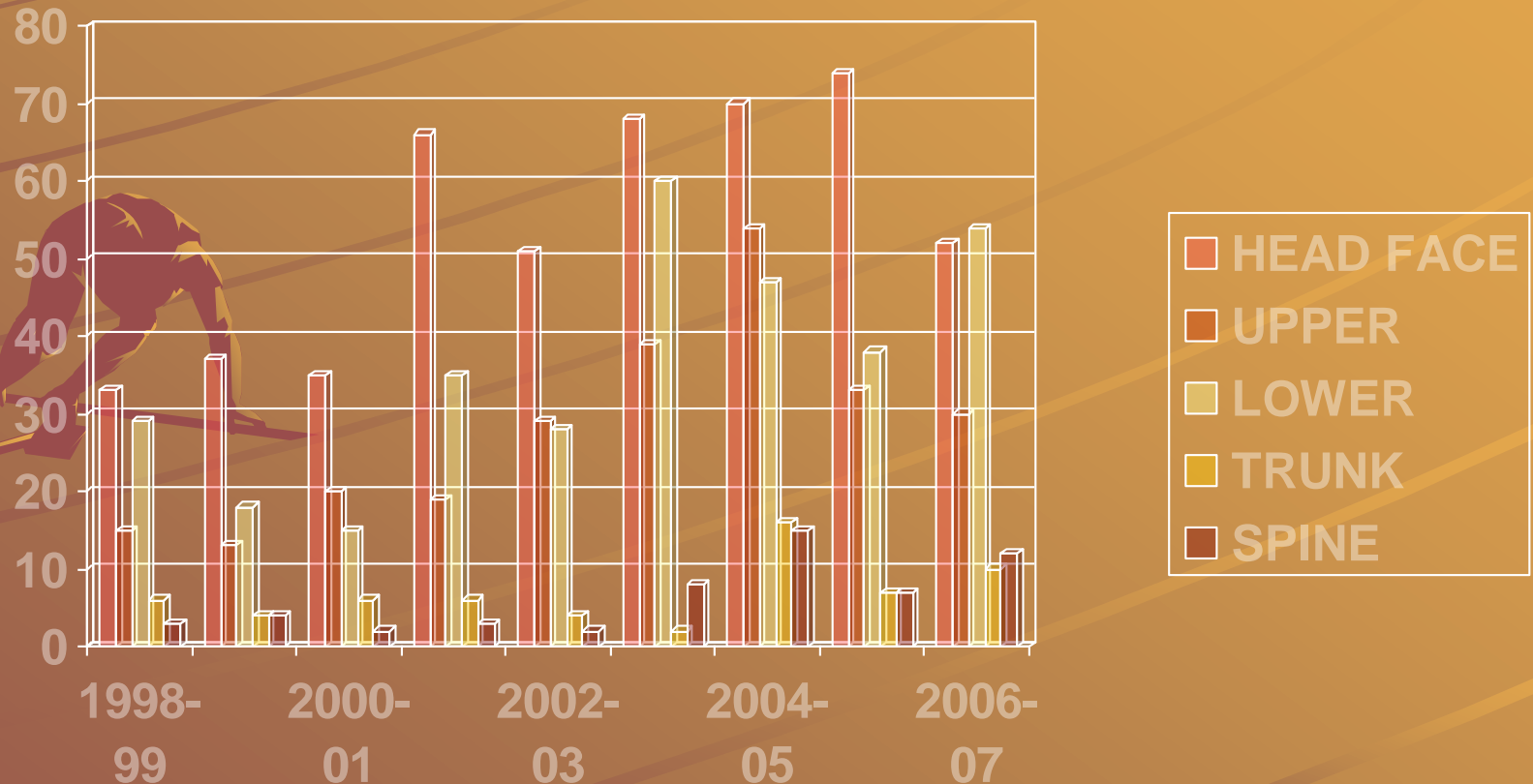


CHL	Canadian Hockey League	1991-2000
NHL	National Hockey League	1989-2001
SWE	Swedish Ice Hockey Team	1986/2001
SUI	Swiss Ice Hockey League	1996-1998

IIHF injury reporting system 1998-2007

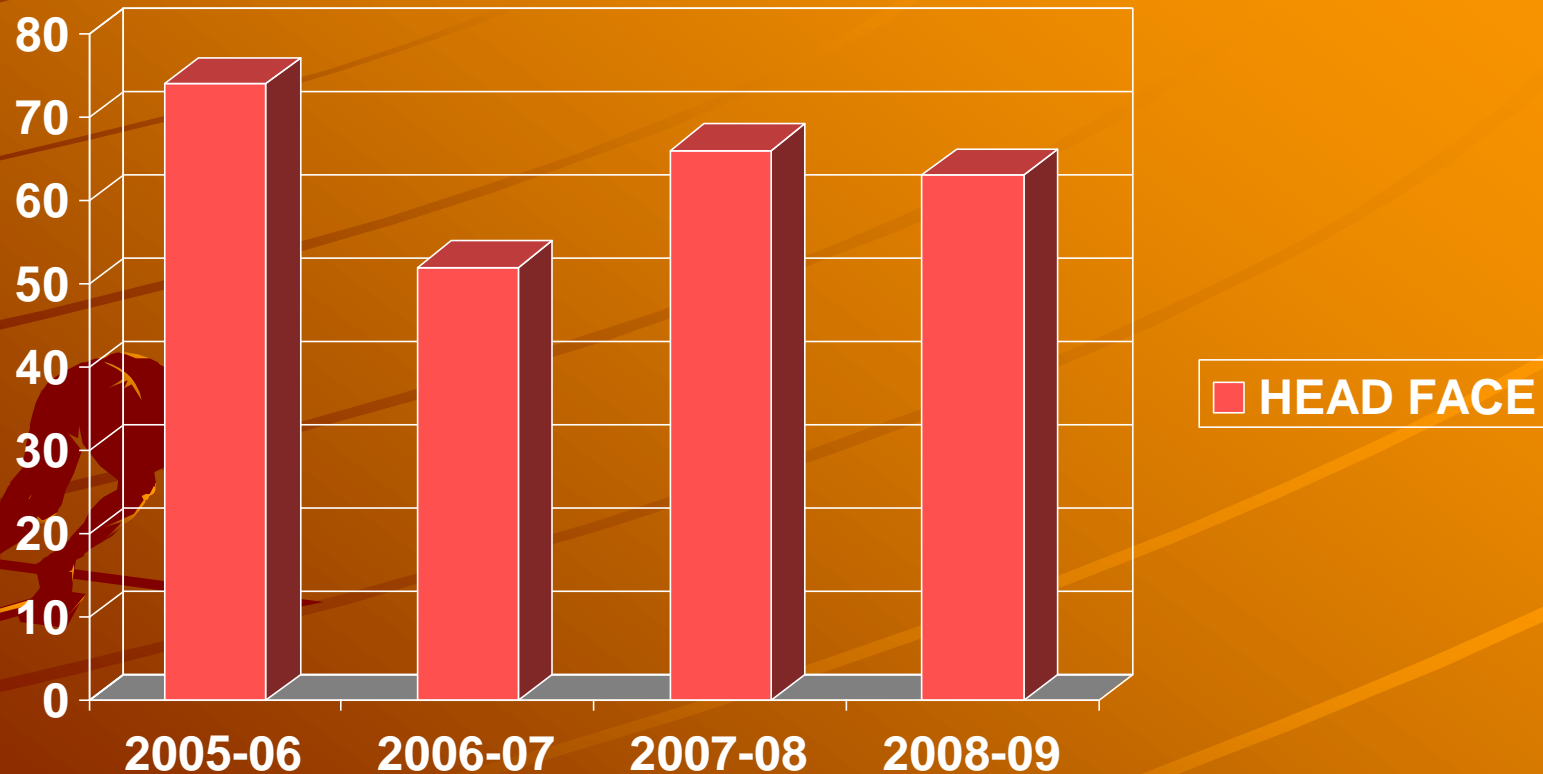
Aubry M et al. 2008:

122 IIHF Championships, 1197 Injuries, 2464 Games



HEAD/FACE

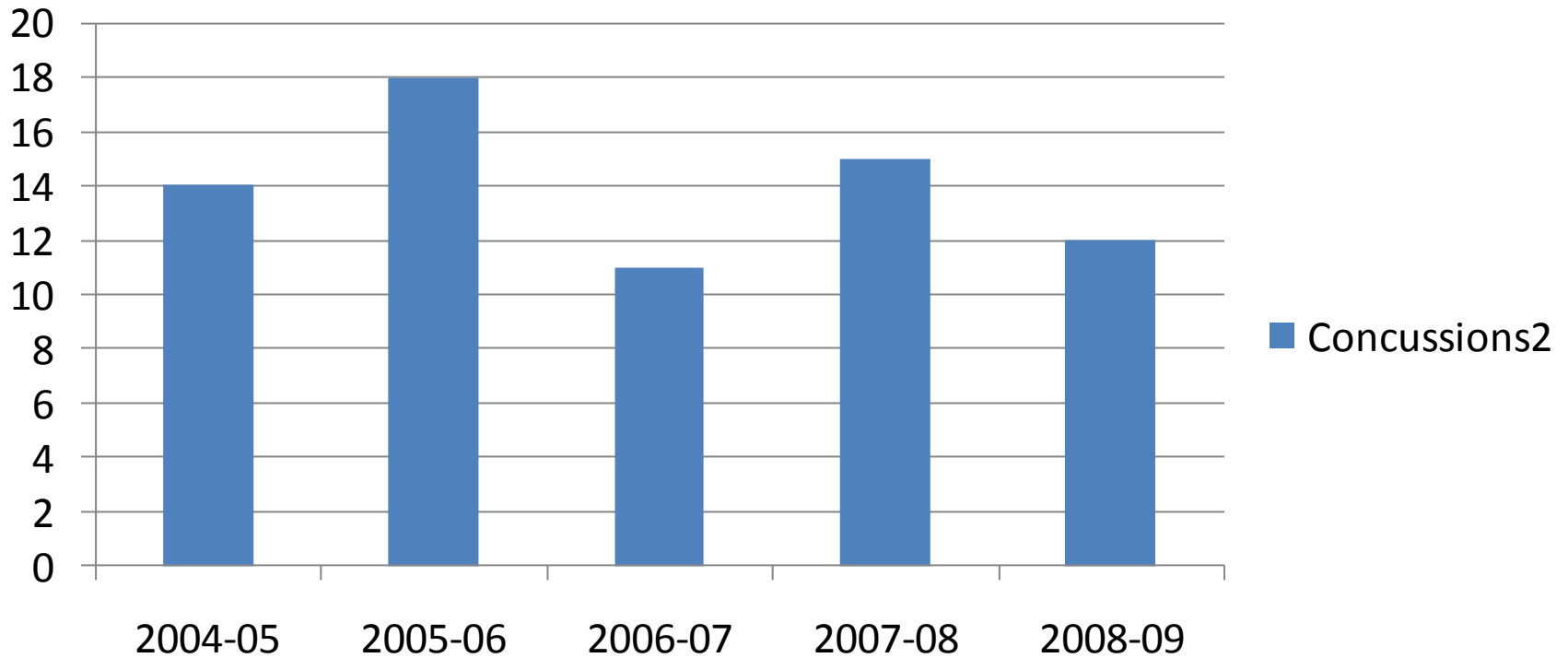
IIHF injury reporting system 1998-2007



CONCUSSIONS

IIHF injury reporting system 1998-2007

Concussions2



A “NEW” Concussion Protocol in Sports Proposed by the CIS Group

- **Clinical history: Preparticipation Evaluation**
- **Signs and symptoms of acute concussion**
- **Sideline evaluation**
- **Return to play guidelines**



Preparticipation Evaluation

- **Knowledge about suffered concussion in the past is essential !!!**
- **Past concussions are underreported by athletes, medical personnel and coaches**
- **A serious preparticipation evaluation includes the concussion history, a baseline cognitive assessment, symptom score of each athlete**
- **Computerized neuropsych testing recommended in organized high risk sports (e.g. professional football, ice hockey, boxing).**

Clinical History

✦ **Facial and neck injuries**

✦ **Concussion history**

✦ **Equipment**



Sideline Evaluation
Can he return to play ?



Kapanen.mpeg

•**Sideline evaluation**

Sideline evaluation including neurological assessment and mental status testing is an essential component in the protocol.

The on-field diagnosis of concussion can be very difficult not only for the young inexperienced sports medicine practitioner but also for a long years experienced team physician.

There may be no direct trauma to the head and frequently the injured patient is not unconscious.

•**Sideline evaluation**

The athlete may be unaware that he has been injured immediately after the injury and may not shown any obvious signs of concussion.

To complicate the situation, athletes of all levels of competition, but first of all in professional sport, tend to minimize or hide symptoms in an attempt to prevent their removal from the game, thus creating the potential for exacerbation of the injury.

Evaluation

◆ Symptoms

◆ Cognitive behavior

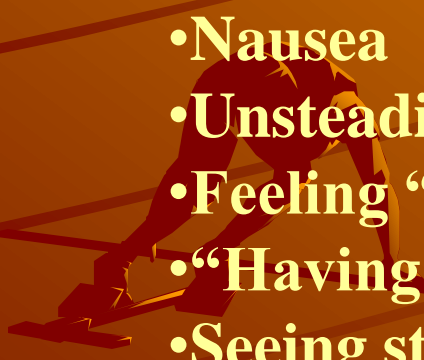


Symptoms

- ◆ **Headache**
- ◆ **Dizziness**
- ◆ **Seeing stars**
- ◆ **Ringing ears**
- ◆ **Nausea**
- ◆ **Slow response**
- ◆ **Fuggy, stunned, dinged, dazed....**



Incidence of typical symptoms
(reported by the injured athlete)



•Headache	55%
•Dizziness	41%
•Nausea	12%
•Unsteadiness/loss of balance,	22%
•Feeling “dinged”/“stunned”/“dazed”	28%
•“Having my bell rung”	38%
•Seeing stars or flashing lights	12%
•Ringing in the ears	5%
•Double or blurred vision	16%

Cognitive

◆ **Period, score, opposition,
time, place....**

◆ **Amnesia**

◆ **Confusion**



Physical signs (observed by medical staff)

- **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 unusual or inappropriate emotions (laughing, crying)**
- **Nausea/vomiting**
- **Vacant stare/glassy eyed**
- **Slurred speech**
- **Personality changes**
- **Inappropriate playing behavior**

Sideline evaluation (The SCAT Card)

- **Signs**
- **Memory**
- **Symptoms score**
- **Cognitive assement**
- **Neurologic screening**



Sport Concussion Assessment Tool (SCAT)

Sport Concussion Assessment Tool (SCAT)

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.

	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.

The SCAT Card
(Sport Concussion Assessment Tool)

Medical Evaluation

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 period or half is it? ___; Who scored last? ___
What team did we play last? ___; Did we win our last game? ___

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

4) COGNITIVE ASSESSMENT

5 word recall

	(Example)	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 backwards (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) NEUROLOGIC SCREENING

	Pass	Fail
Speech	___	___
Eye Motion and Pupils	___	___
Pronator Drift	___	___
Gait Assessment	___	___

Any neurologic screening abnormality necessitates formal neurologic 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, short duration 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

For more information see the "Summary and Agreement Statement of the Second International Symposium on Concussion in Sport" in the:
Clinical Journal of Sport Medicine 2005; 15(2): 48-55 - British Journal of Sports Medicine 2005; 39(4): 196-204 - Physician in Sportsmedicine 2005; 33(4): 29-44

Management

- ✦ **No return in the current game**
- ✦ **Monitor for deterioration**
- ✦ **Medical evaluation**



CIS Recommendation: When a player shows ANY symptoms or signs of a concussion:

- **The player should not be allowed to return to play in the current game or practice.**
- **The player should not be left alone; and regular monitoring for deterioration is essential.**
- **The player should be medically evaluated after the injury.**
- **Return to play must follow a medically supervised stepwise process.**

Kopf – Trauma - Hirnerschütterung ?

Check gegen den Kopf, Sturz in die Bande mit benommenem
Spieler am Boden – Handlungsvorschrift der SIHA

Head Up!
Keine Symptome
**Ready To
Play**

**Schlag mit
Wirkung**

„LOC“

„Loss Of Consciousness“
= Bewusstseinsverlust

„TILT“

Bewusstseinsstörung

Notfallstation

Beobachten

Grundsätzlich ist eine
Überwachung zu Hause
möglich. Bei Unsicherheiten
oder Verschlechterung zum Arzt

**Spezifische Nachbetreuung
Return To Play (RTP)**

Die Nachbetreuung erfolgt gemäss dem offiziellen Algorithmus und RTP-Protokoll. Neuropsychologische Beurteilung empfohlen (IMPACT) und bei komplexer Hirnerschütterung allenfalls neurologische Abklärung.

Return to play Recommendations **(The Vienna CIS-Group Consensus)**

The majority of injuries will be simple concussions and such injuries recover spontaneously over several days following the below protocol .

It is important to emphasise to the athlete that no activity / complete rest means physical and cognitive rest.

**RTP: The RETURN TO PLAY following a
concussion follows a stepwise process:**

- 1. No activity, complete rest. Once asymptomatic, proceed to the next level (2)**
- 2. Light aerobic exercise such as walking or stationary cycling, no resistance training**
- 3. Sportspecific training (e.g. skating in hockey, running in soccer)**
- 4. Non-contact training drills**
- 5. Full contact training after medical clearance**
- 6. Game play**

Postconcussion Symptoms Scale (PCS Scale)

It was developed to help monitoring the injured athlete by himself or by not medical personal such as physiotherapist, coaches or parents.

Table 1 Scale of postconcussion symptoms

	Rating						
	None			Moderate		Severe	
Headache	0	1	2	3	4	5	6
Nausea	0	1	2	3	4	5	6
Vomiting	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
Numbness or tingling	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Balance problems	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
Feeling slowed down	0	1	2	3	4	5	6
Feeling like "in a fog"	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
Trouble falling asleep	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
Sadness	0	1	2	3	4	5	6
Nervousness	0	1	2	3	4	5	6
Other	0	1	2	3	4	5	6

Adapted from Lovell and Collins.¹³

Post concussion syndrome

✦ Symptoms persist

✦ Headache, dizziness

✦ Fatigue, insomnia



Second Impact Syndrom - SIS

- ◆ Second “Hit” before Recovery
- ◆ Increased intracranial pressure
- ◆ Danger of Herniation
- ◆ Mortality >50%
- ◆ Morbidity 100%



Prevention risk management strategies

- ◆ **Fair Play and Respect**
- ◆ **Preparticipation Evaluation**

- ◆ **Information of players/coaches/parents**
- ◆ **Enhanced coaching techniques**

- ◆ **Rule changes**
- ◆ **Strict rule enforcement**
- ◆ **Stiffer penalties for illegal play**

- ◆ **Neck strengthening**
- ◆ **Protective equipment design and mandated use**
 - **Face shields, mouthguards, and helmets/headgear ?**

**WHEN IN DOUBT
SIT THEM OUT !!**



Thanks for your attention

...and remember

FAIR PLAY 
AND RESPECT