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Concussion – The Role of Baseline Testing

Monitoring the injured brain

Concussion is a brain injury. However, unlike many other injuries, there is no “visible wound”.

There may be damage to the structure of the brain but this is almost always impossible to visualise, even with most brain scans. It is therefore important to measure and monitor changes in how the brain functions after a suspected or confirmed concussion.

Sometimes these changes are obvious such as loss of consciousness, memory loss, confusion or seizures (fits) but in most cases the changes are subtle and more difficult to detect.

Important measures of brain function

There are several insights into how the brain is working:

- **Symptoms – how the player is feeling**
 - These include **physical** features such as headaches, nausea, dizziness, tiredness and sensitive eyes; **cognitive** (“thinking”) changes such as poor concentration; **emotional** changes such as depression, irritability or anger and **sleep** disturbances.

- **Signs – what others can see**
 - These include confusion, inappropriate responses or actions, poor balance and incoordination.

For more on signs and symptoms of concussion go to www.BokSmart.com

References: Field side SCAT (Zurich 2012) McCrory P, et al. Br J Sports Med 2013;47:250–258;
CDC –FAQs about Baseline Testing www.cdc.gov/concussion/sports/baseline_test.html

- **Specific brain function tests**
 - These include questions designed to test orientation and memory.
 - Such tests may be:
 - **Verbal** – a tester (usually a doctor) asks specific questions
 - **Pencil-and-paper** – a tester (usually a doctor or psychologist) asks the player to complete certain tasks on paper
 - **Computerised** – a tester (usually a doctor or psychologist) asks the player to complete a battery of computer-generated tasks

Importantly, the brain’s **cognitive recovery** (ability to think and function efficiently) may only occur several days **after all symptoms have cleared**, and may lag behind the improvement in concussion symptoms.

Baseline Testing

“**Baseline**” refers to measures of any of the above features of a player’s brain function in the **normal, uninjured state**.

A “**Baseline Test**” is a pre-season examination performed by a trained healthcare professional ideally before the start of training at the beginning of the season. This baseline information provides a meaningful comparison for tests conducted after an injury.

Brain function is different between players so it is more accurate to compare a player’s post-concussion findings to **his or her own baseline** results rather than having to compare to a generalised population-based average score or having no baseline data at all to compare to.

Conventional forms of baseline testing include:

- **The Sports Concussion Assessment Tool 3 (SCAT3) or Child SCAT3**
 - These protocols consist of a record of symptoms, answers to standard questions that test memory and thinking ability, and balance tests.
 - Importantly, some people complain regularly of symptoms such as headache, lightheadedness or tiredness which may not be related to a concussion.
 - Similarly, memory and recall as well as balance differ amongst individuals and should be recorded before the season.

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- **Computerised brain function tests**

- These are scientifically formulated tests performed on a computer that assess important parameters of brain function such as memory, reaction times and information processing speed.
- Examples of computerized brain function tests include CogState Sport[®], Axon Sport[®], ImPACT[®] and Headminders[™].

All baseline testing should be conducted in a **quiet, supervised environment** that allows the player to concentrate and perform optimally.

Additional input may be obtained from family members, teachers, coaches and peers who may describe how the player's behaviour or performance has changed after an injury.

- **Baseline testing put into context**

- Baseline testing provides useful information on the brain function of an individual in a **normal, uninjured state**.
- The information is particularly useful when compared to results of similar tests performed after a suspected or confirmed concussion.
- In addition, repeated tests performed over a period of time may give an indication of any **longer term changes** in brain function.
- Return-to-play decisions should **not** be made on the basis of a computerised test or any other form of neuropsychological assessment alone.
- No test replaces assessment of a concussed player by a **medical doctor**.
- **Baseline and post-injury tests** should be compared and analysed by a doctor or neuropsychologist in the context of the doctor's medical assessment.

The most accurate means of determining a player's wellbeing after a suspected or confirmed concussion is a thorough **assessment by a medical doctor** who incorporates the **baseline measures** and **post-injury findings** into the assessment.

Do not forget to find out more about the age-appropriate Graduated Return-to-play protocols and SARU's Concussion Regulations at <http://boksmart.sarugby.co.za/content/concussion> and www.BokSmart.com

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