

## **Concussion Evaluation and Management Protocols**

The Return To Play (RTP) decision-making process is complex and dynamic. Despite ongoing research, the RTP decision remains one of the most complicated in sports medicine and largely a clinical endeavor without firm empirically derived guidelines. The weight of clinical and empirical evidence suggests that the RTP decision-making process should be individualized rather than relying on generic RTP guidelines. Of significance is our current understanding from the research literature that the signs and symptoms of concussion are dynamic and evolve over time. Consequently, symptoms may not be present until hours or days following the initial blow(s).

### **Concussion Defined (Concussion in Sport Group, 2013):**

Concussion is a brain injury and is defined as a complex pathophysiological process affecting the brain, induced by biomechanical forces. Several common features that incorporate clinical, pathologic 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 neurologic function that resolves spontaneously. However, in some cases, symptoms and signs may evolve over a number of minutes to hours.*
- 3. Concussion may result in neuropathological changes, but the acute clinical symptoms largely reflect a functional disturbance rather than a structural injury and, as such, no abnormality is seen on standard structural neuroimaging studies.*
- 4. Concussion results in a graded set of clinical symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course. However, it is important to note that in some cases, post-concussive symptoms may be prolonged.*

### **Early Signs & Symptoms of Concussion:**

Cognitive features: unaware of game specifics (opposition colors, score of game, last play); confusion; amnesia (does not recall events prior to the hit or after the hit); alteration in consciousness; not oriented to time, place, or date.

Physical symptoms: Headache, dizziness, nausea, unsteadiness/loss of balance, feeling "dinged" or stunned or "dazed," "having my bell rung," seeing stars or flashing lights, ringing in the ears, and double vision.

Delayed symptoms: Sleep disturbance, memory disturbance, decreased information processing speed, fatigue, psychological disturbance (e.g. depression/anxiety/irritability/emotional stability).

## **Baseline Testing**

- ImPACT has been chosen as the baseline instrument for all national teams.
- All NEW players to national teams will be baseline tested by ATC staff (and additional help as needed) once rostered to the team.
- ATC are to determine whether any new, incoming players have been baseline tested within the US Soccer database. If the player has not been tested then a new ImPACT baseline will be administered prior to the player engaging in any contact play.
- If the player believes that he has been tested by an MLS club, contact Dr. Echemendia who can determine whether a baseline evaluation was conducted and he will transfer the data as appropriate.

## **Acute Evaluation/Management**

Players who are suspected of having sustained a concussion shall be removed from play immediately and evaluated by team medical staff. The evaluation shall consist of a standardized acute concussion evaluation using the SCAT3.

If after initial evaluation the player is diagnosed with a concussion he or she shall not be returned to play on the same day. A player does not need to have lost consciousness to suffer a concussion.

An email should be sent to the U.S. Soccer Medical Staff, Hughie O'Malley (homalley@ussoccer.org), Anton Rill (arill@ussoccer.org), and Dr. Ruben Echemendia (rechemendia@comcast.net) advising that a concussion has been diagnosed. Please include the clinical details of the injury.

## **Post-Acute Evaluation and Management**

An individualized and graded approach to RTP should begin after the player is asymptomatic at rest for at least 24-48 hours. During this time the player should have both physical and cognitive rest. The length of time a player must be symptom free will vary depending on the nature of the injury, the player's age, concussion history and psychological status.

Once symptom free the player shall undergo a post-injury evaluation. Whenever possible the player will be referred to a consulting neuropsychologist for a standardized neuropsychological evaluation that will consist of an interview, ImPACT and the US Soccer Neuropsychological Test Battery. The Consulting Neuropsychologist will communicate the results of the evaluation to the Team Physician who is ultimately responsible for making the RTP decision using the guidelines contained herein. The US Soccer Consulting Neuropsychologist functions in a consulting capacity to both the team and US Soccer. He/she functions under the directive of US Soccer. At those times when an injury occurs outside of North American or in an area where a consulting neuropsychologist cannot be accessed, the team ATC should contact Dr. Echemendia to discuss the situation. At this time the ATC may administer a post-injury ImPACT test and contact Dr. Echemendia for post-injury consultation/interpretation. Please note that a post-injury ImPACT should not be administered without first having contacted Dr. Echemendia.

Once the player is symptom free at rest and deemed to be neurocognitively at or above baseline, he or she can begin the gradual process of light aerobic workout, followed by more intense aerobic workouts, strength training, non-contact sport-specific drills, contact sport-specific drills, heading training and finally, full RTP. At all times the player should be monitored for a re-emergence of somatic and cognitive symptoms. Symptoms should be monitored on a daily basis using the Post Concussion Symptom Checklist.

In accordance with current consensus guidelines, there is no mandatory period of time that a player must be withheld from play following a concussion. However, at minimum, a player MUST be symptom free at rest and upon exertion, and determined to be neurocognitively at baseline. Players under the age of 18 shall be managed more conservatively than older players.

**At no time shall a player under the age of 18 be returned to play sooner than 7 days after becoming symptom free.**

**Graded Return to Play Example (Prague Modified):**

- (1) Rest (cognitive and physical) until asymptomatic at rest (24 hours);
- (2) Light aerobic exercise (e.g. stationary bicycle) for 15-20 minutes.
- (3) Moderate intensity aerobic exercise (30 minutes).
- (4) Sport-specific training (ball handling, passing, light running, NO HEADING).
- (5) Non-contact training drills, including full exertion interval training (may start resistance training).
- (6) Begin Heading Training (steps 1 & 2 below)
- (7) Full contact training with heading steps 3 & 4
- (8) Return to competition (game play)

Typically, progression to the next level only occurs if the player remains symptom free for 24 hours (time frame may be lessened or lengthened dependent on individual player symptoms and history). If symptoms re-emerge, the player should begin with the previous step after being symptom free for 24 hours. Player should only progress to the next level when instructed to do so by the team ATC or the Team Physician.

**Heading Training Example** (Modified from Johnston, et al., 2004)

1. Partner and player inside 6-yd box. Partner tosses ball softly to player; controlled, straight header, within box, appropriate technique. Five tosses straight ahead, then five to the left, and five to the right. If no sx occur then proceed to step 2 the NEXT DAY.
2. Repeat step 1 to start. After an active rest period (run, ball work with feet), partner and player within 18yd box. Partner tosses ball (longer distance, slightly harder), player does controlled header with good technique within box. Five each straight, left, right. If no sx occur then proceed to step 3 the NEXT DAY.
3. Same as Step 2 with Partner and Player outside 18yd box (longer distance, harder throw). If player remains sx-free then move to step 4 the following day.
4. Full practice with more dynamic, unpredictable heading.