



The Return To Play (RTP) decision-making process after concussion is one of the most complicated in sports medicine. Despite ongoing research, the current assessment of concussion relies on clinical evaluations of symptoms, cognitive function, and balance. Of significance is our current understanding from the research literature that the signs and symptoms of concussion are dynamic, often non-specific, and evolve over time. Consequently, symptoms may not be present until hours or days following the initial blow(s). Cognitive function and balance are also commonly affected during concussion and these, along with symptoms, should return to baseline levels of function prior to return to contact play. The weight of clinical and empirical evidence suggests that the RTP decision-making process should be individualized, taking into account an athletes' history of injury, and prior concussion history including other modifiers (e.g. history of migraine headache, attention deficit hyperactivity disorder/learning disability, anxiety/depression history).

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 maybe 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; Slowed information processing speed; decreased attention and concentration.

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

Psychological symptoms: Depression, anxiety, anger, irritability, and difficulty controlling emotions.

Sleep Disturbance: Too much sleep, difficulty falling asleep or staying asleep.

BASELINE TESTING

All NEW players to development academy will be baseline tested with either a combination of the Standardized Concussion Assessment Tool 3 (SCAT3) and a computerized neurocognitive test such as ImpACT or similar program administered by a certified Athletic Trainer (ATC) or other team medical staff member once rostered to the team.

- It is recommended that baseline testing occurs every 2 years unless the athlete sustains a concussion.
- If the athlete has a baseline within the last 2 years from their physician or other medical provider on file, permission to obtain that baseline should be secured.



ACUTE EVALUATION/MANAGEMENT

Players who are suspected of having sustained a concussion shall be removed from play immediately and evaluated by team medical staff (e.g. ATC and/or physician if available). A player does not need to have lost consciousness to suffer a concussion. The evaluation shall consist of a standardized acute concussion evaluation using the SCAT3. All players suspected of having a concussion must be seen by a physician. All assessments, including daily assessments once a diagnosis of concussion has been made, and all components of the RTP progression, should be documented and included in the medical record.

If after initial evaluation the player is diagnosed with a concussion he or she shall not be returned to play on the same day.

If there is any concern for concomitant cervical spine injury or more serious brain injury, the athlete should be immobilized and transported to the nearest emergency department according to your Emergency Action Plan. If the athlete is medically stable and no additional testing is indicated, the initial management should include patient education, and physical as well as cognitive rest.

POST-ACUTE EVALUATION AND MANAGEMENT

Once the athlete is back to a baseline level of symptoms, the player shall undergo post-injury neurocognitive testing. An individualized and graded approach to RTP should begin after the player is back to their baseline level of symptoms for at least 24-48 hours. The RTP progression includes a progressive increase in both the level of exertion as well as the risk for contact. An example of the RTP progression in soccer players is outlined below. Once an athlete is back to their baseline level of symptoms for at least 24-48 hours, they can initiate light aerobic activities, and neurocognitive testing should be arranged.

In conjunction with a physician neurocognitive testing can be performed using ImPACT and the data can be interpreted by a consulting neuropsychologist within US Soccer's Neuropsychologists network ([link?](#)).

Once the player is back to their baseline level of symptoms and balance at rest and exertion (as determined by use of the SCAT3), and the neuropsychologist has determined that they are neurocognitively at or above baseline, the player can advance along the graded RTP protocol as outlined below to strength training, non-contact sport-specific drills, contact sport-specific drills, heading training and finally, full RTP. Throughout the RTP progression the player should be monitored for a re-emergence of somatic and cognitive symptoms.

In accordance with current consensus guidelines, there is no mandatory period of time that a player must be withheld from play following a concussion, or how long each step in the RTP should take. These decisions are individualized and will vary depending on several factors including the nature of the injury, the player's age, concussion history and psychological status. Research is beginning to suggest that low level physical exertion may be beneficial for slow to recover athletes even though they may continue to report mild symptoms. A physician must approve and oversee the situation in which physical activity is introduced while a player is symptomatic.

However, at minimum, a player MUST be back to their baseline level of symptoms and balance at rest and upon exertion, and determined to be neurocognitively at baseline prior to return to contact activities and full play. A physician must, in writing, clear an athlete to return to play and acknowledge the athlete has progressed asymptotically through the graded RTP process. Players under the age of 18 should be managed more conservatively than older players.



GRADED RETURN TO PLAY EXAMPLE (PRAGUE MODIFIED):

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

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

HEADING TRAINING EXAMPLE

- 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's 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's 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.