

National Football League Head, Neck and Spine Committee's Protocols Regarding Return to Participation Following Concussion

Introduction

The management of concussion is important to football players, healthcare providers, the National Football League (NFL) and its member Clubs, and the National Football League Players Association (NFLPA). The NFL's Head, Neck and Spine Committee, with input from the NFLPA, NFL Physicians Society and the Professional Football Athletic Trainers Society (PFATS) has developed a comprehensive protocol, adapted from the 4th International Concussion in Sports Conference, outlining the protocol for a player's return to participation following the diagnosis of a concussion. These Protocols should be read and applied in conjunction with the **NFL Head, Neck and Spine Committee's Protocols Regarding Diagnosis and Management of Concussion**.

Each player and each concussion is unique. Therefore, there is no set time-frame for return to participation or for the progression through the steps of the graduated exercise program set forth below. Recovery time will vary from player to player. The decision to return a player (hereinafter referred to as the "player-patient"), to participation remains within the professional judgment of the Head Team Physician or Team Physician designated for concussion evaluation and treatment, performed in accordance with these Protocols. All return to full participation decisions are to be confirmed by the Independent Neurological Consultant (INC). The INC should be informed when a concussion occurs so that consultation at a medically appropriate time can be arranged. The Team Physician may consult with the INC as often as desired during the concussion recovery period. The INC will be consulted specifically to answer the question of the player-patient's neurological health and his full return to competitive participation (see Step 5 below). The final clearance for return to play is a decision made by the team's medical staff and must be confirmed by the INC.

Return-to-Participation Protocol

After a player-patient has been diagnosed with a concussion, he must be monitored on a daily basis, or more frequently if clinically indicated in the opinion of the Team Physician, through the Return-to-Participation Protocol (described below). Team medical staff should consider the player-patient's current concussive injury, including an in-depth consideration of past exposures, medical history, family history, and future risk in managing the player-patient's care.

After having been diagnosed with a concussion, the player-patient must progress through the following protocol in order to return to participation. A player-patient may proceed to the next step in the protocol only after he has demonstrated tolerance of all activities in his current step without recurrence of signs or symptoms of concussion being observed or reported. Should the activities of a step trigger recurrence of signs or symptoms of concussion, those activities should be discontinued and the player-patient returned to the prior step in the protocol. The player-patient must remain at his pre-concussion baseline level of signs and symptoms during the exertion itself, as well as for a reasonable period of time afterward. What constitutes a reasonable amount of time shall be determined on a case-by-case basis by the Team Physician. Depending on the severity of the concussion and the time required for return to baseline, the progression through the steps may

be accelerated. Communication between the medical staff and the player-patient is essential to determining the progression through the steps of the protocol.

The Return-To-Participation Protocol:

Step One: Rest and Recovery

This is the physical and relative cognitive rest step. The player-patient is prescribed rest, limiting or, if necessary, avoiding such activities as electronics, social media and team meetings until his signs and symptoms and neurologic examination, including cognitive and balance tests, return to baseline status. During this step, the player-patient may engage in limited stretching and balance activity as tolerated at the discretion of the medical staff. Should additional issues present, the Team Physician should consider external consultation or additional diagnostic examinations.

Once the player-patient is at his baseline level of signs and symptoms and neurological examination, he may be cleared to proceed to the next step.

Neurocognitive testing is administered to assess the player-patient's level of cognitive function and identify any acute / subacute deficits that would affect his ability to resume normal activities. Neurocognitive testing can be introduced any time after completing Step One, or during Steps Two or Three, as long as it is completed prior to the initiation of contact activities. The timing of neurocognitive testing is up to the Team Physician with consultation from the team's neuropsychology consultant. All neurocognitive tests are to be interpreted by the team's neuropsychology consultant, with the results communicated to the Team Physician.

Step Two: Light Aerobic Exercise

Step Two involves the initiation of a graduated exercise program. Under the direct oversight of the team's medical staff, the player-patient should begin graduated cardiovascular exercise (e.g., stationary bicycle, treadmill) and may also engage in dynamic stretching and balance training. The duration and intensity of all activity may be gradually increased so long as the player-patient remains at baseline while performing the activity and for a reasonable period thereafter. If there is recurrence of signs or symptoms the activity should be discontinued. He may attend regular team meetings and engage in film study.

If neurocognitive testing was not administered during Step One, it should be administered during Step Two or Three. If a player-patient's initial neurocognitive testing is not interpreted as back to baseline by the consulting team neuropsychologist, the tests will be repeated at a time interval agreed upon by the team physician and consulting team neuropsychologist (typically 48 hours). Additionally, a comprehensive evaluation of potential non-injury related causes of a noted neuropsychological decrement should be performed by the Team Physician. An athlete may be allowed to participate in non-contact activities even if their neurocognitive testing is interpreted as abnormal. The player-patient should not proceed to contact activities until their neurocognitive testing is interpreted as having returned to their baseline level by the consulting team neuropsychologist or, if a decrement persists, until the Team Physician has determined that this is not due to the concussion. The need and time interval for additional testing will be determined by the

Team Physician, in consultation with the team's neuropsychology consultant, based on the clinical status of the player-patient.

Once the player-patient has demonstrated his ability to engage in cardiovascular exercise without recurrence of signs or symptoms, he may proceed to the next step.

Step Three: Continued Aerobic Exercise & Introduction of Strength Training

The player-patient continues with supervised cardiovascular exercises that are increased and may mimic sport specific activities, and supervised strength training is introduced. Some may consider this step as a continuation of Step Two. If neurocognitive testing was not administered after Step One, or during Step Two, it should be administered during Step Three. If a player-patient's initial neurocognitive testing is not interpreted as back to baseline by the consulting team neuropsychologist, the tests will be repeated at a time interval agreed upon by the Team Physician and consulting team neuropsychologist (typically 48 hours). A player-patient may be allowed to participate in non-contact activities even if his neurocognitive testing is interpreted as abnormal. The player-patient should not proceed to contact activities until their neurocognitive testing is interpreted as back to their baseline level by the consulting team neuropsychologist or, if a decrement is still present, until the Team Physician has determined a non-concussion related cause. The determination of when to proceed with contact activities is ultimately made by the Team Physician.

Once the player-patient has demonstrated his ability to engage in cardiovascular exercise and supervised strength training without recurrence of signs or symptoms, he may proceed to the next step.

Step Four: Football Specific Activities

The player-patient may continue cardiovascular conditioning, strength and balance training and participate in non-contact football activities such as throwing, catching, running and other position-specific activities. All activities at this step remain non-contact. (e.g., no contact with other players or objects, such as tackling dummies or sleds).

If the player-patient is able to tolerate all football specific activity without a recurrence of signs or symptoms of concussion and his neurocognitive testing has returned to baseline, he may be moved to the next step in the sequence.

Step Five: Full Football Activity/Clearance

After the player-patient has established his ability to participate in non-contact football activity including team meetings, conditioning and non-contact practice without recurrence of signs and symptoms and his neurocognitive testing is back to baseline, the Team Physician may clear him for full football activity involving contact. Once cleared by the Team Physician, the player-patient may participate in all aspects of practice. If the player-patient tolerates full participation practice and contact without signs or symptoms and the Team Physician concludes that the player-patient's concussion has resolved, he may clear the player-patient to return to full participation. Upon clearance by the Team Physician, the player must be examined by the INC assigned to his Team. The INC

must be provided a copy of all relevant reports and tests, including the player-patient's neurocognitive tests and interpretations. If the INC confirms the Team Physician's conclusion that the player-patient's concussion has resolved, the player-patient is considered cleared and may participate in his Team's next game or practice.

Table 1. An Example of a Graduated Exertion Protocol* #

Steps	Activity	Objective
1. Rest & Recovery	Routine daily activities as tolerated.	Recovery
2. Light Aerobic Exercise	10-20 minutes on a stationary bike or treadmill with light to moderate resistance supervised by the team's athletic trainer. No resistance training or weight training. Duration and intensity of the aerobic exercise can be gradually increased over time if no symptoms or signs return during or after the exercise.	Cardiovascular challenge to determine if there are any recurrent concussion signs or symptoms.
3. Continued Aerobic Exercise and Introduction of Strength Training	With continued supervision by the athletic trainer, increase the duration and intensity of the aerobic exercise (e.g. more intense or longer time on the bike or treadmill, introduction of running and sprinting) and introduction of non-contact sport specific conditioning drills (e.g. changing direction drills, cone drills). Introduction of strength training supervised by the athletic trainer.	Progress cardiovascular exercise, add strength training and more complex movements to determine if there are any recurrent concussion signs or symptoms.
4. Football Specific Activities	Participation in all non-contact activities for the typical duration of a full practice.	Increasing football specific demands to determine if there are any recurrent concussion signs or symptoms. Add the cognitive load of playing football.
5. Full Football Activity / Clearance	Full participation in practice and contact without restriction.	Tolerance of all football activities without any recurrent concussion signs or symptoms.

*This Table serves as a guideline. Specifics will depend on each player's situation. There is no set timeline for return to play or progression through the protocol

#Adapted from the 4th International Concussion in Sport Conference. McCrory P, Meeuwisse WH, Aubry M, et al. Br J Sports Med, 2013;47:250–258.