

# How should we follow athletes after a concussion?

Alex Akhavan, MD, Cynthia Flores, DO, Shannan Green, MD, Jason Hackett, MD, Minh Nguyen, MD, J. William Kerns, MD

Shenandoah Valley Family Practice Residency, Virginia Commonwealth University, Front Royal

Karen Knight, MSLS

University of Virginia, Charlottesville

## EVIDENCE-BASED ANSWER

Athletes sustaining a concussion should be held from contact activities a minimum of 7 days; they must be asymptomatic and their coordination and neuropsychological tests should have returned to their pre-injury baseline (strength of recommenda-

tion [SOR]: **B**, based on multiple prospective cohort studies). High-risk athletes (eg, those with a history of previous concussion, high-school age or younger, or female) may need to avoid contact even after all these criteria are met (SOR: **C**, expert opinion).

## CLINICAL COMMENTARY

### Management of an athlete after concussion should be handled on an individualized basis

Immediate sideline testing should include symptom and cognitive screening as well as a thorough neurologic exam. Any deficits should warrant withholding the athlete from returning to the game. Given the myriad of guidelines published, the importance of following an athlete to complete symptom resolution in the subsequent postconcussive period cannot be overstated. If resources—such as baseline neuropsychologic, postural stability, and other data—are available, these tests can be used to help make the decision

to return a symptom-free athlete to full-contact activity. When these additional assessments are back to baseline, they provide valuable objective markers in postconcussive recovery. In the absence of any baseline neurocognitive and other ancillary data, the athlete should be held from contact activity for at least a week after symptoms resolve. These recommendations should be modified for those having sustained multiple or higher-grade concussions.

Sourav Poddar, MD

Team Physician, University of Colorado Buffaloes;  
Department of Family Medicine, University of Colorado Health Sciences Center

### ■ Evidence summary

Concussion, as defined by the American Association of Neurologists, is “a trauma-induced alteration in mental status that *may or may not involve loss of consciousness*.”<sup>1</sup> There are approximately 300,000 sports-related concussions sustained each season in the US, although many athletes do not recognize the symptoms of concussion or may under-report them.

While concussions usually result in no long-term sequela, persistent neurocognitive deficits and psychiatric illnesses, including depression, may result. Case reports exist of fatal brain swelling in athletes who suffer a second

head injury while still recovering from a first one, although more recently the existence of a “second impact syndrome” has been disputed.<sup>2</sup>

A large prospective cohort study of 2900 US college football players found that players with 1 previous concussion had a 40% increased risk of future concussion, and those with 3 previous concussions had a three-fold increase in risk.<sup>3</sup> High school students with concussions are 3 to 4 days slower in recovering memory function than college students,<sup>4-6</sup> and women with concussions are 1.7 times more likely to have cognitive impairment than men.<sup>7</sup>

Concussions are often accompanied

by symptoms and cognitive problems that can be overlooked if not carefully and systematically assessed. A prospective study of high-school athletes demonstrated that neuropsychological dysfunction takes a week or longer to resolve in “ding” concussions (defined as no loss of consciousness and overt symptoms resolved within 15 minutes).<sup>8</sup> A prospective cohort study of boxers at the US Military Academy found that it takes 3 to 7 days for recovery of neurocognitive function.<sup>9</sup> Another cohort study of US college football players found that while postural stability commonly returns in just a day or 2, cognitive recovery often takes 3 to 5 days, and symptoms last over 7 days post-injury for 1 of 8 concussed athletes.<sup>10</sup>

Sport concussion assessments should include testing for cognition, postural stability, and self-reported symptoms. Results can then be compared with each individual's preseason baseline. Examples of screening instruments include SCAT (the Sideline Concussion Assessment Tool),<sup>11</sup> SAC (the Standardized Assessment of Concussion), BESS (the Balance Error Scoring System), as well as ImpACT or other neurocognitive tests, to evaluate and document memory, brain processing speed, reaction time, and postconcussive symptoms.<sup>10-12</sup> SCAT, SAC, and BESS can be used on the sidelines, and each can be employed for baseline and follow up testing.

Results from these tests should be interpreted in light of all other aspects of the injury (physical exam, age, sex, history of previous concussion, etc) to guide the decision on returning to play.<sup>11,12</sup> After neurological and balance symptoms have resolved, noncontact exercise may be allowed. When neuropsychological testing has returned to preseason baseline, full contact may be permitted.

Athletes, their families, trainers, and coaches should be educated about concussions so that they are better equipped to both identify and report symptoms.

Care for injured athletes should also include education about the long-term effects of multiple concussions.<sup>12</sup>

### Recommendations from others

The 2nd International Conference on Concussion in Sport, Prague 2004<sup>11</sup> (emphasis added) recommended the following stages of recovery from a concussion:

1. **No activity, complete rest.** Once *asymptomatic*, proceed to level 2
2. Light aerobic exercise such as walking or stationary cycling, no resistance training
3. Sport-specific exercise (eg, skating in hockey, running in soccer), progressive addition of resistance training at steps 3 or 4
4. Noncontact training drills
5. Full contact training *after medical clearance*
6. Game play.

The National Athletic Training Association recommendations are:<sup>12</sup>

- Increase in education of staff working directly with athletes
- Increase in documentation about events surrounding and subsequent to the concussion
- Initial baseline testing for high-risk sports
- No single test should be use exclusively for return to play, as concussions can present in different ways
- Evaluations by athletic trainers or team physician after concussion Q 5 minutes
- Athletes symptomatic at rest and after exertion for 20 minutes (sprinting, push-ups) should be disqualified for that event
- Pediatric patients should have more strict/prolonged recovery periods.
- Wake athletes from sleep at home only if there has been loss of consciousness, prolonged amnesia, or significant symptoms

### FAST TRACK

**If you find any deficits on symptom or cognitive screening, you should not allow the athlete to return to the game**

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## CLINICAL INQUIRIES

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