

Guest Editorial

Concussion and Sports

There has been a substantial increase in research on concussion among athletes in the past decade as reflected in a striking increase in the number of publications on the topic [4]. Two consensus conferences have added substantially to the definitions of concussion and the return to activity decisions that plague clinicians. The first of these conferences was held in Vienna and provided incentive for researchers by concluding that there was insufficient research to establish evidence-based guidelines for return to activity [1]. The second conference, held in Prague, offered new definitions of concussion and a more precise description of how to return athletes to activity [2]. The Prague group described two types of concussion: those that resolve within 7 to 10 days of injury (“simple concussions”) and those that cause persistent symptoms (“complex concussions”). Complex concussions are consistent with what is generally described as post concussion syndrome (PCS) [5].

The Prague group emphasized the safety of athletes and others involved in high risk activity, citing evidence that a second concussion before the first concussion is resolved creates risk of much more serious consequences. They provided a detailed description of a step-wise return to activity guidelines. First, symptomatic individuals must have complete rest until asymptomatic. Once asymptomatic, they may proceed to light aerobic exercise, followed by sport specific exercise, non-contact sport specific exercise, and finally full contact sport specific exercise. The Prague group also provided some controversial comments on neuropsychological testing of individuals with concussion. They suggested that neuropsychological testing should not be done while the athlete is symptomatic because the test results will not add to the decision making process. Further, they suggested that neuropsychological results should not be the sole basis of return to activity decision making but rather serve as an aid to what is predominantly a clinical decision.

The increase in published research on concussion has been aided in a substantial manner by the development of brief computerized neuropsychological tests that are generally administered before the athletic season to establish a baseline of cognitive performance, and after concussion to determine the athlete’s performance against baseline. For a review of available computerized tests, see a recent paper by Randolph and colleagues [3]. This review, like the Prague consensus conference, raises important questions about the use of neuropsychological tests in determining cognitive dysfunction following concussion. The authors [3] suggest that there is insufficient information on the reliability of the currently available tests to make decisions about the readiness of individuals to return to activity and the use of such tests is recommended with a great deal of caution. Segalowitz et al., in this issue, provide an independent evaluation of one of the computerized tests used with athletes (called ANAM) and found the test to be adequate in reliability.

Fazio and colleagues describe the use of ImPACT, another computerized test of neuropsychological functioning that is commonly used with high school and collegiate athletes. Fazio et al. compared symptomatic and asymptomatic athletes and found both groups had measurable declines in performance from baseline when compared with a non-concussed control group. The study highlights the value of neuropsychological testing in the diagnosis of simple concussions. Brooks offers a clinical picture of the use of ImPACT at baseline and following concussion by describing two cases that illustrate the value of objective information on cognitive performance following concussion. Brooks describes one athlete that reported post concussion symptoms but was regarded as having psychological issues rather than concussion. Results of neuropsychological testing (using ImPACT) supported the athlete’s description of symptoms. The second case reported by Brooks reinforces the findings of the Fazio et al. study, demon-

strating that a player can report being symptom free but still show cognitive signs of concussion. The paper by Ptito and colleagues describes the use of functional MRI in research and clinical assessment and provides a brief glimpse of what may be the future in concussion assessment.

The increased research and attention to concussion has demonstrated the complexity of diagnosing and treating concussion, especially for the individual with persistent symptoms. Rees and colleagues describe PCS in males and females and how symptoms change from immediately after the concussion until later when PCS is diagnosed. The later stage is characterized by increased anxiety and depressive symptoms. Bloom and colleagues also focus on PCS and attempt to determine if psychological factors play a role in PCS. More specifically, they examine the manner in which we explain positive and negative experiences and whether these interpretations play a role in PCS. Leddy and colleagues present a theory for concussion and PCS that suggests that it is not the brain per se that is injured but the brain's ability to regulate blood flow and pressure. With this theory they propose a treatment for PCS using controlled exercise. Such a treatment is quite outside the usual recommended rest and anti-depressant treatment.

The final pair of studies included in this special issue describes the epidemiology and prevention of concussion. Kozlowski and colleagues present a large population-based investigation of grade school and high school youngsters with head injury. The study finds that concussion is more likely to occur when young people are head injured in high speed activities, especially those involving wheeled devices (e.g. skate boarding). The Kozlowski study compared two processes for coding the mechanism of injury: the ICD IX E codes and the International Classification of External Causes of Injury (ICECI). They found that both coding systems need further development. Gianotti and Hume describe the costs and benefits of an educational program on concussion and provide convincing evidence that the incidence of concussion among young people in sports can be reduced.

The research presented in this issue demonstrates that concussion can present serious consequences for some young athletes and warrants the attention it has received. We appreciate the efforts of these authors to provide current research on the topic. While this research provides useful findings it nevertheless raises unanswered questions. We need to better understand the pathophysiology of concussion so that we may develop treatment models that are evidence-based. We also need to better understand the mechanisms of injury so that we may learn how to prevent concussions in the first place.

Guest Editors

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