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 M E D I C I N E

Editorials

Warm up

A whiff of the future

I was intrigued to read in the press recently, a story based on a new study published by de Boer in the journal, *Geology*, that in Ancient Greece, the oracle at Delphi was probably in a state of a drug induced trance when advising supplicants. Plutarch, the historian, who was also the high priest at the temple of Apollo in Delphi, describes how the high priestess who spoke the oracles inhaled “sweet smelling vapours” in her chasm under the temple. De Boer and his coworkers discovered that the walls of this chasm or adytum contain volatile gases from the bituminous limestone that lies beneath the temple. The most common of these gases was ethylene, which smells sweet and moreover breathing it often induces a state of euphoria. Sometimes people have a more violent reaction. They become delirious and thrash around—a state that Plutarch also recorded. The high priestess, it seems, was as much a glue sniffer as a guru.

It is interesting how attitudes change. What was seen in Ancient Greece as prophecy would today be seen as a social problem. Glue sniffing and other illicit drug use are banes of urban society. In sport, drug use is widespread. Both recreational drugs as well as performance enhancing or ergogenic agents are a commonplace feature of elite competition. We are no longer shocked when athletes are sent home from competition, stripped of their records or medals or stopped

at customs inspections with banned substances. We have recently had the situation of athletes at the world athletic championships threatening to strike if an athlete known to have tested positive to erythropoietin was allowed to compete. What a situation!

It is not surprising that the outgoing International Olympic Committee (IOC) president despaired that the drug use was so endemic, that detection, and ultimately removal of all drug use within elite sport was a forlorn hope. We can only hope that the new IOC supremo, Dr Jacques Rogge, will be true to his medical training by upholding the Hippocratic tradition and continuing the drug battle at the IOC.

It also seems strange, as an IOC outsider, that more sophisticated testing is not performed. Prior to the Sydney 2000 Olympics, speculation about the introduction of testing for EPO and Growth Hormone testing was widespread and the ultimate EPO test strategy that was introduced was confusing. Whilst there may have been very good reasons for this approach, it may be cognizant of the IOC to be more transparent in its anti-drug strategy. We, as sports clinicians, are on the same side and we also see the negative effects of banned drug use first hand.

Perhaps prophecy as to the future of the drug dilemma in sport should take a leaf from the ancient oracle. A little chemical help is always welcome!



What's in a name?

I was disappointed to see a recent editorial in one of our sister sport medicine journals. The journal issue concerned was a supplement devoted to sport related concussive injuries. While such noble sentiments are to be supported nevertheless the terminology of concussion once again is becoming confused.¹ The authors use the term “mild traumatic brain injury” to describe the clinical entity of concussion. A seemingly small change yet one that has important implications for the understanding of the clinical problem, and more importantly serves to confuse clinicians reading published articles on the topic. It may be useful for clinicians to understand the background of this issue.

One of the major limitations in this field is that there is no universal agreement on the standard definition or nature of concussion.^{2–4} The historical context of this injury refers to a transient disturbance of neurological function caused by “shaking” of the brain that accompanies low velocity brain injuries.^{5–7} The clinical manifestations of

concussion as a transient neurological syndrome without structural brain injury have been known since the 10th century AD.⁸

Following pioneering experimental work demonstrating the transient and functional nature of concussion by Denny-Brown *et al*, the term “acceleration concussion” was proposed as the generic descriptor that should be applied to all forms of traumatic brain injury.⁹ Implicit in this concept is that the term concussion should be synonymous with traumatic brain injury. A variation on this view holds that concussion refers to the mechanism of injury and motion of the brain within the skull rather than any clinical symptoms or pathology.^{10–11} In some quarters, this view has been modified to incorporate a threshold effect beyond which permanent or structural brain damage may occur, and that the degree of pathological damage is dependent upon the direction and magnitude of rotational forces on the brain following impact.^{12–13}

In an attempt to resolve this confusion, the Committee on Head Injury Nomenclature of the Congress of Neurological Surgeons proposed a “consensus” definition of concussion, which was subsequently endorsed by the American Medical Association and the International Neurotraumatology Association.^{14 15} This definition has now become the accepted definition by most researchers in this field. The Congress of Neurological Surgeons definition states that concussion is: “. . . a clinical syndrome characterised by the immediate and transient post-traumatic impairment of neural function such as alteration of consciousness, disturbance of vision or equilibrium due to mechanical forces”

Developing in parallel with the term concussion has been the term “mild brain injury”. Jennet *et al* proposed the Glasgow Coma Scale (GCS) as a prospectively validated prognostic scale for the assessment of traumatic brain injury.¹⁶ This scale distinguished mild, moderate, and severe brain injury on the basis of a standardised score at six hours following injury. The time frame was used in order to exclude “trivial” injuries from the analysis and to allow resuscitation to occur with stabilisation of the underlying brain injury prior to assessment.

Because the GCS was designed to be applied six hours after brain injury, the full spectrum of brain injury must also encompass a “minimal” injury subset that falls below the threshold for a GCS mild injury as measured at six hours. In clinical practice, the majority of sporting concussions falls into this group. In lay parlance, the typical descriptors of these minimally significant injuries include being “dinged” or “having one’s bell rung”. Concussion is a subset of GCS mild brain injury, however, the converse is not true and the terms cannot be used interchangeably.

How then can we resolve the difficulties in concussion definition? Considering that the principal limitation of the Congress definition is the duration of symptoms in some cases—that is, not transient—the alternative does not adequately reflect the common clinical condition of concussion seen on sporting fields throughout the world each week. Several common features that incorporate clinical, pathological and biomechanical injury constructs that may be utilised in defining the nature of a concussive head injury include²:

- Concussion may be caused either by a direct blow to the head or elsewhere on the body with an “impulsive” force transmitted to the head
- Concussion results in an immediate and short-lived impairment of neurological function
- Concussion may result in neuropathological changes however the acute clinical symptoms largely reflect a functional disturbance rather than structural injury

- Concussion may result in a graded set of clinical syndromes that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential stereotyped course

- Normal conventional (computer tomography and magnetic resonance scanning) neuroimaging studies.

In attempting to resolve this problem, an “all encompassing” definition along the lines of the neurosurgical approach or even simply defining concussion as “a (transient) post-traumatic impairment in neurological function” remains inadequate. It may be that with further research a more specific time limited categorisation may be incorporated, however, at the present time, evidence is lacking as to a precise separation from more severe categories of brain injury.

The use of the term “mild traumatic brain injury”, however, is inadequate to define the problem and more importantly is inappropriate to understand the conceptual relationship between mild brain injury as defined by the GCS and the historical understanding of concussion. To use the terms interchangeably is incorrect conceptually and adds to, rather than detracts from, the existing confusion in understanding the problem. We should all speak with one voice on this issue—concussion!

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Headache in sport

The prevalence and nature of headache in sport is largely unknown. The only published study on sport related headaches was a survey performed on university students participating in varsity sport. The authors found that headaches were reported by 35% of all respondents with no gender effect evident.^{1 2} There have also been anecdotal case reports of migraine and other headache syndromes occurring in a variety of sports.^{3–6}

Community studies also note exercise as a potent trigger of migraine and other forms of headache. Despite this, the

precise epidemiology of this phenomenon is unknown in community studies.⁷

Previously published epidemiological data on sport related headache suggests that headache in this setting is common, although the precise nature of the headaches and epidemiology remains unclear.^{1 2} One would intuitively expect that in contact and collision sports that the prevalence of headaches would be high, however, prospective epidemiological studies remain to be performed.

Few studies in sport have utilised the International Headache Society diagnostic criteria to ensure uniformity in headache categorisation.⁸ Furthermore, such research based criteria remain to be tested in the sporting situation.

The accurate diagnosis of headache syndromes in sport has important treatment implications.^{4,5} In professional sport, many conventional headache medications (such as beta-adrenergic antagonists, caffeine, codeine-containing preparations, dextropropoxyphene, narcotics, and opioids etc) are banned agents under International Olympic Commission rules. Accordingly the ability of a team physician to accurately diagnose and treat the specific headache requires an understanding of the symptomatology and nature of headaches that may present in these situations.

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