The Olympic Games and sports medicine

In my view, the reawakening of modern interest in the sports sciences after the second world war can be traced to three events, all related to the Olympic Games. In this Olympic year, it is perhaps appropriate to review that history and to speculate on possible future intellectual challenges that the Olympic Games may yet pose for our profession.

The first significant event was the realisation in the 1960s that drug use in international sport was on the increase. The creation of the International Olympic Committee (IOC) Medical Committee, with the express responsibility of controlling drug use in Olympic competition, and the subsequent introduction of drug testing at the 1968 Olympic Games, focused global attention on our profession and its role in contemporary scientific issues in international sport. Besides its many other functions, this committee has more recently been responsible for the establishment of the Olympic Prize to honour individuals with a lifetime of exceptional achievement in the sports sciences. This award, to be bestowed for the first time at the 1996 Atlanta Olympic Games, will further enhance the stature of our profession before a massive global audience.

The second event was the quite dramatic rise to dominance of the eastern European countries, especially the former German Democratic Republic (GDR), in Olympic competition. During the 1968 Olympic Games, the first Games in which the GDR competed as a team separate from West Germany, their athletes won 25 medals. In the 1988 Olympic Games, athletes from that country won 102 medals, one more than the total medal count for athletes from the United States, a country with a population almost 10-fold larger than that of the GDR. The huge social cost of such success is still being counted.

But in as much as other nations perceived that this success resulted from a more “scientific” and professional approach to sport in the GDR, so those nations with the capacity began to investigate ways in which science could be profitably applied for the enhancement of human sporting performance. Of the Commonwealth countries, Australia especially has taken the lead in these developments.

The third important factor was the holding of the 1968 Olympic Games at Mexico City. For Mexico City is sited at an altitude of 2270 m and never before had the Olympic Games been held in a city so high above sea level.

This single event first exposed, on an international scale, the very real and quite embarrassing inadequacies in our knowledge of some quite basic issues in the applied sports sciences. For at that time, the real effects of medium altitude on athletic performance were simply not known. Nor had the potential health risks associated with holding Olympic competition at altitude been studied.

Challenged by this ignorance and, perhaps, by the desire to gain a competitive advantage for their athletes, most nations with capacity in the exercise sciences immediately established exercise at altitude as an urgent research priority. Many of the legendary modern physiologists were soon involved. Not unexpectedly, the British turned to the late Dr Griffiths Pugh, whose high altitude research in the early 1950s is considered to be one of the most important reasons why the British were the first to reach the summit of Mount Everest in 1953.

For four weeks at the end of 1966, Pugh studied six leading British middle distance runners during a period of acclimatisation to altitude at Mexico City. He showed that, compared to performance at sea level in Britain, the athlete’s times in a 3 mile (4842 m) running race increased by 8.5% within the first week of exposure to altitude; performance then improved somewhat but was still 5.7% lower than sea level performance after four weeks at altitude. This even after four weeks of acclimatisation at altitude, performance in a 3 mile race was slowed by about 43 seconds in world class athletes from sea level who were unacclimatised to running at altitude. Pugh concluded that while performance improved with residence at altitude, the time it would take for full acclimatisation was a “matter of months rather than weeks.” He also expressed some concern that the heart “during and after maximum exercise at 2270 m is more irritable than at sea level, and it is conceivable that there might be a risk of ventricular fibrillation.”

This classical study sets a standard for the measurement of the ergogenic effect of a specific intervention in a tightly controlled experimental setting. Subsequent events confirmed the prediction that the endurance running events in those Games would be dominated by athletes who resided at altitude, most especially those from East Africa. Sir Roger Bannister’s statement that it would take the competitive lifetime for an athlete born
at sea level to adapt for maximum exercise at medium altitude seemed to be correct. The postulated dangers of running at altitude also gained some credence in the performance in the 10 000 m final of Australian distance runner and world record holder at many distances, Ron Clarke. Leading the race with 600 metres to run, Clarke slowed precipitously in the last 400 m, finishing fifth. He collapsed unconscious at the finish. When he regained consciousness 20 minutes later, he could not speak. Fourteen years after that collapse, Clarke underwent corrective heart surgery for a ruptured mitral valve. The relationship of his collapse at Mexico City to the subsequent development of his heart condition is a matter of debate to this day.

Interest in the effects of medium altitude on athletic performance has never again enjoyed such sustained scientific interest, attesting to the power of the Olympic Games for focusing the minds of scientists. Indeed the holding of the finals of the 1995 Rugby World Cup and the 1996 Africa Soccer Cup of Nations at moderate altitude in Johannesburg, South Africa, failed to initiate any substantive research on the effects of such altitude on performance in team sports in which high intensity exercise alternates with periods of rest. What new challenges might we expect future Olympic Games to excite in the minds of sports scientists?

The first will continue to be the elimination of unfair drug use in Olympic and other competition – a topic that grows annually more complex and seemingly ever more resistant to solution. But one doping issue that could be answered with appropriate testing is the list of drugs that are truly ergogenic and which should therefore be banned.

For example, the true ergogenic effects of the sympathomimetic amines, responsible for a large number of positive doping tests, often as a result of the athlete’s unwise but nevertheless inadvertent use of over-the-counter ‘flu and cough preparations, needs to be determined. If, as we found, there seems to be no measurable ergogenic effect of some of these agents, at least in some events and at therapeutic doses, then there is a need to re-evaluate the wisdom of listing such agents. A list of banned drugs comprising exclusively those agents which have a documented ergogenic effect on athletic performance would (a) eliminate the unfair cursing of athletes who have unwittingly used currently banned but ergogenically ineffective substances, for the treatment of legitimate medical conditions, and (b) discourage the widespread use of drugs, like the sympathomimetic amines and other stimulants, by athletes who incorrectly believe that the IOC would only ban such agents if they are effective. In fact, the majority of the drugs on the IOC banned list are included because of a lack of evidence proving that they are not effective, a subtle distinction that is lost on most athletes and indeed on the general public as a whole.

The IOC Medical Committee would do international sport a major service if it were to initiate this line of research.

The second issue concerns the increasing time demands placed on young athletes competing in international competition. While much of the attention has been on the effects of such training and competition on the physical maturation of young athletes, it would seem that more attention should be placed on the long term psychological risks and benefits that such participation can bring, not only to those who are successful but, perhaps more importantly, to the much larger number of children who fail to fulfil their own and (often) their parents’ dreams. Many have pointed out that committing a young person to a rigorous training programme during childhood is an experiment, the long term results of which cannot be predicted. Yet few children give informed consent for their participation in these experiments. This produces a moral dilemma that is yet to be addressed adequately, but which must have an impact on the future development of those sports.

It is my prediction that, in the next 20 years, there will be a gradual de-emphasis in international competition on those sports that favour early specialisation and intensive training at a young age. As the premier promoter of such sports, the Olympic movement through its medical committee will probably become a primary focus determining the way in which those sports evolve in the future.

The third issue concerns the pressures to which sports persons are exposed by the increasingly nationalistic zeal incited by modern international competition. The recently completed Cricket World Cup on the Asian subcontinent brought those passion into stark relief when there were fears that their own supporters would threaten the lives of the members of the defeated Indian and Pakistani teams. When this occurs, there is a need to question whether victory in international competition has become too important. Perhaps there are less inflammatory ways in which a nation’s patriotic zeal can be developed.

Fortunately the more accepting approach of the British to “losers” is still respected in South Africa. If it were not, this editorial contributed by a medical member of the losing South African World Cup cricket team might never have been written. Perhaps our profession needs to encourage debate on ways in which the ire of defeat in international competition can be defused.

TIM NOAKES

MRCP(UK) CCT Biomechanics of Exercise Research Unit and Liberty Life Chair of Exercise and Sports Science, Sports Science Institute of South Africa, Boundary Road, Neutlands, 7700, South Africa

Drug control programmes

Drugs in sports has been a popular topic during the latter part of this century. Drugs used in sports can be divided into three groups: therapeutics, performance enhancers, and mood alters (drugs of abuse). In the world of sports, especially in an Olympic year, the performance enhancers become a top priority. Within this group of drugs are included anabolic agents, stimulants, enhancers of oxygenation, and relaxants. Performance enhancers

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T Noakes

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