

What medicine owes to the Olympic Games

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I have been interested in sports medicine since 1933, when an International Congress on this subject was held in Turin; it was the second Congress organised by the FIMS which had been founded in St. Moritz during the Winter Games of 1928. I have therefore had the opportunity to witness the gradual development of sports medicine and to take an active part in it, both as medical officer of the Italian team at many Olympic Games and as a responsible member of national and international organisations in this sector. It has been during this long period of activity that I remarked the peculiar character, from a medico-biological point of view, of each Olympiad I have attended.

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My first experience of sports medicine was in boxing. I can remember that during the contests held to select the Italian team for the *1936 Games in Berlin*, there were several accidents, some of which severe. I was then the doctor attached to the National Boxing Federation and in such a position was able to organise a wide medical examination of boxers throughout the country, based on the completion of an individual medical card with special reference to the nervous system. The result of this research was the approval of the Boxing Federation to the first collection of rules aimed at the prevention of accidents in boxing. These rules included a compulsory medical examination of every applicant to a boxing club and a check-up every following year, the temporary suspension of the practice of boxing after a knock-out, and the final exclusion from activity after three consecutive knock-outs. These rules, along with the constitution of a Medical Commission, were later internationally acknowledged by the AIBA at its 1946 Congress in London.

1948

Biomechanics

After the war, the XIVth Olympiad was held in London—the *Olympiad of austerity* as it was called by the new President of the IOC, Sigfrid Edström; and it was. In my memory, two events stand out. One is the victory of two Italians, Consolini and Tosi (gold and silver medals for discus, with the Olympic record broken). I had supervised their preparation along with their coach Oberweger, an engineer, who had participated at the Berlin Olympic Games in the same discipline. We had studied, from an anatomical-functional point of view, the best position of the arm holding the discus during the turning of the body, before throwing it; and we had found that the best position for obtaining the maximum effect from the muscles of the shoulder was intermediate between adduction and



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abduction: it was the confirmation of the importance of *biomechanics* applied to sports, not only for the prevention of injuries, but also for the improvement of results.

The second episode is remembered by many who witnessed it. In the interesting book of Monique Berlioux "D'Olympie à Mexico", a whole chapter is devoted to the sprain of an athlete, the Jamaican Wint, in the 4 x 400 m. relay. In the Jamaican team, Wint was the last to start, having 20 metres of disadvantage in respect of Cochrane of the USA; Wint pulls the baton away from MacKenley and, as Monique writes, "darts off like a leopard springing after its prey"; he joins Cochrane, but suddenly stops: he tries to restart but falls on the grass verge, claspng his calf; the whole stadium stands up, distressed by the drama of this athlete. That episode was the starting point of a new chapter in sports medicine: the study of muscle injuries, a problem widely dealt with by the 1952 Sports Medicine Congress in Trieste and later by the XIIth FIMS International Congress in Luxembourg in 1956.

1952

Beginning of the crusade against doping

At the XVth Olympiad, held in Helsinki in 1952, the problem of *doping* was already under discussion in many countries: in Italy during a cycling race, two young cyclists were found dead at the edge of the road; in the small pocket of their sports vests were found two empty boxes of amphetamines. I was then already Secretary General of the FIMS which had been officially recognised at the Session of Oslo the same year. In that capacity, I had an official exchange of letters with Sir Arthur Porritt who, as a doctor and member of the IOC Executive Board, was charged to deal with the problem of doping. At that time gas chromatography, which has made the checking of a doped athlete so easy, was not yet discovered; so what could be done was only the search for doping substances in the dressing rooms of Messuihalle, with a negative result. It was the beginning of the crusade against doping, later realised by the IOC Medical Commission.

The Helsinki Games were dominated by the personality of Zatopek, *the human locomotive*. His three gold medals in the 5000 m.,

10,000 m. and marathon were the result of a change in the technique of training: alternating periods of maximum effort with periods of relative rest, *interval training* (which has since then entered into the practice of many sports disciplines) was empirically discovered. The technique is described by Paul Martin, a doctor and ex-Olympic athlete, in his interesting book "*Jeux Glorieux*": "In the 5000 m. and 10,000 m. he made successive bursts of speed, leaving his opponents gasping, thus breaking their rhythm", whilst in the marathon "he had to run at a completely regular pace for thirty kilometres, until he no longer had any opponents to beat". At the end of the 42 kilometres he said: "I have had my daily training." Since then we have had "marathon training" besides "interval training". Both were empiric discoveries, explainable by the physiological mechanism of adaptation to physical stress, as conceived by Selye, who was later invited to present a major report at the FIMS International Sports Medicine Congress in Paris in the same year—1952.

The Helsinki Games were also the occasion, through the analysis of the individual entry forms of the 4925 athletes representing 90 per cent of the inhabitants of the world, of a cultural sociological study (edited by Jokl, Karvonen and others) in which sports were considered in connection with sex, age, nutrition, etc.

1956 to 1964

A highly specialised profession

The preparation for the Olympic Games in Melbourne was, from the sports medical point of view, more sophisticated, at least in some European countries, like Germany, France and Italy. It was the beginning of the trend towards a check of the athlete by means of laboratory tests and no longer by a simple clinical examination. This was particularly true for cardio-respiratory function. It was the natural consequence of the gradual change in the conception of Olympic sport which had taken place over the years: "Olympic sport is no longer a serious hobby for amateurs, a thrilling spare-time activity; it is a fight for which the players have sacrificed everything else" (Berlioux). The Olympic victory acquires a character of

prestige for the country and the winning athlete is exalted as a superman. The consequence was an eager tendency to achieve exceptional performances, and sports necessarily evolved towards technology, which demanded of scientific research the reason for the results, with the aim of increasingly improving them. These performances, pushed to the extreme limits of human possibilities, needed therefore a continuous assessment of the condition of the athlete through a series of functional tests, aimed at revealing all the aspects, both physical and psychological, of the athlete. This tendency of sports doctors to work "en équipe" was even more evident in the years preceding the 1960 Games in Rome. Sports medicine began to be less of a leisure activity, changing rapidly into a highly specialised profession. In many countries laboratories were created, the main objective of which is to collect the maximum of information regarding the specific physiology of the athlete and to check his condition with scientific methods.

This was the starting point for the project of the *Olympic Medical Archives*, the aim of which was to collect anthropological and physiological data from the athletes participating in the Games. The realisation of the project proved to be difficult, due to the resistance of many coaches to let their athletes be examined during the Games. Notwithstanding, it was possible to collect a significant number of filing cards during the Olympic Games in Rome; the data obtained were analysed by Gedda, studying the relationship between the performance and the place of origin, the traits of family and growth, the phenotypical traits of every athlete examined, together with his medical history and his mental and behaviour traits.

The number of athletes examined was much higher during the Olympic Games in Tokyo (1964) where a special stand in the Olympic village invited the athletes to co-operate with the research as a "volunteer of science", and a special diploma was given to those who were examined. The realisation of this project was the special task of Dr. J. B. Wolffe, then Vice-President of the FIMS. Also during the Games in Tokyo, a Commission for the standardisation of physical fitness tests was created, with the co-operation of all scientific organisations participating in the First World Congress of Sport Sciences which was held immediately before the opening of the Games.

1968 Altitude

A very important contribution to human physiology was made by sports medicine in the years preceding the Olympiad in Mexico City. The assignment of the Games to this city, situated at 2240 metres above sea level, raised many doubts and reservations about the possible dangers connected with performances at this height; and many countries, in view of participating in the Games, organised research expeditions at medium altitude resorts. The problem was not new to physiologists interested in sport, beginning with Paul Bert's "La pression barométrique" (1878) and A. Mosso's "The man on the Alps" (1897), and continuing with Lœwy, Haldane and Dill. But this time the problem, highlighted by the Games, gave rise to a number of meetings and publications whose conclusions can be summarised as follows:

At medium altitude (i.e. between 2000 and 3000 metres) many athletic performances are improved, compared with at sea level, by the decreasing gravity acceleration and minor air viscosity; the minor pressure of oxygen in the air decreases the aerobic capacity of the athlete who attempts to compensate increasing the pulmonary ventilation; there is also an increase in the number of red cells in the blood and their content in haemoglobin. These mechanisms of adaptation do not seem to be necessary in short performances, realised in apnoea, which are not affected negatively by decreasing atmospheric pressure, while are not sufficient to compensate the greater "oxygen debt" in heavy protracted exertions. In both cases, the time of recovery after the performance is longer at altitude than at sea level. As a result of these studies, a rest period at medium altitude of at least 20-30 days was considered necessary in order to adapt the organism to the new environmental situation and to gain the new neuromuscular co-ordination automatism. This time can be reduced to 10 days for the sports realised in apnoea.

The Olympiad in Mexico was also the occasion to carry out a study in which 1265 athletes from 92 countries co-operated. The study, directed by Dr. Garay and recently published, included family data, intended to reveal any possible role of parents and siblings in the development of the athlete's



Paolina Pigni

career and an anthropological analysis and genetic characterisations, including studies of sex chromatin, blood groups, etc.

1972 Sex control

The problem of sex control had always worried the officials of the sports in which women are permitted to compete: the performances of some of these athletes aroused doubts about their sex followed by discussion and gossip. Until the Games of 1972 all that was requested for the admission to competitions was a certificate from the team doctor attesting the feminine sex of the subject; naturally that did not solve the problem

which was then faced by the IOC Medical Commission. The Commission decided that the method of checking sex through the research of sex chromatin (body of Barr) in the cell nuclei was sufficiently reliable for the purpose. The method was officially applied at the Winter Games in Grenoble, through the examination of the buccal smear, and in Munich with the cells of the hair bulb.

Also the problem of doping, whose epidemiology had expanded over the years, stimulated a series of studies, meetings and practical experiments, which culminated in the perfect organisation of the laboratories in Munich during the Games where it was possible to check in one single day more than 80 samples of urine—a demonstrative example of how sport can stimulate medical research, confirmed recently by the new method of detecting steroids in athletes who use them, through the method of *radio-immuno essay*.

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What then have we doctors not learned from the Olympic Games? We have failed to make a complete collection of simple physiological and anthropometric data of all participating athletes. The idea of the Olympic Medical Archives was good, but the practical realisation was wrong for the reasons already stated. As a matter of fact, it should be enough that each *entry form* to the Games, completed in the country of origin of the athlete with a few physio-anatomical data, be collected and analysed through computers: this should be a large field of biological research provided by athletes and until now not exploited enough. In current sports contests, pushed to the extreme limits of human possibilities, the result of this research could contribute to the focusing of *specific* athletic physiology, which is not yet completely known.

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