

## Sports medicine: a European perspective. Historical roots, definitions and scope

E. ERGEN<sup>1</sup>, F. PIGOZZI<sup>2</sup>, N. BACHL<sup>3</sup>, H. H. DICKHUTH<sup>4</sup>

Sports medicine has always been difficult to define because it does not involve just one area but a wide scope of health care of professionals and recreationally active individuals with the functions of curative, rehabilitative and preventive aspects. Athletes and active individuals demand expertise and sport-specific knowledge varying from musculoskeletal problems to environmental stresses, from cardiological to dermatological, from endocrinological to psychological questions. Moral, legal and health related difficulties (such as doping) of the professional athlete pose a unique and complex picture to medical doctors. Finally, prevention is an area of increasing specialized interest, knowledge and expertise. Many believe that sports medicine will make its most significant contributions in the area of prevention. Participation in all forms of physical activity at all levels is a huge part of everyday modern life and its benefit to health and quality of life is very clear.<sup>1-18</sup>

There has been a growing need and therefore an interest in sports medicine among European countries over the last century due to increased participation in physical activities following many national projects promoting these programs. The aim of this article is to give an historical background of both medicine and science articulating them into sports medicine and

<sup>1</sup>Physical Education and Sport School  
Department of Sports Medicine  
School of Medicine, University of Ankara, Ankara, Turkey

<sup>2</sup>Sports Medicine Unit, University Institute  
of Movement Sciences (IUSM)  
Health Science Department, University of Rome, Rome, Italy

<sup>3</sup>Institute of Sport Sciences  
Department of Sports and Exercise Physiology  
University of Vienna, Vienna, Austria

<sup>4</sup>Department of Sports Medicine, Medical Hospital  
University of Freiburg, Freiburg, Germany

sport sciences, the definitions, scopes and educational perspectives of sports medicine in several countries. Attempting to handle the roots of sports medicine requires to firstly identify the main stream of medicine. Furthermore, medicine is also a scientific discipline and needs to justify the relations with other areas, especially with sport sciences.

### Medicine

Healing a disease or treating an injury has always been crucial to human race and many ways have been found to apply treatment techniques and methods. These practices are fundamental for the continuation of life. Self-preservation and reproduction are concerned as basic instinctive actions of human being. According to Maslow's hierarchy of needs theory,

Address reprint requests to: Dr. E. Ergen, Physical Education and Sport School, Department of Sports Medicine School of Medicine, University of Ankara, Ankara, Turkey.

human being should maintain his basic needs like physiological and security first. The need to be healthy is considered as a basic need. This innate necessity is based on a unity or solidarity of folk-ways. In fact, folklore is an essential unity and settled customs exhibit a well-established accreditation for cultural developments, changes and inventions. The answers to questions and solutions to problems have been found within this community life style.

The answer to the question "How to live (healthy)?" is directly related to diseases diagnosis and treatment. Primitive man has followed natural ways to solve this problem. Presumably, in every corner of the world, in Asia, Far East, Africa, Middle America, North America, Middle East, Europe, there have been different means of medical support using herbs or other methods. Primitive medicine then evolved to today's modern medicine. In Western sources, the medicine has been a prominent term to explain the art of healing. Lexicographically, medicine is the science of diagnosing, treating, or preventing disease and other damage to body or mind. It is generally believed that the term medicine comes from Latin (c. 1225) *medicina*, which means healing art and science. In fact, some authors indicate that the term medicine can well be related to Ancient Egyptian (Kemetic, KMT) *Medicine*. Very few are aware that ancient Kemet (called Egypt by the Greeks, meaning the Black Land-fertile soil of the River Nile) was the intellectual, spiritual, scientific and industrial center of the world. As revealed from various medical papyri, KMT medicine was incredibly advanced and people were probably the first in the world to have based their knowledge of careful observations, as well as trial and error. Hippocrates (so-called father of medicine) was one the famous ancient Greek scholars who educated (like many others as Socrates, Plato, Aristotles, Democritus who have attended Kemet's famous temple universities in Ipet Isut-Karnak in Arabic, Waset-Thebes in Greek and Luxor in Arabic) in Men Nefer (Memphis) at the temple of Imhotep (the earliest known physician, c. B.C. 2980). The physicians in Ancient Egypt were known as *SWNW* or *SUNU* (or *zuwnu*), which can be translated into "doctor". Ke'*Met-sunu* is pronounced very close to *medicina* in Latin. Presumably, ancient Greek scholars have adopted the name of KMT priest-magician-healers Ke'*Met sunu* and this was than transformed to Latin term *medicina*. Greeks have then served to dissociate medicine from magic and religion to a sec-

ular practice. Galen (A.D. 131-201), the personal physician of the Roman Emperor Marcus Aurelius, became the first physician who documented his observations and known as the founder of experimental medicine. Aesculapius (the ancient hospital and according to Homer, also the name of mortal father of Machaon and Podaleirius were other "famous healers" together with Galen. In his writings, he has stressed the need to grasp "the nature of what is" or physics (study of matter and energy), as a reflection of the evolution of medicine away from religion. That's why, in English, medical doctors are also called as "physicians", which further underscores the differentiation of medicine from metaphysics.

### Science

The word "science" comes from a Latin (c. 1300) word *scientica*, which means "knowledge" (of something). More specifically, *scire* (L) means to "know", probably originally derived from "to separate one thing from another, to distinguish", and/or related to *scindere*, "to cut, divide". Until the Enlightenment, the word "science" meant any systematic or exact, recorded knowledge. "Science", therefore, had the same sort of very broad meaning that "philosophy" had that time. There was a distinction between, for example, "natural science" and "moral science", which latter included what it is now called philosophy, and this mirrored a distinction between "natural philosophy" and "moral philosophy". More recently, "science" has come to be restricted to what used to be called "natural science" or "natural philosophy". Natural science can be further broken down into "physical science" and "biological science". "Social science" is often included in the field of science as well.

Within this context, medicine is concerned with prevention and treatment. Each subdivision is further divided into clinical and basic studies. Most of the people come into contact with clinical medicine as patients, however there is a heavy research component in clinical medical studies. Clinical practice is mainly based on the application of techniques and methods gained throughout a long study dedicated to learning, to knowledge, and to distribution of knowledge. In many cultures, the term "doctor" (from Latin: *teacher*), instead of physician, was usually awarded to an individual who learned diagnosing and treating a human and demonstrated a long and productive career

in this field. Therefore, some authors emphasize that, the “medicine is the art of healing which uses scientific methods” whereas others indicate that, the “medicine is the science of diagnosing, or preventing disease and other damage to the body and mind”.

Medicine is also regarded as a branch of health sciences together with dentistry, veterinary medicine, pharmacology, pathology, etc. However, medicine is closely incorporated with other hard sciences (like anthropology, biochemistry, biophysics, genetics, etc.), earth sciences (like physics, chemistry, etc.) and social sciences (like psychology, sociology, economics, etc.).

### **A short history of sports medicine in the European countries**

The evolution of medicine has shown a distinct characteristic, which is based upon and entirely dependent on human health. For example, wrapping the corpse with linens for mummification has probably led to taping and bandaging for fixation of broken and injured extremities in later years. Regarding medicine and exercise (more specifically sport), the first use of therapeutic exercise is credited to Herodicus, who is thought to have been one of Hippocrates' teachers. Until the 2<sup>nd</sup> century AD, when the first “team doctor”, Galen, was appointed as doctor of the gladiators, the physician only became involved if there was an injury. Whether or not there was good communication between the trainer-coach and the team physician back then is a matter of speculation. What is clear however, is that from its beginnings, sports medicine has been multidisciplinary with the obligation not only to treat injuries but also to instruct and prepare athletes. Of course, not only ancient Egyptian physicians, Hippocrates and Galen, but also some other physician names are also pronounced by several authors who have contributed to the development of sports medicine: Avicenna (Ibn-I Sina 980-1036), Gerolamo Mercuriale (1530-1606), Bernardino Ramazzini (1633-1714), August Bier (1861-1949), and Arlie V. Bock (1888-1984) by developing techniques to promote health and fitness and to ensure the safety and well-being of everyone who participates in athletic competition.

The first world's sports medical establishment took shape in Dresden (Germany) in 1911. The First Congress for the Scientific Investigation of Sports and Physical Exercises was held in 1912 (Oberhof) and

the term “sports physician: sportarzt” (Dr. A. Mallwitz) was first used in 1913. The first sports medical journal was published by French Society of Sports Medicine (SMEPS) in 1922. The foundation of sports related medical societies followed these developments in sports medicine (in 1921 The Dutch and in 1922 Swiss). The 33 physicians as delegates from 11 countries participating to the 2<sup>nd</sup> Winter Olympic Games in St. Moritz founded the Association International Medico Sportive (AIMS) in 1928, which then the name of the organization was changed into Fédération Internationale de Médecine Sportive (FIMS) in 1934. FIMS was prevalently a European organization until IOC recognized FIMS “as the designated competent international organization for biological and medical research to medicine and sport and medical care of athletes”. FIMS later was recognized by the World Health Organization (WHO) as a non-governmental organization (NGO) and by the International Council of Sports and Physical Education (ICSPE) in 1960.

During the First Polish Sports Physicians' Congress (1937) in Worochta, the Polish Sports Physicians Association was established and the Finnish Society of Sports Medicine was founded in 1939. Charles University in Praha (founded in 1348, Czech Republic) had the honor of establishing the first institute of sports medicine in a medical faculty by Dr. Jiri Kral (in 1945). Actually, long ago in Czechoslovakia, J. E. Purkyne (1850) has put forward the idea of favorable effect of body training for human health. Together with several important research topics, first wireless transmission of heart frequency and cardiological observations during sport events were all studied in this institute.

In addition to the above mentioned countries, Scandinavian, Mediterranean and Balkan Countries have long sports medicine tradition.

After the 2<sup>nd</sup> World War, in 1958 it was established in Italy, Milan by Prof. Margaria the first School of Specialization in Sport Medicine. Presently, Italy is one of the few countries in the world to have a public system of health rules for sports activities. People practicing sports activities, organized by sports federations or sports promotion bodies have to undertake a periodical medical visit in order to obtain a certification of eligibility to sport. The requested screening tests and physical examinations are different according to the type of sport, and are listed in special decrees issued by the Ministry of Health which regulate on competitive sport activity (1982) and not competitive

sport activity (1983), on competitive sport activity for disabled people (1993) and on professional sport activity (1995). But it is since 1950 that it is mandatory to obtain a medical certification for eligibility to sport for all professional and amateurs athletes. From 1971, the Government intended to safeguard the health of all those practicing sport activity at competitive and not competitive level with laws that, regularly updated, regulate preventive preparticipation screening in competitive and not competitive sports. Competitive athletes must undergo a yearly preventive screening protocol including a past medical history, clinical evaluation, urinalysis, ECG at rest and after step test, and pulmonary function tests. This evaluation can only be performed by physicians board certified in sports medicine, who are legally responsible for the accuracy of this assessment, being the final judges for the eligibility to sport and its certification.

During the preparticipation screening some acute or chronic pathologies can be detected, so that sport activity is discouraged and the eligibility to sport denied. The causes for not eligibility can be associated to all organs and apparatus pathologies, but basically the majority of anomalies or pathologies are associated to the cardiovascular system. The eligibility to sport can be permanent (serious pathologies) or temporary (acute, but not serious pathologies).

During the 9<sup>th</sup> European Congress of Sports Medicine (1997) organized under the patronage of FIMS and hosted by Portuguese Sports Medicine Society and Porto Sport Club, participants and delegates from 40 nations formed the first council of delegates and established the European Federation of Sports Medicine Associations (EFSMA) recognized by FIMS. Presently 39 countries are EFSMA members.

### *Sport sciences*

The science of human athletic performance is as old as sportive endeavor itself. In order to achieve higher performances, the coaches of athletes have always adopted systematic practices or techniques. The ambition to elevate athletic success has been a basic for all sports culture. Thus, Greek athletes trained in accordance with a 4-day cycle (tetrad) and consumed athletic diets (meat, herbs, sesame seeds, dried figs, and mushrooms). The sport sciences can be defined as those natural scientific disciplines that can be applied to the theory and practice of athletic performance. Sports sciences have evolved over the last

2 centuries. The rise of physiology and exercise physiology during the 19<sup>th</sup> century coincided with the development of many sport disciplines in Europe and in North America. French physician and physiologist Pierre-Jean-Georges Cabanis (1757-1808) took a major step toward a true physiology of human performance by offering a systematic inventory of the human organism and its sources of energy. Sir John Sinclair's *A collection of papers, on the subject of athletic exercises* (London, 1806) employs a similarly underdeveloped physiology while discussing the phenomenon of training with all the specificity. The "exercise physiology" of the 19<sup>th</sup> century developed slowly due to a lack of communication between pioneering scientists and their theories and the athletic subculture for which "scientific" really meant any sort of systematic procedure.

This division between science and sport had 2 major consequences. First, even at the end of the century, at a time when sport was gaining mass popularity, there was very little scientific interest in boosting athletic performance. Second, athletes and their coaches showed little knowledge or interest in contemporary science. Training techniques were thus explained according to "scientific" notions about the physiology of exercise that gave wide latitude to the idiosyncrasies of various practitioners. Even after 1870, as British physiologists began to catch up with their French and German counterparts, the term "scientific training" was used frequently to refer to the regimens devised by individual trainers who spoke in the most rudimentary scientific terms on the basis of personal observations. This ad hoc approach is evident in R. J. Lee's *Exercise and training: their effects upon health* (London, 1873), which scarcely advances beyond the generalities of Sinclair dating from most of a century earlier. While maintaining that exercise is important for "the preservation of health and prevention of disease", Lee admits that physiologists had neglected training as a scientific problem. The founder of performance physiology in Germany, Nathan Zuntz, published on a whole series of topics relevant to the biology of the athlete: circulation, respiration, energy metabolism, nutrition, muscular work and altitude physiology. In 1899 his son, Leo, published the first adequate study of the energy metabolism of the cyclist. During the 1920s the Nobel Prize-Winner muscle physiologist A. V. Hill published several essays on the connection between his research and high-performance athletics.

As it can clearly be seen that, sport sciences have been, in a way, triggered by physiologists and physicians. This inevitably does not apply to some other sport science disciplines like biomechanics. For example, the analysis of athletic movement was first made possible by the “chronophotography” invented by the great French physiologist Etienne-Jules Marey (1830-1904). As early as 1872 Marey’s predecessor, the Anglo-American photographer Edward Muybridge, had photographed the horse in motion, and in 1879 Muybridge announced that he would toward apply this technique to “all the imaginable postures of athletes, horses, oxen, dogs and other animals in movement”. Marey’s chronophotography improved upon Muybridge’s work by including the precise time intervals that separated these new and startling images of bodies and limbs frozen in time, thereby making human and animal motion both visible and comprehensible for the first time. In 1894, Marey stated his interest in producing instantaneous photographic images of “very strong and competent athletes”, and at the 1900 Olympic Games in Paris he used chronophotography to reveal the secrets of the champions. The high-speed photographs and computer-generated stick-figures that enable biomechanics experts to assist runners and throwers today can be traced back to Marey’s work. It can be pointed out that biomechanics has been initiated with the help of photographers.

The first attempts to measure human gas metabolism while performing quantified physical work can be traced back to the year 1790. The developments in ergometry in the 19<sup>th</sup> and 20<sup>th</sup> centuries are well documented. But the first ergospirometry apparatus that met all scientific requirements was introduced in 1950s.

The application of basic sport sciences into athletic practices can be named as coaching. Coaching, in fact, is also considered, by some authors, as an art using science (coaching science), like medicine uses science in its practice. The subject of both coaches and physicians is a human being (athlete and/or patient).

Sports medicine is a discipline (a well-established profession having a long historical background) in health sciences whereas it can also be as regarded a scientific discipline in cooperation with sport sciences. Sport is a cultural phenomenon. Any related aspects (athlete himself or events happening) in sports are observed, measured, evaluated, analyzed and documented using techniques and methods by several sci-

entific disciplines so-called sport(s) science(s). Coaching, as clinical medical practice, applies the information gained through studies in sport sciences. Both serve to the benefit of active people and professionals within 2 distinct perspectives, as one pushes the limits, the other scopes to protect the athlete’s health within these limits.

#### *Duties and responsibilities of a sport medicine specialist (physician)*

Sports medicine is an interdisciplinary and multidisciplinary clinical specialty. This specialty can also be given as a subspecialty (or so-called additional, secondary or superspecialty) following to other medical specialties. In some countries where no specialization programs are offered, postgraduate studies (M.Sc. and Ph.D.) are organized. Sports medicine is dealing with the improvement of general well-being and health of the population through promotion of an active lifestyle. In addition, medical care of all people who exercise or involve sports activities and diagnosis, treatment, prevention, rehabilitation and functional evaluation following to injuries or illnesses resulting from amateur (recreational) or professional participation to physical activities, exercises and sport is of the general interest in sports medicine.

Medicine in the broadest sense means the science and practice of the diagnosis, treatment and prevention of a disease. Clinical means the science and practice of or for the treatment of patients. That is to say a medical doctor who comes into direct contact with the patient. In other words, sports medicine is a clinical entity working for a specific (active, sporting and exercising) population.

#### *The scope of sports medicine*

Sports medicine is not just a discipline solely related to diagnosis and treatment of musculoskeletal injuries. From the very beginning, sports medicine was recognized that the specialty should be more than just taking care of sporting elite athletes. Prevention of some chronic disease caused by sedentary life style is an area of increasingly specialized knowledge, interest and expertise in sports medicine. Illness or injury in sport can be caused by many factors, from environmental to physiological and psychological. In other words, diseases and other such problems in the athlete demanding expertise and sport-specific knowl-

edge are the fields of interest of sports medicine. Pre-participation physical examination is an important responsibility of sports medicine physicians. The use of supplements, pharmacological or otherwise, and the topics of doping control and gender verification present complex moral, legal and health-related difficulties which are handled by sport physicians. There are other particular problems associated with international sporting events, such as the effects of travel, acclimatization and the attempt to balance an athlete's participation. Much of this represents new fields of study where extensive clinical and basic science research is burgeoning. Consequently, sports medicine can encompass an array of areas mainly cardiology, orthopedic surgery, physical medicine and rehabilitation, traumatology, internal medicine, etc. Sports medicine scope involves exercise prescription for health promotion and therapeutic use in chronic diseases.

Sports medicine is also considered as an area that involves health care professionals, researchers and educators from a wide variety of disciplines cooperating as a team within the scope of not only curative and rehabilitative, but also preventive aspects. A sports medicine team includes physicians (specialized and non-specialized but certified) and surgeons, athletic trainers, physical therapists, coaches, sport scientists, masseurs, dieticians, psychologists, and other related personnel. Sports medicine specialist (physician) is the leader of the sports medicine team and responsible for planning and programming the services. In case of running a unit or department, sports medicine specialist (physician) is in charge of the facility.

#### *Educational requirements in sports medicine*

Following a 6-year medical study, the minimum duration of a specialist training program should be at least 4 years supervised and approved by the related institutions and bodies (governmental and/or non-governmental organization, e.g. the Faculty, National Medical Association, Ministry of Health). The resident doctors should work at related clinics (compulsorily at orthopedics and traumatology, physical medicine and rehabilitation, cardiology, and electively at emergency medicine, physiology or pediatrics, etc.) during their training for at least 2 years. The remaining period should be allocated to serve at sports medicine clinic and some field experience should be gained (e.g. as team physician and event duties, sport clubs).

Subspecialty (or additional specialty in some countries) in sports medicine should be obtained along with a program (at least 2 years) following a medical specialty and consisting of additional training through accredited fellowship (subspecialty) programs in sports medicine. Subspecialty programs may be open to all medical specialties but more specifically orthopedic surgeons, physical medicine doctors, physiologists and cardiologists are encouraged to be engaged in sports medicine training programs. The program is designed according to previously taken courses and training.

Sports medicine, in some countries, is of academic interest and postgraduate studies are offered (M.Sc, Ph.D., M.Phil, etc.). In addition, some courses (e.g. basic and advanced team physician courses approved by FIMS and IOC courses) on sports medicine are given by national or international associations and bodies with the aims of increasing the interest and number of physicians to serve for active population. Within this context, short courses and training programs like postgraduate studies for allied health professionals should not be named with "sports medicine". These course are preferably named as either "sports, exercise and health" or more specifically "sports, exercise, health and medicine" in order to differentiate between a medical (specialty, in this case "sports medicine") discipline than other related field of studies.

#### *Sports medicine education in the European countries*

European Federation of Sports Medicine Associations and European Olympic Committees (EOC) Medical and Scientific Commission have jointly conducted a survey on the sports medical educational activities in European countries. The analysis of responded questionnaires has revealed the following information; 44 countries have replied the questionnaire. Presently, 19 European countries (Belarus, Bulgaria, Czech Republic, Finland, Georgia, The Netherlands, Italy, Latvia, Portugal, Romania, Russia, Serbia and Montenegro, Slovenia, Spain, San Marino, Turkey, FYR of Macedonia, United Kingdom and Ukraine) offer sports medicine specialization. The specialization period varies between 2 to 5 years. In general, the Ministry of Health is the main authority approving specialization in these countries. Another 15 countries (Andorra, Armenia, Austria, Azerbaijan, Belgium, Croatia, France, Germany, Hungary,

Luxembourg, Monaco, Moldova, Poland, Slovakia and Switzerland) run subspecialty programs. This means, in total, 34 countries carry out sports medicine education. Full sports medicine specialization is being planned to be established in 6 countries in the future (Armenia, Azerbaijan, Croatia, Israel, Luxembourg and Malta). Furthermore, 18 countries (including some of the above mentioned ones) run sports medicine courses, diploma studies and post-graduate education programs (M.Sc. and doctorate). This shows a clear demand and interest for sports medicine education in most of the European countries.

With regard to European Union (EU), 9 countries (Czech Rep., Finland, Holland, Portugal, Spain, Latvia, Italy, United Kingdom and Slovenia) offer specialty and 6 (Austria, Belgium, France, Hungary, Slovakia and Germany) subspecialty programs (15 in total). Bulgaria, Croatia, Romania, Turkey, and FYR of Macedonia are E.U. candidate countries and already offering sports medicine specialization programs. These figures seem to be very promising for future advancement of sports medicine scope in Europe not only with regard to elite athletes but also for the health promotion.

#### *UEMS and recognition of sports medicine in Europe*

EUMS (European Union of Medical Specialists) Council convened in Munich on 21 and 22 October 2005 and agreed upon the creation of Multidisciplinary Joint Committee (MJC) on Sports Medicine. This important development will lead to establish a European Board of Sports Medicine in the future. Creation of Sports Medicine MJC in EUMS will also be encouraging to promote and harmonize sports medicine education in all European Countries and full recognition of sports medicine specialty by all medical authorities in member countries.

#### *Institutions offering sports medicine training*

Sports medicine specialization training/education should be given in an appropriately designed and equipped institution/clinic (preferably affiliated with a university hospital) by qualified academic personnel. The sports medicine institute/clinic (or center) should have convenient space to accommodate enough patients at policlinic, laboratory, treatment and rehabilitation units, administrative offices and waiting lounge.

A sports medicine center, offering specialty pro-

gram, is expected to have functional evaluation and rehabilitation units equipped with relevant updated devices (*e.g.* ergometry, dynamometry, ergospirometry, anthropometry, electrotherapy, mechanotherapy, strength development, proprioception measurement and training devices). The use of such equipments in other departments (cardiology, physiology, physical medicine, etc.) at a close vicinity may also be appropriate due to economical reasons.

#### *Duties and responsibilities (FIMS ethical codes)*

FIMS's ethical codes apply to all sports medicine specialists (physicians). A summary of these items is given below:

1) Medical ethics in general: the same ethical principles that apply to the practice of medicine shall apply to sports medicine. The main duties of a physician include: always make the health of the athlete a priority; never do harm; never impose your authority in a way that impinges on the individual right of the athlete to make his/her own decisions.

2) Ethics in sports medicine: physicians who care for athletes of all ages have an ethical obligation to understand the specific physical, mental and emotional demands of physical activity, exercise and sports training. A different relationship exists between sports medicine practitioners, their employers, official sports organization, professional colleagues and the athletes. In sports medicine there is also a link between the pathologic concern and specific recreational and professional activity. An athletic injury has a direct and immediate impact on the participation in this activity that may have psychological and financial implications.

3) Special ethical issues in sports medicine: the physician's duty to the athlete must be his/her first concern and contractual or other responsibilities are of secondary importance. A medical decision must be taken honestly and conscientiously. A basic ethical principle in health care is that of respect for autonomy. An essential component of autonomy is knowledge. Failure to obtain informed consent is to undermine the athlete's autonomy.

4) The athlete-physician relationship: the physician shall not allow consideration of religion, nationality, race, party politics or social standing to intervene between his/her duty and the athlete.

The basis of the relationship between the physician

and the athlete should be that of absolute confidence and mutual respect. The athlete can expect a physician to exercise professional skill at all times. Advice given and action taken should always be in the athlete's best interest. The athlete's right to privacy must be protected. The regulations regarding medical records in health care and medicine shall also be applied in the field of sports medicine. The sports medicine physician should maintain a complete and accurate record of the patient. In view of the strong public and media interest in the health of athletes, the physician should decide with the athlete what information can be released for public distribution. When serving as a team physician, the sports medicine physician assumes the responsibility to athletes as well as team administrators and coaches. It is essential that each athlete is informed of that responsibility and authorizes disclosure of otherwise confidential medical information, but solely to the specific responsible persons and for the expressed purpose of determining the fitness of the athlete for participation. The sports medicine physician will inform the athlete about the treatment, the use of medication and the possible consequences in an understandable way and proceed to request his or her permission for the treatment.

5) Training and competition: sports medicine physicians should oppose training and practices and competition rules as they may jeopardize the health of the athlete. In general, the physician shall obtain knowledge of the specific and mental demands made of athletes when they participate in sport activities. Relevant aspects in this respect include expertise, effectiveness and efficiency, and safety. If the athletes concerned are children or growing individuals, the physician must take into consideration the special risks that the sport in questions may represent to persons who have not yet reached physical or psychological maturity.

6) Education: sports medicine physicians should participate in continuing education courses to improve and maintain the knowledge and skills that will allow them to provide optimal advice and care to their patient athletes. Knowledge should be shared with colleagues in the field.

7) Health promotion: sports medicine physicians are obligated to educate people of all ages about the health benefits of physical activity and exercise.

8) Injuries and athletes: it is the responsibility of the sports medicine physician to determine whether the injured athletes should continue training or par-

ticipate in competition. The outcome of the competition or the coaches should not influence the decision, but solely the possible risks and consequences to the health of the athlete. Injury prevention should receive the highest priority.

9) Therapeutic exercise: when supported by scientific research, a detailed exercise prescription should be part of the therapeutic plan for an athlete recovering from injury or disease.

10) Relationship with other professionals: the sports medicine physician should work in collaboration with professionals of other disciplines. The sports medicine physician should cooperate with physical therapists, podiatrists, psychologists, sports scientists including biochemist, biomechanics, physiologists, and others. The sports medicine physician has the final responsibility for the health and well being of the athlete and should therefore coordinate the respective roles of these professionals and those of appropriate medical specialists in the prevention, treatment and rehabilitation of disease and injury. The concept of interdisciplinary teamwork is fundamental to the practice of sports medicine. A sports medicine physician should refrain from publicly criticizing fellow professionals who are involved in the treatment of athletes. When a sports medicine physician recognizes that the athlete's problems are beyond his level of expertise, it beholds him to advise the athlete of other persons with the necessary expertise and refer the athlete to such appropriate persons for assistance.

11) Relation to officials, clubs, etc.: at a sport venue, it is the responsibility of the sports medicine physician to determine when an injured athlete can participate in or return to an event or game. The physician should not delegate this decision. To enable the sports medicine physician to undertake this ethical obligation the sports medicine physician must insist on professional autonomy and responsibility for all medical decisions concerning the health, safety and legitimate interest of the athlete. No third party should influence these decisions. No information about an athlete may be given to a third party without the consent of the athlete.

12) Doping (see also FIMS Position Statement) The sports medicine physician should oppose and in practice refrain from using methods to improve performance artificially such as those prohibited by the IOC and WADA. The physicians have forcefully opposed the use of methods that are not in accordance with

medical ethics or scientifically proven experience. Thus, it is contrary to medical ethics to condone doping in any form. Neither may the physician in anyway mask pain in order to enable the athlete's return to practicing the sport if there is any risk of aggravating the injury.

13) Research: research should be conducted following the ethical principles accepted for research in animals and human subjects. Research should never be conducted in a manner which may injure athletes or jeopardize their athletic performance.

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