The protection of the athlete health
a common challenge for sports medicine
and sport science

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WHO: 70% of all deaths are lifestyle related in 2020

- Physical Inactivity
- Smoking
- Alcohol
- Nutrition, Overweight, Obesity

Somewhere, something went terribly wrong
In Europe participation in physical activities has been growing among people of all ages.

- 40% of EU citizens say that they play sport at least once a week.
- A majority of EU citizens (65%) get some physical exercise at least once a week.
- However, 34% of respondents say that they seldom or never do physical exercise.

“SPORT AND PHYSICAL ACTIVITY” Eurobarometer 2010 European Commission
The essentials of sportsmedicine

1. Exercise as an essential component of health care throughout life
2. Medical management and supervision of recreational and competitive athletes and others who exercise on a regular base
3. Exercise for prevention and treatment of diseases and injuries
THE GREAT CHALLENGE OF SPORTS MEDICINE

Sport performance will increase and demand a totally scientific training and an optimal health. The average life span will increase, Sports Medicine would have to be widely used to promote health among the people.
PREVENTION

SPORT MEDICINE

MEDICAL CARE OF ATHLETES
Sports cardiology
Sportprevention and sporttherapy
Nutrition and antidoping
The Sports Medicine Department accredited as Institute of Sports Medicine by the FMSI.
1. Medical History
2. Physical Examination
3. 12-Lead ECG at rest and after exercise (step test)
ITALIAN SCREENING MODALITY

CV preparticipation screening
based on history + PE + ECG

More sensitive than the limited US protocol
~ 2% OF THE ATHLETES POPULATION IS DISQUALIFIED FROM COMPETITION

~70% OF DISQUALIFICATIONS DUE TO CARDIOVASCULAR DISEASES
(Most frequent: ARRHYTHMIAS, VALVULAR DISEASES INCLUDING MITRAL VALVE PROLAPSE COMPLICATED BY SIGNIFICANT VENTRICULAR ARRHYTHMIAS OR MITRAL VALVE REGURGITATION, HCM, HYPERTENSION;
Less frequent: CONGENITAL AND RHEUMATIC HEART DISEASES, PERICARDITIS, DILATED CARDIOMYOPATHIES)
**USA:** The American Heart Association recommends that some form of preparticipation cardiovascular screening for high school and collegiate athletes is justifiable and compelling, based on ethical, legal and medical grounds; 12 lead ECG is not cost-effective for screening a large population of young athletes due to its low specificity

*(Circulation 1996)*

**ITALY:** 12-lead ECG enhances the sensitivity of the screening process for detection of cardiovascular diseases with risk of SD (abnormal ECG in up to 95% of patients with HCM)

*(JAMA 2002)*
CARDIAC DISEASES POTENTIALLY RESPONSIBLE FOR SUDDEN DEATHS CAN BE ONLY PARTIALLY IDENTIFIED AT PREPARTICIPATION SCREENING OF ATHLETES

ECG abnormalities are present in up to 95% of HCM and 80% of ARVC patients.
CV Abnormalities found at autopsy in athletes ≥35 yrs who died suddenly

80% Coronary artery disease

HCM
MVP
Unexplained
Aquired Valve Disease
ARVD 23%

Anomalous c.a. origin 12%

Premature CAD 18%

HCM 2%

Anomalous c.a. origin 12%

ARVD 3%

HCM 36%

Atherosclerotic c.a. disease 2%

athletes < 35 yrs

(Corradino et al. NEJM 1998)

(Maron et al. JAMA 1996)
Sudden Death in different sports disciplines

Maron BJ JAMA 1996
EUROPEAN STANDARD FOR MEDICAL EVALUATION OF COMPETITIVE ATHLETES

Medical History
Physical Examination
12-Lead ECG
ESC Report

Cardiovascular pre-participation screening of young competitive athletes for prevention of sudden death: proposal for a common European protocol

Consensus Statement of the Study Group of Sport Cardiology of the Working Group of Cardiac Rehabilitation and Exercise Physiology and the Working Group of Myocardial and Pericardial Diseases of the European Society of Cardiology

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Sudden Cardiovascular Death in Sport

LAUSANNE RECOMMENDATIONS

Under the umbrella IOC Medical Commission
10 December 2004

PREPARTICIPATION CARDIOVASCULAR SCREENING

“Sudden death” in sport has to be fully appreciated. The leading cause (more than 90%) of non-traumatic sudden death in athletes is related to pre-existing cardiac abnormality.

For the purpose of this recommendation, sudden cardiovascular death is defined as:

Death occurring within one hour of the onset of symptoms in a person without a previously recognised cardiovascular condition that would appear fatal: this excludes cerebrovascular, respiratory, traumatic and drug related causes.

The purpose of this recommendation is to identify, as accurately as possible, athletes at risk in order to advise them accordingly.
THE SPECIALIZATION IN SPORTSMEDICINE
Harmonization of the Training Programmes in Sport Medicine
PREMONITORY SYMPTOMS IN YOUNG ATHLETES WHO SUDDENLY DIED

- **HCM**
  - 21% Syncope, dizziness, and/or chest pain
  
  (Maron et al., JAMA 1996)

- **CCAA**
  - 37% Syncope, chest pain, and/or palpitations
  
  (Basso et al., Circulation 2000)

- **ARVC**
  - 54% Syncope, and/or palpitations
  
  (Corrado et al., NEJM 1998)
IDENTIFICATION OF NEW RISK FACTORS

*Biohumoral and epidemiological assessment of sport-related cardiovascular risk*
Hyperhomocysteinemia is a well-established risk factor for cardiovascular diseases.

The results of these studies confirm the existence of a sport-related hyperhomocysteinemia which appears linked neither to the same variables found in the general population, nor to specific training-related variables. We suggested that it would represent an adaptation to training but the possibility of a secondary vascular damage cannot be excluded.
Structural Cardiac Disease Diagnosed by Echocardiography in Asymptomatic Young Male Soccer Players


Overall prevalence of structural heart diseases in symptomatic is well assessed (range is between 0.6 and 1.2%) but the overall prevalence of structural heart disease in asymptomatic (mild congenital lesions that may remain clinically silent for a long time) is more difficult to quantify.

Study group: 3100 male soccer players

Our data suggest that a quite relevant percentage of asymptomatic, apparently healthy, children and adolescents has a structural congenital cardiac disease difficult to diagnose or suspect by the current screening based on medical history, PE and ECG. Trans-thoracic echocardiography could significantly improve the diagnostic power of the screening (echocardiography identified 56 previously unknown cardiac abnormalities).
ESC Study Group of Sports Cardiology Position Paper on cardiovascular adverse effects of doping in athletes
Deligiannis A., Björnstad H., Carre F., Heidbüchel H., Kouidi E., Panhuyzen-Goedkoop N.M., Pigozzi F., Schänzer W., Vanhees L.
Prohibited substances abuse and SCD

Anabolic Steroids
GH, EPO
Beta 2-Agonists
Amphetamines
Cocaine
Ephedrine
Narcotics
Cannabinoids
Alcohol
OUR EXPERIENCE
Experimental model for the study of the effects of platelet derived growth factors on muscles

Objectives of the study
1) The identification of the most suitable animal model for the study of the effects of platelets derived growth factors on muscle repair processes (e.g. site of injury, size and type of injury, time for healing, technique for blood cells drawing and separation).

2) Identification of the morphological, morphometrical, ultrastructural modifications of the lesional and perilesional treated muscle cells in comparison with the untreated cells.

3) Identification of the behaviour of the satellite cells (qualitative and quantitative) in the lesional and perilesional zones in comparison with the untreated muscles.

4) Evaluation of the potential long term appearance of muscle fibrosis.

The final aim is to provide a comprehensive picture of the immediate, intermediate and long lasting effects of platelet derived growth factors used for the treatment of muscle injuries with the aim of providing additional insights both under a clinical point of view and in light of potential anti-doping rule violations
OUR EXPERIENCE

Experimental model for the study of the effects of platelet derived growth factors on muscles

Immediate inflammatory response in treated and untreated tissues. It is clearly evident that the treatment with PRP is able of recruiting a significative greater amount of white blood cells in the site of injury. Istochemistry studies are ongoing in order to analyse the types of cells recruited in the site of injury.
Platelet-rich plasma in muscle healing.
Borrione P, Di Gianfrancesco A, Pereira M.T., Pigozzi F.
Therefore, given these facts, F.W. Booth et al, 2002 coined the definition:

**Sedentary Death Syndrome (SeDS)**

to categorize the emerging entity of sedentary lifestyle-mediated disorders that ultimately result in increased mortality

*Weak skeletal muscles, low bone density, hyperglycemia, glucosuria, low serum, HDL, obesity, low physical endurance, and resting tachycardia are a set or group of symptoms that together characterize SeDS.*
SPORT THERAPY

Musculoskeletal pathologies

Endocrine diseases

Cardiovascular diseases

Cancer

Pulmonary diseases
Life Expectancy - global

Age

1955  1998  2004  2025

48  60  83  73

1955  1998  2004  2025
# Conditions that are caused or worsened by sedentary lifestyle

Sedentary living increases these conditions

| 1. Angina, heart attack, coronary artery disease | 13. Colon cancer |
| 3. Hypertension | 15. Prostate cancer |
| 4. Peripheral vascular disease | 16. Osteoporosis |
| 5. Stroke | 17. Low Back pain |
| 6. Type II diabetes | 18. Stiff joints |
| 7. High blood triglyceride | 19. Sarcopenia |
| 8. High blood cholesterol | 20. Physical frailty |
| 10. Obesity | 22. Depression |
| | 25. Premature mortality |

F.W. Booth et al, 2002
„The Harvard Study“ (1993)

Period: 1962-1977
"Relative risk of all cause mortality" (according to physical activity)
Circulus vitious of physical inactivity and muscle loss

- immobility
- frailty
- increased age
- decreased physical activity
- sarkopenia
- muscleatrophie
- less activity
- muscle mass decrease
- functional ability decrease
- number of muscle fibres decrease
- Protein synthesis decrease
- anabolic hormons decrease

Age
Circulus vicious of physical inactivity to overweight

- increased age
- decreased physical activity overfeeding
- overweight/obesity „feeling fat and shape less“
- more overfeeding – compensating - frustration
- overweight induced chronic diseases
- reduced life quality poly-morbidity
- less physical activity

Age
Survival Curves for All-Cause Mortality by BMI Categories

Data from 25714 men with 1025 all-cause deaths and 439 cardiovascular disease deaths during 258781 man-years of observation

Ming Wei et al, 1999
Reduces the risk of dying prematurely from heart disease and other conditions
• Reduces the risk of developing diabetes
• Reduces the risk of developing high blood pressure
• Reduces blood pressure in people who already have high blood pressure
• Reduces the risk of developing colon and breast cancer
• Helps to maintain a healthy weight
• Helps build and maintain healthy bones, muscles, and joints
• Helps older adults to become stronger and better able to move about without falling
• Reduces feelings of depression and anxiety, and
• Promotes psychological well-being
Overall physical inactivity is estimated to cause 1.90 million deaths globally

Physical inactivity causes globally, about 10-16 % of cases each of breast cancer, colon and rectal cancers and diabetes mellitus, and about 22 % of ischaemic heart disease. The risk of getting a cardio-vascular disease increases up to 1.5 times in people who do not follow minimum physical activity recommendations.

WHO/NMH/NPH/PAH/03.2
To die young as late in life as possible
To die short after **mid of life**, but biologic old as a result of chronic diseases „Sedentary Death Syndrome“
Foundation of FIMS

19 February 1928
117 member countries
Strategic plan 2010-2014
Cooperation with International Organizations related to sports medicine
SPECIAL PROJECTS

1. FIMS Collaborating Centers of Sports Medicine