

# PHYSIOLOGY OF SPORT AND EXERCISE



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Office hours:

Tuesday: 13.00 – 15.00

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# LESSONS

Wednesday

Time:

9.00 – 10.40

Building E34, Classroom 203

Laboratory A33/130

# Conditions for completing:

- Attendance (max. 3 absence)
- Worksheets
- Written test (about 20 closed questions)

# Content of lessons

- 1 13.2. Introduction to physiology of sport and exercise.
- 3 20.2. Structure and function of skeletal muscle. Skeletal muscle and exercise.
- 4 27.2. Metabolism, energy and basic energy systems. Metabolic adaptation to training.
- 5 6.3. Structure and function of cardiovascular system, cardiovascular response and adaptation to exercise.
- 6 13.3. Structure and function of respiratory system, respiratory response and adaptation to exercise.
- 7 20.3. Structure and function of the nervous system. Neuromuscular adaptation to training.
- 8 27.3. Endocrine glands and their hormones. Hormonal response and adaptation to training.
- 9 3.4. Thermoregulation. Responses and acclimatization to exercise in hot and cold environments.
- 10 17.4. Body composition.
- 11 24.4. Overtraining syndrome + monitoring training and performance in athletes.
- 12 15.5. Spiroergometry + Written test.

# **Introduction to physiology of human and physiology of sport and exercise**

The physiology of human is concerned with the study of functions of the organ systems.

The physiology of exercise deals with the study of an organism in the course of a movement activity. It studies functional changes taking place during the physical exercise.

# FACTORS OF ATHLETIC PERFORMANCE

## PSYCHE

- Motivation
- Emotion
- Adaptation

## TECHNIQUE

- Special Skills
- Movement Skills



## SOMATIC FACTORS

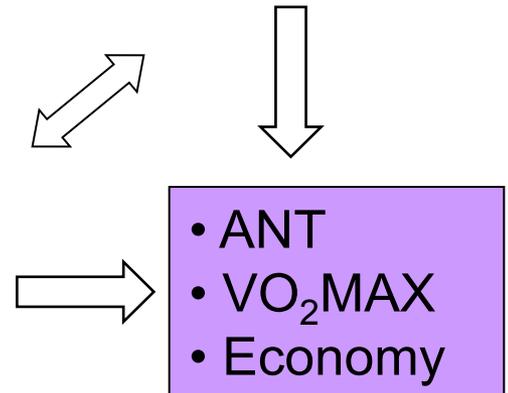
- Somatotype
- Height, weight, %fat
- Muscle fibers (SO, FG)

## TACTIC

- Analytic Abilities
- Tactical Thinking
- Foresight

## MOTOR ABILITIES

- Speed (max. speed, reaction, ...)
- Strength (max. strength, isometric, ...)
- Endurance (speed, strength endurance, ...)
- Coordination
- Flexibility



- ANT
- VO<sub>2</sub>MAX
- Economy

# FACTORS OF SPRINT

## PSYCHE

- Motivation
- Emotion
- Hothead

## TECHNIQUE

- start from starting blocks
- sprint step (frequency, length)



## TACTIC

- concentration before race

## SOMATIC FACTORS

- Somatotype: mesomorph
- Tall, no fat
- Muscle fibers (FG, FOG)

## MOTOR ABILITIES

- Speed (maximal speed, reaction speed)
- Strength (dynamic strength)
- Coordination
- Flexibility of joints

# FACTORS OF DISTANCE and MARATHON RUNING

**PSYCHE**

- Motivation
- Emotion
- Active phlegmatic

**TECHNIQUE**

- Running step



**TACTIC**

- Tactical Thinking
- Distribution of power

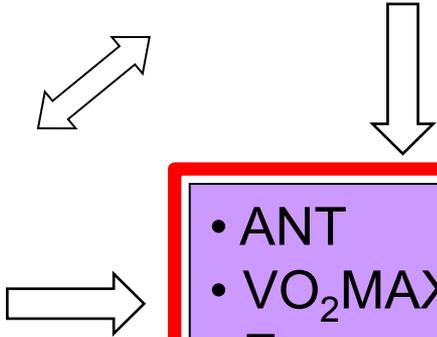
**SOMATIC FACTORS**

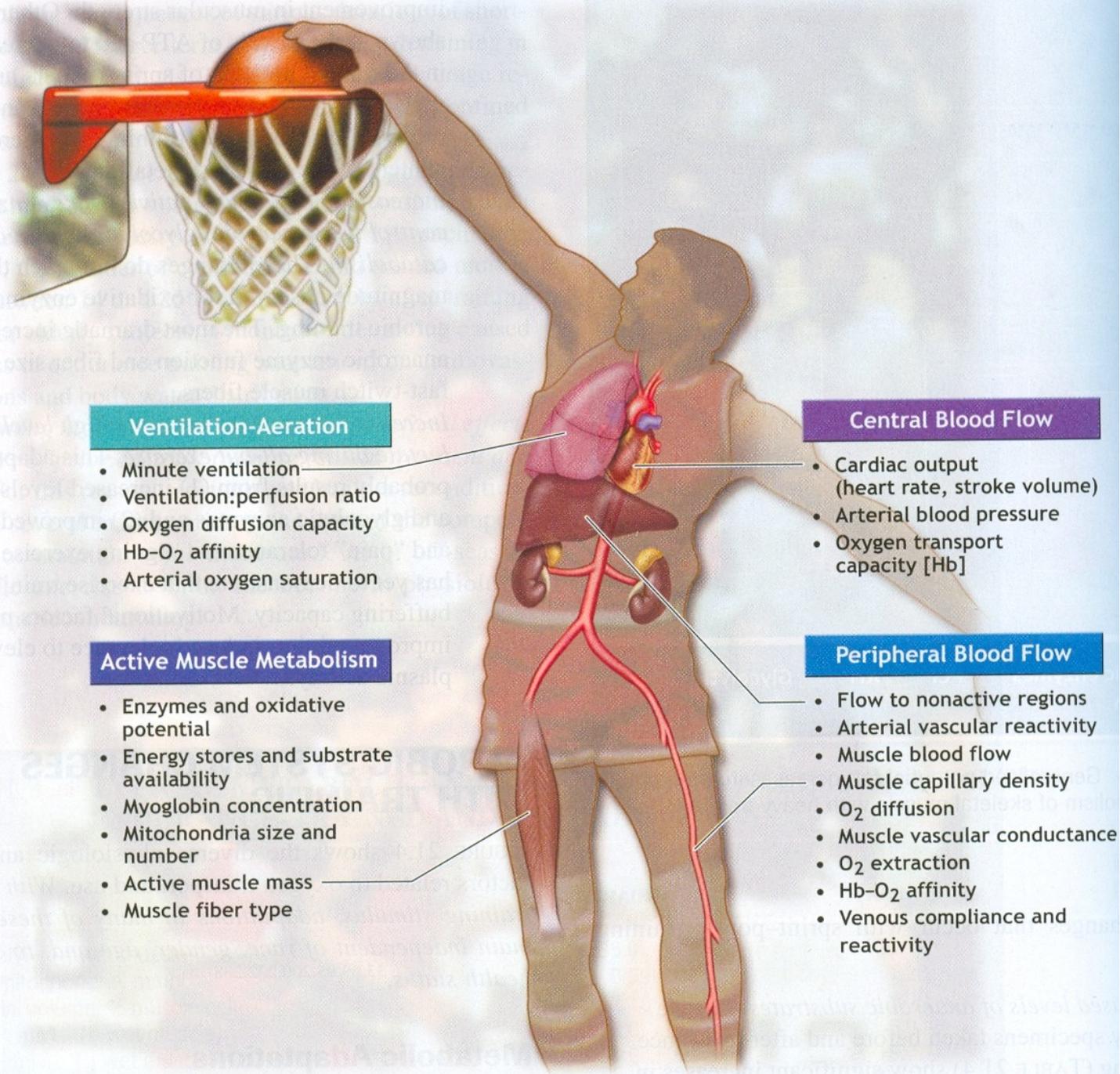
- Somatotype: ectomorph
- no fat
- Muscle fibers (SO, FOG)

**MOTOR ABILITIES**

- Endurance (special endurance, speed endurance, strenght endurance)
- Coordination

• ANT  
• VO<sub>2</sub>MAX  
• Economy





### Ventilation-Aeration

- Minute ventilation
- Ventilation:perfusion ratio
- Oxygen diffusion capacity
- Hb-O<sub>2</sub> affinity
- Arterial oxygen saturation

### Active Muscle Metabolism

- Enzymes and oxidative potential
- Energy stores and substrate availability
- Myoglobin concentration
- Mitochondria size and number
- Active muscle mass
- Muscle fiber type

### Central Blood Flow

- Cardiac output (heart rate, stroke volume)
- Arterial blood pressure
- Oxygen transport capacity [Hb]

### Peripheral Blood Flow

- Flow to nonactive regions
- Arterial vascular reactivity
- Muscle blood flow
- Muscle capillary density
- O<sub>2</sub> diffusion
- Muscle vascular conductance
- O<sub>2</sub> extraction
- Hb-O<sub>2</sub> affinity
- Venous compliance and reactivity

# What is Exercise Training?

The repeated use of exercise to improve physical fitness.

## Adaptations to Exercise

### **Acute adaptations = reactions**

The changes in human physiology that occur during exercise or physical activity.

### **Chronic Adaptations**

The alterations in the structure and functions of the body that occur in response to the regular completion of physical activity and exercise.

# TASK n. 1

- What is your name?
- Where are you from?
- What are you studying (which studies) on your home faculty?
- Did you have physiology of human?
- If YES, how many hours (e.g. 2 h/week lecture, 2 h/week practice or seminar)?
- Did you have physiology of sport and exercise?
- If YES, how many hours?
- When are you leaving Czech Republic (e.g. 28th of May 2023)?
- What is your favourite sport/sport discipline?