

## **Lecture 4**

**Theme (Тема):** Cardiovascular Training (Кардиотренировки)

**Teaching Methods (Методы обучения):**

Interactive lecture, multimedia demonstration, guided practice, problem-based learning, and small group discussion. (Интерактивная лекция, мультимедийная демонстрация, практические упражнения, технология проблемного обучения и работа в малых группах.)

**Technical Teaching Tools (Технические средства обучения):**

Multimedia presentations, heart rate monitors, instructional videos, treadmill or stationary bikes, interactive whiteboard, and fitness tracking applications. (Мультимедийные презентации, пульсометры, обучающие видеоролики, беговые дорожки или велотренажёры, интерактивная доска и приложения для отслеживания физической активности.)

**Learning Outcomes (Результаты обучения лекции):**

After completing this lecture, students will be able to:

Define cardiovascular training and explain its physiological significance.

Identify types and methods of cardiovascular exercise. Understand the principles of intensity, duration, and frequency in aerobic training. Apply safe and effective cardiovascular training methods for different fitness levels. Assess cardiovascular endurance and monitor heart rate during exercise.

**Lecture Plan (План лекции):**

- Concept and importance of cardiovascular training.
- Physiological mechanisms of aerobic exercise.
- Principles of cardiovascular endurance development.
- Types of cardiovascular exercises (continuous, interval, circuit).
- Methods for monitoring intensity (heart rate zones, Borg scale).
- Safety guidelines and progression principles.
- Summary and discussion.

### **1. Definition and Importance of Cardiovascular Training**

Cardiovascular training, also known as aerobic training, refers to exercises that primarily rely on the aerobic energy system to sustain prolonged physical activity. The term “aerobic” means “with oxygen,” emphasizing the body’s ability to use oxygen to produce energy for muscle contractions.

The main goal of cardiovascular training is to improve the efficiency of the heart, lungs, and circulatory system, enabling them to deliver oxygen to working muscles more effectively. Regular aerobic training reduces the risk of chronic diseases such as heart disease, obesity, type 2 diabetes, and hypertension. It also enhances overall endurance, mental well-being, and quality of life.

## **Physiological Mechanisms**

During cardiovascular exercise, several physiological changes occur:

The heart pumps more blood per beat (increased stroke volume).

The respiratory system improves oxygen uptake efficiency.

Capillary networks in muscles expand, enhancing oxygen delivery.

The mitochondria within cells become more active, producing more energy (ATP).

Resting heart rate decreases due to improved cardiac efficiency.

These adaptations lead to increased aerobic capacity ( $\text{VO}_2 \text{ max}$ ), which is the key indicator of cardiovascular fitness.

## **Principles of Cardiovascular Endurance**

The development of cardiovascular endurance is based on three core variables:

Frequency – how often you train (recommended 3–5 times per week).

Intensity – how hard the heart and lungs work (typically 60–85% of maximum heart rate).

Time – the duration of each session (usually 20–60 minutes).

The FITT principle (Frequency, Intensity, Time, Type) helps design individualized cardiovascular programs according to fitness level and goals.

## **Types of Cardiovascular Exercises**

### **Continuous Training**

Involves steady, moderate-intensity activity (e.g., jogging, cycling, swimming) performed for extended periods. Ideal for beginners and endurance development.

### **Interval Training**

Alternates periods of high-intensity effort with active recovery (e.g., 1 minute of fast running followed by 2 minutes of walking). Improves aerobic and anaerobic capacity.

### **Circuit Training**

Combines aerobic and resistance exercises in a sequence with minimal rest. It develops cardiovascular fitness, strength, and muscular endurance simultaneously.

### **Cross-Training**

Uses a combination of different aerobic activities (e.g., swimming one day, cycling another) to prevent monotony and overuse injuries.

## **Monitoring Exercise Intensity**

To ensure safe and effective cardiovascular training, intensity must be properly monitored:

### **Heart Rate Zones:**

Calculate Target Heart Rate (THR) using the Karvonen formula:

$\text{THR} = [(220 - \text{age} - \text{resting HR}) \times \% \text{ intensity}] + \text{resting HR}$

Training within 60–80% of maximum heart rate optimizes cardiovascular benefits.

**Borg's Rate of Perceived Exertion (RPE):**

A subjective scale (6–20) that correlates perceived effort with physiological strain. Moderate activity typically corresponds to RPE 12–14 (“somewhat hard”).

**Talk Test:** If you can speak comfortably but not sing, the intensity is appropriate for aerobic training.

### **Safety and Progression**

Safety during cardiovascular training requires gradual adaptation and proper technique. Key guidelines include:

Begin each session with a 5–10 minute warm-up and finish with a cool-down.

Increase training volume by no more than 10% per week.

Wear appropriate clothing and stay hydrated.

Avoid overtraining and monitor for signs of fatigue or pain.

Progression should be systematic, respecting the individual's fitness level and recovery needs.

### **Conclusion**

Cardiovascular training plays a fundamental role in maintaining overall health, endurance, and longevity. It strengthens the heart, improves metabolism, and enhances psychological resilience. Incorporating various aerobic activities with controlled intensity and adequate recovery ensures sustainable results and a balanced fitness lifestyle.

### **Key Vocabulary & Expressions**

| Term                    | Translation                        | Definition                                                 |
|-------------------------|------------------------------------|------------------------------------------------------------|
| Cardiovascular training | Кардиотренировка                   | Exercise that strengthens the heart and circulatory system |
| Aerobic exercise        | Аэробное упражнение                | Activity that uses oxygen for energy production            |
| Endurance               | Выносливость                       | The ability to sustain physical effort over time           |
| Heart rate              | Частота сердечных сокращений       | Number of heartbeats per minute                            |
| VO <sub>2</sub> max     | Максимальное потребление кислорода | The maximum rate of oxygen uptake during intense exercise  |
| Interval training       | Интервальная тренировка            | Alternating periods of high and low intensity              |
| Circuit training        | Круговая тренировка                | Series of exercises with minimal rest between them         |
| Cross-training          | Перекрёстная тренировка            | Alternating between different                              |

| Term              | Translation                          | Definition                                        |
|-------------------|--------------------------------------|---------------------------------------------------|
|                   |                                      | types of cardio exercises                         |
| Borg scale        | Шкала Борга                          | A subjective measure of perceived exertion (6–20) |
| Target heart rate | Целевая частота сердечных сокращений | Optimal heart rate range for training             |

### Discussion Questions

Why is cardiovascular training essential for maintaining health?

What physiological changes occur in the body during aerobic exercise?

How do frequency, intensity, and duration influence endurance improvement?

Compare continuous and interval training in terms of benefits.

What methods can be used to monitor exercise intensity safely?

### References

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