Lecture 8.

Theme (Тема): Body Composition and Weight Management (Состав тела и контроль массы тела)

Teaching Methods (Методы обучения):

Interactive lecture, multimedia demonstrations, case study analysis, group discussions, fitness assessment activities, and self-evaluation exercises. (Интерактивная лекция, мультимедийные презентации, анализ кейсов, групповое обсуждение, фитнес-тестирование и самооценка.)

Technical Teaching Tools (Технические средства обучения):

Multimedia presentations, body composition analyzers (bioelectrical impedance devices, calipers), BMI charts, fitness applications, digital scales, and instructional videos. (Мультимедийные презентации, анализаторы состава тела, таблицы ИМТ, приложения для мониторинга, электронные весы и обучающие видеоматериалы.)

Learning Outcomes (Результаты обучения лекции):

After completing this lecture, students will be able to:

1. Define body composition and its role in health and fitness.
2. Identify methods for assessing body composition.
3. Understand the relationship between energy balance, nutrition, and body weight.
4. Apply effective strategies for weight management and fat reduction.
5. Develop individualized approaches to maintain optimal body composition.

Lecture Plan (План лекции):

- Definition and importance of body composition.
- Components of body composition.
- Methods for body composition assessment.
- Principles of energy balance and metabolism.
- Strategies for weight management.
- Health risks of obesity and underweight.
- Summary and discussion.

1. Definition and Importance of Body Composition

Body composition refers to the proportion of fat mass and fat-free mass (muscle, bone, water, and organs) in the human body. It provides a more accurate assessment of health and fitness than body weight alone.

A healthy body composition indicates a low proportion of body fat and a higher proportion of lean tissue. It contributes to better metabolic health, improved physical performance, and reduced risk of chronic diseases such as cardiovascular disorders, diabetes, and osteoporosis.

Understanding body composition is essential for athletes, trainers, and healthcare professionals because it directly affects endurance, strength, and energy efficiency.

2. Components of Body Composition

Body composition consists of two main categories:

- **Fat Mass (FM):** Includes essential and storage fat.
  - *Essential fat* is necessary for normal physiological functions (e.g., brain, nerve, and organ health).
  - *Storage fat* serves as energy reserve but in excess increases health risks. Recommended body fat percentage:
  - **Men:** 10–20%
  - **Women:** 18–28%
- **Fat-Free Mass (FFM):** Comprises muscles, bones, organs, and body water. Higher muscle mass improves metabolism, mobility, and functional strength.

3. Methods for Assessing Body Composition

Several methods are used to evaluate body composition:

1. **Body Mass Index (BMI):**
   Calculated as *weight (kg) / height² (m²)*.
   - Underweight: <18.5
   - Normal: 18.5–24.9
   - Overweight: 25–29.9
   - Obese: ≥30

   However, BMI does not distinguish between fat and muscle mass.
2. **Skinfold Measurements:**
   Uses calipers to measure subcutaneous fat at specific sites (e.g., triceps, abdomen, thigh). Accurate when performed by trained professionals.
3. **Bioelectrical Impedance Analysis (BIA):**
   Sends a weak electrical current through the body to estimate fat and lean mass based on electrical resistance.
4. **Dual-Energy X-ray Absorptiometry (DEXA):**
   The gold standard method for measuring bone density and body composition.
5. **Hydrostatic Weighing or Air Displacement (BodPod):**
   Estimates body density and fat percentage through fluid or air displacement.

Regular assessment helps monitor progress and adjust nutrition and training programs.

4. Principles of Energy Balance and Metabolism

Energy balance determines body weight changes and is based on the relationship between:

- **Energy intake** (calories consumed)
- **Energy expenditure** (calories burned through basal metabolism, physical activity, and thermogenesis)
- **Positive energy balance** (intake > expenditure) → weight gain
- **Negative energy balance** (intake < expenditure) → weight loss

The **Basal Metabolic Rate (BMR)** accounts for about 60–70% of total energy expenditure. Factors influencing BMR include age, gender, body composition, and hormone levels.

Maintaining energy balance ensures stable body weight, while strategic adjustments help achieve specific goals like fat loss or muscle gain.

5. Strategies for Weight Management

Effective weight management combines balanced nutrition, regular exercise, and behavioral strategies.

1. **Nutrition:**
   - Focus on nutrient-dense foods (vegetables, lean proteins, whole grains).
   - Limit processed foods, sugars, and saturated fats.
   - Maintain portion control and consistent meal timing.
2. **Physical Activity:**
   - Combine cardiovascular exercise (calorie burning) with strength training (muscle building).
   - Aim for at least **150 minutes of moderate activity per week.**
3. **Behavioral and Psychological Factors:**
   - Set realistic, measurable goals.
   - Monitor progress (food diaries, fitness apps).
   - Address emotional eating and stress management.
4. **Lifestyle:**
   - Adequate sleep and hydration.
   - Avoid crash diets; prefer gradual weight changes (0.5–1 kg per week).

6. Health Risks of Obesity and Underweight

- **Obesity:** Associated with hypertension, heart disease, insulin resistance, joint problems, and sleep apnea. It can also impact mental health and self-esteem.
- **Underweight:** Leads to nutrient deficiencies, hormonal imbalances, weak immunity, and osteoporosis.

Maintaining optimal body composition supports long-term health, mobility, and functional independence.

7. Conclusion

Body composition and weight management are key indicators of overall health and physical fitness. Understanding how energy balance, nutrition, and

exercise interact allows individuals to make informed lifestyle choices. Sustainable progress depends on consistency, balanced diet, and regular assessment rather than short-term dieting strategies.

Key Vocabulary & Expressions

Term	Translation	Definition
Body composition	Состав тела	Ratio of fat mass to lean body mass
Fat mass	Жировая масса	Total amount of fat in the body
Lean mass	Безжировая масса	Muscles, bones, and water content
Body Mass Index (BMI)	Индекс массы тела (ИМТ)	Ratio of weight to height used to classify weight status
Energy balance	Энергетический баланс	Relationship between calories consumed and calories burned
Basal Metabolic Rate (BMR)	Основной обмен веществ	Energy expended at rest to maintain basic body functions
Caloric deficit	Дефицит калорий	When energy intake is less than energy expenditure
Obesity	Ожирение	Excessive accumulation of body fat
Underweight	Недостаточная масса тела	Weight below healthy range
Bioelectrical impedance	Биоэлектрический импеданс	Method for estimating body composition through electrical resistance

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Discussion Questions

1. Why is body composition a more accurate health indicator than body weight alone?
2. What are the advantages and limitations of BMI as a measurement tool?
3. How does energy balance affect weight control?
4. Which strategies can help maintain a healthy body composition?
5. Why is it important to combine physical training with nutritional planning?

References

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