Evaluation of nutritional state

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Introduction

- **Obesity** - the excessive accumulation of energy reserves in the form of fat. Energy intake is higher than the supply. The cause is usually a combination of higher energy intake, lack of exercise, hereditary factors, psychological factors and a bad diet in childhood. Rarely it is only one specific cause (antidepressants, endocrinological diseases).

- **Malnutrition** - a disease is caused by insufficient intake of nutrients, inability to absorb nutrients because of diseases of the gastrointestinal tract or excessive catabolism for example in tumor diseases.

Key words

- Structural and storage fat
- Lipolytic hormones
- Active body mass
- Bioimpedance
- Metabolic syndrome
- The relationship between overweight and DM
- The relationship between overweight and hypertension
- Healthy lifestyle

Structural and storage fat

- Structural fat: not consumed (base of biological membranes)
- Storage fat: reserve, deposit

Lipolytic hormones

- adrenaline
- noradrenaline
- growth hormone
- glucagon
- ACTH
- prolactin
- cortisol

Active body mass

- Musculoskeletal system
- Passive - fat

Bioimpedance

- Measurement of electrical conductivity / "resistance" of the tissue

Metabolic syndrome

- X syndrome (increased risk of death from cardiovascular complications)

- Diabetes Mellitus
- Hypertension
- Obesity
- Dyslipidemia (LDL, TAG)

The relationship between overweight and DM

- DM type II – insulin resistance

The relationship between overweight and hypertension

- High blood cholesterol
- Atherosclerosis of the arteries
- Reduced arterial compliance

Healthy lifestyle

- Principles that support our bodies to maintain health as long as possible
- General: a healthy diet (for actual energy consumption adapted intake of fat, carbohydrate, proteins, minerals, vitamins), sufficient exercise, enough sleep, a healthy environment (smog, smoking), stress management, etc.

Objective evaluation of nutritional status

- 1. Based on anthropometric indicators
- 2. Measurement of body fat by caliper
- 3. Measurement representation of fat in the body by bioelectrical impedance method
- 4. Measurement of muscle mass

1. Based on anthropometric indicators

- **Broca's index**
- Based on the calculation of ideal weight

- **Ideal weight**
- Men:
- Height cm – 100 /// height v m^2 – 23
- Women:
- Height cm – 100 – 10% /// height v m^2 – 21,5
- Index: actual weight / ideal weight x 100

Broca's index

Obesity category	% ideal weight
Slight	115 – 129
Very	130 – 149
Heavy	150 – 199
Morbid	> 200

BMI (body mass index)

- BMI = kg / m^2

Category	men	women
Malnutrition	< 20	< 19
Normal	**20 – 24.9**	**19 – 23.9**
Overweight	25 – 29.9	24 – 28.9
Obesity	30 – 39.9	29 – 38.9
Severe obesity	> 40	> 39

Waistline

waistline (cm)		
Category	**men**	**women**
Recommended range	≤ 94	≤ 80
Necessary to reduce weight	95 – 102	81 – 90
Weight loss requires medical help	> 102	> 90

Waist / Hip ratio

- Recommended range

- women: < 0.8

- men: < 1.0

2. Measurement of body fat by caliper

- Measurement of the layer of fat under the skin
- It shows the energy balance of the organism
- The triceps skinfold (the scapula, the abdomen, etc.)

The triceps skinfold (mm)

	Physiological	Mild to moderate deficit	Significant deficit
Women	> 16.5	10 – 15	< 10
Men	> 12.5	7.5 – 11	< 7.5

3. Measurement representation of fat in the body by bioelectrical impedance method

- Principle of the method:
- Various tissues of the body have different electrical permeability according to the amount of water (muscle vs. fat)
- Measurement of permeability is called bioelectrical impedance
- It calculates the ratio of fatty tissue to other tissues
- Depends on the amount of fluid in the body - hydration

- https://www.chponline.com/store/cart.php?m=product_list&c=87
- http://nutritiondarling.com/2011/08/bio-impedance-analysis/

4. Measurement of muscle mass

- Arm muscle circumference
- The corrected arm muscle area

Arm muscle circumference

- AMC = AC - π TTS

- AMC – arm muscle circumference
- AC – arm circumference
- TTS – the triceps skinfold

Muscle mass loss	none	mild	heavy
Women	> 23.2 cm	14 – 21 cm	< 14 cm
Men	> 25.3 cm	15 – 23 cm	< 15 cm

The corrected arm muscle area

- Corrected to the skin tissue and fat
- Corrected to the bones
- Men: cAMA = (AMC^2 / 4 π) – 10
- Women: cAMA = (AMC^2 / 4 π) – 6.5

Deficit	none	mild	moderate	heavy
Women	> 36.3	29.1 – 36.3	25.5 – 29.0	< 25.4
Men	> 40.9	32.8 – 40.8	28.7 – 32.7	< 28.6

Conclusion

- Evaluation of nutritional state is an important indicator in all areas of medicine
- Both malnutrition and obesity may be detrimental for the human organism
- The process of evaluation of nutritional state starts with simple formulas and continues to using sophisticated measuring instruments
- The results help to set the diet correctly (rational, reducing, high-energy, etc.)