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NUTRITION AS A FACTOR HEALTH PROTECTION AND PROMOTION. PHYSIOLOGICAL NUTRITIONAL STANDARDS. VALUES OF INDIVIDUAL FOOD COMPONENTS IN HUMAN NUTRITION. VALUE PROTEINS IN HUMAN NUTRITION, THEIR NORMS AND SOURCES OF INCOME IN THE BODY

Study guide for students of the medical faculty

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Nutrition as a factor health protection and promotion. Physiological nutritional standards. Values of individual food components in human nutrition. Value proteins in human nutrition, their norms and sources of income in the body: study guide for students of the medical faculty

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This training manual contains material that reflects modern hygienic ideas about the most important factor in the human environment - nutrition. The data on the types and functions of nutrition, basic hygienic requirements for the preparation of a food ration are presented. The information on the regulated and unregulated human energy consumption, the main components of a balanced diet, the principles of constructing a diet is given. Methods for studying the actual nutrition of the population are described.

The manual contains situational tasks, test tasks, a list of the main and recommended additional literature that facilitate the assimilation of the material.

Methodical recommendations "Nutrition as a factor health protection and promotion. Physiological nutritional standards. Values of individual food components in human nutrition. VALUE proteins in human nutrition, their norms and sources of income in the body", prepared in the discipline "Hygiene" in accordance with the Federal State Educational Standard of Higher Professional Education for students studying in the specialty General Medicine (05.31.01).

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Nutrition is one of the most active and important environmental factors which exerts diverse effects on the human body, ensures its growth, development, health preservation, disability and optimum life expectancy. Food products are a complex combination of chemical substances, comprising:

I. Nutrients:

food:

- proteins,
- fats,
- carbohydrates,
- vitamins,
- Mineral salts
- water;

taste:

- organic acids,
- ethers
- ketones,
- dyes,
- tannins,
- aromatic compounds and others.

II. Anti-nutritional substances:

- antiaminokisloty,
- antimineralnye substances
- antivitamin, and others.

III. Alien substances (impurities):

- pesticide residues,
- radioactive substances, heavy metal salts,
- nitrosamines,
- admixture of vegetable or other origin, and other substances.

The "nutrient" and "anti-nutritional" substances are natural components of the food product, and alien (impurities) are in foods as a result of disturbances of cultivation, storage, transportation and packaging. Nutrients provide biological

organism needs for nutrients and energy, a flavoring products provide appearance, texture, color, odor, taste, etc. Antinutritional substances are a natural component of the food reduces its bioavailability (e.g., antivitamin askorbinaza destroys ascorbic acid product). Foreign substances can have on the body adverse effects.

Objectives of food hygiene:

1. The study of quantitative and qualitative sides human nutrition in a variety of conditions of life and activity.

2. Development of measures to improve the usefulness of supply and enrichment of food with biologically active substances, vitamins, amino acids, polyunsaturated fatty acids, and others.

3. Implementation of control - nredupreditelno go and sanitary control current (carried hygienists).

4. Measures for the prevention of foodborne diseases and intoxications.

5. Control and organization of preventive nutrition in industrial businesses, schools and children's nutrition in schools, child care centers and others.

Food Hygiene - the science of healthy, rational and preventive nutrition.

I. Healthy nutrition - harmless.

II. Balanced diet -it is the power of a healthy person. It helps:

a) improve the level of health,

b) improve the body's resistance,

at) Conservation of high efficiency, vitality and life expectancy,

g) the best growth INDIVIDUALS to whom, and intellectual development of the younger generation.

III. Preventive nutrition -This diet is also a healthy person, but subject to the influence of harmful factors in the workplace. Its purpose - to weaken the effect of harmful factors affecting the working body.

Health food - a differentiated diet therapy, taking into account the pathogenesis, clinical picture and dynamics of the disease.

nutritional care It is used in all diseases.

Balanced diet includes:

1. Physiological norm.

2. The rules of consumer products.

3. Diet.

Physiological norms - provide the body with all substances in specific amounts and optimum ratios.

In physiological nutritional standards distinguish two aspects:

1) quantitative, Ie calorie diet,

2) quality - nutrients that provide calories.

The quantitative aspect provides a covering body energy expenditure. They consist of *uncontrolled spending*- basal metabolism (1400-1700 kcal), and the specific dynamic action of food (FBC), constituting 10% of the basal metabolism, i.e., 140-170 kcal and *regulated expenses* - Energy consumption in the course of employment, household and domestic work, sports, etc. (200-260 kcal / h)..

In addition, for children, teenagers and elderly people is taken into account age, but for the working-age population - age and nature of the work.

In accordance with the physiological norms entire population is divided into groups.

Allocated 9 groups of children on the basis of age, including 3 groups of infants, 6 groups of preschool and school age. In the last two groups used and sex - boys and girls in the group of 11-13 years and boys and girls in the group of 14-17 years. By age group selected and retirement age (60-74 years) and older than 75 years with the differentiation by gender.

Adult working-age population, depending on the severity of the work is divided into 5 groups of men and women in 4 groups.

Group 1. Employees mainly intellectuals:

- heads of enterprises and organizations; engineering workers whose work requires a high physical activity; doctors, in addition to doctors of surgical profile; teachers; workers of science, literature and art, managers and employees of the controls.

Group 2. Workers employed a light physical labor:

- engineers and technicians whose work is associated with some physical effort; agronomists and livestock; veterinarians; nurses and nurses; sellers of manufactured goods shops and service industries; workers and telegraph communication; teachers; physical education and sports instructors, coaches.

Group 3. Employees average severity of labor:

- mechanics; adjusters and adjusters; doctors surgical; chemists; textile and shoemakers; vehicle drivers; food industry workers; employees of public utilities and catering; sellers, railway and water transport workers; machinists hoisting mechanisms; printers.

Group 4. Workers in heavy physical labor:

- construction workers; agricultural workers; miners at work surface; workers oil and gas industry; metallurgy; riders; employees of pulp and paper and woodworking industries.

Group 5. Workers employed especially in heavy physical labor.

- miners working underground; masons; excavators; loaders etc..

In each of these groups highlighted the differentiation by age: 18-29 years, 30-39 years and 40-59 years.

As additional groups allocated pregnant women and lactating women and children 6 months of 1- and 7 - 12 months.

Physiologically optimal nutritional standards reflect the needs of specific groups of the population in the major nutrients and energy.

The qualitative composition Power presents content in a ration of proteins, fats, carbohydrates, minerals and vitamins. All the nutrients in their predominant purpose can be divided*3 groups.*

1) proteins and minerals: calcium, phosphorus - with predominantly plastic function.

2) Fats and carbohydrates - predominantly energy function.

3) vitamins and mineral salts - trace elements and makroelementy- substances involved in metabolic processes.

One of the major components of food is protein. It provides the best conditions

for the normal functioning of the body and its high efficiency. Especially important has sufficient protein content to a growing organism, because protein belongs to the basic plastic part.

Insufficient intake of protein affects the function of all systems.

1. The enzyme system.

2. Synthesis of hormones.

3. reduced the protective functions of the body due to decreased production of antibodies (as reduced biosynthesis globulins, g-globulin). Reduced resistance of the child's body to the respiratory and intestinal infections.

4. When a lack of protein in the diet is observed hemodyscrasia process and the change in the morphological composition of the blood, as well as reducing the oncotic pressure.

5. Reduce the amount of protein in the diet causes the wasps Loosening of the excitation and inhibition.

6. X*ronicheskoe, insufficient intake of protein leads* to impaired liver function, causes the development of fatty liver. Soviet scientists found that to prevent fatty liver requires choline, which may be supplied as a finished product with- products (fosfotidy) or may be synthesized in the body with the assistance of the amino acid methionine. Methionine also comes with complete proteins of animal origin. The disease most often affects infants 6-8 months. Mortality 40-50%. When administered in the diet full of protein disease can be cured.

7. Insufficient protein intake from food It reflected on the course of mineral metabolism. Violation of calcium-phosphorus metabolism in children may be associated not only with the disadvantage of salts, vitamin D, but with the drawback of protein. In this case, there is inhibition of bone growth and change their chemical composition.

8. Protein deficiency in the first 2 years of life can lead later to stunting and delayed psychomotor development.

9. Protein deficiency affects vitamin metabolism. When administered in a sufficient amount of animal nutritionth protein reduces disease pellagra.

When protein deficiency in the diet increased excretion of vitamin C, increases the urinary excretion of riboflavin (B2) and develops ariboflavinoz.

With long-term constant, insufficient intake of proteins with food in children develops kwashiorkor disease, which is translated from the language of the inhabitants of Ghana is child's illness weaned. This disease is common in developing countries of Indo-China, Africa and South America. As a child grows, if conserved protein deficiency Kwashiorkor disease becomes an adult disease - malnutrition or nutritional marasmus, is a disease irreversible and lead to the death of such patients as early as adolescence.

Protein requirements depend on age, sex, nature of work, climatic and national peculiarities, and others.

For this purpose a method for determining nitrogen balance. When entering a certain minimum protein dietary nitrogen equilibrium is established, ie, the amount of nitrogen excreted equal to its entering the food. If the amount of protein in the diet is not enough, then it sets a negative nitrogen balance, ie the consumption of tissue protein intake exceeds them with food rations.

DA pre-school children is 53- 69 g, for pupils - 77-98 g for adults 58-87 grams for women and 65-117 g in men, according to their professional activities.

In general, the food rations from protein should be provided 14% of caloric intake.

proteins Animal proteins are full, i.e., It contains all the essential amino acids - valine, histidine, isoleucine, leucine, lysine, methionine, tryptophan, threonine and phenylalanine. proteins of animal origin must not be less than 60% for children and not less than 55% - for adults.

Among the essential amino acids greatest importance for the human organism are tryptophan, lysine and methionine. The optimal ratio of these amino acids in the daily diet is 1: 3: 3, which corresponds to their ratio in human milk and averaged amino acid composition of the human body.

The biological role of the scarcest 3 essential amino acids:

1) Methionine - is involved in fat metabolism (exchange-regulating

phosphatides fats), it is one of the best litotropnyh substances that prevent fatty liver. Methionine is involved in the synthesis of choline - antisclerotic factor. Crank protects against severe lesions in radiation exposure and the action of bacterial toxins. It enhances the expression of action of vitamin B12, folic acid, etc.

ANDSource methionine is milk protein casein, which contains up to 3% methionine a lot of it is contained in proteins cod, eggs, meat, ie animal products.

In nature, the highest content of sulfur containing amino acids (Methionine + Cystine) *beans sunflower*

2) Lysine *associated with hematopoiesis,* With its lack reduces the number of red blood cells and the amount of Hb, and also noted a violation of calcification of bone, muscle wasting. Lysine is necessary for the growth of young organisms.

The main *source* lysine is *milk protein.* Cottage cheese contained 1.5% lysine. *There is also found in meat animals.*

3) Tryptophan - is an amino acid required for synthesis of nicotinic acid in the organism (PP), the formation of whey proteins and synthesis of hemoglobin. Growth factor. The younger age, the greater the need for tryptophan (1.0).

Products - sources	complete protein (%).
meat	16-22
a fish	14-20
bird	16-24
eggs	12.5
egg powder	52
milk	3.4
cheese skinny	17.5
fat cottage cheese	13
different cheeses	18-25.

Less high-grade amino acid composition are proteins of vegetable origin.

Furthermore, among the vegetable foods have bean containing a large amount of high-grade proteins:

1. peas - 19,8%
2. beans - 19,6%
3. lentil - 20,4%
4. pea flour - 22%
5. defatted soy flour - 41.4%.

Proteins of these products are in sufficient quantities particularly valuable amino acids such as tryptophan, lysine, methionine, and soy contains these amino acids, even more than meat, and the methionine in it as much as in the curd.

Food

BMI (Body mass index) = mass (kg)/height (m2)

For example: 6-5 / 1.752 = 65/3.06 = 21.2

If the BMI is in the range of 18.5 - 25 kg/m, the mass is considered to be ideal, if from 25.1 to 30 kg/m - the excess weight if BMI greater than 30.1 kg/m "- talking about obesity.

The calculation of the individual's energy needs

Calculation of daily energy (the work is done by example)

a) The SBI (male) = 66 + 13.7 x weight (kg) + 5.0 x height (cm) - 6.8 x age (years) - *66* + 13.7 x 70 + 5 X 180 - 6.8 x 20 = 66 + 959 + 900 - 136 = 1789 Kcal

SBI (female) = 655 + 9.6 x weight (kg) + 1.8 x Height (cm) - 4.5 x age (years)

b) E day = SBI x CFA (1.4 or 1.6 for students - if physical activity is enhanced) = 1789 x 1.4 = 2505 Kcal

Calculation of individual needs in proteins, fats and carbohydrates

*Example of calculation.*Daily energy consumption are, for example 2505 kcal, corresponding to 100% of requirement and energy. Of these, 12% have to be compensated at the expense of protein. Is a rate of:

2505 kcal - 100%

x protein calories 12%

x = 301 kcal

To determine the protein requirements necessary in grams divided by 301 kcal protein caloric factor of 4 kcal / g:

301 kcal / 4 kcal / g = 75.3 g protein

Similarly determine the need for fat (3.0%) and carbon (58%), taking into account that the coefficients of caloric carbohydrates - 4 kcal / g, fat - 9 kcal / g.

Calculation Example imbalance of essential nutrients

nutrients	norms	The actual	imbalance
	individual	supply	
	needs		
B	75	86	N
F	73	89	p 0.8
In	353	376	N

Calculation Example fakticheswho supply

Name	**The**	**B**	**F**	**In**	**EC**
products					
Breakfast					
Buckwheat	200 gr.	6.0	6.8	27.0	202
Tea with sugar	400 gr.	0.4		14	56
Bun	100 gr.	7.9	9.4	55.5	339
Rye bread	50 oz.	3.4	0.6	20.0	100
					697 kcal
Dinner	-	-	-	-	-
Borscht	500 gr.	4.0	5.0	20.4	144
puree	300 gr.	6.4	2.4	44.2	224
beef burger	100 gr.	14.2	11.4	13.0	213
peach juice	200 gr.	0.6		33.0	136
bread, wheat	100 gr.	8.6	1.4	45.1	228
					945 kcal
Dinner					
Fried potato	200 gr.	4.6	17.2	37.8	322
beet salad	200 gr.	3.6	0.2	19.6	96
bread, wheat	100 gr.	• 8,6	1,4 -	45.1	228
Butter	10 gr.	0.1	7.2	0.1	65
sausage Doctor	50 gr.	6,4 •	**P 1**	0.8	128
Russian cheese	5Q g.	11.6	14.8		364
Tea without sugar	200 gr.	-	-	-	-
					1203kkal;
Total:		**86**	**89**	**376**	**2845kkal**

Diet

Example of calculation.

The daily energy value of food - 2845 kcal

Energy breakfast value - 697 kcal

Calculation for breakfast:

2845 kcal ------ 100%

697 kcal ------ x%

x = 697 * 100/2845 = 24.5%

Similarly, we calculate the percentage distribution of the energy value for lunch and dinner.

Conclusion:

My diet

Breakfast 24.5%	Norm
Lunch 33%	25 - 30% 45 - 50%
Dinner 42.5%	20 - 25%