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**HUMAN HEALTH:
REALITIES AND PROSPECTS**

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**HEALTH
and
NUTRITION**

Edited by Nadiya Skotna

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This monograph is the product of a group of authors, united by a common goal to present the results of their research aimed at preserving human health by means of healthy nutrition and promotion of healthy lifestyle. The monograph confirms the urgent need to improve the work with adolescents and young people, their parents and teachers for health promotion and formation of environmental responsibility.

This work is undoubtedly useful for scientists as well as for the general public, parents, teachers, civil servants dealing with these issues and social workers.

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CONTENTS

PREFACE	5
SECTION I. MEDICO-BIOLOGICAL FEATURES OF RATIONAL NUTRITION	6
<i>Chapter 1. The application of authors' phytocomplexes "Zdorovya simyi" (health of the family) in the patient rehabilitation of the stages I–II of dyscirculatory hypertonic encephalopathy with cognitive deficits (Pavlusenko I., Makeev M., Ostroverha Yu.)</i>	<i>7</i>
<i>Chapter 2. Physiological and hygienic assessment of schoolchildren's nutrition: current state of affairs (Kotsur N., Tovkun L.)</i>	<i>16</i>
<i>Chapter 3. To the question of the role of health-improving nutrition in the prevention of elderly diseases (Bibik L., Bibik M., Borodina N.)</i>	<i>26</i>
<i>Chapter 4. Chislographica (GRAPHICS-NUMBER) literacy of rational nutrition with excess weight and associated common diseases (Znayda A., Pivovarchuk V., Udalov A., Negoda A., Vasilyev A., Znayda A., Nakonechny V., Kaminsky V., Pivovarchuk O.)</i>	<i>36</i>
<i>Chapter 5. Legal, medical, social and economic aspects of rational feeding of babies in Ukraine (Krychkovska A., Zayarnyuk N., Lobur I., Khomenko A., Gubyska I., Marintsova N., Novikov V.)</i>	<i>46</i>
<i>Chapter 6. Comparative analysis of antimicrobial properties of <i>Persicaria bistorta</i> L., <i>Mentha piperita</i> and <i>Vaccinium Myrtillus</i> L. (Ivasivka A., Hoivanovych N., Stakhiv V.)</i>	<i>58</i>
<i>Chapter 7. Sugar substitutes and their effects on the human body (Stetsula N., Senkiv V., Obukh V., Wanot B.)</i>	<i>68</i>
<i>Chapter 8. Trends in prevalence of thyroid diseases among the population in Verkhovyna district of Ivano-Frankivsk region (Monastyrska S., Stetsyk R., Kravtsiv R.)</i>	<i>81</i>
<i>Chapter 9. The healthy situation perception of people after 60 years using the medical evidences of the specialistic consultations of voivodeship hospitals in Czestochowa (Mizerska K., Kosior-Lara A.)</i>	<i>93</i>
SECTION II. ENVIRONMENTAL ASPECTS OF NUTRITION AND HEALTH	102
<i>Chapter 10. Opportunities for safe biomedication of household stores (Shved O., Petrina R., Vasylyuk S., Fedorova O., Gubriy Z., Havryliak V., Shved O. M., Novikov V.)</i>	<i>103</i>
<i>Chapter 11. The evaluation of the hydroecosystem (natural waters) toxicity in Turka and Skole districts of Lviv region (Kropyvnytska L., Stadnichuk O., Martyniuk I.)</i>	<i>117</i>
<i>Chapter 12. Prospects of using sulfur in the rabbits feeding (Lesyk Ya., Dychok A.)</i>	<i>130</i>
<i>Chapter 13. Baking characteristics of winter wheat grain depending on elements of cultivation technology (Dziubailo A., Senkiv V., Slobodian L.)</i>	<i>143</i>
<i>Chapter 14. The research of sewage and surface water of the dumps of Boryslav ozokerite deposit (Krechivska G., Pavlyshak Y., Voloshanska S.)</i>	<i>156</i>

Chapter 15. Organic farming as a prerequisite of a healthy diet (<i>Drozdl I., Gasior J., Dytso O.</i>)	166
Chapter 16. Comparative characteristics of the EU and Ukrainian standards for the purchase of dairy raw milk, their approaching to EU requirements (<i>Farafonov S., Stakhiv V.</i>)	175
SECTION III. SOCIO-PEDAGOGICAL ASPECTS OF HEALTH AND NUTRITION	193
Chapter 17. Formation of health-safety competences among students in the scientific pedagogical project "Intelligence of Ukraine" (<i>Kirilenko S.</i>)	194
Chapter 18. The problems of formation of the healthy modus vivendi of students of higher education establishments in the sphere of health protection (<i>Kalichak U., Kalichak Yu.</i>).....	204
Chapter 19. Nutrition state of student youth in current conditions (<i>Kovalchuk H., Lupak O., Musina S., Pitteljon L.</i>)	215
Chapter 20. Nutrition as a source of energy for a primary school student (<i>Vashchenko O.</i>)	227
Chapter 21. Students' overweight as a factor of developing obesity (<i>Fil V., Ivasivka A., Shypytiak Ye.</i>)	237

Chapter 20. NUTRITION AS A SOURCE OF ENERGY FOR A PRIMARY SCHOOL STUDENT

O. VASHCHENKO,

Borys Grinchenko Kyiv University,
18/2, Shamo Str., Kyiv,
Ukraine, 04053,
e-mail: o.vashchenko@kubg.edu.ua

Abstract. *The article is devoted to the analysis of features and requirements for organization of rational nutrition of primary school students. Attention is drawn to the fact that in the younger school age the further formation of the body and slow linear increase in the length and weight of the body continue, metabolic processes become more intense, skeletal system and skeletal muscles form, as well as the cardiovascular, pulmonary system, digestive tract, immunological defense system.*

The digestive system of a primary school student is ready to fulfill an important function – to provide a fast-growing organism with nutrients, but the mucous membrane is still too tender. Therefore, it is advisable to teach children that, despite the lack of time and stressful training schedule, you should always thoroughly chew your food carefully, without hesitation.

Physiological needs of the organism increase according to the growth of the child's body. This, above all, causes the need for energy, basic nutrients as well as all micronutrients (vitamins and minerals). In addition, a primary school student acquires a new social status. The transition to a new way of life associated with learning, as well as with a new circle of peers, imprints both on the organization of nutrition for schoolchildren, and on individual skills and habits. Classes in the school, sports games and physical education raise the appetite of the child. However, some of the "whims" in the diet left since pre-school years (the predominance of some types of products and the rejection of others) may remain among primary school students.

Malnutrition, which is expressed in protein-caloric or micronutrient insufficiency of vitamins and minerals, causes increased fatigue of a student, reduces performance, mental and physical activity, increases the risk of colds and other infectious diseases. Although the nutrition of a child of primary school age consists of the same products as adult food, the organization of child's feeding (regime, quantity of products, set of products) have significant differences.

Keywords: *rational nutrition, primary school, primary school student.*

Formulation of the problem

Nutrition is the most important factor that determines the health of an individual. Solid health is an indicator of the quality of life of a modern person, and the aspiration for it must be the priority of everyone. Proper healthy nutrition keeps health and plays an important role in preventing diseases that depend on the quality of food.

Food is a source of energy. It is provided by three groups of the main nutrients contained in foods – proteins, fats, carbohydrates. These groups of nutrients constitute the majority of the food by weight. About 11–14 % of energy is supplied by proteins of the food we constantly consume, 31 % are fats and 55 % are carbohydrates. The most important source of energy in food is carbohydrates (starch, sugars). They provide the highest energy part in the human diet, in the second place – fats, and then – proteins.

Energy is released during the oxidation of glucose and fatty acids formed during the digestion process in the human body. Oxidation of glucose, fatty acids and energy release is carried out with the participation of oxygen, as well as minerals, vitamins and enzymes acting

as catalysts. The effectiveness of energy use for physiological functions and biochemical processes is only 20–25 %, and 75–80 % of energy is released in the form of heat that maintains a constant body temperature.

The nature of nutrition plays an important role as a risk factor or a means of preventing chronic non-communicable diseases. Usually, chronic diseases have many causes, and nutritional factors are just one of the groups of risk factors that contribute to their development. In addition, people in different ways perceive the negative effects on the body of nutrients, their redundancy or lack of them [1].

Harmony in the physical and spiritual sense of human life is impossible without proper nutrition. Reception of food is also a means of people communication. Satisfaction with food is one of life's pleasures that support positive emotions.

Thus, the diet interacts with many spheres of human life and society. Let's consider the peculiarities of the influence of nutrition on human livelihoods and its importance in preserving and strengthening health.

The familiar and usual word "nutrition" can mean different phenomena. The simplest application of the concept is the definition of the act of eating. In a broader sense, nutrition is understood to mean all phenomena, processes, and objects relating to food and its use by a person. Recently, there was a whole science of food and nutrition, which is called nutritiology. This is the science of food, food products, their effect and interaction, their role in maintaining health (or the emergence of diseases), about the processes of their use, assimilation, transfer, disposal and withdrawal from the body. In addition, the science of nutrition studies how and why a person chooses food, how this choice affects his/her health [1].

Many major risk factors for disease in developed countries (that is, blood pressure, cholesterol, overweight, obesity, low fruit and vegetable intake, and iron deficiency) are nutrition related. Provision of adequate diet for the school aged child will enhance learning capacity as well as prevent adult diseases such as ischaemic heart disease, hypertension, some types of cancer and diabetes. In principle therefore, nutritional problems in the school aged child may carry into adulthood. Patronage for convenience foods which tend to have high fat content are a major determinant of nutritional problems.

The first idea appeared in the history of world and Ukrainian nutritional science was a concept of rational nutrition that includes a vision of the source of energy and nutrients that are guaranteed to prevent the shortage of energy or nutrients that cannot be replaced. Considering the role of nutrition in the emergence of chronic diseases the term "healthy nutrition" is spreading more and more. This term is not only satisfies physiological need for nutrients and energy, but also includes the concept of food as preventive action to avoid risk factors of chronic non-communicable diseases.

Current study uses the terms "healthy nutrition", "rational nutrition", "proper nutrition" as one, which means nutrition that promotes normal growth and development of a child, preservation and maintenance of its health and longevity.

Thus, nutrition provides the basic vital functions of the body. It is of particular importance in the case of children healthcare, when the formation of basic life supporting systems takes place.

Purpose of the study: analysis of the characteristics and requirements for the organization of nutrition of primary school students.

Presentation of the main material

In the younger school age the further formation of the body and slow linear increase in the length and weight of the body continue, metabolic processes become more intense, skeletal system and skeletal muscles form, as well as the cardiovascular, pulmonary system, digestive tract, immunological defense system.

The rate of growth, the increase in body weight, the sequence of increase in various parts of the body, as well as the ripening of various organs and systems at each age stage of the child's life under optimal conditions, "unfold" within the normal range. Unfavorable factors (malnutrition, lack of physical activity, non-compliance with the training and rest regimes, etc.) can have a significant effect on the physical development of primary school students. Significant deviations from the norm of physical development are a signal for adults, therefore, it requires immediate consult a physician for advice or take the necessary measures to improve the child's health.

The digestive system of a primary school student is ready to fulfill an important function – to provide a fast-growing organism with nutrients, but the mucous membrane is still too tender. Therefore, it is advisable to teach children that, despite the lack of time and stressful training schedule, you should always thoroughly chew your food carefully, without hesitation.

The basic laws of proper nutrition include qualitative and quantitative adequacy to the physiological needs of the organism, as well as the regularity of eating – compliance with the regime. It is important to consider the child's lifestyle, national food traditions, climatic, seasonal, and ecological living conditions for organizing a balanced diet. Of particular importance are physiological characteristics of children of a particular age group.

Physiological needs of the organism increase according to the growth of the child's body. This, above all, causes the need for energy, basic nutrients as well as all micronutrients (vitamins and minerals). In addition, a primary school student acquires a new social status. The transition to a new way of life associated with learning, as well as with a new circle of peers, imprints both on the organization of nutrition for schoolchildren, and on individual skills and habits. Classes in the school, sports games and physical education raise the appetite of the child. However, some of the "whims" in the diet left since pre-school years (the predominance of some types of products and the rejection of others) may remain among primary school students [1].

The regime of a primary school student should preserve 4–5-time meals. More frequent meals at the expense of "snacks" at home or at school are possible. The student's breakfast is the most important meal. The organization of a student is essential, since it is necessary to get up early and hurry to school. This is the reason for frequent breakfast misses. In this regard, the role of a hot breakfast in school is getting important and should be provided after the 2nd or 3rd lesson.

Malnutrition, which is expressed in protein-caloric or micronutrient insufficiency of vitamins and minerals, causes increased fatigue of a student, reduces performance, mental and physical activity, increases the risk of colds and other infectious diseases.

Although the nutrition of a child of primary school age consists of the same products as adult food, the organization of child's feeding (regime, quantity of products, set of products) have significant differences. An important condition for normal physical development of a child is the use of products with enough protein.

Protein starvation leads to a violation of physical and mental development. Girls at 9 years and boys at 10 years experience hormonal changes in their bodies, which cause the restructuring of many organs and systems (including the digestive system). It is necessary to take into account and not to give children food that is difficult to digest (greasy, over roasted, very sour and salty), as well as food containing a lot of spicy seasoning [1].

The increased permeability of the intestinal wall, where the main processes of digestion and absorption of food occur, is typical for children. Because of this, undissolved substances run into blood that can cause the body's immune response. Therefore, children at younger school age can often develop allergic reactions to one or another food. Parents should take this into account and do not include a large quantity of new products into diet.

The food consumed by primary school students must be varied. Varied food is a food that consists of various products of plant and animal origin.

Only such food fulfils the needs of the growing organism, because it contains the required amount of proteins, fats, carbohydrates, minerals and vitamins. The more diverse the food's composition, the better it is assimilated by the organism.

Menus for children should be thought out in advance, taking into account their age characteristics and nutritional needs. To excite the appetite, children do not need spicy seasoning, such as mustard, pepper. But for them it is necessary to include sauerkraut, vegetable salads and so on in the menu. Milk, dairy products and cereals are very healthful. A mandatory condition for the full assimilation of nutrients is the taste of food. Using the same dishes daily sharply reduces appetite and reduces the allocation of digestive juices.

The nutrition of children in the summer and winter is somewhat different. In the winter, at low temperatures, the child's body spends more energy. Therefore, the child's food in this period should be of greater energy value. In the summer, at high ambient temperatures, food, which contains nutrients that are easily digestible and necessary for the body, is recommended, as the activity of the digestive glands of children in the heat drops sharply, the number of digestive juices is not enough.

Easily digestible, for example, are milk and vegetable food. Milk contains all nutrients necessary for normal growth and development of a child, and plants, in addition, contains a lot of vitamins, mineral salts and fiber, which enhances intestinal peristalsis. Abuse of greasy and meaty food in the summer can lead to stagnation in the stomach, intestines, which causes fermentation, rotting, and sometimes also disorders of the digestive tract [1].

There is no product in nature, that contains all the nutrients. No product can provide the person with all the essential nutrients. Milk, for example, contains proteins, fats, milk sugar (lactose), vitamins A and B, but does not contain vitamin C. For good health, you need more than forty different nutrients that are contained in a variety of foods. Only a rational combination of these products provides the human body with the necessary nutrients.

The diet of primary school students has to meet certain requirements. An analysis of modern research and publications makes it possible to separate two main conditions for adherence to the nutrition regime of a primary school student. It is the sequence and hours of child's meal. Even the great Avicenna noticed that there is a certain order for meal, which must be maintained by everyone who cares about own health.

Proper nutrition organization plays one of the main roles in the child's daily rhythm. Food should be consumed when the body is optimally prepared for its perception. The daily rhythm of nutrition, especially its secretory functions, requires the distribution of food of different composition. The time for consuming fat and protein foods is an afternoon. Sour milk products are suitable for dinner. That is why it is so important to form child's idea of a proper diet in childhood.

Parents are role models for their children, therefore any dietary habits formed by the parent is likely to be reflected in the child. Adult's role-modelling healthy eating patterns can have a positive influence on children's eating patterns when providing healthy meals and snacks at home. Parents should provide a variety of foods and establish regular meal and snack times.

Modern dietitians believe that a primary school student should eat five times a day. So, the first breakfast children receive at home from seventh to seventh thirty (and have to consume 15–20 % of the daily ration). The food consumed during the period of maximum activity of the stomach (7–9 hours in the morning) is digested better. All fats, proteins and carbohydrates will be cleaved and distributed, and the body will get enough of the nutrients that are especially needed for children in the morning for intense mental activity [7].

For the second time, younger students have breakfast after the second lesson. The expediency of using the second breakfast is that it is during the period from 9 to 11 o'clock in the morning that the pancreas, which regulates the level of sugar in the blood, is active and, if hunger aren't staved, the mental perception of the educational material decreases.

During the activity of the pancreas, the consumed food will be fully digested, since this gland allocates special enzymes for the digestion of food.

During this period, it is desirable to take 15–20 % of the daily diet.

Primary school students also dine at school from 12:30 to 13:00. They consume 35–40 % of the daily ration during the lunch, when they especially want to eat, as all the processes of digestion are activated. The absorption of nutrients is carried out in the small intestine, and they are carried through the blood throughout the body. This contributes to the fact that from 16:00 to 19:00 the mental and physical activity of a child raises.

Before evening children eat from 15:00 to 15:30. They have 5–10 % of the daily ration. In the case of dinner, children should know and follow certain rules, namely: to have dinner no later than 2-3 hours before sleep (between 17:00 and 18:00), and use no more than 20 % of the daily ration. Food should be easily digestible, of vegetable or sour-milk origin [8].

For normal physical and mental development of children it is necessary that their nutrition was complete in quantitative and qualitative proportions. The main nutrients (proteins, fats, carbohydrates, vitamins, mineral salts, water) should be balanced according to the child's age. The energy costs of children are significantly higher than the energy costs of an adult. That is why the total caloric content of the daily ration of the child should be higher by 10 % than in adults, which will promote its proper physical development [3].

The need for a child in movements is determined by the biological laws of its development. Psychologists say that the younger the child, the greater its need for motor activity and the harder it tolerates the long-term static position during the training. In the case of inadequate motor activity, a primary school student has a sense of discomfort that manifests itself in deteriorating of health condition (headache, pain in the muscles of the hands, legs, back, drowsiness) and in emotional imbalance (indistinctness, aggressiveness, irritability).

Physical activity, like rational nutrition, is an integral part of a healthy lifestyle of a primary school student. It requires certain energy costs, which can only be restored due to a well-balanced diet and the nutritional balance of the food consumed by the child [4].

The child's body differs from the adult by rapid development, the formation of organs and systems. These physiological characteristics are determined by the needs of children in nutrients and energy. In turn, the high nutrient and energy requirements per unit of body weight of children require the proper selection of foods and their correlation.

For normal growth and development of the child's body, the food should contain proteins, fats, carbohydrates, vitamins, minerals and water.

Proteins are the basic plastic material from which the body builds its cells and tissues. Due to insufficient supply of proteins, there is a lag in the body weight and growth of the child, delayed mental development, reduced resistance of children to infections, increased susceptibility to respiratory diseases, etc [5].

It's worth saying that negatively affects the body not only a small amount of protein, but also its excess. It causes predisposition to allergic diseases. The lower the age of the child, the higher the need for proteins for 1 kg of body weight: from 3 to 7 years – 3–3.5 g, from 8 to 12 years – 2.5–3 g, older than 12 years – from 2 to 2.5 g.

Proteins are also a building material for the human body. Of these, new cells are formed and grow, making people grow. Proteins exist both in animal and plant origin and are found in meat, fish, eggs, milk, kefir, beans and peas.

Other important things in the nutrition of children are fats. They provide energy costs, contribute to a better assimilation of vitamins. Insufficient amount of fats negatively affects the

body's condition: slows down growth and development, reduces resistance to infections, inflammation on the skin, etc. Excessive consumption of fats also negatively affects the body.

Fat restores heat energy (heat). It is used as a source of energy and for warming up the body. Fat-rich products are butter, vegetable oils, fat and so on [5].

The main nutrients include carbohydrates, which are simple and complex. Simple carbohydrates are sugars (sucrose, glucose, fructose, lactose, galactose), complex – starch, pectins, and others. Carbohydrates are the main source of energy. Carbohydrates also play an important role in brain activity. The tissues of the brain consume carbohydrates, namely glucose, more than twice the muscle. Inadequate supply of carbohydrates with food disrupts the utilization of fats. There is such a statement: "Fat burns in a flame of carbohydrates". Excess carbohydrates also have a detrimental effect on the body's condition. Excessive amounts of simple carbohydrates (sucrose, glucose) are rapidly digested, can turn into fats and promote the development of obesity.

The rate of carbohydrates in food depends on several factors. For people with high energy costs, it is bigger than for people with low costs.

For a primary school student, it is recommended to use 290–340 g of carbohydrates per day.

Carbohydrates are also a source of energy and are spent on muscle work, as well as for the vital functions of the body (physical labor, movement, breathing, work of the heart, etc.). Carbohydrates are found in bread, porridge, potatoes, honey, sugar, candy, cakes, pastries.

Of great importance is the presence of the required amount of vitamins in nutrition of the younger students. They promote the proper growth and development of children, participate in all metabolic processes. The child's body is especially sensitive to lack of vitamins, which causes rapid fatigue, irritability, children lose appetite, resistance to infectious diseases is weakened [5].

Vitamins are the regulator of metabolic processes in the body. They play an important role in increasing the resistance to the disease, which is closely linked to the processes of growth and development. Vitamins are also not formed in the body (except vitamin D), but come from food.

Vitamins are divided into two large groups: soluble in water (water soluble) and soluble in fats (fat soluble). Water-soluble vitamins include vitamin C, vitamin B₁, vitamin B₂, vitamin B₆. Fat-soluble – vitamin A, vitamin E, vitamin K, D.

Vitamin C is involved in all types of metabolism, promotes the growth of cells and tissues, increases the natural immunity, the body's resistance to harmful effects. Due to lack of vitamin C, vascular walls are damaged, hemorrhages are observed, muscle weakness appears. The main sources of vitamin C are fresh vegetables, fruits, berries, herbs, in particular lemons, wild rose, oranges, tangerines.

Vitamin B₁ improves the function of the central nervous system, participates in the metabolism of carbohydrates. Due to its lack in nutrition, there might be changes in the muscles structure, nervous system, appetite can worsen. Vitamin B₁ can be found in rye and wheat bread, egg yolk.

Vitamin B₂ affects the activity of the central nervous system, participates in the formation of hemoglobin, in the regulation of the function of the gastrointestinal tract. Due to lack of vitamin B₂ appears inflammation of the mucous membrane of the oral cavity, cracks in the corners of the mouth, inflammation of the eyes, skin diseases, there are changes in the work of the nervous system. Vitamin B₂ is present in significant quantities in products of animal origin: meat, liver, eggs, milk, dairy products.

Vitamin B₆ is involved in protein metabolism, it also promotes the formation of essential fatty acids, improves hematopoiesis. Inadequate vitamin B₆ in children's nutrition can increase excitability, hematopoiesis, changes in the skin. Vitamin B₆ is found in meat, liver, fish, egg yolks, vegetables, fruits.

Vitamin A stimulates the growth and reproduction of cells in the body, provides normal development of the skin and mucous membranes, increases the resistance of the body to infections, participates in the formation of the visual pigment. Due to insufficient vitamin A intake, the body's resistance to infections is reduced, growth slows down, dry skin develops, vision is deteriorating. Vitamin A is found in many foods: fish oil, liver, butter, egg yolk, vegetables, fruits (apricots). The highest A-vitamin activity is inherent in β -carotene, which is found in all vegetables and fruits of yellow, orange and reddish brown color.

Vitamin D is involved in the absorption of calcium and phosphorus in the intestine, the formation of bone tissue. Due to the lack of vitamin D in the body, symptoms of rickets may occur.

Vitamin E improves the absorption process in the intestine, protects fats from oxidation. Due to its lack in the body there might be muscular dystrophy, deterioration of the production of sex hormones. Vitamin E can be found in salad, vegetables, meat, liver, eggs, vegetable oils, milk, nuts.

Vitamin K is involved in blood clotting. Due to its insufficient amount in the body there is a tendency to bleeding. Vitamin K is found in plant foods: cabbage, pumpkin, spinach. From animal products to vitamin K rich liver [5].

In the food consumed by a child, there must always be mineral substances, because they are not formed in the body, but come from food. They are needed for the proper growth and development of bone, muscle tissue, hematopoietic, nervous and immune systems.

Among the minerals, calcium plays an important role in the formation of bone and teeth. It is necessary for the proper functioning of the nervous and muscular systems. Calcium is involved in the processes of blood coagulation. A lot of calcium is contained in rough rye and wheat bread, as well as in some kinds of greens (spinach, salad, sorrel). The best source of calcium is milk, lactic acid products, milk whey, and cheese [6].

The child's body also needs phosphorus. A lot of phosphorus is found in the liver, brain, meat, cheeses, eggs, and fish.

Iron is a component of hemoglobin. Products rich in iron include beef, egg yolk, rye and wheat bread from grinding flour, liver and kidney.

Magnesium is also needed to strengthen bone tissue. If its level is not enough, the assimilation of food deteriorates. High level of magnesium can be found in rye bread, cereals, bran.

The addition of sodium and potassium salts to the body is very important. These elements regulate water-salt metabolism. Potassium is found in vegetables, fruits, milk, and meat.

The composition of the child's nutrition should also include trace elements – substances contained in the body in small quantities, but necessary for its livelihoods. This is copper, zinc, manganese, cobalt, fluorine, iodine, and the like. The trace elements are rich liver, egg yolk, vegetables.

Water plays an important role in the child's body. All processes of metabolism occurring in an organism, are possible only with the participation of water, due to the dissolution in it of many chemical compounds. Water is needed to remove the products of exchange.

For the child, both excess and insufficient water are harmful. Over excessive fluid intake swells cells and tissues, there is an additional burden on the cardiovascular system, the kidneys.

Lack of water in the child's body leads to thickening of the blood, fever, and digestive problems. At junior school age for healthy children, the daily requirement for water is approximately 30 ml per 1 kg of child weight. The need for a child in water is also met by the fluid that is part of the food [2].

The essential amino acids – lysine, tryptophan, histidine, methionine are considered as growth factors. Their largest suppliers are fish, meat, and eggs.

Each food product has features related to its chemical composition. There are products of plant and animal origin. Vegetable food is predominantly carbohydrate, that is, it contains a lot

of carbohydrates and a small amount of proteins. Animal food, on the contrary, contains a lot of proteins, and carbohydrates are very small, or they do not have them at all. Knowledge of the properties of a product enables it to be used as quickly as possible.

The largest amount of proteins is found in meat, fish, and eggs. For children, low-fat meat types are recommended. Many proteins contain various dairy products. However, proteins are also present in products of plant origin. Especially a lot of them in legumes (beans, peas, soybeans). People get carbohydrates when they eat bread, cereals, potatoes, and sugar. Fat is taken from the body of vegetable oil and butter, fat. Many fats are in meat, raw, eggs, sour cream.

Particular attention should be paid to the daily ration of primary school students. A growing organism needs a five-hour meal every day. The daily ration should be distributed as follows: breakfast 15–20 %, second breakfast 15–20 %, lunch 45–50%, supper 5–10 %, supper 15–20 % daily food.

A modern school student, according to nutritionists, should eat at least five times a day. For a growing organism, milk, cheese, sour-milk products – sources of calcium and protein – are mandatory. Deficiency of calcium and phosphorus will help fill fish dishes. For the garnish it's better not to eat potatoes and pasta, but porridge with stewed or cooked vegetables (cabbage, beets, onions, carrots, beans). For a day, schoolchildren should drink at least 1–1.5 liters of liquid, but not sparkling sweet water.

It is very important to feed the child correctly in the morning. Student must eat porridge (oatmeal has proved to be the best, nutritious ones are also buckwheat and rice porridge), pasta, fresh vegetables; fruits (fruits are preferred to apples, rich in fiber and pectin). This is a complex form of carbohydrates, the stock of which is necessary for the child.

Other carbohydrates are better divided into intermediate receptions during the school day: fruit drinks, tea, coffee, buns, cookies, candies will provide a constant flow of fresh glucose into the bloodstream and stimulate mental activity of schoolchildren [7].

Fat is also needed to meet the energy needs of schoolchildren. Their share accounts for 20–30 % of the total daily energy expenditure.

A primary school student must eat the necessary quantities of fiber – a mixture of hardly digestible substances contained in the stems, leaves and fruits of plants. It is necessary for normal digestion. Proteins are the main material used to build tissues and organs of a child. Proteins differ from fats and carbohydrates in that they contain nitrogen, so proteins can not be replaced by any other substances.

Students of 7–11 years old should receive 70–80 g protein per day, or 2.5–3 g per 1 kg of weight, and students of 12–17 years of age 90–100 g, or 2–2.5 g per 1 kg of weight. Children and adolescents – young athletes with increased physical activity (including tourists) – need to increase the daily rate of consumption of protein to 116–120 g at the age of 10–13 years and to 132–140 g at the age of 14–17 years.

Kids' nutrition should take into account qualitative features of proteins. It must be done in a way that the proportion of proteins of animal origin in the diet of school-age children is 60–65 %, in adults – 50 %.

The needs of a child's body are most closely matched to milk protein, as well as all other components of milk. In this regard, milk should be considered as a compulsory infant food product that can not be replaced. For school-age children, the daily milk requirement is 500 ml. It should be borne in mind that 100 g of milk corresponds to 12 g of milk powder or 25 g of condensed milk.

The child's lunch, like an adult's one, should consist of three dishes. The physiological significance of the first, second, third dishes for the organism was studied in I. Pavlov's laboratory.

The first dishes are different soups and borsch. Their nutritional value depends on the ingredients. So, red and green borsch contains many vitamins and minerals. Soups contain a lot of cauliflower substances. Liquid substances of the first dishes stimulate the secretory function

of the glands of the stomach and are absorbed through the cells of the stomach into the bloodstream and fall into the whole body.

The second meal is the most nutritious. It is boiled, roasted and stewed meat or fish with various side dishes. The conversion of this food requires a large number of enzymes in the digestive tract that split proteins, fats and carbohydrates. The third dish is raw fruit, jelly, compotes, juices. It is useful because it contains a lot of vitamins.

The proper organization of nutrition must be taken care of not only by the family, parents, but also by the educational institution. In small schools where there are no school doctors, the teacher is responsible for organizing the nutrition of students.

The school should have a buffet that provides schoolchildren with hot breakfast. The energy value of school breakfasts is usually 1200–1600 kJ. In order for the buffet to be properly organized, the people responsible for cooking should make a hot breakfast menu for a week, taking into account the nature of the children's activities and the season. For a hot breakfast, it is supposed to offer 2, and for lunch 3 dishes.

Classes in the school, sports games and physical education increase the appetite of students. Malnutrition causes children fatigue, reduced physical and mental activity, increases the risk of colds and other diseases, as the child's body feels protein-caloric and micronutrient insufficiency (insufficiency of trace elements).

Junior schoolboy's ration should contain five meals a day. More frequent meals due to snacks at school and at home are also possible.

Conclusions

Thus, a modern primary school student, according to nutritionists, should eat at least five times a day, with a hot meal included for breakfast, lunch and dinner. For a growing organism, milk, cheese, dairy products – sources of calcium and protein – are mandatory. Calcium and phosphorus deficiency will also help to balance fish dishes. As a garnish it is better to use not potatoes or macaroni, but stewed or cooked vegetables (cabbage, beets, onions, carrots). For a day students should drink at least 1–1.5 liters of liquid, not soda water, but fruit and vegetable juices.

It is very important to feed the child right from the morning. In addition to sweet tea, confectionery products the breakfast must necessarily include bakery products, cereals, macaroni, fresh vegetables; among fruits, preference is given to apples rich in fiber and pectin. They are complex forms of carbohydrates, the stock of which is extremely needed for every child. Other carbohydrates are better divided into intermediate methods during the school day: fruit drinks, herbal tea, cacao, rolls, cookies, candies will provide a permanent inflow of fresh portions of glucose to the child's body into the bloodstream and stimulate its mental activity.

The second most important component of food that is needed to meet the energy needs of a junior school student is fats. Their share accounts for 20–30 % of the total daily energy expenditure of the child.

A primary school student should consume the necessary quantities of fiber – a mixture of hardly digestible substances contained in stems, leaves and fruits of plants. It is essential for normal digestion. Proteins are the main material used to build tissues and organs of a child. Proteins differ from fats and carbohydrates in that they contain nitrogen, so proteins cannot be replaced by any other substances.

Each food product has features its own related to its chemical composition. There are products of plant and animal origin. Vegetable food is predominantly carbohydrate, that is, it has a lot of carbohydrates and little protein. Animal food, on the contrary, contains many proteins, and very little or no carbohydrates. Knowledge of the properties of a product allows you to use it as rationally as possible.

The largest amount of proteins is found in meat, fish, and eggs. For children, we recommend to cook not fatty varieties of meat. Many proteins contain various dairy products. However, proteins are also present in products of plant origin. Especially a lot of them can be

found in legumes (beans, peas, soybeans). Carbohydrates are consumed by the kid while eating bread, cereals, potatoes and sugar. Fat the baby's body receives from vegetable oil and butter. Lots of fats are contained in meat, raw, eggs, sour cream.

The indispensable amino acids for children are lysine, tryptophan, histidine, methionine, which scientists consider as growth factors. Their largest suppliers are fish, meat, and eggs.

While planning the organization of rational nutrition for the junior school student one should also take into account the child's lifestyle, national traditions, climatic, seasonal and environmental conditions of life, as well as the physiological characteristics of students of a particular age group.

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