

## THE ROLE OF NUTRITION IN ENSURING HEALTHY LIVING

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### ABSTRACT

The article discusses the development of priority areas of modern nutrition, such as the organization of healthy nutrition of the population and the role of proper nutrition in ensuring a healthy life. Proper nutrition is the most important factor that ensures human health, resistance to external negative influences, his ability to work, which determines the quality and duration of his life. The article also discusses current trends in the development of food biochemistry and issues related to the study of the characteristics of metabolic processes in the body. The ways of nutrition correction, and optimization by nutritional value are determined. A special place is given to the analysis of specialized products, including dietary supplements. As an optimal nutritional formula, the formula of a balanced diet for adults by academician A.A. Pokrovsky.

**Keywords:** healthy nutrition, balanced nutrition, rational nutrition, balanced diet, foodstuffs of the 21st century.

### Introduction

Ensuring the proper nutrition of the population is a complex and multifactorial process that can be achieved by considering the basic components of food products, transformations during storage and processing, as well as the physiological significance of the basic components of food products [1, 2].

When it comes to the state policy in the field of proper nutrition, a complex of measures aimed at creating conditions that meet the demand for rational nutrition of the population is understood. This involves considering its traditions, values, economic situation, and ensuring the fulfillment of the demand for rational nutrition [by the population].

In our era, among the fundamental problems faced by human society, some of the most prominent ones can be noted as follows:

- provision of food for the world population;
- energy supply;
- raw materials, including water supply;
- environmental protection, ecological and radiation safety of the planet's inhabitants;
- mitigation of the negative consequences of intensive production activities and protecting people from the consequences of these negative activities.

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One of the most important and complex issues among these problems is the provision of food for the world population. Food products actively influence the human body from the moment of birth until the last days of life. Substances entering the human organism through food undergo complex biochemical transformations during metabolism, converting food substances into the structural elements of cells. These converted food substances supply our organism with plastic material and energy, create essential physiological and cognitive performance, determine human health, activity, lifespan, and reproductive ability.

Therefore, the nutritional status is one of the most crucial factors determining the health of a nation. Food products not only meet the basic nutritional needs and energy demands of individuals but also fulfill preventive and therapeutic functions.

Nutritional physiology studies the impact of food substances on the human body, optimal conditions for their digestion and absorption, and the individual's demand for these food substances. Food products used for consumption are characterized by the chemical nature of their components and their diversity in composition.

## **Nutritional Theories and Concepts**

The formulation of scientific ideas about the role of nutrition and food substances in life processes began only in the mid-19th century. Scientific achievements related to the discovery of vitamins, microelement ions, clarification of the structure of proteins, fats, carbohydrates, and nucleic acids, as well as research on the role of microelements in the organism's life, the organization and structure of biological systems, are included in this period [3, 4].

The nature of the first scientific paradigm of nutrition is to provide the body with the necessary food substances for normal functioning and the liberation from its waste components.

At the end of the 19th century and the beginning of the 20th century, the theory of balanced nutrition was formulated based on three main principles by the academician A.A. Pokrovsky of the Academy of Medical Sciences [1, 7]:

- The intake of substances with ideal nutrition perfectly corresponds to their loss.
- The absorption of nutritious substances is ensured through the destruction of food structures and the utilization of both organic and inorganic substances by the organism.
- The body's energy expenditure must be balanced with energy intake.

According to this concept, ensuring a normal life is possible by providing the body with the necessary quantity of food from five essential classes:

- energy sources – proteins, fats, carbohydrates;
- essential amino acids;
- vitamins;
- essential fatty acids;
- inorganic elements.

Water, although not a nutrient, is essential for physiological processes in the human body, (such as respiration, perspiration, etc.), to take place in order to sustain life.

Typically, the body utilizes about 300-400 ml of metabolic (endogenous) water released during biological oxidation processes. The remaining portion of the daily requirement (1750-2200 ml) should be supplied to the body through water obtained from food.

Thus, this theory is based on determining the proportions of individual food substances in the diet that reflect the amount of metabolic reactions supporting the life activity of the organism, as well as the compatibility with chemical transformations occurring in fermentative systems within

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the organism. However, a balanced approach to nutrition has led to the misconception that only the digested food components in the body are valuable, and the rest belong to waste, which is not accurate [5, 6].

The further development of science and medicine, particularly in the 1990s, led to the formulation of the theory of adequate nutrition by the Russian nutritionist Academician A.M. Ugolev. This theory is based on four main principles [7]:

- Food is digested both by the organism and by bacteria residing in the digestive tract.
- The absorption of food substances by the organism is ensured through the activity of bacteria that remove them from food and synthesize additional food substances.
- Normal nutrition is not based on the intake of a single type of food but is dependent on the intake of various foods and regulatory substances.
- Physiologically important components of food are called “dietary fibers”, which are considered to be essential ballast substances.

“Dietary fibers” are biopolymer components of plant-origin foods that encompass non-digestible polysaccharides (cellulose, hemicellulose, pectins, and native protopectins) and polyphenol compounds. Cellulose and hemicellulose are essentially indigestible components, while pectins and polyphenols are digestible polymers [8-13].

Indigestible dietary fibers exert a stimulatory effect on peristalsis (the rhythmic contraction and relaxation of muscles in the walls of the intestines), while digestible dietary fibers act as sorbents and a nourishing substrate for intestinal microflora.

The theory of adequate nutrition formulates the basic principles that ensure rational nutrition by considering the entire complex of food substances, their metabolic processes, and the compatibility of chemical substances with the individual characteristics of the body's ferment systems [3, 4, 10].

Rational nutrition is based on three fundamental principles:

1. Maintaining an energy balance, considering the adequacy of energy supplied through food, and the energy expended in vital activity processes.
2. Meeting the organism's demand with the optimal quantity and proportion of food substances.
3. Adhering to a specific schedule and frequency of meals, as well as maintaining a balanced distribution of food in each meal.

The energy supplied through food is utilized for the maintenance of basal metabolic exchange, the specific dynamic activity of food, and muscle activity.

Basal metabolism is the minimum amount of energy required to sustain an individual's life in a state of complete rest (under comfortable conditions, including during sleep).

The amount of energy required to maintain basal metabolism varies based on factors such as age, gender, environmental conditions, etc. For example, for a person who is 30 years old and weighs 65 kg, it may be around 1570 kcal, while for a 30-year-old woman weighing 55 kg, it could be around 1120 kcal.

Even the intake of a small amount of food requires energy, which is referred to as the specific dynamic action of food. In conditions of mixed nutrition, the increase in basal metabolic exchange due to the optimal consumption of substances and the specific dynamic effect of food accounts for an average of 10-15%, equivalent to about 140-160 kcal per day.

The overall energy consumption for the fulfillment of all functions supporting human life processes, taking into account gender and the type of occupational activity, is presented in Tab. 1.

**Table 1.** Average Daily Energy Expenditure (kcal).

<b>Gender</b>	<b>Physical Work</b>	<b>Mental Work</b>
Females	2750-3000	2550-2800
Males	2350-2550	2200-2400

Energetic metabolism in children and the elderly is lower compared to average indicators. Therefore, the energy balance is the ratio between consumed and expended energy. According to the second principle of rational nutrition, the diet should include substances from each of the five food classes, each playing its specific role.

It has been shown that the optimal ratio of proteins, fats, and carbohydrates in the diet is close to 1:1:4 for the nutrition of a generally healthy individual. With increased energy intake and the associated increase in overall requirements, the composition of fats and carbohydrates in the diet should be increased to a lesser extent than proteins.

Rational nutrition's third principle is based on four main rules: 1. Regularity in nutrition, considering the complex of substances that ensure normal digestion; 2. Fractional nutrition throughout the day, with 3-4 meals; 3. Rational selection of foods in each intake; 4. Optimal distribution of meals throughout the day, with no more than one-third of the daily diet consumed in a single meal.

The regularity of nutrition is associated with adherence to meal times, during which the reflex development of gastric juice secretion occurs. This ensures the normal digestion and absorption of food in the body.

The rational distribution of food throughout the day, based on the quantity and energy value of the consumed food, ensures an equal load on the digestive system. This allows for the timely provision of the necessary energy and nutrients to the body.

The formation of food in each meal should provide optimal conditions for its assimilation. Products containing animal proteins are recommended for consumption in the first half of the day, while in the second half, it is more advisable to consume dairy and vegetable products.

The optimal distribution of food throughout the day varies based on age, physical activity, and daily routine. For middle-aged individuals, the most rational approach is to have four meals a day, while for the elderly, five meals a day with intervals of 4-5 hours between meals are recommended.

In Japan, a concept of healthy nutrition has been formulated concerning the creation of “physiological functional foods”. This concept involves understanding the intake of foods that benefit human health, enhance resistance against diseases, and allow individuals to maintain an active lifestyle for an extended period [14]. The positive effects of functional foods on health include:

- lowering cholesterol levels in the blood;
- maintaining healthy teeth and mucous membranes;
- providing energy;
- reducing the risk of certain forms of cancer.

The consumption characteristics of functional foods include three components: nutritional value, taste, and physiological effects.

Compared to ordinary daily products, functional foods should have a healthy, balanced diet and be safe in terms of nutritional value. These requirements apply not only to individual

ingredients but also to the overall product.

Healthy food products, in the current ecological situation, play a role in preventing aging in the body. The concept of balanced nutrition is based on determining the ratios of individual food substances in the diet, reflecting the totality of metabolic reactions characterizing the chemical processes ultimately ensuring the vital activity of the organism.

For a balanced diet, the formula (according to A.A. Pokrovsky) presents the food components that meet the physiological characteristics of the body, as shown below (Table 2).

**Table 2.** Balanced Diet Principles for Adults According to A.A. Pokrovsky

<b>Water, g</b>	1750-2200	<b>Minerals, mg:</b>	
Including:		Calcium	800-100
Beverages (water, tea, coffee, etc.)	800-1000	phosphorus	1000-1500
Soups	250-500	sodium	4000-6000
Food products	700	Potassium	2500-5000
<b>Proteins, g</b>	80-100	Chlorine	5000-7000
Including:		Magnesium	300-500
Essential amino acids:		Iron	15
Tryptophan	1	Zinc	10-15
Leucine	4-6	Manganese	5-10
Isoleucine	3-4	Chromium	2-2,5
Valine	4	copper	2
Theonine	2-3	cobalt	0,1-0,2
Lysine	3-5	Molybdenum	0,5
Methionine	2-4	Selenium+	0,5
Phenyllalanine	2-4	Fluorine	0,5-1,0
Non-essential amino acids:		iodine	0,1-0,2
Histidine +	2	<b>Vitamins, mg:</b>	
Arginine +	6	Vitamin C (ascorbic acid)	70-100
Cystine +	2-3	Vitamin B <sub>1</sub> (thiamine)	1,5-2,0
Tyrosine +	3-4	Vitamin B <sub>2</sub> (riboflavin)	2,0-2,5
Alanine	3	Vitamin B <sub>2</sub> (various forms)	0,04
Serine	3	(300-400 ME for children)	
Glutamic acid	16	Vitamin PP (nicotinic acid)	15-25
Asparagine	6	Vitamin B <sub>3</sub> (pantothenic acid)	5-10
Proline	5	Vitamin A (various forms)	1,5-2,5
Glycine	3	Vitamin B <sub>6</sub> (pyridoxine)	2-3
<b>Carbohydrates, g</b>	400-500	Vitamin B <sub>12</sub> (cobalamin)	0,005-0,08
Including:		Vitamin B <sub>15</sub> (pangamic acid)	2,5
Starch	400-450	Vitamin R (rutin)	25
Sucrose	50-100	Vitamin B <sub>9</sub> (folate acid)	0,1-0,5
<b>Organic acids (lactic, citric, etc.), g</b>	2	E (various forms)	2-6
<b>Balast substances (fiber, prectin), g</b>	25	K (various forms)	2
<b>Fats, g</b>	80-100	Biotin	0,15-0,3
Including:		Choline	500-1000
Polyunsaturated fatty acids	3-6	Lipoic acid +	0,5
Vegetable oils	20-25	Inositol, g +	0,5-1,0
Cholesterol +	0,3-0,6		
Phospholipids +	5		

Note: + denotes food substances that can be partially substituted or their indispensability cannot be strictly determined.

The diet regimen presented in Table 2 is based on the total energy value of food substances, which is equivalent to 3000 kcal per day.

### Modern human nutrition, basic food groups

Modern human nutrition, ultimately influencing health, is shaped by the three principles of rational nutrition, taking into account the physiological needs for energy, macro, and microelements. At the same time, it reflects the individual characteristics, economic capabilities, and dietary preferences of a particular person [6, 14-16].

Actually, today there are no strict, normatively established rules for creating a diet. Perhaps the only rule is a diverse diet that meets all physiological needs of an individual. Dietitians' general recommendations include the following:

- Consuming a variety of foods;
- Maintaining an ideal body weight;
- Reducing the intake of fats, saturated fats, and cholesterol;
- Increasing the consumption of complex carbohydrates (starch, fiber);
- Decreasing sugar intake;
- Reducing sodium intake (NaCl).

The latest food policy recommendations from the WHO include the following:

- a) Cereals and potatoes should provide more than 50% of the energy production;
- b) The production of vegetables (including potatoes) and fruits should ensure their consumption at a level of at least 400 g per person per day.

In general, the daily diet should include the following four food groups: 1) Meat, fish, eggs - sources of proteins and minerals; 2) Potatoes, bread, legumes, and other products from cereals - sources of carbohydrates and fiber; 3) Dairy and dairy products (including yogurt, cheese) - sources of proteins, carbohydrates, calcium, and B vitamins; 4) Fruits and vegetables - sources of vitamins and minerals.

The estimated dietary intake of traditional food products that provide the body with energy and essential nutrients is given in Table 3.

**Table 3.** Recommended Food Basket for Meeting the Body's Energy and Essential Nutrient Requirements

Main products	Product quantity	
	grams/day	kilograms/year
All bread products (in terms of flour)	330	120,4
Potatoes	265	96,7
Vegetables and greens	400	146,0
Fresh fruits	260	94,9
Dried fruits	10	3,6
Sugar	100	36,5
Vegetable oil	20	7,3
Meat and meat products (in commercial forms)	205	74,8
Fish and fish products (in commercial forms)	50	18,2
Lard	5	1,8
Milk	450	164,2
Animals fats	15	5,5
Cottage cheese	20	7,3
Yogurt	18	6,6
Cheese	18	6,6
Milk and dairy products	1090	390,0
Egg	40	14,6



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The need to adjust the composition of the diet to the physiological norms of micronutrient levels should be considered with changes in energy demand.

It has been determined that prolonged use of a diet with an energy value of less than 1500 kcal disrupts the optimal supply of nutrients to the body.

Considering the trends of further reduction in human energy needs, the diet should ensure the necessary level of essential micronutrients. In this aspect, existing problems in the field of nutrition have been identified, taking into account conflicts proposed in the 21st century that ensure optimal nutrition:

- Inadequate content of essential nutrients in the diet, including vitamins, macro- and micronutrients, dietary fibers, plant oils, and animal proteins;
- Imbalance in basic food components; discrepancies between consumed and expended energy; "empty" calories, excess weight, and obesity issues;
- Alcoholism and smoking (tobacco use);
- Contamination of food products with chemical and biological xenobiotics; food preservation issues;
- Poor nutritional culture (it is believed that everyone should have necessary knowledge about nutrition based on the general culture, and also should understand the specifics of their own organism, allowing for an individual approach to diet formulation).

Currently, the main focus of nutrition and food hygiene is directed towards the resolution of the following priority tasks:

- Ensuring the population's health and preventing diseases by changing the composition of products and the structure of the diet;
- Development of individual nutrition and purposeful diet therapy;
- Evaluation of the energy value of ontogenesis;
- Ensuring the safety of food production at all stages and commercial stages;
- Studying the impact of nutrition on the ontogenesis of unicellular and multicellular organisms, including aging processes, by deciphering the transmission and encoding of food signals within cellular internal exchange processes and within the framework of the organism's integrity;
- Clarification of the role of food and foreign substances in the development mechanism of humans.

### **Final Result**

Factors contributing to poor nutrition include:

- Low nutritional value of food products;
- Inadequate, unbalanced nutrition;
- Low biological value of food substances;
- Insufficient knowledge, low culinary culture;
- Low purchasing power of the population, poverty;
- Incorrect and poor dietary habits.

21st-century foods include:

- Traditional (natural) products;
- Modified (processed) natural products;
- Genetically modified food sources;
- Biologically active food supplements.

- Factors contributing to a healthy diet:
- Economic opportunities ("Wallet");
  - Variety of food products ("Clock");
  - Level of nutritional education ("Culture")..

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## SAĞLAM HƏYATIN TƏMİN EDİLMƏSİNDƏ QİDALANMANIN ROLU

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### XÜLASƏ

Məqalədə əhalinin sağlam qidalanmasının təşkili və sağlam həyatın təmin edilməsində düzgün qidalanmanın rolu kimi müasir qidalanmanın prioritet sahələrinin inkişafından bəhs edilir. Düzgün qidalanma insanın sağlamlığını, xarici neqativ təsirlərə davamlılığını, onun iş qabiliyyətini təmin edən, həyatının keyfiyyətini və müddətini şərtləndirən ən mühüm amildir. Məqalədə həmçinin qida biokimyasının inkişafındakı mövcud tendensiyalar və orqanizmdə metabolik proseslərin xüsusiyyətlərinin öyrənilməsi ilə bağlı məsələlər müzakirə olunur. Qidalanmanın korreksiyası, qida dəyərinə görə optimallaşdırma yolları müəyyən edilir. İxtisaslaşdırılmış məhsulların, o cümlədən pəhriz əlavələrinin təhlilinə xüsusi yer verilir. Optimal qidalanma formulası olaraq böyüklər üçün balanslaşdırılmış pəhriz düsturu akademik A.A. Pokrovski.

**Açar sözlər:** sağlam qidalanma, balanslaşdırılmış qidalanma, rasionel qidalanma, balanslaşdırılmış pəhriz, 21-ci əsrin qidaları.

## РОЛЬ ПИТАНИЯ В ОБЕСПЕЧЕНИИ ЗДОРОВОГО ЖИЗНИ

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## АБСТРАКТ

В статье рассматривается развитие приоритетных направлений современного питания, таких как организация здорового питания населения и роль правильного питания в обеспечении здоровой жизни. Правильное питание – важнейший фактор, обеспечивающий здоровье человека, устойчивость к внешним негативным воздействиям, его трудоспособность, определяющий качество и продолжительность его жизни. В статье также рассматриваются современные тенденции развития биохимии пищи и вопросы, связанные с изучением особенностей обменных процессов в организме. Определены пути коррекции и оптимизации питания по пищевой ценности. Особое место отведено анализу специализированной продукции, в том числе биологически активных добавок. В качестве оптимальной формулы питания была использована формула рационального питания для взрослых академика А.А. Покровский.

**Ключевые слова:** здоровое питание, сбалансированное питание, рациональное питание, рациональное питание, продукты питания XXI века.