THE STRATEGY FOR SCIENTIFIC SUPPORT IN IMPLEMENTING STATE POLICY ON OPTIMIZING POPULATION NUTRITION

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The article presents the authors' opinion on ways to optimize the nutrition of the population of the Russian Federation. It shows that the dietary patterns currently common in the country are still far from optimal, as they underdeliver on vegetables, fruits, and dairy products, and provide excessive amounts of sugar, salt, foods rich in animal fat, and trans fats. Inadequate dietary patterns compromise health and nutritional status, leading to an increase in diet-related diseases such as cancer, cardiovascular diseases, type 2 diabetes, obesity, gout, and osteoporosis, which are major contributors to mortality in economically developed countries, including Russia. According to the authors, there are several aspects that are crucial in the matter of overall health improvement and extension of active longevity: optimization of the dietary patterns in Russia, popularization of the principles of rational nutrition and healthy lifestyle; introduction of measures to decrease the incidence of socially significant non-communicable diseases (atherosclerosis, cardiovascular diseases, hypertension, type 2 diabetes mellitus, nutritional obesity, and others); acceleration of adoption of innovative health protection technologies in healthcare, including early diagnosis of non-communicable diseases of an alimentary nature, their targeted prevention and treatment.

Keywords: nutrition optimization, nutritional status, health care, alimentary-dependent diseases, nutriome

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СТРАТЕГИЯ НАУЧНОГО ОБЕСПЕЧЕНИЯ РЕАЛИЗАЦИИ ГОСУДАРСТВЕННОЙ ПОЛИТИКИ В ОБЛАСТИ ОПТИМИЗАЦИИ ПИТАНИЯ НАСЕЛЕНИЯ

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В статье изложено мнение авторов о путях оптимизации питания населения Российской Федерации. Продемонстрировано, что в настоящее время традиционная структура питания населения страны все еще далека от оптимальной, что связано с недостаточным содержанием в рационе овощей и фруктов, молочных продуктов на фоне избыточного количества сахара, соли, продуктов, богатых животным жиром и трансжирами. Нарушение структуры питания приводит к негативным последствиям для здоровья, пищевого статуса, постоянному прогрессированию числа алиментарно-зависимых заболеваний, таких как онкологические, сердечно-сосудистые, сахарный диабет 2-го типа, ожирение, подагра, остеопороз и др., которые являются основными причинами смертности населения экономически развитых стран, в том числе и России. Для повышения уровня здоровья и качества жизни, продления периода активного долголетия, по мнению авторов, наиболее важное значение имеют следующие аспекты: оптимизация питания населения России, внедрение принципов рационального питания и здорового образа жизни в общественную практику; снижение заболеваемости социально значимыми неинфекционными заболеваниями (атеросклероз, сердечно-сосудистые заболевания, артериальная гипертония, сахарный диабет 2-го типа, алиментарное ожирение и др.); ускорение внедрения в практику здравоохранения инновационных здоровьесберегающих технологий, включая раннюю диагностику неинфекционных заболеваний алиментарной природы, их направленную профилактику и лечение.

Ключевые слова: оптимизация питания, пищевой статус, здоровьесбережение, алиментарно-зависимые заболевания, нутриом

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Optimization of nutrition of the population is one of the priorities in the Russian Federation's state health preservation policy.

Unfortunately, the dietary patterns currently common in the country are still far from optimal, as they underdeliver on vegetables, fruits, and dairy products, and provide excessive amounts of sugar, salt, foods rich in animal fat, and trans fats [1].

Recent research revealed that inadequate dietary patterns compromise health and nutritional status, leading to an increase in diet-related diseases such as cancer, cardiovascular diseases, type 2 diabetes, obesity, gout, and osteoporosis, which are major contributors to mortality in economically developed countries, including Russia [2].

The analysis of data from epidemiological studies conducted at the Federal Research Center for Nutrition, Biotechnology and Food Safety allows identifying several factors that hinder the development of a conscious need to eat properly:

– continuity of improper dietary patterns in the families and society in general;

– insufficient knowledge about proper nutrition;

– unreliable, incorrect, contradictory information about nutrition given by the media;

– active advertising, availability and a wide range of foods with improper content of critically important nutrients.

Given the current situation, it is necessary to boost the scientific efforts supporting popularization of proper nutrition and spread of information about it; these efforts are also aligned with the goals set by the Decree of the President of the Russian Federation of 25.04.2022 No. 231 "On Declaring the Decade of Science and Technology in the Russian Federation", the Demography national project, Order of the Ministry of Health of the Russian Federation of 15.01.2020 No. 8 "On Approval of the Strategy for Promotion of Healthy Lifestyle in the Population, Prevention and Control of Non-Communicable Diseases up to 2025" [3–5].

According to the Decree of the President of the Russian Federation of 18.06.2024 No. 529 "On Approval of Priorities and the List of the Most Important High-End Technologies," one of the main directions for scientific and technological evolution of Russia involves development of "preventive and personalized medicine, ensuring healthy longevity," which is further supported by the goal of preserving the people of Russia and developing human potential of the country, formulated as a strategic national priority. The implementation of these plans and the achievement of this goal primarily involve establishing a foundation for sustainable natural population growth in the Russian Federation and increasing life expectancy. Thus, the main purpose of the Long and Active Life national project is to increase the average life expectancy of the Russian population to 78 years by 2030 and to 80 years by 2036.

Currently, the following aspects are most important for improving health and quality of life of the population, as well as prolonging active longevity therein:

– optimization of the dietary patterns practiced by the Russian population, implementation of the principles of rational nutrition and healthy lifestyle;

– reduction of the incidence of socially significant non-communicable diseases (atherosclerosis, cardiovascular diseases, hypertension, type 2 diabetes, nutritional obesity, etc.);

– acceleration of adoption of innovative health-saving technologies in healthcare, including early diagnosis of non-communicable diseases of alimentary nature, their targeted prevention and treatment.

Federal Research Center for Nutrition, Biotechnology and Food Safety conducted fundamental, exploratory, and applied research in this area, and achieved the results described below.

First-ever formalization of the concept of nutriome as a set of nutritional factors necessary to maintain a dynamic balance between humans as an evolution-shaped biological species and the environment, with the purposes thereof being the support of vital activity, procreation and preservation of the species, maintenance of the body's adaptive potential, antioxidant defense system, apoptosis, metabolism, and the immune system function [6, 7].

Clarification of the human being's need for energy and nutrition, with the updated knowledge underpinning the newly formulated methodological recommendations "Standard Physiological Need for Energy and Nutrition among Various Population Cohorts of the Russian Federation" (MR 2.3.1.0253-21), which became the basis for the development of a new edition of the Decree of the Ministry of Health of Russia No. 614 "Rational Standards of Food Consumption Meeting Current Healthy Nutrition Requirements (Recommendations)" [8, 9].

Identification of the fundamentally new mechanisms of interaction of biologically active substances and their effect on the body, as well as proving their essential properties (L-carnitine, dihydroquercetin, polyunsaturated fatty acids, polyphenols, flavonoids, vitamins, etc.) [10, 11].

In progress: metagenomic studies of the intestinal microbiome as it relates to the features of nutrition, including in case of alimentary-dependent diseases [1].

We formalized a fundamentally new scientific field of medicine: anthroponutriology. It emphasizes the leading role of nutritional factors in physical development and enables personalized optimization of nutrition and lifestyle, accounting for the parameters of basic metabolism, muscle function, which generally determine the risk factors for cardiovascular, endocrine, gastroenterological diseases, diseases of the musculoskeletal system (depending on the somatotype). We conducted a comprehensive examination of the nutritional status and functional capacity of top tier athletes, discovered basic-level flaws in the structures of their diets, and suggested personalized remedial measures. The effectiveness of immunity boosting biologically active substances (L-carnitine, coenzyme Q10, anthocyanins, capsaicin, ginsenosides, etc.) was proven in experiments that involved athletes practicing various sports, with their current professional activity phase factored in [12–14].

Development of an interdisciplinary approach to early prevention of obesity based on the knowledge of nutritional factors triggering obesity in childhood, including in breastfed children; the approach was incorporated into methodological recommendations "Early Prevention of Obesity in Children." The results of the respective research are included in the "Program of Optimization of Feeding of Children in the First Year of Life in the Russian Federation" and the "Program of Optimization of Nutrition of Children Aged 1 to 3 years in the Russian Federation." There were developed approaches to dietary therapy of epilepsy for children based on the ketogenic diet, which are included in the clinical recommendations "Glut1 deficiency syndrome." Studies of the eating behavior of schoolchildren and the factors that determine it are the basis of methodological recommendations MR 2.4.0312-22 "Additional Nutrition in Educational and Health Organizations for Children." Long-term studies of the nutrition of women during pregnancy and breastfeeding formed the basis of the monograph "Nutrition of Pregnant and Lactating Women. Breastfeeding" [15–17].

Investigation of the risk factors for development of osteoporosis in children with chronic liver diseases, including concomitant pathologies, drug therapy associated with the development of osteoporosis, decreased physical activity, and insufficient intake of calcium and vitamin D with food [18].

Investigation of the allergens that cause food allergies in children and adolescents. There were suggested methods of step-by-step diet therapy that promote the formation of oral tolerance, and developed formulations of alternative food products for patients with food allergies that enable diet therapy personalization and malnutrition prevention; The research efforts also studied the biomarkers of immune inflammation that predict the development of severe clinical manifestations of food allergy [19–21].

The analysis of single nucleotide polymorphisms that enabled molecular-level examination of the role played by nutrition in maintaining health or developing various diseases; together with clinical, molecular biological and epidemiological studies, it is important to the matter of nutrition optimization. The use of nutrigenomics methods allowed understanding the significance of interaction of genes and food components in the etiology and pathogenesis of obesity, which is a significant risk factor for cardiovascular diseases, type 2 diabetes, etc. Differences in the frequency of occurrence of gene

polymorphisms associated with obesity have been established for the regions of the Russian Federation. Studies have shown the role of the said polymorphisms in the development of nutritional deficiencies, including those associated with insufficient amounts of vitamins (in particular, vitamin D). There were established the diagnostically valuable features of gene polymorphism in obese patients, including those with type 2 diabetes; low vitamin D availability, anxiety and depression have been discovered in patients with obesity and degenerative spinal diseases [1, 22].

Study of the nutritional risk factors for non-alcoholic fatty liver disease, with description of the characteristic nutritional patterns that increase the risk of the disease, and design of innovative specialized food products to correct the said patterns that enable effective treatment and prevention of non-alcoholic fatty liver disease and its complications [23].

The results of 10 years of research on chemical composition of Russian-made food products conducted by the Federal Research Center for Nutrition, Biotechnology and Food Safety are summarized in the 4th edition of the "Chemical Composition of Russian Food Products" reference book. The book was developed and prepared for publication as part of the implementation of the "Public Heath Reinforcement" federal project of the Demography national project, with the participation of the Federal Service for the Oversight of Consumer Protection and Welfare (Rospotrebnadzor). Industry research institutes and unions of manufacturers of various food products also took part in the work on the reference book. For the first time, a printed publication provides data on the composition of specialized food products present on the Russian consumer market; the new edition also contains significantly reviewed and updated data on the composition of bread, fish and fish products, dairy products, fruits and vegetables [24].

The "Strategy for Improving the Quality and Safety of Food Products in the Russian Federation until 2030", approved by Decree of the Government of the Russian Federation of 29.06.2016 No. 1364-r (hereinafter referred to as the Strategy), along with the action plan for its implementation approved by Decree of the Government of the Russian Federation of 19.04.2017 No. 738-r, promote healthy dietary patterns in different Russian population cohorts. The strategy is focused on providing adequate nutrition, preventing diseases, increasing the duration and improving the quality of life, stimulating the development of production and sales of food products of proper quality on the market.

There were developed and implemented methodological recommendations MR 2.3.0122–18 "Color Coding Food Labels for Consumer Information"; they contain unified approaches to colors used on food labels depending on the content of critically important substances in it, including added sugar, salt, saturated fatty acids, and transisomers of fatty acids (measured against the recommended daily intake), which allows raising the consumers' awareness and enables them to make an informed and correct choice of foods for a healthy diet [25].

One of the most important tasks of the state policy is to saturate the consumer market with high-quality food products to ensure proper nutrition of the population, prevent diseases, and stimulate the development of production.

In order to optimize the provision of micronutrients to the Russian population and prevent vitamin deficiency, it is advisable to legislate fortification with vitamin D and B vitamins of mass-consumption foods such as bread and milk. Fortification of the diet is a strategy that is safe and effective in prevention or minimization of micronutrient deficiencies. There have been developed several approaches to this practice [26, 27].

Biofortification involves increasing the micronutrient value of food products through plant or animal breeding, use of genetic engineering, agronomic techniques relying on fertilizers or protective agents, and the enrichment of farm animal feed with micronutrients. Under this approach, the micronutrient, entering the animal's body, goes through biotransformation, and is ultimately consumed by humans in its natural form, which negates the arguments of opponents of the use of synthetic vitamins.

In high-income countries, along with application of this approach, the food has been artificially fortified for more than 100 years now: essential micronutrients (vitamins and mineral salts) are added thereto during production. Large-scale fortification means the mandatory or voluntary addition of micronutrients that are scarce in the usual diet of a given population, with the target foods being those most commonly consumed. The purpose of large-scale fortification is to reduce the frequency and severity of micronutrient deficiency and correct micronutrient-related disorders in the general population. The effectiveness of mandatory food fortification depends on the initial saturation of the population with micronutrients, the incidence of deficiency-related conditions, the correct choice of the product to be fortified, which depends on its share in the diet structure, habits of the population and its availability thereto, effectiveness of quality control, degree of fortification, and regular monitoring and evaluation of consumption of the fortified products.

There is scientific and practical evidence that the use of fortified mass-produced foods increases the amount of micronutrients consumed (their blood serum content grows), and reduces the incidence of anemia, goiter, and the likelihood of neural tube defects. According to the "Fundamentals of Russia's State Policy in the Field of Healthy Nutrition," the proportion of foods fortified with vitamins and minerals should be 50% of the total output of bread, but until recently, the share of bakery products high in vitamins and minerals was insignificant. Expanding the range and increasing the produced volume of fortified foods will improve micronutrient consumption in the country, provided the consumers make informed choices of micronutrient-rich products.

Increasing the market share of foods with preventive properties, which have a special chemical composition, will help to solve the micronutrient deficiency problem, reduce calorie counts, and improve the nutritional density of the diet both in organized groups and in individual consumption. In recent years, the range of such products has grown significantly, but they are often designed without regard to the preventive goals and lacking the necessary medical and biological justification of the composition and declared properties. The range of vitamin-like and minor food components with antioxidant properties used in the formulation is expanding. There are foods with processed fruit and berry materials (pomace, black currant berries, etc.) that combine the properties of two types of substances, dietary fiber and antioxidants, as functional components [28].

It is necessary to implement measures aimed at explaining to the population the importance of micronutrients and consumption of vitamin-mineral supplements and fortified foods. There is an obvious need for a state-level integrated approach to the design of fortified mass-consumption and specialized products. It is important to develop a system of recommendations for the food industry that defines

the priorities in the field of forming healthy diets and providing the population with all essential nutrients, with an emphasis on micronutrients.

In this area, a serious problem is the virtually lacking domestic production of food ingredients and substances (protein isolates and concentrates, amino acids, vitamins, food additives, enzyme preparations, biologically active substances, starter cultures, and probiotic microorganisms). The nation still depends on imports of vitamin-mineral polyunsaturated fatty acids, premixes, long-chain nucleotides, and prebiotics (oligosaccharides). One of the solutions to the problem of import substitution in this sector of the food industry is the restoration of the domestic biotechnological industry [25].

We believe that implementation of "Health for Everyone" federal project would benefit from measures seeking to develop and deploy high-end technologies for personalized, therapeutic, and functional nutrition designed for health preservation, which would be directly related to the creation of innovative food products and their mass production.

In 2021, devised by the Presidium of the Russian Academy of Sciences and the Federal Research Center for Nutrition, Biotechnology and Food Safety, there was launched the "Health Preservation, Nutrition, Demography" consortium, which is an effective tool creating conditions needed to fully commercialize and mass-produce the newly developed foods for personalized and functional nutrition. It is a comprehensive, full-cycle R&D project that includes activities from fundamental and exploratory research in the field of specialized food products for all groups of the Russian population to large-scale production and saturation of the country's consumer market with them. This project is being implemented under the leadership of the Russian Academy of Sciences with the support of the Russian Ministry of Education and Science, the Russian Ministry of Health, and Rospotrebnadzor. Its direct participants as industrial partners are domestic producers of fortified and specialized food products, as well as raw materials components.

The number of industrial partners of Consortium increases every year, which indicates a growing interest the Russian business has towards research and innovative activities in the field of high-end technologies for personalized, therapeutic, and functional nutrition products for health preservation.

CONCLUSION

Thus, the problem of optimizing the nutrition of the Russian population and ensuring the quality of domestic food products is intersectoral and interdisciplinary. It has to do with implementation of the state policy in the field of food safety and public health, and finding the right solution thereto requires an integrated approach and interdepartmental interaction of the Russian Academy of Sciences with the Ministry of Education and Science of the Russian Federation, the Ministry of Health of the Russian Federation, Rospotrebnadzor, and other interested federal executive authorities, with the participation of the Federal Research Center for Nutrition, Biotechnology and Food Safety and other specialized research centers.

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