



# The problem of transition from curative to preventive medicine in the 21<sup>st</sup> century (A brief overview of the state of medicine at the present stage)

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## Opinion

Even Confucius rightly believed that the causes are more important than the results, and this is directly related to human diseases. More than 150 years ago, the great Russian surgeon N.I.Pirogov predicted that the future belongs to preventive medicine. Interestingly, in what time we live in relation to N.Pirogov, if in 2016 at the All-Russian Youth Educational Forum it was proclaimed that prevention is the main principle of future medicine (again someday). But in 1937 the famous American expert and medical historian Henry Sigerist wrote that the era of a thousand-year predominance of medicinal medicine ends and the era of preventive medicine begins, the foundations of which appeared in the USSR. Even the famous scientist Claude Bernard believed that every doctor should know three things: the health conditions to support them, the conditions for the development of diseases to prevent them, and the conditions for recovery to use them. Unfortunately, there is no idea in our society that doctors should be engaged not only in treatment, but also in the causes of diseases and factors affecting them yet.

The beginning of this new paradigm was the well-known longitudinal study of health in the small American town of Framingham. The generalization of the results of such studies allowed WHO to formulate the concept of risk factors for various diseases, which served as the basis for prevention and made it possible to organize preventive care. Of course, medical medicine has not yet exhausted itself, and its technological capabilities require a wider distribution, and not concentration only in large clinics. And for some time, medical medicine can be combined with

preventive medicine, but this must be seriously addressed. Primary or social prophylaxis is focused on creating and maintaining factors and conditions that promote health, secondary or social and medical prophylaxis is aimed at preventing and early detection, especially of those diseases that are easily exposed to the early stages (this includes vaccination, immunization, preventive examinations and screenings, clinical examination of health contingents), and tertiary or medical prophylaxis is focused on preventing the transition of the disease to a more severe or more severe form, exacerbations, partial or full recovery of health and disability for medical reasons (this includes treatment in all its diversity and clinical examination of chronically ill).

Attempts to develop preventive medicine in our country have been made before: the institute of preventive medicine was organized, in some places periodic and targeted examinations, screenings were conducted, markers were searched for the early detection of a number of diseases, and the foundations of social or factorial predisposition to diseases, many polyclinics of prevention, in the examination rooms were measured temperature and blood pressure on both hands, a gynecological examination of all women who came to the doctor, and a digital examination of the rectum in men of a certain age were carried out (now there are new opportunities for this), a program of medical examination of the entire population that was not implemented was created, a program of conducting routine preventive examinations, most of which are assignments because of the money allocated to them, was launched, and attempts were made to prepare a doctor preventive.

**We believe that now the development of the not fully implemented prophylactic direction of domestic health care should be moved as follows:**

a. Training doctors at the undergraduate and postgraduate level (it should be radically changed), the

creation of public health schools. These schools should have two streams of applicants doctors with the requirements for continuing medical education in fundamental, analytical medicine and biostatistics; on health policy and organization; on prevention and a healthy lifestyle; on epidemiology and hygiene; quality management of medical care and evidencebased medicine; primary health care; according to the methodology of drafting strategies, concepts, programs and projects; according to the methodology of analysis of health status and choice of priorities; on economics, efficiency and health financing; continuous improvement of health care; on placement and leadership; on the relationship of doctors with patients and local authorities. The second stream of applicants should be from the public sphere (engineers, economists, lawyers, teachers, the deputy corps and others) for their preparation in the Public Health field according to a truncated program with the addition of knowledge on the role and place of healthcare and medical care in modern society, according to social medicine, health literacy, mass physical education and good nutrition, the Health for All program, nursing, leadership selection and first aid. In fact, it will be a wellprepared healthcare asset or paramedics, promoting the promotion of sanitary and medical knowledge, improving public health. They should represent the interests of people and medical organizations in government and in civil society.

Total in Europe, there are hundreds of public health schools united in a single association, ASPHER. In Russia, they are in St. Petersburg, Arkhangelsk and other cities. In Moscow, at the I.M. Sechenov Medical Academy, the Higher School of Health Care Management was created, which is somewhat different from public health schools (PHS).

One of the best such schools is the Scandinavian Nordic School of Public Health in Gothenburg, Sweden, which was established more than 50 years ago. It provides compulsory postgraduate education for graduates of medical faculties who study 5.5 years at the universities of Lund, Gothenburg, Uppsala, Umea, Linking and Stockholm (Carolina Institute). Postgraduate education begins with an internship (21 months) in several major specialties. Then graduates receive a license for nonindependent work under the supervision of an experienced professional. Then, after 4 years of work, postgraduate education continues in one of 60 medical specialties and only after that, after passing a certain test, you can get a certificate of a specialist list. In total, the preparation of a doctor has been conducted for 11.5 years. Particularly noteworthy was the KazakhKazakhstan School of Public Health organized in Almaty (Kazakhstan) in 1997.

b. Medicine should be concentrated in droves for a number of visuals that are easily diagnosed with

the help of preventive examinations, selfexamination and screenings, which can be detected on forms and types of diseases on their possibly early detection for effective treatment. This group of diseases is psychologically determined and makes up the majority of patients in polyclinics. Accordingly, they are easily treated on the basis of special treatment protocols and do not require special diagnostic methods. This group of patients also does not require the involvement of highly specialized specialists at the level of centers at the regional or federal level. For their treatment and prevention, there are centers of health and clinical prevention.

However, the wrong tactics chosen in systemic prophylaxis can have negative consequences. D. Rose formulated the idea of a preventive paradox: great successes on a societal scale may be of little significance for each individual participant. On the other hand, insignificant negative consequences for each individually lead to enormous losses at the level of society. Moreover, negative consequences in the form of increased mortality were also observed with the correction of hypercholesterolemia. On this occasion, D. Rose wrote that in the study, cholesterollowering drugs may have killed more than they saved.

c. A more complex issue is the diagnosis for difficulttorecognize diseases that are severe and

practically not yet completely treatable. What is most difficult is the identification of these diseases at the level of already formed fatal complications. The treatment of which is problematic due to the high costs in both technological and economic aspects. In such patients, new principles of approach to preclinical diagnosis are required. In recent years, the prevalence of diseases has been gained by determining their predisposition using informative immunogenetic markers and tests in order to then link them to real life social factors and conditions, which will increase alertness for many serious diseases.

In life sciences and their practical applications, genetics plays the role of a central, integrating link, since human development, the formation of organs and tissues, cell differentiation, biochemical and physiological processes, and interaction with the environment are controlled based on information encoded in its genome. All metabolic processes are also genetically controlled. That is why in world bibliographic systems more than 30% of all publications in the field of life sciences are related to genetics and its applications.

In the past 20 years, the development and improvement of genetic technologies has taken place against the backdrop of a methodological revolution in the study of the molecular genetic level of organization of living systems and the emergence on this basis of omix technology (genomics, transcriptomics, proteomics, metabolomics). The development of sequencing methods and

the reduction in the cost of decoding genomes have led to the accumulation of huge amounts of information: by 2018, tens of thousands of genomes of various types of eukaryotes have been deciphered. Methods for the study of complete transcriptomes of tissues, cells, and individual genes are rapidly developing, providing valuable information on gene expression and their regulation; Methods for studying genetic variation based on microarray technologies and highperformance genome sequencing are being improved.

Improving the methods of electrophoresis, chromatography and mass spectrometry has led to the difficulty of organizing living systems at the proteomic and metabolic levels: millions of proteins are expressed in animal and plant cells, the amount of which is much larger than the number of genes in their genomes, which allows fine regulation molecular genetic processes in living systems. Bioinformatics and systemic computer biology are rapidly developing, without which it is unthinkable to conduct hightech biological research. They play a key role in the integration and analysis of experimental data, modelling the features of the structural and functional organization of living systems and planning new experiments. That is why in developed countries the development of genetic technologies is carried out with largescale and systematic support from the state and business.

In Russia, in recent decades, both in fundamental genetics and in the development of genetic technologies, a catastrophic lag has been observed due to the lack of support from the state and business. It is no coincidence that Russian President Vladimir Putin recently at a meeting of the Council on Science and Education instructed the scientific community to develop a program of largescale genomic

research in the Russian Federation in order to develop new drugs and new medical technologies on this basis. To eliminate this lag and the transition to accelerated development, it is necessary to intensify research and development in critical areas of fundamental genetics and its applications, aimed at introducing modern genetic technologies into practice.

Particular attention should be paid to the pointofcare examination of healthy contingents in order to prevent the occurrence of a particular disease, and the examination of chronically ill patients for the prevention of fatal complications. As you know, a universal cure for cancer does not yet exist, and all efforts are aimed at suppressing the growth of atypical cells. Moreover, it is impossible to protect yourself from cancer with the help of a healthy lifestyle, sports and diets. The solution to cancer lies in the field of immunogenetic research. The genome is a combination of hereditary material contained in the cell of the body. Therefore, at first it is necessary to determine the genome (or their totality), which is responsible for the appearance of various forms of cancer, then to connect the identified genotype with the phenotype, that is, with the conditions for the onset of functioning of this gene. And when all of this for prevention becomes clear and proven, then we can begin to identify gene technologies, that is, possible effects on the genome, which in essence will relate to treatment.

Thus, the prevention of diseases, including predisposition and prenosological diagnosis, should not only expand, but also deepen. We must not forget that the keys to a number of diseases are at the immunogenetic level and can only be identified by research and experimental methods.