
**PECULIARITIES OF PROFILING AND PROBLEMS
OF TEACHING BIOLOGICAL AND BIOORGANIC CHEMISTRY
FOR STUDENTS STUDYING UNDER THE EDUCATIONAL
AND PROFESSIONAL PROGRAM "PEDIATRICS"**

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ABSTRACT

Background. The methodical article covers to problematic issues of higher education in general, and medical education in particular, as well as specialized teaching of biological and bioorganic chemistry in medical institutions of higher education, for students studying in the specialty "Pediatrics" and the importance of mastering the relevant skills and abilities taking into account the chosen specialization in the field of medicine.

The aim of the study was to analyze, systematize and develop general approaches to the further improvement of specialized educational materials in biological and bioorganic chemistry for level 2 (master's degree) students majoring in specialty 228 "Pediatrics".

Materials and Methods. General scientific research methods, namely analysis and synthesis were used. Scientific literature, educational programs and normative documents of higher medical education were investigated. Bibliosemantic method and system analysis method were used.

Results. The issues of professional competence formation of future doctors studying under the educational and professional program (EPP) "Pediatrics" were considered, taking into account the age characteristics of metabolic processes and regulation of biochemical processes. The problems and relevance of the level of formation of the professional competence of teachers of medical institutions of higher education and its development in our time, taking into account the socio-economic and political situation and the ongoing russian aggression, were discussed. The effectiveness of the profiling process largely depends on the creation of optimal methods of learning, which include the preparation of profiled EPPs, work programs of educational disciplines and syllabuses created on their basis. Owing to the study of issues of age-related biochemistry, peculiarities of biochemical processes in childhood, students' motivation to learn the educational material increases and a stable interest in the chosen profession is formed.

Conclusions. One of the tasks for the integration of the higher school into the European educational space is to increase the level of competence of pediatricians studying by EPP "Pediatrics" from the point of view of the teaching staff's mastery of innovative teaching methods and readiness for their implementation in the pedagogical process due to profiling of various sciences for their more thorough study.

Keywords: *specialized teaching, age biochemistry, pediatrics, quality of medical education.*

Introduction

Despite the rather long existence of an independent state, Ukraine still, unfortunately, has not

been able to overcome the socio-economic crisis, which is certainly deepened by the ongoing russian aggression. The crisis is also clearly evident in the system of higher education, in particular medical education. Steps to reform university education have been taken a long time ago, but they are so superficial and poorly coordinated that they do not solve urgent problems [1]. The decline in the quality of education and the residual principle of its financing, the breakdown of information links, the backwardness of the material and technical base

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of higher education, the outflow of teaching staff abroad, which is connected both with the ongoing military aggression and with a sharp devaluation of the status of teaching and scientific activity, as well as inadequate material support and social protection of the teaching staff and students of education – all this creates real threats to the national security of the country in the future after our victory [1]. As a result, as of now, higher education in general and medical education in particular in Ukraine is becoming uncompetitive, inferior to the level of education in developed countries and practically not recognized by the European community. Such an unfavorable situation requires well-thought-out and systematic reforms to give the opportunity to realize the enormous intellectual potential that exists in our society.

The fact is indisputable that, even at the current stage of development of the Ukrainian state, taking into account the ongoing Russian aggression, education, in particular, higher medical education, should remain a development priority as the future "cornerstone" around which the state will be built after our victory. The extremely difficult modern conditions in which our state finds itself pose the task of revising the goals and responsibilities of education [2]. The directions of the development of the education system are aimed at accelerated development in comparison with other areas of society, since education is related to the development of human potential and, at the same time, prepares leaders and specialists to ensure reforms in other areas of human activity [3]. The need for accelerated development of the education system, as is accepted in the developed countries of the world, is the basis of the concept of the educational process in new realities and provides an opportunity for all participants of the educational process to obtain the highest level of competence [4; 5]. The proof of the transition to a new model of education is the rejection of the passive role of participants in the process, the recognition of only an active position and, for this purpose, the determination of the personal trajectory of education by each student, which gives the opportunity to work fruitfully in the conditions of the newly formed information society [6].

Modernizing the Ukrainian higher education system according to the European model is the most acceptable method of reforming it today, where, in particular, in higher medical education, emphasis is placed on practical-oriented teaching and clear profiling of future specialists [7]. It is necessary to finally eliminate the post-Soviet lega-

cy with its overloading of the theoretical component of education at a higher medical school. State should contribute in every way to the creation and development of powerful university clinics based on European models, which will allow to significantly improve the quality of medical care for the population, ensure the competitiveness of future medical specialists on the domestic and international labor markets [8].

It is clear that most of the processes at the tissue and cellular levels of living matter have already been deciphered and further research is highly relevant only if they are carried out at the molecular and submolecular levels. Therefore, the significance of biological chemistry as the main fundamental discipline is indisputable, and the development of models for its further structuring and profiling are priorities for a higher medical school [9].

The aim of the study was to analyze, systematize and develop general approaches to the further improvement of specialized educational materials in biological and bioorganic chemistry for level II (master's degree) students majoring in specialty 228 "Pediatrics".

Materials and Methods

General scientific research methods, namely analysis and synthesis were used. Scientific literature, educational programs and normative documents of higher medical education were studied. Bibliosemantic method and system analysis method were used.

Results and Discussion

Biological chemistry is still one of the leading fundamental disciplines in the system of higher medical education. At the current stage, it is developing at a rapid pace and has achieved great success in such sections as molecular biology, biochemical genetics, genetic engineering, and so on [9]. In this regard, a modern doctor must be a professional, armed with advanced scientific knowledge, able to make decisions and act in non-standard conditions, be communicative, have a creative and proactive approach to work. These requirements become especially relevant in the training of future pediatricians, because the main integral indicator according to WHO recommendations, which characterizes the quality of medical care in developed countries, is, namely, child mortality, in particular, the number of deaths in the age group of children under one year per 1,000 newborns.

To educate and train a highly qualified pediatrician in the course of teaching biological chemistry, it is necessary to take into account scientific

data from other experimental disciplines, taking into account age characteristics. Pediatricians deal with children's bodies, which are constantly developing and transforming. During the ontogenetic development of a person, there are changes in the metabolism of substances and energy, both quantitatively and qualitatively. Each age period corresponds to a state of metabolism that provides an optimal ratio of plastic and bioenergetic processes. With age, the ratio between the main phases of metabolism (anabolism and catabolism) gradually changes. In certain age periods, children are especially vulnerable, sensitive, and their resistance, in particular immunological, may be reduced. It is necessary to remember the peculiarities of the development and energy supply of the functioning of the central nervous system at various stages of the development of the child's body, and, especially, in early childhood, when the basis for the so-called higher nervous activity is formed. All this should be taken into account by pediatricians, because they are responsible for the mental and physical health and development of the child, and it is during childhood that a person acquires the "main margin of strength" that should serve him throughout his life.

Profiling (profilization) in the teaching of biological chemistry for students studying by EPP "Pediatrics" is a necessary, most promising and, at the same time, difficult direction in the implementation of the educational process. Pediatric students must learn about the peculiarities of the course of biochemical processes in normal and pathological conditions, taking into account the anatomical and physiological features of the child's body in each of the periods of its development. Also, the study of the peculiarities of metabolism in childhood, even in the presence of relevant information in the educational literature available to students, taking into account the lecture hours, created certain difficulties in the assimilation of this material. Therefore, it was extremely necessary to prepare high-quality methodological materials of the management type, in particular, appropriate work training programs for disciplines and syllabuses, for the correct organization of students' work, with the aim of creating conditions for the most effective assimilation of topics, which contain the necessary amount of specialized educational material for the students of the EPP "Pediatrics". In this regard, the Department of Biological and Bioorganic Chemistry of Poltava State Medical University has developed a working curriculum for biological and bioorganic che-

mistry and the corresponding syllabus on the basis of the EPP "Pediatrics", which include profile questions featuring the peculiarities of the chemical composition and exchange processes in the children's body. In the practical classes, specialized questions from pediatrics containing elements of age-related biochemistry are considered, in particular, data are given on the need for food substances, nuances of their digestion and absorption, features of energy, carbohydrate, lipid and protein metabolism, maintenance of water-electrolyte balance, regulatory action of vitamins and hormones. The age-related features of the biochemical composition of blood, urine and other biological fluids in normal and pathological conditions are discussed. For example, when considering the topics of the "Enzymology" section, the issues of qualitative and quantitative characteristics of the enzyme spectrum in different age groups are highlighted. At the same time, it is emphasized that in early childhood, a number of enzyme systems are not fully formed, in particular, this applies to the enzymes of the gastrointestinal tract. All this requires the pediatrician to pay close attention to the organization of proper feeding of children in early childhood. Issues of changes in the activity of the isoenzyme spectrum of lactate dehydrogenase, creatine phosphokinase, alkaline and acid phosphatases, etc., which ensure the processes of metabolic and diagnostic differentiation of cells, are considered. All this allows us to conclude that the formation of enzyme systems in ontogeny proceeds at different speeds depending on age. Vitamins are involved in the functioning of a number of enzymes. Data related to the needs of individual vitamins at different age periods of a child's life, their characteristics, as well as the biological role of water-soluble and fat-soluble vitamins in children are considered in practical classes with students studying by EPP "Pediatrics". At the same time, assessing the role of each of these vitamins in metabolic processes, the causes of vitamin deficiency, as well as hypervitaminosis in childhood and the clinical manifestations of the resulting pathologies are discussed. In the practical classes devoted to the consideration of neurohumoral regulation of metabolism, information is given about the peculiarities of the synthesis and secretion of hormones of the hypothalamic-pituitary system, hormones of the thyroid, pancreatic, parathyroid, and adrenal glands. When considering topics from bioenergetics, the specifics of the energy needs of individual organs at different periods of a child's life are emphasized,

and the issues of energy supply of the central nervous system at the age of one year are carefully considered at the molecular level.

When considering the topics devoted to the exchange of proteins and amino acids, the leading role of these substances as the main plastic material in the growing body is noted, data on the daily need for proteins and essential amino acids in different age periods are given. We also pay attention to the digestion and intracellular metabolism of amino acids in children. We emphasize that the main and most complete source of proteins and amino acids in early childhood is mother's milk, we emphasize the priority of breastfeeding. In practical classes on carbohydrate metabolism, we pay attention to the peculiarities of the metabolism of glucose and other monosaccharides (fructose, galactose) in different periods of childhood. Emphasis is placed on the value of lactose in breast milk in the first months of a child's life. On the basis of the acquired knowledge, we are trying to form the clinical thinking of future pediatricians regarding the molecular mechanisms of the occurrence of various disorders of carbohydrate metabolism, both at the stage of digestion (malabsorption syndrome, maldigestion, etc.), as well as at the stage of intracellular metabolism of monosaccharides (fructosemia, hereditary fructose intolerance, galactosemia, glycogenoses and aglycogenoses). In topics devoted to lipid metabolism, we consider the peculiarities of the digestion of individual classes of lipids, the difference in the lipoprotein spectrum of blood and cholesterol metabolism in children of different age groups. We emphasize that water-electrolyte exchange in children is characterized by high lability, immaturity of its regulation mechanisms, especially in early childhood. Considering the sections "Biochemistry of blood" and "Biochemistry of urine", we draw the attention of students to the peculiarities of the physicochemical properties and chemical composition of these biological fluids at different times of the child's ontogenesis, we discuss the functions and biological role of individual components of blood and urine, their significance in the

diagnosis of children's diseases age. All this will undoubtedly help the future pediatrician to correctly use biochemical indicators of blood and urine in the diagnosis and treatment of specific nosological units of children's pathology. We emphasize that the main questions of the clinical and biochemical characteristics of the pathological conditions of various organs and tissues (diseases of the liver, kidneys, connective and muscle tissues, hemostasis and anti-hemostasis systems, the central nervous system and the cardiovascular system, etc.) will be considered during the study of the elective component "Clinical Biochemistry", which is included in the EPP "Pediatrics".

Conclusions

Therefore, knowledge of the peculiarities of metabolism in the child's body, which are considered as profile questions in the study of the discipline "Biological and bioorganic chemistry", will help the future pediatrician in assessing the state of metabolic processes in the norm and in pathology, will provide a general idea of the formation of metabolic processes in different age periods of ontogenesis.

Prospects for further research

This study will allow to determine the optimal steps on the way to the formation in the future of a new practical-oriented elective component "Clinical biochemistry of children's age" for students studying in specialty 228 "Pediatrics".

DECLARATIONS:

Disclosure Statement

The authors have no potential conflicts of interest to disclosure, including specific financial interests, relationships, and/or affiliations relevant to the subject matter or materials included.

Statement of Ethics

The authors have no ethical conflicts to disclosure.

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