

**ROLE OF INTERDISCIPLINARY APPROACH IN TEACHING THE SUBJECTS
“BIOORGANIC AND BIOLOGICAL CHEMISTRY” AND “MEDICAL BIOLOGY”***M.V. Dikal, O.H. Cherniukh, T.M. Bilous, V.H. Khomenko*

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Keywords:*interdisciplinary approach, interdisciplinary relations, clinical thinking, medical students.**Bukovinian Medical Herald. V.23, № 2 (90). P. 40-45.***DOI:***10.24061/2413-0737. XXIII.2.90.2019.31**E-mail: dikalmariana@gmail.com, chernyukh.oksana72@gmail.com, bilous.tetiana@bsmu.edu.ua, khomenko.violeta@bsmu.edu.ua***Objective:** *to achieve a maximal level of interdisciplinary approach in teaching the subjects “Bioorganic and Biological Chemistry” and “Medical Biology” with the purpose to improve the level of knowledge and analytical comprehension of metabolic process regularities and peculiarities of their disorders in man.***Material and methods.** *The tasks of the investigation are to design both unidirectional and mobile bidirectional integration patterns of theoretical subjects on the base of common learning topics and processes involving both horizontal and vertical structural disciplinary formations. Cumulative-comparative and logic-analytical analysis of educational curricula and their application in the educational process are necessary from the point of view of practical interdisciplinary integration.***Results.** *Correct and content integration of the educational process in training medical specialists should be based on an integral understanding of the major biological, biochemical, histological and anatomical characteristics of the human body on the whole. Systemic interdisciplinary approach in teaching enables to train specialists with a qualitatively new level of clinical thinking, who are able to evaluate patient's condition by means of integration of acquired knowledge and skills, results of biochemical, anatomical, clinical and instrumental methods of the research.***Conclusions.** *Implementation of interdisciplinary integration into the educational process in teaching the subjects “Bioorganic and Biological Chemistry” and “Medical Biology” will ensure the formation of both one-sided (Biology-Chemistry) and two-sided (Biology-Chemistry-Biology) interdisciplinary interaction directed to the development of systemic clinical thinking, cognitive activity and independent work. Therefore, none of the educational subjects isolated from others is able to form professional competence of a future medical specialist.***Ключові слова:***міжпредметна інтеграція, міждисциплінарні зв'язки, клінічне мислення, студенти медичних спеціальностей.**Буковинський медичний вісник. Т.23, № 2 (90). С. 40-45.***РОЛЬ МІЖПРЕДМЕТНОЇ ІНТЕГРАЦІЇ ПРИ ВИВЧЕННІ
ДИСЦИПЛІН «БІООРГАНІЧНА І БІОЛОГІЧНА ХІМІЯ» ТА
«МЕДИЧНА БІОЛОГІЯ»***М.В. Дікал, О.Г. Чернюх, Т.М. Білоус, В.Г. Хоменко***Мета роботи** — досягнення максимального рівня міжпредметної інтеграції при викладанні дисциплін «Медична біологія» та «Біоорганічна та біологічна хімія» з метою покращення рівня знань та підвищення аналітичного розуміння закономірностей метаболічних процесів та особливостей їх порушень у людини.**Матеріал і методи.** Створення як однонаправлених, так і мобільних двосторонніх схем інтеграції теоретичних дисциплін на базі спільних тем, процесів, що вивчаються із залученням як горизонтальних, так і вертикальних структурних міждисциплінарних формувань. Сукупно-порівняльний та логіко-аналітичний аналіз навчальних робочих планів та застосування їх у навчальному процесі з точки зору практичної міждисциплінарної інтеграції.

Результати. Правильна та змістовна інтеграція навчального процесу при підготовці спеціалістів медичного профілю повинна ґрунтуватися на цілісному розумінні основних біологічних, біохімічних, гістологічних та анатомічних особливостей організму в цілому. Системний міждисциплінарний метод навчання дозволяє підготувати фахівців з якісно новим рівнем клінічного мислення, які здатні адекватно оцінити стан пацієнта з допомогою інтеграції набутих знань та навичок, результатів біохімічних, анатомічних, клінічних та інструментальних методів дослідження.

Висновки. Упровадження інтеграції міжпредметних зв'язків у навчальний процес при викладанні дисциплін «Біоорганічна і біологічна хімія» та «Медична біологія» забезпечить формування як односторонніх (біологія-хімія), так і двосторонніх (біологія-хімія-біологія) міждисциплінарних взаємодій, які спрямовані на розвиток системного клінічного мислення, пізнавальної активності та самостійності. Отже, жодна навчальна дисципліна, ізольована від інших, неспроможна сформувати професійну компетентність майбутнього медика.

Ключевые слова:

межпредметная интеграция, междисциплинарные связи, клиническое мышление, студенты медицинских специальностей.

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РОЛЬ МЕЖПРЕДМЕТНОЙ ИНТЕГРАЦИИ ПРИ ИЗУЧЕНИИ ДИСЦИПЛИН "БИООРГАНИЧЕСКАЯ И БИОЛОГИЧЕСКАЯ ХИМИЯ" И "МЕДИЦИНСКАЯ БИОЛОГИЯ"

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Цель работы — достижение максимального уровня межпредметной интеграции при преподавании дисциплин "Медицинская биология" и "Биоорганическая и биологическая химия" с целью улучшения уровня знаний и повышения аналитического понимания закономерностей метаболических процессов и особенностей их нарушений у человека.

Материал и методы. Создания как однонаправленных, так и мобильных двусторонних схем интеграции теоретических дисциплин на базе общих тем, процессов, которые изучаются с привлечением как горизонтальных, так и вертикальных структурных межпредметных формирований. Совокупно-сравнительный и логико-аналитический анализ учебных рабочих планов и применение их в учебном процессе с точки зрения практической междисциплинарной интеграции.

Результаты. Правильная и содержательная интеграция учебного процесса при подготовке специалистов медицинского профиля должна основываться на целостном понимании основных биологических, биохимических, гистологических и анатомических особенностей организма в целом. Системный междисциплинарный метод учебы позволяет подготовить специалистов по качественно новому уровню клинического мышления, которые способны адекватно оценить состояние пациента с помощью интеграции приобретенных знаний и навыков, результатов биохимических, анатомических, клинических и инструментальных методов исследования.

Выводы. Внедрение интеграции межпредметных связей в учебный процесс при преподавании дисциплин "Биоорганическая и биологическая химия" и "Медицинская биология" обеспечит формирование как односторонних (биология-химия), так и двусторонних (биология-химия-биология) междисциплинарных взаимодействий, которые направлены на развитие системного клинического мышления, познавательной активности и самостоятельности. Следовательно, ни одна учебная дисциплина, изолированная от других, неспособна сформировать профессиональную компетентность будущего медика.

Проблеми вищої медичної освіти

Introduction. According to the principles of Bologna process improvement and enhancing the quality of modern medical education in Ukraine is a priority task today ensuring the formation of an integrated educational-scientific space in Europe and increasing a number of competitive specialists in medical field. In its turn, it will promote the possibility of further employment of graduates of Ukrainian higher educational medical establishments in the world labour market. Advanced requirements to training medical specialists assume not only higher level of knowledge but formation of clinical outlook for further application of acquired theoretical knowledge and professional skills into professional work [1, 2]. It mostly concerns fundamental educational subjects including “Bioorganic and Biological Chemistry” and “Medical Biology” which are an integral part in a basic training of medical students. Therefore, the issue of interdisciplinary approach in teaching these subjects is topical and perspective as reformation and improvement of up-to-date education assume overcoming isolated teaching of the subjects and elaboration of new educational curricula in which the issues of practical classes are considered as an integral part, but not a separate unit of the educational process. It is a guarantee of training an erudite medical specialist with a high level of theoretical knowledge and practical skills able to make substantiated and correct decisions in urgent situations [3,4].

The objective of the investigation is achieving a maximal level of interdisciplinary approach in teaching the subjects “Bioorganic and Biological Chemistry” and “Medical Biology” with the purpose to improve the level of knowledge and analytical comprehension of metabolic process regularities and peculiarities of their disorders in man.

Material and methods. The subjects of our investigation are educational working plans and curricula on disciplines involved in interdisciplinary integration. The tasks of the investigation are to design both unidirectional and mobile bidirectional integration patterns of theoretical subjects on the basis of common learning topics and processes involving both horizontal and vertical structural disciplinary formations. Cumulative-comparative and logic-analytical analysis of educational curricula and their application in the educational process are necessary from the point of view of practical interdisciplinary integration.

Results and Discussion. Considering the questions of interdisciplinary approach Department of Bioorganic and Biological Chemistry and Clinical Biochemistry cooperates closely with Departments of Medical Chemistry, Physiology, Histology, Medical Biology and Genetics [5].

“Bioorganic and Biological Chemistry” and “Medical Biology” are fundamental subjects learnt by the first and second-year medical students. They are basic in the system of medical education to form a further stage of studies at theoretical and clinical departments. The knowledge obtained is essential for understanding the fundamentals of etiology and pathogenesis of various

diseases. The topics included in learning Module № 2 «Organism level of life organization. Fundamentals of human genetics» on the subject of Medical Biology, and Module № 3 «Molecular biology. Biochemistry of tissues and physiological functions and their regulation» are of a special importance in mastering Bioorganic and Biological Chemistry.

Interdisciplinary approach in teaching these subjects is realized on various structural levels [6, 7]:

- objective — relations based on learning one and the same object in the perspective of various educational disciplines. For example, in the course of learning Medical Biology there are questions concerning the structure and functions of nucleic acids, and the knowledge concerning chemical structure of these compounds is extended while learning the similar topic in Bioorganic and Biological Chemistry.

- theoretical — relations based on the use of the same element of theory, law, and rule. For example, E. Chargaff's rule and complementarity law considered in learning of both subjects are different according to the purpose of classes and enable to form an appropriate element to be studied comprehensively.

- methodical — relations applying similar methods of cognition. For example, multimedia presentation, the use of tables, diagrams, schemes, outlines etc. In addition, the teaching staff and students of the University use intensively the distance learning server «Moodle» (Modular Object Oriented Distance Learning Environment), containing structurally formed in compliance with the topics of classes electronic outlines, diagrams, schemes, tables, videos, references to web-sites in Internet. It promotes a maximal concentration of students and mastering knowledge by them.

- operative — relations based on the use of the same method of activity. For example, solving theoretical, calculated, clinical-situational tasks and tests [8].

Due to this comprehensive approach to interdisciplinary relations transform between the subjects in their term ensuring synchronization of educational material of two independent subjects in time, increasing the rate of teaching, promoting concentration of students, their motivation and interests in the process of learning. At the same time, misinterpreting opinion of students concerning “minor — less important subjects” is withdrawn, as all the educational units are integrated between them, equal in rights and their importance.

Cognitive activity of students is stimulated, and integration of affiliated educational subjects is a perspective method to improve educational curricula in the system of higher education.

The main tasks of interdisciplinary approach are activation of preliminary obtained knowledge, abilities and skills essential for further comprehensive mastering topics of classes. And a teacher as if “going ahead” is able to motivate students to learn educational subjects envisaged by the educational curricula forming multilat-

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eral interdisciplinary relations promoting the development of logic thinking [8,9].

To realize interdisciplinary approach first of all the plan of the practical lesson is designed including the subject of discussion, the focus questions, closely connected with the material studied in one of the units of Medical Biology, educational references are indicated as well as questions and tasks for self-control [10]. The following forms of interdisciplinary integration are used during practical classes:

- revision — the method is that on the moment of learning structural organization and functions of proteins, for example, students review the knowledge obtained in the course of Medical Biology, Physiology and Histology (a correct thinking is directed by the teacher).

- historical excursions — during practical classes students get to learn scientific achievements of prominent scientists and their contribution into the development of certain sciences. For example, while learning the topic “Structure and functions of nucleic acids” students prepare brief reports concerning scientific studies of E. Chargaff, F. Kreek, D. Watson, R. Franklin.

- instruction — learning the subjects Bioorganic and Biological Chemistry and Medical Biology includes carrying out laboratory-practical works according to the instructions to every practical work with additional element of filling in tables, learning diagrams, supplementing figures and schemes with further writing down into a workbook, that in its turn, trains students to plan their work and organize self-testing of their work, analysis and drawing conclusions [11].

- research method — based on the use of problematic questions or clinical-situational tasks of an interdisciplinary character promoting the formation of clinical thinking, analyzing, specifying and generalizing the knowledge obtained. For example: 1. “Due to helminthic invasion a 35-year old woman develops jaundice. What parasitic worms can cause this condition? What biochemical tests can confirm the diagnosis?” To solve all these “step-by-step” interdisciplinary tasks the knowledge obtained from the previously or parallel mastered subjects should be used, such as Medical Biology, Physiology and Histology. At the same time, insufficient knowledge on certain topics is leveled promoting better understanding and rethinking of the material on the subjects studied.

- interdisciplinary information — to supplement the content of textbooks and give more comprehensive understanding of certain issues of the curriculum the students prepare presentations or review reports to the topic they study. For example, the topic “Regulation of gene expression” is supplemented with students’ presentations concerning classification of mutagenic agents, their value and effect on the human body, where obtained knowledge in many subjects is applied.

Therefore, correct and content integration of the educational process in training medical specialists should be based on an integral understanding of the major biological,

biochemical, histological and anatomical characteristics of the human body on the whole. Systemic interdisciplinary approach in teaching enables to train specialists with a qualitatively new level of clinical thinking, who are able to evaluate patient’s condition by means of integration of acquired knowledge and skills, results of biochemical, anatomical, clinical and instrumental methods of the research [12].

Initial formation of clinical and logic thinking of a future doctor occurs directly in learning basic theoretical subjects. Analytical aspects in understanding pathology should be established by modern education in the form of interdisciplinary integration assuming a level structural organization of the educational process:

- the first level — integration within the limits of one subject;

- the second level — combination and revision of the same material in the areas of different subjects as if “at different angle of view”;

- the third level — ability to combine, analyze and oppose different objects and phenomena;

- the fourth level — independent application of acquired knowledge to make the diagnosis as a certain final stage of clinical thinking formation and real ability to work with patients.

To train qualified doctors the third and fourth levels of interdisciplinary integration should be introduced.

Conclusion. Implementation of interdisciplinary integration into the educational process in teaching the subjects “Bioorganic and Biological Chemistry” and “Medical Biology” will ensure the formation of both one-sided (Biology-Chemistry) and two-sided (Biology-Chemistry-Biology) interdisciplinary interaction directed to the development of systemic clinical thinking, cognitive activity and independent work. Therefore, none of the educational subjects isolated from others is able to form professional competence of a future medical specialist.

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