

Ministry of Health of the Republic of Belarus
Educational institution
"Gomel State Medical University"

Department of Biological Chemistry

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METHODOLOGICAL RECOMMENDATIONS

for a practical lesson in the academic discipline "Biological Chemistry"
for 2nd year **students** of the Faculty of Foreign Students
majoring in 1-79 01 04 "Medical Care"

Topic: Biochemistry of blood 1. Fundamentals of ABB regulation.

Duration 4 hours

Approved at the meeting of the Department of Biological Chemistry
(Protocol No. 10 dated 29.08.2025)

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1. LEARNING AND EDUCATIONAL GOALS, MOTIVATION FOR MASTERING THE THEME, REQUIREMENTS FOR THE INITIAL LEVEL OF KNOWLEDGE

Each of us at least once in our lives had a blood test. Blood is the most important object of medical biochemistry. This is due to significant changes in the concentration of proteins in plasma, the activity of a number of enzymes and other indicators in various diseases, as well as the availability of this tissue for research.

Purpose of the class:

To study the indications of the physicochemical constants of blood in normal and pathological conditions, the mechanisms of regulation of the acid-base state, as well as the functional role of the protein spectrum of blood plasma in normal and pathological conditions. To master the method of determining the concentration of iron in blood plasma by the colorimetric method. To instill in students a sense of pride in their chosen profession and to form in them a culture of caring for their health.

Class objectives:

The student must know:

1. basic physical and chemical constants of blood and their changes in pathology;
2. types, causes and mechanisms of development of acidosis and alkalosis;
3. blood plasma proteins, their classification, fractionation methods and characteristics of individual representatives, as well as changes in the protein spectrum in pathology;
4. the concept of "residual nitrogen" and "azotemia" and their diagnostic value;

The student must be able to:

1. determine the concentration of iron in blood plasma by colorimetric method.

1. CONTROL QUESTIONS FROM RELATED DISCIPLINES

1.1 Composition of blood, structure and functions of formed elements (histology, biology).

1.2 Basic physical and chemical constants of blood (physiology).

2. CONTROL QUESTIONS ON THE TOPIC OF THE CLASS

2.1 Blood, its composition and functions. Basic physical and chemical constants of blood. The level of major metabolites.

2.2 Blood plasma proteins: general characteristics, classification, separation methods, characteristics of individual representatives of each class. Changes in the protein spectrum of blood in pathology, types of proteinemia.

2.3 Residual nitrogen: composition, origin, diagnostic value of individual components. Types of azotemia and their causes.

2.4 The concept of the acid-base state: principles of organization, regulation mechanisms (physico-chemical and physiological), classification of disorders (types, causes and mechanism of development of acidosis and alkalosis), correction mechanisms.

2.5 SSART questions:

1. *Methods for isolating blood plasma proteins: electrophoresis, salting out, etc.*
2. *Changes in the protein spectrum in pathology (examples of dis- and paraproteinemias).*

3. PRACTICAL PART OF THE CLASS

Laboratory work No. 1 "Determination of the concentration of iron in the blood plasma by the colorimetric method", Laboratory work No. 2 "Determination of calcium in the blood serum (method of Moidin and Zak)". Laboratory work No. 3 "Titrometric method for determining the "alkaline" blood reserve."

4. STUDY PROCESS

4.1 Introduction

4.2 Theoretical part of the class

4.3 Practical part of the class: Laboratory work No. 1 "Determination of the concentration of iron in the blood plasma by the colorimetric method", is carried out experimentally according to the instructions. Laboratory work No. 2 "Determination of calcium in blood serum (method of Moidin and Zak)". Laboratory work No. 3 "Titrometric method for determining the "alkaline" blood reserve."

4.4 Laboratory works 2 and 3 are performed according to the publication "Biological Chemistry: Workbook" (in 2 hours, part 2) / A.N. Koval [and others]. - Gomel: GomGMU, 2020. - Part 2 - 88 p.

4.5 The control of mastering the topic.

4.6 The final part of the class. Summing up, checking the protocols, announcing tasks (as well as the topics of the SSART abstract messages) for the next class.

5. QUESTIONS FOR SELF-CHECKING KNOWLEDGE

Self-control of knowledge on the topic "Blood-1. Fundamentals of ABB regulation" is carried out by computer testing using the Moodle platform access mode: <https://dl.gsmu.by/course/view.php?id=81>

6. LITERATURE

1. Биохимия : учебник / под ред. Е.С. Северина. – 5-е изд., испр. и доп. – М.: ГЭОТАР-Медиа, 2020. – 768 с.: ил.

2. Схемы и реакции основных метаболических путей : учеб.-метод. пособие для студентов учреждений высш. образования, обучающихся по специальностям 1-79 01 01 "Лечеб. дело", 1-79 01 04 "Мед.-диагност. дело" / М-во здравоохранения РБ, УО "ГомГМУ", Каф. общей, биоорганической и биологической химии ; А.И. Грицук [и др.]. – Гомель: ГомГМУ, 2018. – 127 с. – Рек. УМО по высш. мед., фармацевт. образованию.

3. Baynes, J. W. Medical biochemistry / J.W. Baynes, M. H. Dominiczak ; ELSEVIER . – 2019. – 682 p.

4. Ferrier, D. R. Lippincott's Illustrated Reviews: Biochemistry / D. R. Ferrier ; Wolters Kluwer . – 2014. – 552 p.

5. Chatterjea, M. N. Textbook of Medical Biochemistry / M. N. Chatterjea, R. Shinde ; Jitendar P Vij. – 2012. – 876 p.

6. Vasudevan, D. M. Textbook of Biochemistry for Medical Students / D. M. Vasudevan, S. Sreekumari, K. Vaidyanathan ; Jitendar P Vij. – 2011. – 657 p.

7. Marks, D. B. Board Review Series: Biochemistry / D. B. Marks ; Harwal

Publishing . – 1994. – 337 p.