

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 2<sup>nd</sup> year **students** of the Faculty of Foreign Students  
majoring in 1-79 01 04 "Medical Care"

**Topic:** Enzymes 3. Medical enzymology.

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. TRAINING AND EDUCATIONAL OBJECTIVES, MOTIVATION FOR COMPLETION OF THE TOPIC, REQUIREMENTS FOR THE INITIAL LEVEL OF KNOWLEDGE

Enzymes are widely used in medical practice. Changes in their functioning is the cause of the pathology. They are used as markers of various diseases, as well as medicines.

### **Purpose of the class:**

To form ideas about the main aspects and problems of medical enzymology. Learn to determine the activity of creatine kinase in blood plasma and evaluate its diagnostic significance. educate students have a sense of pride in their chosen profession and develop a culture of respect for their health.

### **Class objectives:**

#### ***The student should know:***

1. cellular and organ localization of enzymes,
2. the concept of marker and organ-specific enzymes and their use in enzyme diagnostics,
3. reasons for the development of enzymopathologies,
4. possibilities of using enzymes in enzyme therapy.

#### ***The student should be able to:***

1. determine the activity of creatine kinase in blood plasma and evaluate the diagnostic significance of the results.

## 2. CHECKLIST OF THE QUESTIONS FROM RELATED SUBJECTS

The structure and functions of the cell. The main differences between animal and plant cells (histology, biology).

2.2. The structure and functions of individual organelles, their role in the processes of cell vital activity (histology, biology).

## 3. CHECKLIST OF CONTROL QUESTIONS FOR THE LESSON

3.1. Allosteric regulation of enzyme activity. Properties of allosteric enzymes.

3.2. Isoenzymes, their biological role. Localization of enzymes in the cell. Marker and organ-specific enzymes. Characteristics of lactate dehydrogenase isoforms. Characteristics of CK isoforms.

3.3. Enzymopathies: classification, degree of clinical manifestations, causes, examples of enzymopathies.

3.4. Enzymodiagnosics. Principles, objects and tasks of enzymodiagnosics. The use of enzymes in enzyme diagnostics. The use of enzymes in laboratory practice to determine the concentration of substrates and enzyme activity. The use of enzymes in industry and production.

3.5. Enzyme therapy. The use of enzymes for replacement therapy. Changes in the activity of enzymes in ontogeny.

## 4. PRACTICAL PART OF THE LESSON

Laboratory work No. 1 "Quantitative analysis of urine amylase activity by Wolgemuth" (performed theoretically). Laboratory work No. 2 "Creatine kinase activity analysis in blood plasma" (practically performed).

## 5. PROCESS OF THE LESSON

### 5.1 Introduction.

5.2 Theoretical part of the lesson: control questions are considered, an oral survey of students is conducted.

5.3 Practical part of the lesson: Laboratory work No. 1 “Quantitative analysis of urine amylase activity by Wolgemuth” (performed theoretically). Laboratory work No. 2 “Creatine kinase activity analysis in blood plasma” (practically performed).

Laboratory work is carried out according to the publication "Biological Chemistry: Workbook" (in 2 parts, part 1) / Gritsuk A.I. [et. al.]. - Gomel: GomSMU, 2021. - 76 p.

### 5.4 The control of mastering the topic.

5.5 The final part of the lesson. Summing up, checking the protocols, announcing tasks for the next lesson.

## 6. QUESTIONS FOR KNOWLEDGE SELF-CONTROL

Self-control of knowledge on the topic "Enzymes 3. Medical enzymology" is carried out by computer testing using the Moodle platform. Access mode: <https://dl.gsmu.by/mod/quiz/view.php?id=5026>.

## 7. LIST OF REFERENCES:

1. Harper's Illustrated Biochemistry / Victor W. Rodwell [and oth.]. — 30th edit. -New York[and oth.] : McGraw-Hill Education, 2015. — 817 p.

2. Meisenberg, G. Principles of medical biochemistry / G. Meisenberg, W. H. Simmons. — 4th ed. -Philadelphia: Elsevier, [2017]. — xii, 617 p.

3. Vasudevan, D. M. Textbook of biochemistry for medical students / DM Vasudevan, S Sreekumari. — 5th ed. — New Delhi : Jaypee brothers medical publishers, 2009. — xvi, 535 p.

4. Gritsuk, A. I. Biochemistry. P. 1 : lectures, notes / A. I. Gritsuk, A. N. Koval ; Gomel state medical University, Department of biochemistry. — Gomel, 2016. — 380 p.