

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: Hormones 2. Particular endocrinology.

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:

The elucidation of the hormones role in the vital activity of the organism, begun only a few decades ago, is already yielding tangible results. Some experts believe that the tomorrow of medicine is the era of hormones.

The purpose of the class:

To study the mechanisms of action of hormones involved in the regulation of metabolism. Form an idea of mechanisms of hormonal effects in the regulation of metabolism. To foster in students a sense of pride in their chosen profession and to form in them a culture of respect for their health.

Class objectives:

The student should know:

1. Concepts about the chemical nature, regulation of secretion, the mechanism of action of hormones.
2. The main clinical manifestations of hormone hypo- and hyperfunction.
3. Concepts about the adaptive role of hormones.
4. Concepts of hormonal regulation of energy metabolism during stress.

The student should be able to:

1. Work with micropipettes.
2. Work with a semi-automatic biochemistry analyzer.

2. CONTROL QUESTIONS FROM RELATED DISCIPLINES:

- 2.1. The nature of hormones and their properties (bioorganic chemistry, histology, physiology).
- 2.2. Types of receptors (histology, physiology).

3. CONTROL QUESTIONS ON THE TOPIC OF THE CLASS.

3.1 TSH: chemical nature, mechanism of action, regulation of secretion. T_3 and T_4 : chemical nature, biosynthesis, regulation of secretion, mechanism of action, role in metabolism, main clinical manifestations of hypo- and hypersecretion.

3.2 STH: chemical nature, mechanism of action, regulation of secretion, main clinical manifestations of hypo- and hypersecretion of the hormone. Regulation of secretion and the role of IGF.

3.3 Insulin: chemical nature, stages of synthesis, regulation of secretion, mechanism of action, role in metabolism. The main clinical manifestations of hypo- and hypersecretion of insulin.

3.4 Glucagon: chemical nature, regulation of secretion, mechanism of action, role in metabolism.

3.5 ACTH: chemical nature, mechanism of action, regulation of secretion, main clinical manifestations of hypo- and hypersecretion. Glucocorticoids: structure, regulation of secretion, mechanism of action, role in metabolism, main clinical manifestations of hypo- and hypersecretion.

3.6 Mineralocorticoids: chemical nature, regulation of secretion, mechanism of action, role in metabolism, main clinical manifestations of hypo- and hypersecretion.

3.7 Catecholamines: chemical nature, synthesis (reactions, enzymes), regulation of secretion, mechanism of action, role in metabolism, main clinical manifestations of hormone overproduction.

3.8 Gonadotropins (FSH and LH): chemical nature, mechanism of action, regulation of secretion. Estrogens: chemical nature, mechanism of action, regulation of secretion, main clinical manifestations of hypo- and hypersecretion.

3.9 Gonadotropins (FSH and LH): chemical nature, mechanism of action, regulation of secretion. Androgens: chemical nature, mechanism of action, regulation of secretion, main clinical manifestations of hypo- and hypersecretion.

3.10 The adaptive role of hormones. The concept of stress. Hormonal regulation of energy metabolism during stress.

3.11 SSART QUESTIONS:

1 Type 1 diabetes (insulin deficient) Causes of occurrence, comparative characteristics (similarities and differences).

2 Type 2 diabetes (insulin resistant). Causes of occurrence, comparative characteristics (similarities and differences).

3 Thymus hormones. Chemical nature. Biological role and clinical applications.

4 Endorphins, enkephalins: structure, biological role.

5 Gestagens. Progesterone: chemical nature, regulation of secretion, mechanism of action, role in metabolism, tissue metabolism, main clinical manifestations of hypo- and hypersecretion.

4. PRACTICAL PART OF THE CLASS

Laboratory work No. 1 " Laboratory work No. 1. Detection of iodine in a thyroid preparation." Laboratory work No. 2 "Qualitative reactions to adrenaline", Laboratory work No. 3 "Detection of 17-ketosteroids in urine" (carried out theoretically).

Laboratory work is performed according to the publication "Biological Chemistry: Workbook" (in 2 hours, part 2) / Koval A.N. [and etc.]. – Gomel: GomGMU, 2020, Part 2. – 88 p.

5. PROCESS OF THE CLASS

5.1 Introduction

5.2 The theoretical part of the class: control questions are considered, the tasks of the SIWS are dealt with.

5.3 Practical part of the class: laboratory work is performed using a workbook on biological chemistry.

5.4 Control of mastering the topic.

5.5 The final part of the class. Summing up, checking the protocols, announcing assignments (as well as topics for abstracts of the SIWS) for the next class.

6 QUESTIONS FOR SELF-CONTROL OF KNOWLEDGE

Self-control of knowledge on the topic "Hormones-2" is carried out by computer testing using the Moodle platform access mode:<https://dl.gsmu.by/course/view.php?id=81>

7. 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.