### PRINCIPLES OF PHYSIOLOGICAL REGULATION OF THE BODY FUNCTIONS.
#### PHYSIOLOGY OF BLOOD.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>Date/Group/Time</th>
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<tr>
<td>1</td>
<td>Homeostasis. General characteristics of the endocrine system. Hormonal activity of the hypothalamus and pituitary gland.</td>
<td>30/09/2019</td>
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<td>3</td>
<td>Hemostasis. Calcium/phosphorus metabolism.</td>
<td>14/10/2019</td>
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<td>4</td>
<td>Erythrocyte.</td>
<td>21/10/2019</td>
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<td>5</td>
<td>Leukocytes – immunity. Glucocorticoids.</td>
<td>28/10/2019</td>
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<td>6</td>
<td>Erythrocytes – blood groups. Cross-match blood test. Main principles of blood transfusion. Repetition of failed and/or absent activities in cycle I.</td>
<td>04/11/2019</td>
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Topics of seminars are published below

**Credit of the cycle I (Rybacka St – Aula).**

<table>
<thead>
<tr>
<th>Seminars</th>
<th>Topic (location)</th>
<th>Date/Group/Time</th>
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<tr>
<td>Seminar I</td>
<td>Internal environment of the body. Fluid compartments. Isolating and transporting function of the cellular membrane (Physiology Dept)</td>
<td>04/10/2019 N1 (12:00) N3 (13:30)</td>
<td>11/10/2019 N2 (12:00) NA (13:30)</td>
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<td>Seminar II</td>
<td>Functions of blood. Erythrocytes. Transport of O₂ and CO₂ (Hall A/Rybacka St.)</td>
<td>04/10/2019 N2 (12:00) NA (13:30)</td>
<td>11/10/2019 N1 (12:00) N3 (13:30)</td>
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<td>Seminar III</td>
<td>Receptive function of the cellular membrane (Hall A/Rybacka St.)</td>
<td>18/10/2019 N1 (12:00) N3 (13:30)</td>
<td>25/10/2019 N2 (12:00) NA (13:30)</td>
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<tr>
<td>Seminar IV</td>
<td>Leukocytes. Immunity (Physiology Dept)</td>
<td>18/10/2019 N2 (12:00) NA (13:30)</td>
<td>25/10/2019 N1 (12:00) N3 (13:30)</td>
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**Credit of the cycle I (Rybacka St – Aula).**

15/11/2019

1. Introduction. The role of physiology in medical sciences.

YOU MUST KNOW FOR ACTIVE PARTICIPATION:
- Homeostasis – physiological methods of its maintaining. Controlling in homeostatic systems; homeostat; an idea of the negative/positive feedback loop.
- Internal environment of the human organism; its surfaces of contact with external environment. Principle parameters of the body homeostasis.
- Hormone – definition; division of hormones. Mechanisms of hormonal activity. Regulation of the hormonal secretion – an idea of the feedback loop in endocrine system.

Unit 2: Water compartments of the human organism. Morphotic and non-morphotic elements of blood.

2. Microscopic view of the stained and non-stained blood.
4. Erythrocyte sedimentation rate (ESR).

YOU MUST KNOW FOR ACTIVE PARTICIPATION:
- Reasons for erythrocyte sedimentation. Erythrocyte sedimentation rate (ESR). Values of ESR in various physiological states.

Unit 3. Hemostasis.

2. Examination of the hemostatic process – review of the main diagnostic methods.
3. Estimation of the cloting time.
4. Estimation of the coagulation time.
5. Regulation of the calcium and phosphorus metabolism – discussion.

YOU MUST KNOW FOR ACTIVE PARTICIPATION:
- Function of calcium in metabolism of the organism; fractions of calcium in plasma of blood; hypo- and hypercalcemic hormones. Regulation of secretion and action of PTH and calcitonin. Vitamin D₃.

Unit 4. Erythrocytes.

1. Erythrocyte counting techniques.
2. Hematocrit.
3. Red blood cell indices (MCV, MCH, MCHC, RDW).
4. Transport of the respiratory gases in blood.

**YOU MUST KNOW FOR ACTIVE PARTICIPATION:**
- Erythrocytes – morphology (adaptation of the erythrocyte’s shape to the function), reference values.
- Hematocrit – definition, value, clinical significance; definitions of blood indices (MCV, MCH, MCHC, RDW).
- Erythropoietin and other factors affecting erythropoiesis; metabolism of iron.

**Unit 5. Leukocytes – immunity.**
1. Leukocytes counting techniques.
2. Leukocyte differential count (Shilling smear).
3. Division and functions of leukocytes.
4. Specific and non-specific immune response; Glucocorticoids – discussion.

**YOU MUST KNOW FOR ACTIVE PARTICIPATION:**
- Morphology and division of leukocytes – lymphocytes, monocytes, neutrophils, eosinophils, basophils.
- Glucocorticoids – secretion and action.

**Unit 6. Blood types.**
2. Assessment of A and B antigens in ABO (ABH) system.
3. Assessment of D-antigen in Rh blood system.
4. Donor-recipient blood compatibility testing.
5. Principles of blood transfusion.

**YOU MUST KNOW FOR ACTIVE PARTICIPATION:**

1. Homeostasis – principle phenomenon in the organism.
2. Total body water.
3. Fluid compartments.
4. Intracellular compartment.
6. Cellular membrane as the barrier between intra- and extracellular environment of the body – morphology and features of the cellular membrane.
7. Transporting function of the cellular membrane.
   - Passive transport: diffusion, transport proteins (symports, antiports, uniports), ionic channels (voltage-gated, ligand-gated), aquaporins.
   - Active transport: primary and secondary active transport.


1. Introduction.
2. Composition of blood: cells, plasma.
3. Physical properties of blood.
4. Functions of blood.
8. Transport of carbon dioxide.

Seminar III: Receptive function of the cellular membrane.

1. Transduction of information via cellular membrane and within the cell.
2. Basic terms: extracellular ligand, agonist, antagonist/blocker, second messenger.
4. Ionotropic receptors. Nicotinic receptor.
5. Metabotropic receptors.
   - Molecules with tyrosine kinase activity. Insulin receptor.
   - Receptors coupled with protein G. Second messengers.
6. Adrenergic and cholinergic receptors.

Seminar IV. Leukocytes. Immunity.

1. Antigen, antibody, immunity, antigenicity – definitions.
2. Morphology and division of the immunological system.
3. Leukocytes – division and function.
4. Humoral and cellular immunity.
5. Non-specific, inborn immunity.
6. Specific, acquired immunity.