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

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Internal environment of the body. Homeostasis.</td>
<td>02-10-2019</td>
</tr>
<tr>
<td>2</td>
<td>Principles of the hormonal regulation.</td>
<td>09-10-2019</td>
</tr>
<tr>
<td>3</td>
<td>Function of the erythron. Erythrocyte indexes. Transport of O₂ and CO₂.</td>
<td>16-10-2019</td>
</tr>
<tr>
<td>4</td>
<td>Defensive mechanisms of the organism.</td>
<td>23-10-2019</td>
</tr>
<tr>
<td>5</td>
<td>Blood groups. Hemostasis.</td>
<td>30-10-2019</td>
</tr>
<tr>
<td>6</td>
<td>Excitable tissues. Electrophysiology of the neuron. General organization of the nervous system. Re-takes of absent or failed activities in cycle I.</td>
<td>06-11-2019</td>
</tr>
</tbody>
</table>

Credit of the cycle 1. Topics discussed on seminar I – VI and units 1 – 6 13-11-2019

Unit 1. Internal environment of the body. Homeostasis.
1. Introduction to medical physiology.
2. Homeostasis. Physiology as a science concerning homeostasis of the organism.
3. Internal environment of the organism.
4. Basic systems that regulate homeostasis of the organism. Interactions nervous – endocrine system.
5. The influence of changes of the osmolality of the environment onto cells (erythrocytes).

Obligatory terms and problems:
Definition of the homeostasis. Internal environment of the body. Main homeostatic parameters of the internal environment of the body. Regulation (control) in homeostatic systems. Comparison of hormonal and neuronal regulation.

Unit 2. Principles of the hormonal regulation.
1. General characteristics of action of the endocrine system.
2. Endocrine activity of the hypothalamus.
3. Hormones of the pituitary gland.

Obligatory terms and problems:

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

Obligatory terms and problems:
- Erythrocytes – morphology (adaptation of the erythrocyte’s shape to the function), normal values. Erythropoietin and other factors affecting erythropoiesis.

Unit 4. Defensive mechanisms of the organism.
1. Microscopic view of the stained blood.
2. Leukocyte counting techniques.
3. Leukocyte differential count (Shilling smear).
4. Erythrocyte sedimentation rate (ESR).

Obligatory terms and problems:

1. Blood groups in ABO and Rh system.
2. Blood typing in ABO and Rh system.
4. Estimation of the bleeding time and clotting (or coagulation) time.
5. Re-takes of absent or failed activities in cycle I

Obligatory terms and problems:

Unit 6. Excitable tissues. Electrophysiology of the neuron. General organization of the nervous system
1. Action potential.
2. Division of stimuli – threshold, subthreshold. “All or nothing law”.
3. Changes in cell excitability during the action potential – absolute and refractory period.
5. Division of nerve fibers. Types of nerve conduction (constant, saltatory, antidromic and ortodromic).

Computer programs/simulations:
2. Stimulation of the nervus ischiadicus.

1. Importance of water in organism.
2. Body water and thermoregulation.
3. Total body water and its division.
4. Water content in various tissues.
5. Water transport.
7. Regulation of the mineral-water balance.
   - Mineralocorticoids
   - Renin-angiotensin-aldosterone system
   - Biological effects of angiotensin II:
   - Natriuretic peptides
   - ANP – biological effects
   - Complex of thirst

Seminar II: Receptive, isolating and transporting function of the cellular membrane (09-10-2019).
1. Homeostasis – principle phenomenon in the organism.
2. Cellular membrane as the barrier between intra- and extracellular environment of the body – morphology and features of the cellular membrane.
3. 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.
5. Cellular receptors – division.
7. Metabotropic receptors.
8. Adrenergic and cholinergic receptors.

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

1. Definition of hemostasis.
2. Stages of hemostasis.
3. Platelets – their content and function.
5. Generation of thromboplastin in extrinsic and intrinsic pathway.
6. Fibrinolysis.
7. Methods of examination of the hemostatic system.

1. Regulation of the calcium-phosphate balance.
   - Function of calcium.
   - Fractions of plasma calcium.
   - Hypocalcemia and hypercalcemia.
   - Regulation of calcium metabolism.
   - Metabolism of phosphate.
   - Phosphate in plasma.
   - Function of PTH.
   - Function of calcitonin.
   - Metabolism and biological effects of vitamin D₃ (cholecalciferol).

2. Glucocorticoids.
   - Glucocorticoids – mechanism of action.
   - Metabolic effects of glucocorticoids.
   - Anti-inflammatory effects of glucocorticoids.
   - Glucocorticoids modify effects of other hormones.
   - Other effects of glucocorticoids.


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.