**Laboratory research number 1**

**Theme: Heart physiology. Properties of a cardiac muscle**

Questions

1. Excitability of a cardiac muscle
2. Contractility of a cardiac muscle
3. Conductivity of a cardiac muscle
4. Automaticity

**Laboratory work:**

**Physiology of visceral system**

1.Monitoring of a cardiac cycle of the frog and graphic registration of the heart beat

2.The study of automatic of conduction system of the heart (The Stannius Ligatures)

**Normal physiology**

1.The study of the excitability of the heart muscle during the cardiac cycle (getting PVCs)

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening

Literature

1. Arthur C. Guyton, John E. Hall, Textbook of Medical Physiology, 12th Edition. Saunders, 2010

2.Gening T.P., Abakumova T.V., Mikhailova N.L., Gilazieva E.N. Human physiology: [Education guidance](http://www.multitran.ru/c/m.exe?t=1006008_1_2&s1=%F3%F7%E5%E1%ED%EE%E5%20%EF%EE%F1%EE%E1%E8%E5)for students of medical faculty. – Ulyanovsk: UlSU, 2016. – 70 p.

3.Gening T.P., Abakumova T.V., Mikhailova, Kadysheva E.N. Normal physiology. Part I. Physiology of excitable tissues, muscles, CNS, analyzers, HNA. Second Edition Ulyanovsk State University. 2018. 104 p.

4.Gening T.P., Abakumova T.V., Mikhailova, Kadysheva E.N. Normal physiology. Part II. Physiology of Cardio-vascular system, Breath, Digestion, Excretion, Endocrine glands, Metabolism and Energy, Blood. Second Edition Ulyanovsk State University. 2018. 135 p.

**Laboratory research number 2**

**Theme: Heart physiology. The cardiac cycle. Regulation of heart work. Methods of heart work research**

Questions

1. Self-regulation of heart work
2. Nervous regulation of heart work
3. Heart reflexes.
4. Humoral influences on heart work
5. The cardiac cycle
6. Tones of heart. Phonocardiography.
7. Electrocardiography.

**Laboratory work:**

**Physiology of visceral system**

1. Recording and analysis of electrocardiogram
2. Listening to heart tones.
3. Determination of the duration of the cardiac cycle by pulse.

**Normal physiology**

1. The study of reflex effects on the heart

2. Investigation of humoral influences on the activity of the heart

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening

Literature

1. Arthur C. Guyton, John E. Hall, Textbook of Medical Physiology, 12th Edition. Saunders, 2010

2.Gening T.P., Abakumova T.V., Mikhailova N.L., Gilazieva E.N. Human physiology: [Education guidance](http://www.multitran.ru/c/m.exe?t=1006008_1_2&s1=%F3%F7%E5%E1%ED%EE%E5%20%EF%EE%F1%EE%E1%E8%E5)for students of medical faculty. – Ulyanovsk: UlSU, 2016. – 70 p.

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**Laboratory research number 3**

**Theme: Overview of the circulation**

Questions

1. Physical characteristics of the blood circulatory system:
2. Functional parts of the circulation.
3. The laws of hemodynamics.
4. Blood pressure.
5. Pressure in the various portions of the circulation.
6. Clinical methods for measuring systolic and diastolic pressure.
7. Regulation of arterial pressure.
8. Arterial pressure pulsation.
9. Venous pressure pulsation.
10. The microcirculation.
11. Structure of the microcirculation and capillary system.
12. Average function of the capillary system.
13. Fluid filtration across capillaries.
14. Control of blood flow by the tissues.

**Laboratory work:**

**Physiology of visceral system**

1. Blood pressure measurement in humans by the method of Riva-Rocci
2. Blood pressure measurement in humans by the method of Korotkov
3. The study of the pulse

**Normal physiology**

1. The effect of adrenaline, acetyleholine, atropine and of adrenaline on atropinized ground on arterial pressure

2. The influence of the cardiac output, the peripheral resistance and the vascular elasticity on arterial pressure

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening

Literature

1. Arthur C. Guyton, John E. Hall, Textbook of Medical Physiology, 12th Edition. Saunders, 2010

2.Gening T.P., Abakumova T.V., Mikhailova N.L., Gilazieva E.N. Human physiology: [Education guidance](http://www.multitran.ru/c/m.exe?t=1006008_1_2&s1=%F3%F7%E5%E1%ED%EE%E5%20%EF%EE%F1%EE%E1%E8%E5)for students of medical faculty. – Ulyanovsk: UlSU, 2016. – 70 p.

3.Gening T.P., Abakumova T.V., Mikhailova, Kadysheva E.N. Normal physiology. Part I. Physiology of excitable tissues, muscles, CNS, analyzers, HNA. Second Edition Ulyanovsk State University. 2018. 104 p.

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**Laboratory research number 4**

Questions to the Colloquium

1. Excitability of a cardiac muscle
2. Contractility of a cardiac muscle
3. Conductivity of a cardiac muscle
4. Automaticity
5. Self-regulation of heart work
6. Nervous regulation of heart work
7. Heart reflexes.
8. Humoral influences on heart work
9. The cardiac cycle
10. Tones of heart. Phonocardiography.
11. Electrocardiography.
12. Physical characteristics of the blood circulatory system:
13. Functional parts of the circulation.
14. The laws of hemodynamics.
15. Blood pressure.
16. Pressure in the various portions of the circulation.
17. Clinical methods for measuring systolic and diastolic pressure.
18. Regulation of arterial pressure.
19. Arterial pressure pulsation.
20. Venous pressure pulsation.
21. The microcirculation.
22. Structure of the microcirculation and capillary system.
23. Average function of the capillary system.
24. Fluid filtration across capillaries.
25. Control of blood flow by the tissues.

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening

**Laboratory research number 5**

**Theme: Breath physiology**

Questions:

1. Breath definition. Breath stages.
2. Mechanism of breath and exhalation.
3. Pressure in a pleural cavity. Pheumothorax.
4. Pulmonary volumes. Spirometry, spirography, pneumotachography.
5. Composition of the inhaled, exhaled and alveolar air.
6. Gas exchange in lungs.
7. Blood transport of gases.
8. Gas exchange in tissue.
9. Respiratory center (Rhythm generator). [Automaticity](http://www.multitran.ru/c/m.exe?t=1146971_1_2&s1=%E0%E2%F2%EE%EC%E0%F2%E8%FF) of the respiratory center.
10. Protective respiratory reflexes.
11. Physiology of airways.

**Laboratory work:**

**Physiology of visceral system**

1. Spirometry
2. Pulmonary function. Volumes and Capacities

**Normal physiology**

1. Respiratory cycle

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening

Literature

1. Arthur C. Guyton, John E. Hall, Textbook of Medical Physiology, 12th Edition. Saunders, 2010

2.Gening T.P., Abakumova T.V., Mikhailova N.L., Gilazieva E.N. Human physiology: [Education guidance](http://www.multitran.ru/c/m.exe?t=1006008_1_2&s1=%F3%F7%E5%E1%ED%EE%E5%20%EF%EE%F1%EE%E1%E8%E5)for students of medical faculty. – Ulyanovsk: UlSU, 2016. – 70 p.

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**Laboratory research number 6**

**Questions to the Colloquium**

1. Breath definition. Breath stages.
2. Mechanism of breath and exhalation.
3. Pressure in a pleural cavity. Pheumothorax.
4. Pulmonary volumes. Spirometry, spirography, pneumotachography.
5. Composition of the inhaled, exhaled and alveolar air.
6. Gas exchange in lungs.
7. Blood transport of gases.
8. Gas exchange in tissue.
9. Respiratory center (Rhythm generator). [Automaticity](http://www.multitran.ru/c/m.exe?t=1146971_1_2&s1=%E0%E2%F2%EE%EC%E0%F2%E8%FF) of the respiratory center.
10. Protective respiratory reflexes.
11. Physiology of airways.

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening

**Laboratory research number 7**

**Theme: Digestion physiology. Digestion in a mouth and in a stomach**

Questions:

1. Digestion as the main component of functional system on maintenance of level of nutritious in an organism.
2. Digestion types.
3. Research methods of digestive tract functions.
4. In experiment
5. In clinic
6. Digestive tract innervation.
7. Digestion in a mouth. Structure and properties of salvia.
8. Swallowing.
9. Digestion in a stomach. Composition of gastric juice.
10. Phases of gastric secretion.

**Laboratory work:**

**Physiology of visceral system**

1**.** Enzymatic properties of saliva in humans.

**Normal physiology**

1. Reflex salivation.
2. The influence of pH on the action of pepsin.

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening

Literature

1. Arthur C. Guyton, John E. Hall, Textbook of Medical Physiology, 12th Edition. Saunders, 2010

2.Gening T.P., Abakumova T.V., Mikhailova N.L., Gilazieva E.N. Human physiology: [Education guidance](http://www.multitran.ru/c/m.exe?t=1006008_1_2&s1=%F3%F7%E5%E1%ED%EE%E5%20%EF%EE%F1%EE%E1%E8%E5)for students of medical faculty. – Ulyanovsk: UlSU, 2016. – 70 p.

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**Laboratory research number 8**

**Theme: Digestion physiology. Digestion in intestines. A role of a pancreas and liver in digestion. Motility of gastrointestinal tract (GIT). Absorption in various departments of a GIT.**

Questions:

1. Structure and properties of pancreatic juice. Regulation of pancreatic secretion.
2. Liver role in digestion.
3. Digestion in a nestis and ileum.
4. Secretion of intestinal juice, its structure, properties, secretion regulation.
5. Digestion in a colon.
6. Motility of a stomach. Evacuation of gastric contents in intestines.
7. Motility of small and thick intestine.
8. Absorption in various departments of a digestive tract.

**Laboratory work:**

**Physiology of visceral system**

1. The action of bile on fats.

**Normal physiology**

1. Motor function of the digestive tract in rats.

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening

Literature

1. Arthur C. Guyton, John E. Hall, Textbook of Medical Physiology, 12th Edition. Saunders, 2010

2.Gening T.P., Abakumova T.V., Mikhailova N.L., Gilazieva E.N. Human physiology: [Education guidance](http://www.multitran.ru/c/m.exe?t=1006008_1_2&s1=%F3%F7%E5%E1%ED%EE%E5%20%EF%EE%F1%EE%E1%E8%E5)for students of medical faculty. – Ulyanovsk: UlSU, 2016. – 70 p.

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4.Gening T.P., Abakumova T.V., Mikhailova, Kadysheva E.N. Normal physiology. Part II. Physiology of Cardio-vascular system, Breath, Digestion, Excretion, Endocrine glands, Metabolism and Energy, Blood. Second Edition Ulyanovsk State University. 2018. 135 p.

**Laboratory research number 9**

**Questions to the Colloquium**

1. Digestion as the main component of functional system on maintenance of level of nutritious in an organism.
2. Digestion types.
3. Research methods of digestive tract functions.
4. In experiment
5. In clinic
6. Digestive tract innervation.
7. Digestion in a mouth. Structure and properties of salvia.
8. Swallowing.
9. Digestion in a stomach. Composition of gastric juice.
10. Phases of gastric secretion.
11. Structure and properties of pancreatic juice. Regulation of pancreatic secretion.
12. Liver role in digestion.
13. Digestion in a nestis and ileum.
14. Secretion of intestinal juice, its structure, properties, secretion regulation.
15. Digestion in a colon.
16. Motility of a stomach. Evacuation of gastric contents in intestines.
17. Motility of a small and thick intestine.
18. Absorption in various departments of a digestive tract.

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening

**Laboratory research number 10**

**Theme: Allocation physiology. Regulation of kidney functions.**

Questions:

1. Eliminative organs.
2. Nephron as a structural functional unit of a kidney.
3. Formational and composition of primary urine.
4. Tubular reabsorption as the 2nd stage of formation of final urine.
5. Tubular secretion.
6. Composition of final urine.
7. Regulation of kidney activity.
8. Humoral regulation;
9. Nervous control;
10. Influence of arterial pressure on work of kidneys.
11. Act of uresis.

**Laboratory work:**

**Physiology of visceral system**

1. Experience Minor

**Normal physiology**

1. Demonstration of the:

* Effect of hydrostatic pressure, osmotic pressure and diameters of the glomerular afferent and efferent arterioles on urine flow
* Influence of the aldosterone and the antidiuretic hormone on the urine flow
* Influence of glucose on urine flow

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening

Literature

1. Arthur C. Guyton, John E. Hall, Textbook of Medical Physiology, 12th Edition. Saunders, 2010

2.Gening T.P., Abakumova T.V., Mikhailova N.L., Gilazieva E.N. Human physiology: [Education guidance](http://www.multitran.ru/c/m.exe?t=1006008_1_2&s1=%F3%F7%E5%E1%ED%EE%E5%20%EF%EE%F1%EE%E1%E8%E5)for students of medical faculty. – Ulyanovsk: UlSU, 2016. – 70 p.

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**Laboratory research number 11**

**Theme: Physiology of endocrine glands**

Questions:

1. Definition, classification of hormones.
2. Interrelation and interaction of endocrine glands.
3. Hormones of adenohypophysis.
4. Physiology of a thyroid gland.
5. Parathyroid glands.
6. Pancreas physiology.
7. Adrenocortical hormones.
8. Adrenal medulla hormones.
9. Reproductive hormones.

**Laboratory work:**

**Physiology of visceral system**

1. The effect of insulin and aloxan on blood glucose.

**Normal physiology**

1. The effect of Thyroxine, TSH and Propyltiouracil on metabolism

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening

Literature

1. Arthur C. Guyton, John E. Hall, Textbook of Medical Physiology, 12th Edition. Saunders, 2010

2.Gening T.P., Abakumova T.V., Mikhailova N.L., Gilazieva E.N. Human physiology: [Education guidance](http://www.multitran.ru/c/m.exe?t=1006008_1_2&s1=%F3%F7%E5%E1%ED%EE%E5%20%EF%EE%F1%EE%E1%E8%E5)for students of medical faculty. – Ulyanovsk: UlSU, 2016. – 70 p.

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**Laboratory research number 12**

**Theme: Metabolism. Thermal control**

Questions:

1. Definition of metabolism. Processes of assimilation and dissimilation.
2. Plastic and energetic role of nutrients.
3. Nitrogen equilibrium.
4. Regulation of metabolism.
5. Energy balance of an organism.
6. Basic metabolism. Working metabolism.
7. Hess` law.
8. Laws of diets.
9. Heat production.
10. Thermal control.

**Laboratory work:**

**Physiology of visceral system**

1. Making diet

**Normal physiology**

1. Determination of basal metabolism according to the tables of Harris and Benedict

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening

Literature

1. Arthur C. Guyton, John E. Hall, Textbook of Medical Physiology, 12th Edition. Saunders, 2010

2.Gening T.P., Abakumova T.V., Mikhailova N.L., Gilazieva E.N. Human physiology: [Education guidance](http://www.multitran.ru/c/m.exe?t=1006008_1_2&s1=%F3%F7%E5%E1%ED%EE%E5%20%EF%EE%F1%EE%E1%E8%E5)for students of medical faculty. – Ulyanovsk: UlSU, 2016. – 70 p.

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**Laboratory research number 13**

**Questions to the Colloquium**

1. Eliminative organs.
2. Nephron as a structural function unit of a kidney.
3. Forming and composition of primary urine.
4. Tubular reabsorption as the 2nd stage of formation of final urine.
5. Tubular secretion.
6. Composition of final urine.
7. Regulation of activity of kidneys.
8. Humoral regulation;
9. Nervous control;
10. Influence of arterial pressure up on work of kidneys.
11. Act of uresis.
12. Definition, classification of hormones.
13. Interrelation and interaction of endocrine glands.
14. Hormones of an adenohypophysis.
15. Physiology of a thyroid gland.
16. Parathyroid glands.
17. Pancreas physiology.
18. Adrenocortical hormones.
19. Adrenal medulla hormones.
20. Reproductive hormones.
21. Definition of metabolism. Processes of assimilation and dissimilation.
22. Plastic and energetic role of nutrients.
23. Nitrogen equilibrium.
24. Regulation of metabolism.
25. Energy balance of an organism.
26. Basic metabolism. Working metabolism.
27. Hess`s law.
28. Laws of diets.
29. Heat production.
30. Thermal control.

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening

**Laboratory research number 14**

**Theme: Blood physiology. Physiology of erythrocytes.**

Questions:

1. Composition of blood.
2. Blood functions.
3. Physiological constants of blood.
4. Blood plasma. Structure, osmotic and oncotic pressure.
5. Erythrocyte. Structure and functions.
6. Regulation of erythropoiesis.
7. Hemoglobin and its combinations.
8. Erythrocyte sedimentation rate (ESR). Mechanism of ESR.

**Laboratory work:**

**Physiology of visceral system**

1. Determination of the number of erythrocytes in the blood
2. Determination of hemoglobin (Hb) content in blood by the method of Sali
3. The calculation of the color index of blood (CIB)
4. Determination of the erythrocyte sedimentation rate (ESR) by Panchenkov’s method

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening

Literature

1. Arthur C. Guyton, John E. Hall, Textbook of Medical Physiology, 12th Edition. Saunders, 2010

2.Gening T.P., Abakumova T.V., Mikhailova N.L., Gilazieva E.N. Human physiology: [Education guidance](http://www.multitran.ru/c/m.exe?t=1006008_1_2&s1=%F3%F7%E5%E1%ED%EE%E5%20%EF%EE%F1%EE%E1%E8%E5)for students of medical faculty. – Ulyanovsk: UlSU, 2016. – 70 p.

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4.Gening T.P., Abakumova T.V., Mikhailova, Kadysheva E.N. Normal physiology. Part II. Physiology of Cardio-vascular system, Breath, Digestion, Excretion, Endocrine glands, Metabolism and Energy, Blood. Second Edition Ulyanovsk State University. 2018. 135 p.

**Laboratory research number 15**

**Theme: Physiology of leukocytes and thrombocytes. Hemolysis**

Questions:

1. Leukocytes, quantity, leukogram.
2. Regulation of granulocytopoiesis and monocytopoiesis.
3. Lymphocytes. Regulation of lymphocytopoiesis.
4. Thrombocytes, quantity, functions.
5. Types and mechanism of hemolysis.

**Laboratory work:**

**Physiology of visceral system**

1. Determination of the number of leukocytes in the blood

**Normal physiology**

1. Observation of different types of hemolysis

2. Determination of osmotic resistance

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening

Literature

1. Arthur C. Guyton, John E. Hall, Textbook of Medical Physiology, 12th Edition. Saunders, 2010

2.Gening T.P., Abakumova T.V., Mikhailova N.L., Gilazieva E.N. Human physiology: [Education guidance](http://www.multitran.ru/c/m.exe?t=1006008_1_2&s1=%F3%F7%E5%E1%ED%EE%E5%20%EF%EE%F1%EE%E1%E8%E5)for students of medical faculty. – Ulyanovsk: UlSU, 2016. – 70 p.

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4.Gening T.P., Abakumova T.V., Mikhailova, Kadysheva E.N. Normal physiology. Part II. Physiology of Cardio-vascular system, Breath, Digestion, Excretion, Endocrine glands, Metabolism and Energy, Blood. Second Edition Ulyanovsk State University. 2018. 135 p.

**Laboratory research number 16**

**Theme: Blood fibrillation. The doctrine about blood groups**

Questions:

1. Blood fibrillation process. Blood fibrillation factors.
2. Blood fibrillation phases.
3. The anticoagulation system
4. The doctrine about blood groups. Rh factor.

**Laboratory work:**

**Physiology of visceral system**

1. Determination of blood groups and Rh by Colyclons

**Normal physiology**

1. Determination of blood clotting speed

2. Determination of bleeding time by Duke

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening

Literature

1. Arthur C. Guyton, John E. Hall, Textbook of Medical Physiology, 12th Edition. Saunders, 2010

2.Gening T.P., Abakumova T.V., Mikhailova N.L., Gilazieva E.N. Human physiology: [Education guidance](http://www.multitran.ru/c/m.exe?t=1006008_1_2&s1=%F3%F7%E5%E1%ED%EE%E5%20%EF%EE%F1%EE%E1%E8%E5)for students of medical faculty. – Ulyanovsk: UlSU, 2016. – 70 p.

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**Laboratory research number 17**

**Questions to the Colloquium**

1. Composition of blood.
2. Blood functions.
3. Physiological constants of blood.
4. Blood plasma. Structure, osmotic and oncotic pressure.
5. Erythrocyte. Structure and functions.
6. Regulation of erythropoiesis.
7. Hemoglobin and its combinations.
8. Erythrocyte sedimentation rate (ESR). Mechanism of ESR.
9. Leukocytes, quantity, leukogram.
10. Regulation of granulocytopoiesis and monocytopoiesis.
11. Lymphocytes. Regulation of lymphocytopoiesis.
12. Thrombocytes, quantity, functions.
13. Types and mechanism of hemolysis.
14. Blood fibrillation process. Blood fibrillation factors.
15. Blood fibrillation phases.
16. The anticoagulation system
17. The doctrine about blood groups. Rh factor.

Head of the Department

of Physiology and Pathophysiology, professor T.P.Gening