

Choose 1 variant of a right answer to each question or affirmation.

### Introduction. Basic notions

**1. What is the particular challenge of physiology?**

- a) constants of homeostasis only;
- b) micro- and macrostructures of tissues and organs;
- c) functions of an organism;
- d) mechanisms of body functions regulation and their purpose.

**2. Which two questions are most often answered by physiological postulates?**

- a) «what?» and «where?»;
- d) «when?» and «how much? »;
- c) «how?» and «what for?»;
- d) «what to?» and «why?».

**3. What is the ultimate goal of all regulatory processes realization in an organism?**

- a) the maintenance of hemostasis;
- b) regulation of organs activity;
- c) illness treating;
- d) the maintenance of homeostasis.

**4. Dynamic homeostasis is a set of ...**

- a) responses that ensure maintaining constancy of the internal environment of a body;
- b) responses that ensure maintaining changes of the internal environment of a body;
- c) reactions that stop bleeding;
- d) reactions that stimulate some activity in an organism.

**5. What in particular does the word «homeostasis» means in the term of «dynamic homeostasis»?**

- a) variability of the parameters of the body;
- b) stability of the parameters of the body;
- c) stop of a bleeding;
- d) reactions of coagulation.

**6. What in particular does the word «dynamic» means in the term of «dynamic homeostasis»?**

- a) any type of activity of tissues or organs or whole organism;
- b) activity of hormonal regulation mechanisms;
- c) the ability of homeostasis constants to fluctuate within its certain limits;
- d) the inability of homeostasis constants to fluctuate.

**7. Homeostatic parameter is ...**

- a) a specific variable that reflects some function of the body;
- b) a variable that characterizes blood clotting;
- c) a variable that characterizes hormonal activity;
- d) any variable of an organism that can't change.

**8. Which homeostatic index calls rigid?**

- a) unable to change;
- b) changing only during a disease;
- c) capable to change within its narrow limits;
- d) capable to change within its widely limits.

**9. Two main mechanisms of regulation in an organism are ...**

- a) paracrine and endocrine;
- d) endocrine and humoral;
- c) neural and humoral;
- d) neural and hormonal.

**10. A substance which secreted into the blood stream and has a regulatory activity on general level of whole organism is called a(an) ...**

- a) enzyme;
- b) mediator;
- c) hormone;
- d) increate.

**11. A substance which secreted in neuro-neuronal synapses and at the ends of motor neurons of reflex arcs is called a(an) ...**

- a) enzyme;
- b) mediator;
- c) hormone;
- d) increate.

**12. A substance that attaches itself to a molecule of another substance and converts it to an active state is called a(an) ...**

- a) enzyme;
- b) mediator;
- c) hormone;
- d) increate.

**13. A substance that can break down another substance or accelerate the course of any biochemical reaction is called a(an) ...**

- a) enzyme;
- b) mediator;
- c) hormone;
- d) increate.

**14. WHAT CONDITIONS ARE NECESSARY TO CREATE AN ELECTRIC CURRENT?**

- a) a conductor and ions (or electrons)
- d) an electrical field and charged particle
- c) potential difference and an electrical field
- d) potential difference and a conductor

**15. CAN THERE BE A CONDUCTOR WITHOUT AN ELECTRIC CURRENT?**

- a) it can't be in a holistic organism
- b) no
- c) yes
- d) yes, but only during pathology

**16. CAN THERE BE AN ELECTRIC CURRENT WITHOUT A CONDUCTOR?**

- a) it can't be in a holistic organism
- b) no in any cases
- c) yes in any cases
- d) yes, but only if conductor was changed by potential difference

**17. CAN THERE BE AN ELECTRIC CURRENT WITHOUT POTENTIAL DIFFERENCE?**

- a) it can't be in a holistic organism
- b) no
- c) yes
- d) yes, but only during pathology

**18. CAN THERE BE POTENTIAL DIFFERENCE WITHOUT AN ELECTRIC CURRENT?**

- a) it can't be in a holistic organism
- b) no
- c) yes, for example, in accumulators
- d) yes, but only during pathology

**19. FORCE WITH WHICH THE TWO CHARGES INTERACT CALLS ...**

- a) potential difference
- b) conductor
- c) resistance
- d) electrical current

20. RESISTANCE IS A CHARACTERISTIC OF A ...

- a) conductor
- b) potential difference
- c) electrical current
- d) amperage

21. AMPERAGE IS A DIRECT CHARACTERISTIC OF A ...

- a) conductor
- b) potential difference
- c) electrical current
- d) voltage

22. ADD THE FOLLOWING SENTENCE: "THE HIGHER THE VOLTAGE IS, THE ... IS CURRENT INTENSITY, THE ... RESISTANCE OF A CONDUCTOR OR A DIELECTRIC IT CAN OVERCOME FOR ELECTRIC CURRENT TO APPEAR".

- a) greater, greater
- b) greater, lower
- c) lower, lower
- d) all suggestions are absurd

23. ADD THE FOLLOWING SENTENCE: "THE CURRENT (AMPERAGE) IS ... PROPORTIONAL TO THE VOLTAGE AND ... PROPORTIONAL TO THE RESISTANCE".

- a) inversely, directly
- b) inversely, inversely
- c) directly, directly
- d) directly, inversely

24. ADD THE FOLLOWING SENTENCE: "THE GREATER THE POTENTIAL DIFFERENCE IS THE ... RESISTANCE IT CAN OVERCOME".

- a) all suggestions are absurd
- b) no dependence between these parameters exist
- c) lower
- d) greater

25. ADD THE FOLLOWING SENTENCE: "A POTENTIAL DIFFERENCE IS A RESISTANCE THAT OVERCOMES A ... ELECTRICAL CURRENT".

- a) weak
- b) lesser
- c) larger
- d) all suggestions are absurd

### **Excitable tissues**

**1. Minimal force of irritant, capable to cause total excitation, is called ...**

- a) sub-threshold;
- b) supra-threshold;
- c) threshold;
- d) submaximal.

**2. The threshold level of a tissue is its criterion of ...**

- a) excitability;
- b) inhibition;
- c) irritability;
- d) contractility.

**3. On outside surface of excitable cell membrane in condition of a rest concentration of ... ions is less than inside a cell.**

- a) potassium;
- b) sodium;
- c) chlorine;

d) nitrogen.

**4. Returning (restitution) of a membrane potential to resting potential level is called...**

a) repolarization;

b) depolarization;

c) hyperpolarization;

d) local currents.

**5. The mechanism of movement from a solution with a greater concentration of ions into a solution with their lower concentration is called ...**

a) diffusion;

b) pinocytosis;

c) electrostatic gradient;

d) osmosis.

**6. What happen with charge of membrane during the process of it's depolarization?**

a) increase of negative charge of membrane internal surface;

b) increase of positive charge of membrane external surface;

c) change of negative charge to positive;

d) incoming of a negative charges.

**7. Correct order of phases of membrane action potential is:**

a) slow depolarization — fast depolarization — fast repolarization — hyperpolarization — slow repolarization;

b) slow depolarization — fast depolarization — fast repolarization — slow repolarization — hyperpolarization;

c) fast depolarization — slow repolarization — slow depolarization — fast repolarization — hyperpolarization;

d) fast depolarization — slow depolarization — fast repolarization — slow repolarization — hyperpolarization.

**8. Regulation by secretion of substances into the body fluid mediums is called ...**

a) homeostasis;

b) nervous;

c) humoral;

d) potential.

**9. Shifting down of  $H^+$  concentration indicates by ...**

a) pH decreasing;

b) pH increasing;

c) the number of protons;

d) the number of hydrogen atoms.

**10. Tissues capable to respond to irritant by action potential are called...**

a) relaxable;

b) contractive;

c) excitable;

d) irritable.

**11. An entrance of positive charges inside a cell is called ...**

a) hyperpolarization;

b) repolarization;

c) excitation;

d) depolarization.

**12. In depolarization phase ... channels are opening.**

a) potassium;

b) chlorine;

c) sodium;

d) all answers are correct.

**13. The mechanism of movement of ions through membrane by gradient of the concentration without energy consumption is called ...**

- a) passive transport;
- b) pinocytosis;
- c) endocytosis;
- d) active transport.

**14. Electrical currents that exist in slow depolarization phase, in place of an irritant action, between depolarized and yet under-depolarized membrane areas are called ...**

- a) supernormal;
- b) potential;
- c) local;
- d) refractory.

**15. Sodium-potassium pump moves ions  $\text{Na}^+$  and  $\text{K}^+$  through membrane of cell ...**

- a) by their concentration gradients;
- b) without taking into account of their concentration gradients;
- c) against their concentration gradients;
- d) by osmotic gradient.

**16. Two obligatory conditions necessary to create an electric current are ...**

- a) potential difference, opposite charges;
- b) resistance, conductor;
- c) frictions, battery;
- d) potential difference, conductor.

**17. A basic buffer is a solution of ...**

- a) a weak acid and its ions;
- b) a strong acid and its ions;
- c) a strong acid and its salt;
- d) a weak acid and its salt.

**18. Solution which can bind protons is called ...**

- a) basic;
- b) acid;
- c) neutral;
- d) pH active.

**19. Excitable tissues are...**

- a) muscular;
- b) nervous;
- c) glandular;
- d) all answers are correct.

**20. Change of membrane potential in more electronegative direction is called ...**

- a) hyperpolarization;
- b) repolarization;
- c) excitation;
- d) depolarization.

**21. The stronger the irritant is, the stronger is the specific answer of tissue – that is the...**

- a) summation;
- b) “law of force”;
- c) local answer;
- d) “law all or nothing”.

**22. The mechanism of movement of ions through membrane against the concentration gradient with energy consumption is called ...**

- a) passive transport;
- b) pinocytosis;
- c) endocytosis;

d) active transport.

**23. A partial (incomplete) recharging of the membrane in place of sub-threshold irritant's action is called ...**

- a) local currents;
- b) subnormal excitability;
- c) relative refractory;
- d) local response.

**24. A set of responses that ensure maintaining constancy of the internal environment of a body is called ...**

- a) excitability;
- b) hyperpolarization;
- c) homeostasis;
- d) irritability.

**25. Regulation which is carrying out through the central nervous system and by reflexes is called ...**

- a) homeostasis;
- b) nervous;
- c) humoral;
- d) potential.

**26. pH ...**

- a) increases when concentration of  $H^+$  shifts up;
- b) indicates the number of protons;
- c) is lower when content of acids in a medium decreases;
- d) is an indicant of excitability.

**27. Alkalosis is ...**

- a) an increasing of  $H^+$  concentration;
- b) an acidification ;
- c) pH decreasing;
- d) pH increasing.

**28. Solution which can bind protons is called ...**

- a) basic;
- b) acid;
- c) neutral;
- d) pH active.

**29. Acidosis is ...**

- a) an increasing of  $H^+$  concentration;
- b) a basic solution criterion;
- c) pH index;
- d) pH increasing.

**30. Passive transport is the transport of substances ...**

- a) against the gradient;
- b) along the gradient, without the expenditure of ATP energy;
- c) with the consumption of atp energy;
- d) against the gradient, without the expense of energy.

**31. Excitability is the ability of ...**

- a) highly differentiated tissue to exciting;
- b) tissue to rhythmic self-excitation;
- c) highly differentiated tissue to give an action potential to the stimulus;
- d) muscle tissue to change length when excited.

**32. Rest potential is ...**

- a) a membrane potential of excitable tissues in a condition of a rest;
- b) a membrane potential variation in response to irritation;

- c) changing of a membrane potential;
- d) incoming of positive charges into a cell.

**33. Action potential is ...**

- a) a membrane potential of excitable tissues in a condition of a rest;
- b) a membrane potential variation in response to irritation;
- c) changing of a membrane potential;
- d) incoming of positive charges into a cell.

**34. Depolarization is ...**

- a) a membrane potential of excitable tissues in a condition of a rest;
- b) a membrane potential variation in response to irritation;
- c) changing of a membrane potential;
- d) incoming of positive charges into a cell.

**35. Active transport is a transport of substances ...**

- a) along a gradient;
- b) without energy costs with a carrier;
- c) with the consumption of ATP energy;
- d) against the gradient and without the presence of a carrier.

**36. Passive transport includes ...**

- a) phagocytosis;
- b) pinocytosis;
- c) ion pumps;
- d) osmosis.

**37. The charge of the resting membrane potential of a majority of cells is equal to ...**

- a) positive 30–50 mV;
- b) positive 50–90 mV;
- c) negative 30–50 mV;
- d) negative 50–90 mV.

**38. Excitable tissues include ...**

- a) bone, cartilage;
- b) muscle, nervous;
- c) epidermis, serous;
- d) collagenic, elastic.

**39. The resting membrane potential is ...**

- a) rapid fluctuation of the membrane potential;
- b) a stable potential difference between the outer and inner surfaces of the cell membrane;
- c) the potential difference between neighboring cells at rest;
- d) slow fluctuation of the membrane potential.

**40. Active transport includes ...**

- a) phagocytosis;
- b) osmosis;
- c) diffusion;
- d) filtration.

**41. Transport is called ...**

- a) pinocytosis;
- b) electrogenesis;
- c) the transfer of substances through a biomembrane;
- d) the movement of ions along the gradient.

**42. Measures for excitability are ...**

- a) depolarization, hyperpolarization;
- b) repolarization, polarization;
- c) threshold, lability;
- d) action potential, refractoriness.

**43. Active transport includes ...**

- a) diffusion;
- b) osmosis;
- c) filtration;
- d) exocytosis.

**44. For the first time ever, electrical phenomena in living tissues were found ...**

- a) Boudich;
- b) Matteuchi;
- c) Starling;
- d) Galvani.

**45. If the threshold of irritation is high, then the excitability of the tissue is ...**

- a) high too;
- b) low;
- c) normal;
- d) is absent.

**46. If the threshold of irritation is low, then the excitability of the tissue is ...**

- a) high;
- b) low too;
- c) normal;
- d) is absent.

**47. Local response occurs due to ...**

- a) a threshold stimulus;
- b) superthreshold stimulus;
- c) subthreshold stimulus;
- d) maximum irritant.

**48. The speed of excitation in nerve fibers of type A is ...**

- a) 0.5–3 m/sec.;
- b) 3–18 m/sec.;
- c) 70–120 m/sec.;
- d) 5–10 m/sec.

**49. Rapid depolarization is associated with ...**

- a) an avalanche-like entry of Na<sup>+</sup> into the cell;
- b) slow entry of Na<sup>+</sup> into the cell;
- c) sodium inactivation;
- d) the release of K<sup>+</sup> from the cell.

**50. The descending part of the peak of the action potential is ...**

- a) rapid depolarization;
- b) local depolarization;
- c) fast repolarization;
- d) negative trace potential.

**51. One of a description of local currents is ...**

- a) inability to eliminate;
- b) independence from the strength of the stimulus;
- c) the presence of a specific response;
- d) the ability to sum.

**52. Excitable properties of the nerve fiber are ...**

- a) high metabolism, high lability;
- b) low excitability, low lability;
- c) high fatigue, low metabolism;
- d) high excitability, high lability.

**53. Depolarization is associated with ...**

- a) the input of Cl<sup>-</sup>;



- b) the output of  $K^+$ ;
- c) the input of  $Na^+$ ;
- d) the input of  $Cl^-$ , the output of  $K^+$ .

**54. Repolarization is associated with ...**

- a) input of  $Cl^-$ ;
- b) intensive  $K^+/Na^+$  pumps function;
- c) input of  $Na^+$ ;
- d) input of  $Ca^{2+}$ .

**55. The excitation along the nerve fiber is transmitted ...**

- a) along the myelin sheath;
- b) through schwann cells;
- c) on intercepts Ranvier;
- d) using axon transport.

**56. Minimal force of irritant, capable to cause excitation, is called ...**

- a) subthreshold;
- b) superthreshold;
- c) threshold;
- d) submaximal.

**57. Tissues, capable to respond to action of irritant with active potential are called ...**

- a) relaxable;
- b) contractive;
- c) excitable;
- d) conductive.

**58. Excitable tissues are ...**

- a) muscular;
- b) nervous;
- c) glandular;
- d) all answers are correct.

**59. Change of membrane potential in less electronegative direction is called ...**

- a) hyperpolarization;
- b) repolarization;
- c) exaltation;
- d) depolarization.

**60. Change of membrane potential in more electronegative direction is called ...**

- a) hyperpolarization;
- b) repolarization;
- c) exaltation;
- d) depolarization.

**61. In a phase of depolarization permeability of membrane increases basically for ... ions.**

- a) potassium;
- b) chlorine;
- c) sodium;
- d) magnesium;

**62. The mechanism of movement of ions through membrane by gradient of the concentration without energy consumption, is called ...**

- a) passive transport;
- b) pinocytosis;
- c) endocytosis;
- d) active transport.

**63. The mechanism of movement of ions through membrane against the concentration gradient with energy consumption, is called ...**

- a) passive transport;

- b) pinocytosis;
- c) endocytosis;
- d) active transport.

**64. The mechanism of movement from a solution with a greater concentration into a solution with a lower concentration is called ...**

- a) diffusion;
- b) pinocytosis;
- c) electrostatic gradient;
- d) osmosis.

**65. What happens with charge of membrane during the process of its depolarization?**

- a) increase of negative charge of internal surface of membrane;
- b) increase of positive charge of external surface of membrane;
- c) change of negative charge to positive;
- d) hyperpolarization.

**66. What is «absolute refractory period»?**

- a) gradual increase of excitability;
- b) decrease of excitability during the period of hyperpolarization;
- c) the period of full unexcitability;
- d) the period of excitability.

**67. ATP ENERGY IS USED FOR WORKING ...**

- a)  $K^+$  channels
- b)  $Na^+$  channels
- c)  $Na^+ - K^+$  pumps
- d)  $Cl^-$  channels

**68. DEPOLARIZATION PHASE IS PRESENTED ON THE FOLLOWING ACTION POTENTIAL CURVE ...**

- a) descending
- b) ascending
- c) both
- d) none of them

**69. NERVE CELL MEMBRANE HAS THE NEXT CHARGE AT REST:**

- a) negative inside and positive outside
- b) positive inside and positive outside
- c) positive inside and negative outside
- d) negative inside and negative outside

**70. EXCITATION IS ...**

- a) ability of excitable tissues to conduct excitation along the membrane
- b) ability of glandular tissues to secrete products in response to irritation
- c) ability of excitable tissues to generate action potential in response to irritation
- d) process of having electrical potential in response to irritation

**71. EXCITABLE TISSUE IS ...**

- a) glandular
- b) osseous
- c) fibrous
- d) cartilaginous

**72. THRESHOLD IS ...**

- a) depolarization level, excess of which leads to decrease in excitation
- b) depolarization level, excess of which leads to an occurrence of resting potential
- c) depolarization level, excess of which leads to an occurrence of total action potential
- d) depolarization level, excess of which leads to an occurrence of local response

**73. NERVE CELL EXCITATION IS ACCOMPANIED BY ...**

- a) contraction

b) spreading of electrical impulse

c) secretion

d) releasing of energy

74. BRANCHES OF GALVANI FORCEPS MADE FROM THE FOLLOWING METAL(S) ...

a) nickel

b) copper

c) nickel and iron

d) copper and zinc

75. RESTING POTENTIAL IS ...

a) potential difference between damaged and intact muscle surfaces

b) potential difference between outer and inner surfaces of the resting cell membrane

c) potential difference between outer and inner surfaces of the exciting cell membrane

d) potential difference between excited and unexcited muscle areas

76. OUTER SURFACE OF CELL MEMBRANE AT REST IS CHARGED ...

a) electropositive

b) electronegative

c) isn't charged

d) bipolar

77. INNER SURFACE OF CELL MEMBRANE AT REST IS CHARGED ...

a) electropositive

b) electronegative

c) isn't charged

d) bipolar

78. OUTER SURFACE OF THE CELL MEMBRANE AT THE PEAK OF EXCITATION IS CHARGED ...

a) electropositive

b) electronegative

c) isn't charged

d) bipolar

79. INNER SURFACE OF THE CELL MEMBRANE AT THE PEAK OF EXCITATION IS CHARGED

a) electropositive

b) electronegative

c) isn't charged

d) bipolar

80. THE ROLE OF  $\text{Na}^+\text{-K}^+$  ATPase IS CONCLUDED IN ...

a) driving  $\text{Na}^+$  out of the cell, transferring  $\text{K}^+$  inside

b) driving  $\text{K}^+$  out of the cell, transferring  $\text{Na}^+$  inside

c) providing  $\text{Na}^+$  passive transport

d) providing  $\text{K}^+$  passive transport

81. ACTION POTENTIAL IS ...

a) potential difference between damaged and intact muscle surfaces

b) potential difference between outer and inner surfaces of the resting cell membrane

c) fluctuations in the cell membrane potential difference at excitation

d) potential difference between excited and unexcited muscle areas

82. RULE OF "ALL OR NOTHING" STATES ...

a) relational independence of the action potential amplitude from the stimulus strength

b) direct proportional dependence of the action potential amplitude from the stimulus strength

c) inversely proportional dependence of the action potential amplitude from the stimulus strength

d) dependence of the action potential amplitude from the stimulus strength

83. THE FOLLOWING ELECTRICAL RESPONSE TO THE IRRITANT, WHICH POWER IS LESS THRESHOLD, IS ...

- a) electrotonic potential
- b) local response
- c) action potential
- d) trace potentials

84. MOVING FORCE PROVIDING TRANSFERRING  $K^+$  OUT OF THE CELL AT REST IS

- a) diffusion
- b) filtration
- c) facilitated diffusion
- d) active transport

85. WHAT IS THE REASON FOR THE CONTRACTION OF THE MUSCLE IN FIRST GALVANI'S EXPERIMENT?

- a) mechanical stimulation of the nerve with forceps Galvani
- b) closure of a chain consisting of dissimilar metals and tissues of a neuromuscular preparation
- c) closure through the nerve of a chain that includes the inner part and surface of the tissue
- d) occurrence of an action potential in the nerve when it is irritated by a stimulator

86. WHAT EXPERIENCE WAS USED TO PROVE THE ABILITY OF TISSUES TO GENERATE ACTION POTENTIAL?

- a) Galvani's first experience
- b) Galvani's second experience
- c) Matteucci's experience
- d) measuring the resting current using a mirror galvanometer

87. WHAT IS THE ION MECHANISM OF THE LOCAL RESPONSE?

- a)  $Na^+$  quickly driving into the cell, potential difference between the inner and outer surfaces of the membrane is reduced to 0
- b) slowly increases the flow of  $Na^+$  into the cell
- c) momentary movement of maximum amount of  $Na^+$  into the cell
- d) increases the  $K^+$  output from the cell

88. WHAT IS THE ION MECHANISM OF THE FAST DEPolarIZATION OCCURRENCE AT THE ACTION POTENTIAL?

- a)  $Na^+$  quickly driving into the cell, potential difference between the inner and outer surfaces of the membrane is reduced to 0
- b) slowly increases the flow of  $Na^+$  into the cell
- c) incoming of  $Na^+$  into the cell is accompanied by a recharge of the cell membrane below the threshold level
- d) increases the  $K^+$  output from the cell

89. WHAT ARE THE CHARACTERISTICS OF THE LOCAL RESPONSE?

- a) occurs when the stimulus intensity is below the threshold
- b) determines the cell's ability to excite
- c) characterizes the transition moment of local excitation to spreading
- d) exists in cells at the absence of stimuli

90. WHAT IS THE TISSUE EXCITABILITY?

- a) ability to respond to a stimulus
- b) ability to change parameters in response to a stimulus
- c) ability to respond to stimulation by spreading excitation
- d) any response

91. WHAT IS THE TISSUE IRRITABILITY?

- a) ability to change properties in response to the stimulus action with the spread of the action potential.
- b) some response to the stimulus
- c) stimulus action
- d) speed of response to the stimulus

92. WHAT IS AN IRRITANT?

- a) stimulus action
- b) environmental factor that can cause a change in the state of tissues
- c) appropriate tissue response to irritation
- d) the stimulus effect on nerve tissue

### **Muscle, nerve and synapsis**

#### **1. What is typical for process of conduction of signal in nerves?**

- a) anatomical and physiological integrity;
- b) conduction in two directions;
- c) isolation of signal conduction;
- d) all answers are correct.

#### **2. Excitation in unmyelinated isolated nervous fibres is conducted...**

- a) stepwise;
- b) continuously and all fiber consistently excited by spreading of local currents;
- c) in direction of axoplasm movement;
- d) in one-way direction.

#### **3. Lability is...**

- a) the minimal force of irritant, necessary to cause excitation;
- b) minimal time, with which irritant with force equal to threshold should act to cause response;
- c) maximum amount of signals which the cell can produce for 1 second according to frequency of irritant;
- d) ability to generate action potential.

#### **4. How the amplitude of single muscular fiber (myocyte) contraction will depend on the force of threshold irritation or superthreshold one?**

- a) the amplitude will be minimal at influence of superthreshold irritant;
- b) the amplitude will be different at influence of superthreshold irritant or threshold one;
- c) the amplitude will form according to the law of "force";
- d) the amplitude will be maximal in both cases.

#### **5. In what phase of single muscular contraction it is necessary to influence by next irritation in order to get smooth tetanus?**

- a) during the latent period;
- b) during the period of shortening;
- c) during relaxation;
- d) during a rest.

#### **6. What is typical for isotonic contraction?**

- a) muscle changes its tonus (strain) but does not change length;
- b) muscle is shortened but does not change its strain;
- c) isotonic and isometric contractions are synonyms;
- d) high speed.

#### **7. In what variant the correct order of phases of single muscle contraction is named?**

- a) phase of relaxation, shortening phase, latent phase;
- b) shortening phase, phase of relaxation, latent phase;
- c) latent phase, shortening phase, phase of relaxation;
- d) latent phase, phase of relaxation, shortening phase.

#### **8. Energy of ATP is used in muscle for ...**

- a) work of  $\text{Na}^+$ - $\text{K}^+$ -pump;
- b) process of «sliding» of actin and myosin of threads;
- c) work of calcium pump;
- d) all answers are correct.

#### **9. What is the reason of one-way direction of impulse spreading in a synapse?**

- a) synaptic delay;
- b) diffusion of a mediator;

- c) expenditure of a mediator;
- d) receptors and chemoexcited channels are only on postsynaptic membrane.

**10. What is a physiological integrity?**

- a) impulse going by one fiber does not pass to adjacent ones;
- b) local currents can spread along axon in both directions;
- c) structural integrity of cell membranes;
- d) integrity of membrane channels and pumps.

**11. Excitation in myelinated nervous fibre is conducted...**

- a) stepwise;
- b) continuously and all fiber consistently excited by spreading of local currents;
- c) saultatory;
- d) in one-way direction.

**12. What is a specialty of channels on postsynaptic membrane?**

- a) electroexcitability;
- b) chemoexcitability;
- c) irritability;
- d) chemoirritability.

**13. Distant synapses, unexpressed ability of automatism, motor units with one myocyte or several of them are typical for...**

- a) smooth muscles;
- b) skeletal muscles;
- c) cardiac muscle;
- d) all kinds of muscles.

**14. Contracting proteins are...**

- a) actin, troponin;
- b) myosin, tropomyosin;
- c) myosin, ATP;
- d) actine, myosin.

**15. Muscle contraction with it's constant length is called...**

- a) isometric;
- b) isotonic;
- c) auxotonic;
- d) autotonic.

**16. Motor unit is ...**

- a) group of quickly contractile muscular fibres;
- b) group of quickly and slowly contractile muscular fibres;
- c) motoneuron and the group of muscular fibres innervated by it;
- d) motoneuron and muscular fibre innervated by it.

**17. Contraction of muscle with long intervals between stimulus is called...**

- a) smooth tetanus;
- b) dentate (rough) tetanus;
- c) increasing tetanus;
- d) single contraction.

**18. What is the reason of high fatiguability of a synapse?**

- a) synaptic delay;
- b) diffusion of a mediator;
- c) expenditure of a mediator;
- d) receptors and chemoexcited channels are only on postsynaptic membrane.

**19. Specific features of chemoexcited channels...**

- a) is localization on presynaptic membrane;
- b) is a connection with a receptor of a postsynaptic membrane;
- c) is an irritability by any nature impulse;

d) all answers are correct.

**20. Energy use during a muscle contraction:**

a)  $\text{ATP} + \text{ATPase (of myosin)} = \text{ADP} + \text{Ph-group} + \text{E}$ ;

b)  $\text{ADP} + \text{Ph-group} + \text{E} = \text{ATP}$ ;

c)  $\text{Glucose} + \text{O}_2 = \text{lactic acid (or pyruvic acid)} + \text{E}$ ;

d) all answers are correct.

**21. Main elements of a synapse are...**

a) a presynaptic membrane, a synaptic gap, a postsynaptic membrane;

b) a presynaptic gap, a synaptic membrane, a postsynaptic gap;

c) a suprasynaptic membrane, a synaptic gap, a subsynaptic membrane;

d) a suprasynaptic gap, a synaptic membrane, a subsynaptic gap.

**22. What inhibits binding of myosin with actin?**

a) actin;

b) meromyosin;

c) tropomyosin;

d) ATPase.

**23. What is typical for isometric contraction?**

a) muscle changes its tonus (strain) but does not change length;

b) muscle is shortened but does not change its strain;

c) no changes of both tonus and length;

d) strain and length both change.

**24. What ions are released from sarcoplasmic reticulum at excitation?**

a) potassium;

b) chlorine;

c) sodium;

d) calcium.

**25. The relaxation of muscle is caused by...**

a) releasing of  $\text{Ca}^{2+}$  from sarcoplasmic reticulum;

b) blocking of ATPase;

c) active transport of  $\text{Ca}^{2+}$  into sarcoplasmic reticulum;

d) passive transport of  $\text{Ca}^{2+}$ .

**26. Ability of muscle to keep the given length without change of strain is called...**

a) automatism;

b) plasticity;

c) elasticity;

d) excitability.

**27. What is the reason of low lability of a synapse?**

a) synaptic delay;

b) receptors and chemoexcited channels are only on postsynaptic membrane;

c) expenditure of a mediator;

d) diffusion of a mediator.

**28. THE MEDIATOR IN THE NEUROMUSCULAR SYNAPSE IS ...**

a) norepinephrine

b) dopamine

c) acetylcholine

d) glycine

**29. THE FOLLOWING ENZYME INACTIVES ACETYLCHOLINE IS ...**

a) acetylcholinesterase

b) monoamine oxidase

c) catechol-O-methyltransferase

d) carbonic anhydrase

**30. SYNAPSE IS ...**

- a) organelle containing a mediator
  - b) part of the nerve cell where the axon begins
  - c) nerve cell terminal
  - d) structure providing the excitation transfer from the nerve cell to another cell
31. THE IONS WHICH PARTICIPATE IN THE RELEASE OF MEDIATOR FROM THE PRESYNAPTIC TERMINAL ARE ...
- a) Ca<sup>2+</sup>
  - b) K<sup>+</sup>
  - c) Na<sup>+</sup>
  - d) Mg<sup>+</sup>
32. CHEMORECEPTORS OF THE NEUROMUSCULAR SYNAPSE WITH SKELETAL MUSCLE BELONG TO THE FOLLOWING CLASS OF RECEPTORS ...
- a) N-cholinoreceptors
  - b) M-cholinoreceptors
  - c) α-adrenoreceptors
  - d) β-adrenoreceptors
33. WHAT TYPE OF SYNAPSES IS NEUROMUSCULAR SYNAPSE?
- a) adrenergic
  - b) cholinergic
  - c) histaminergic
  - d) glycinergic
34. THE NEXT PART OF THE NEUROMUSCULAR PREPARATION GETS TIRED FASTER
- a) nerve
  - b) synapse
  - c) muscle
  - d) sarcomere
35. THE PHYSIOLOGICAL PROPERTIES OF THE SYNAPSE ARE:
- a) unilateral conduction of excitation
  - b) two-way conduction of excitation
  - c) high lability and low fatigability
  - d) low sensitivity to chemicals
36. ACETYLCHOLINE IN A SYNAPSE BINDS TO:
- a) presynaptic membrane
  - b) cholinesterase
  - c) cholinoreceptor
  - d) sodium ions
37. WHAT PROTEIN OF A SARCOMERE BLOCKS THE INTERACTION BETWEEN ACTIN AND MYOSIN IN A REST?
- a) myosin
  - b) troponin
  - c) Ca<sup>2+</sup>
  - d) actin
38. WHAT IS THE NAME OF A LONG CONTINUOUS CONTRACTION OF A SKELETAL MUSCLE DUE TO THE ACTION OF FREQUENT STIMULI?
- a) tetanus
  - b) rheobase
  - c) chronaxia
  - d) depolarization
39. WHAT IONS ARE DISCHARGED FROM THE SARCOPLASMIC RETICULUM WHEN EXCITED:
- a) potassium
  - b) calcium



c) sodium

d) chlorine

40. ROTATION OF THE MYOSIN HEAD IS PERFORMED IN THE PRESENCE OF:

a) potassium ion

b) sodium ions

c) ATP

d) troponin

41. EXCITATION FROM ONE SMOOTH MUSCLE CELL TO ANOTHER MAY TRANSMITTED VIA:

a) synapses

b) sodium channels

c) calcium channels

d) nexuses

42. EXCITATION FROM ONE SKELETAL MUSCLE CELL TO ANOTHER MAY TRANSMITTED VIA:

a) synapses

b) nexuses

c) calcium channels

d) no such a function

43. A SYNAPSE ELEMENT(S) IS (ARE) ...

a) synaptic gap

b) presynaptic membrane

c) postsynaptic membrane

d) all responses are correct

44. A SYNAPSE ELEMENT(S) IS (ARE) ...

a) synaptic gap

b) sarcomere

c) Ca<sup>2+</sup>-channel

d) all responses are correct

45. A SYNAPSE ELEMENT(S) IS (ARE) ...

a) polysynaptic membrane

b) presynaptic membrane

c) synaptic mediator

d) all responses are correct

46. A SYNAPSE ELEMENT(S) IS (ARE) ...

a) synaptic mediator

b) parasynaptic membrane

c) postsynaptic membrane

d) all responses are correct

47. THE SUBSTANCE USED TO TRANSMIT EXCITATION IN THE SYNAPSE IS ...

a) mediator

b) calcium ions

c) sodium ions

d) all answers are correct

48. THE SUBSTANCE USED TO TRANSMIT EXCITATION IN THE SYNAPSE IS ...

a) mediator

b) calcium ions

c) sodium ions

d) all answers are incorrect

49. THE SUBSTANCE USED TO TRANSMIT EXCITATION IN THE SYNAPSE IS ...

a) cholinoreceptor

b) calcium ions

- c) sodium ions  
d) all answers are incorrect
50. THE SUBSTANCE USED TO TRANSMIT EXCITATION IN THE SYNAPSE IS ...  
a) hormone  
b) calcium ions  
c) sodium ions  
d) all answers are incorrect
51. THE SUBSTANCE USED TO TRANSMIT EXCITATION IN THE SYNAPSE IS ...  
a) acetylcholine hormone  
b) calcium ions  
c) sodium ions  
d) all answers are incorrect
52. IN THE SYNAPSE, RECEPTORS TO THE MEDIATOR ARE LOCATED  
a) in the synaptic cleft  
b) on the presynaptic membrane  
c) on the postsynaptic membrane  
d) all responses are correct
53. THE LAW(S) OF CONDUCTION IS (ARE) THE FOLLOWING ...  
a) the law of anatomical and physiological integrity  
b) isolation  
c) bilaterality  
d) all answers are correct
54. THE LAW(S) OF CONDUCTION IS (ARE) THE FOLLOWING ...  
a) the law of force  
b) isolation  
c) "all or nothing"  
d) all answers are correct
55. THE LAW(S) OF CONDUCTION IS (ARE) THE FOLLOWING ...  
a) the law of anatomical and physiological integrity  
b) no isolation  
c) unilateral conduction  
d) all answers are correct
56. THE STRUCTURAL INTEGRITY OF CELL MEMBRANES IS...  
a) anatomical integrity  
b) physiological integrity  
c) all answers are correct  
d) all answers are incorrect
57. NO MALFUNCTION OF CHANNELS AND PUMPS IS  
a) anatomical integrity  
b) physiological integrity  
c) all answers are correct  
d) all answers are incorrect
58. THE PASSAGE OF EXCITATION IS POSSIBLE IN CASE IF  
a) only the physiological integrity is preserved  
b) only the anatomical integrity is preserved  
c) both the anatomical and physiological integrity are preserved  
d) there is no correct answer
59. AT REST, A MEDIATOR IS LOCATED IN  
a) synaptic cleft  
b) in the state of vesicles  
c) sarcoplasmic reticulum  
d) there is no correct answer

60. LOCAL CURRENTS FROM THE AXON ON THE PRESYNAPTIC MEMBRANE OPEN
- a) calcium channels
  - b) sodium channels
  - c) potassium channels
  - d)  $\text{Na}^+/\text{K}^+$  pumps
61. MYELIN IS FORMED FROM
- a) Schwann's cell
  - b) acetylcholine
  - c) troponin
  - d) all responses are correct
62. MYELIN IS FORMED FROM
- a) Ranvier's cell
  - b) acetylcholine
  - c) troponin
  - d) all responses are incorrect
63. "THE IMPULSE THAT GOES ALONG ONE FIBER DOES NOT PASS TO NEIGHBORING FIBERS", THAT IS
- a) the law of isolation
  - b) the law of anatomical and physiological integrity
  - c) the law of bilaterality of conducting
  - d) there are no correct answers
64. THE STRUCTURAL FORMATION THAT PROVIDES THE TRANSFER OF EXCITATION FROM ONE NERVE CELL TO ANOTHER IS CALLED
- a) nerve
  - b) axon hillock
  - c) Ranvier's node
  - d) synapse
65. A MEDIATOR IN SKELETAL MUSCLES IS
- a) adrenaline
  - b) histamine
  - c) acetylcholine
  - d) gamma-aminobutyric acid
66. THE MEDIATOR OF THE SOMATIC SYNAPSE IS:
- a) glycine
  - b) adrenaline
  - c) acetylcholine
  - d) norepinephrine
67. THE BASIS OF MUSCLE CONTRACTION IS MADE BY:
- a) movement of  $\text{Na}^+$  and  $\text{K}^+$  ions along the sarcolemma
  - b) actin filaments sliding along myosin
  - c) twisting and deforming of all cell organs
  - d)  $\text{CA}^{2+}$  pump operation
68. CONTRACTILE PROTEINS ARE:
- a) myelin
  - b) myosin
  - c) tropomyosin
  - d) troponin
69. THE MAIN SUPPLY OF  $\text{CA}^{++}$  IN SKELETAL MUSCLES IS LOCATED IN:
- a) mitochondria
  - b) myofibrilla
  - c) cisterns of sarcoplasmic reticulum
  - d) the sarcoplasm

70. A SYNAPSE IS A STRUCTURAL FORMATION THAT ARE INTENDED FOR TRANSMITTING EXCITATION:

- a) from an axon to the innervated cell
- b) from a receptor to the nerve center
- c) from the nerve center to the effector
- d) along the muscle fiber

71. ACETYLCHOLINE IN A SYNAPSE BINDS TO:

- a) presynaptic membrane
- b) cholinesterase
- c) cholinoreceptor
- d) sodium ions

72. WHAT IS THE NAME OF A LONG CONTINUOUS CONTRACTION OF A SKELETAL MUSCLE DUE TO THE ACTION OF FREQUENT STIMULI?

- a) tetanus
- b) rheobase
- c) chronaxia
- d) depolarization

73. IONS THAT ARE RELEASED FROM THE SARCOPLASMIC RETICULUM IN EXCITATION:

- a) potassium
- b) calcium
- c) sodium
- d) chlorine

74. A NEXUS IS ...

- a) an electrical synapse
- b) a chemical synapse
- c) a contractile protein
- d) a mediator

75. SKELETAL MUSCLES ...

- a) do not have nexuses
- b) all the myocytes are connected by nexuses
- c) occupy an intermediate position: some myocytes are connected by nexuses, some are not
- d) depends on their organ's location

76. THE ABILITY TO EXCITE BY ITSELF (SELF-EXCITING) IS ...

- a) plasticity
- b) tetanus
- c) automatism
- d) lability

77. CARDIAC MUSCLES ...

- a) do not have nexuses
- b) all the myocytes are connected by nexuses
- c) occupy an intermediate position: some myocytes are connected by nexuses, some are not
- d) depends on initial activity conditions

78. SMOOTH MUSCLES ...

- a) do not have nexuses
- b) all the myocytes are connected by nexuses
- c) occupy an intermediate position: some myocytes are connected by nexuses, some are not
- d) all of the above is incorrect

79. SKELETAL MUSCLES ...

- a) are not capable of automatism
- b) have a high level of automatism
- c) capable of automatism, which develops very poorly

- d) all of the above is incorrect
80. A CARDIAC MUSCLE ...
- a) are not capable of automatism
  - b) has a high level of automatism
  - c) capable of automatism, which develops very poorly
  - d) occupy an intermediate position
81. SMOOTH MUSCLES ...
- a) are not capable of automatism
  - b) have a high level of automatism
  - c) capable of automatism, which develops very poorly
  - d) all of the above is incorrect
82. THE HIGHEST RATE OF CONTRACTION IS EXHIBITED BY
- a) skeletal muscles
  - b) smooth muscles
  - c) heart muscle
  - d) all of the above is true
83. THE LOWEST SPEED OF CONTRACTION IS EXHIBITED BY
- a) skeletal muscles
  - b) smooth muscles
  - c) heart muscle
  - d) all of the above is true
84. A LONG-TERM CONTRACTION WITHOUT COMPLETE RELAXATION IN RESPONSE TO A SERIES OF STIMULI IS ...
- a) automatism
  - b) tetanus
  - c) lability
  - d) elasticity
85. TETANUS IS NOT TYPICAL FOR
- a) heart
  - b) arteries
  - c) biceps muscle
  - d) all of the above is true
86. TETANUS IS NOT TYPICAL FOR
- a) heart
  - b) myocardium
  - c) ventricles
  - d) all of the above is true
87. FATIGUABILITY IS NOT TYPICAL FOR
- a) vascular myocytes
  - b) heart muscle
  - c) skeletal muscles
  - d) biceps shoulder muscle
87. THE ABILITY TO GENERATE MAXIMUM AMOUNT OF ACTION POTENTIAL (AP) PER SECOND IS ...
- a) lability
  - b) automatism
  - c) plasticity
  - d) tetanus
88. HIGH LABILITY IS EXHIBITED BY
- a) skeletal muscle
  - b) heart muscle
  - c) smooth muscle

d) all of the above is true

89. THE ABILITY TO MAINTAIN A PRE-SHAPED FORM IS ...

a) elasticity

b) plasticity

c) lability

d) automatism

90. HIGH PLASTICITY CHARACTERIZES

a) smooth muscles

b) heart muscle

c) skeletal muscles

d) all of the above is true

91. LOW ELASTICITY CHARACTERIZES

a) smooth muscles

b) heart muscle

c) skeletal muscles

d) all of the above is correct

92. THE ISOMETRIC CONTRACTION IS

a) when a muscle contracts but its length does not change

b) when a muscle contracts and its length changes

c) inability to contract

d) long-term contraction

93. CONTRACTION, IN WHICH THE MUSCLE SHORTENS, BUT ITS TONE DOES NOT CHANGE, IS CALLED

a) isometric

b) tetanus

c) isotonic

d) fatigability

94. A GROUP OF MUSCLE FIBERS (CELLS), INNERVATED BY A (ONE) MOTOR NEURON IS...

a) motor unit

b) synapse

c) sarcomere

d) tetanus

95. HEAD OF MYOSIN IS PRESENTED BY

a) the ATP molecule

b) the ADP molecule

c) mitochondria

d)  $\text{Ca}^{2+}$

96. PARTICIPATION IN THE IMPLEMENTING ELECTRICAL AND MECHANICAL PROCESSES IN THE MUSCLE MAINLY TAKES THE FOLLOWING OF THE ...

a) Ca ions

b) Cl ions

c) Na ions

d) K ions

97. TETANUS IS

a) muscle contraction in response to irritation by a single impulse

b) reduced performance after prolonged work

c) deterioration of physiological properties under the influence of damaging (altering) factor

d) long-term cumulative muscle contraction with frequent rhythmic irritation

98. SHORTENING OF A MUSCLES IS DUE TO

a) shortening of myosin filaments

b) shortening of actin filaments

c) weakening of tendons

d) sliding of actin filaments along myosin filaments

99. ACETYLCHOLINE INACTIVATES BY THE FOLLOWING ENZYME

a) cholinesterase

b) monoamine oxidase

c) catechol-methyl transferase

d) adrenaline

100. THE SYNAPSE IS

a) an organelle containing a mediator

b) a part of a nerve cell from which the axon originates

c) the end of the nerve cell

d) the structure that provides the transmission of excitation from one cell to another

101. CA IONS INVOLVED IN SKELETAL MUSCLE CONTRACTION ENTER THE SARCOPLASM FROM ...

a) the intercellular space

b) the sarcoplasmic reticulum

c) the vesicles of the nerve endings

d) the synaptic cleft

102. THE RELEASE OF A NEUROTRANSMITTER FROM A PRESYNAPTIC ENDINGS INVOLVES THE FOLLOWING OF THE ...

a) Ca ions

b) K ions

c) Na ions

d) Mg ions

103. WHAT BECOMES SLIGHTLY CHANGED DURING ISOTONIC CONTRACTION?

a) muscle length

b) muscle tension

c) muscle strength

d) muscle lability

104. WHAT OF THE FOLLOWING BECOMES IS LITTLE CHANGED DURING ISOMETRIC CONTRACTION?

a) muscle length

b) muscle tension

c) muscle strength

d) muscle lability

105. A MOTOR UNIT INCLUDES THE FOLLOWING STRUCTURES

a) motor neurone and all its synapses

b) motor neurone and muscle fiber(s) innervated by it

c) neurons fibers (axons) of one motocenter

d) neurons fibers (axons) and all myocytes of a muscle as an organ

108. TO WHAT TYPE OF SYNAPSES DOES THE MYONEURAL SYNAPSE WITH SKELETAL MUSCLE BELONG TO?

a) adrenergic

b) cholinergic

c) histaminergic

d) glycinergic

109. THE SIGNIFICANCE OF CHOLINESTERASE IN SYNAPSE IS ...

a) to breaks down acetylcholine in the synaptic cleft

b) to promotes the synthesis of acetylcholine

c) to provides interaction of acetylcholine with chemoreceptors

d) to inactivates chemoreceptors

## Central nervous system. Reflexes

### **1. The peripheral nervous system includes:**

- a) nerve fibers, ganglia, plexuses;
- d) the spinal cord;
- c) the brain stem;
- d) the diencephalon.

### **2. Mediators with only inhibitory effect:**

- a) GABA, glycine;
- b) acetylcholine;
- c) serotonin;
- d) norepinephrine.

### **3. For the functioning of the reflex arc, the presence of what components is necessary?**

- a) only receptors;
- b) only afferent and efferent nerve fibers;
- c) only nerve centers;
- d) all components.

### **4. The intercalary neuron (interneuron) is located in:**

- a) the front horns of the spinal cord;
- b) the white matter of the spinal cord;
- c) spinal ganglia;
- d) the posterior horns of the spinal cord.

### **5. The afferent (sensitive) neuron receives information from:**

- a) the receptors;
- b) skeletal muscle fibers;
- c) an inserted neuron;
- d) motor neuron.

### **6. Which of the following reflexes is vegetative?**

- a) knee-jerk;
- b) a blink reflex;
- c) an Achilles one;
- d) defecation reflex.

### **7. Choose the part of the neuron that conducts the impulse from the receptor to its body:**

- a) dendrite;
- b) axon;
- c) receptor;
- d) afferent part.

### **8. Choose the part of a neuron's body membrane which has the lowest threshold:**

- a) dendrite;
- b) axonal colliculus;
- c) receptor;
- d) neuron's body.

### **9. Which part of a neuron carries out metabolic reactions to provide vital activity of the whole cell:**

- a) dendrite;
- b) axonal colliculus;
- c) receptor;
- d) neuron's body.

### **10. What is the basis of nervous regulation?**

- a) reflex;
- b) myelinated nerve fiber;
- c) non-myelinated nerve fiber;



d) excitation of dendrite's membrane.

**11. The concept of a reflex and a reflex arc were first introduced by ...:**

- a) Galvani;
- b) R. Descartes;
- c) I.M. Sechenov;
- d) Matteuchi.

**12. A response of an organism mediated through the central nervous system is named:**

- a) an irritation;
- b) a synapse;
- c) a reflex;
- d) a nerve fiber.

**13. What is a morpho-functional substrate of a reflex?**

- a) reflex arc;
- b) neuron's body;
- c) white matter of a spinal cord;
- d) grey matter of a spinal cord.

**14. What is the first element of a reflex arc?**

- a) afferent neuron;
- b) receptor;
- c) efferent neuron;
- d) grey matter of spinal cord.

**15. A set of one-type receptors, activation of which causes implementation of a particular reflex, is named ...**

- a) a nerve center;
- b) a receptor;
- c) an afferent neuron;
- d) a receptive field.

**16. A sensitive neuron, body of which is located in prevertebral ganglia, is ....**

- a) unipolar neuron;
- b) pseudo-unipolar neuron;
- c) multipolar neuron;
- d) bipolar neuron.

**17. A REFLEX IS ...**

- a) the set of receptors that make up the receptive field
- b) the response of the body to the action of adequate stimuli with mandatory participation of the central nervous system
- c) the time from the beginning of the stimulus to the response
- d) the total of nerve cells

**18. THE PARTS OF THE REFLEX ARC ARE ...**

- a) receptor, synapse, effector
- b) receptor, afferent sensory neuron, nerve center, efferent motor neuron, working organ
- c) receptor, the central nervous system, working organ
- d) afferent neuron, working organ

**19. THE VALUE OF THE CENTRAL NERVOUS SYSTEM FOR THE BODY IS THAT ...**

- a) the central nervous system provides communication between various organs and systems
- b) the central nervous system connects the body with the external environment
- c) the central nervous system regulates functioning of internal organs
- d) all answers are correct

**20. THE SPINAL CORD HAS THE FOLLOWING NUMBER OF SEGMENTS**

- a) 20;
- b) 21;
- c) 41;

d) 31;

21. IN THE ENDINGS OF THE PREGANGLIONIC NEURONS OF THE PARASYMPATHETIC SYSTEM, THE FOLLOWING MEDIATOR IS PRODUCED

- a) GABA
- b) serotonin
- c) acetylcholine
- d) norepinephrine

22. IN THE ENDINGS OF THE PREGANGLIONIC NEURONS OF THE SYMPATHETIC SYSTEM, THE FOLLOWING MEDIATOR IS PRODUCED

- a) GABA
- b) norepinephrine
- c) serotonin
- d) acetylcholine

23. THE PARASYMPATHETIC PART OF THE VEGETATIVE NERVOUS SYSTEM HAS THE FOLLOWING EFFECTS

- a) slows and weakens the heart's contractions
- b) narrows the bronchi
- c) narrows the pupil
- d) all answers are correct

24. THE SYMPATHETIC PART OF THE VEGETATIVE NERVOUS SYSTEM HAS THE FOLLOWING EFFECTS

- a) expands the bronchi
- b) narrows the pupil
- c) increases the motility of the gastrointestinal tract
- d) there is no correct answer

25. THE LOCATION OF CHOLINORECEPTORS

- a) in neuromuscular synapses
- b) in vegetative ganglia
- c) in spinal ganglia
- d) all answers are correct

26. THE ROLE OF CHOLINESTERASE IN SYNAPSES IS THAT THIS ENZYME

- a) transmits excitation from presynaptic to postsynaptic membrane
- b) participates in the synthesis of acetylcholine
- c) breaks down acetylcholine
- d) causes inhibition in the synapse

27. THE CENTER OF THE SYMPATHETIC PART OF THE VEGETATIVE NERVOUS SYSTEM IS LOCATED

- a) in the medulla oblongata
- b) in the lateral horns of the thoracic and lumbar spinal cord
- c) in the lumbar and sacral parts of the spinal cord
- d) in the mesencephalon

28. THE CENTERS OF DEFECATION AND URINATION ARE LOCATED IN THE FOLLOWING SEGMENTS OF THE SPINAL CORD

- a) in the thoracic segments
- b) in the cervical segments
- c) in the lumbar segments
- d) in the sacral segments

29. IN THE PREGANGLIONIC SYMPATHETIC AND PARASYMPATHETIC FIBERS, THE FOLLOWING MEDIATOR IS DISCHARGED

- a) acetylcholine
- b) norepinephrine

c) serotonin

d) GABA

30. HIGHER CENTERS OF REGULATION OF VEGETATIVE FUNCTIONS ARE LOCATED

a) in the mesencephalon

a) in the medulla oblongata

c) in the spinal cord

d) in the hypothalamus

31. THE MAIN FUNCTIONS OF AN AXON ARE

a) conducting an impulse from a neuron body

b) conducting an impulse to a neuron body

c) organization of intercellular interaction

d) synthesis of acetylcholine

32. THE BODIES OF VEGETATIVE PREGANGLIONIC NEURONS ARE LOCATED

a) in the anterior horns of the gray substance of the spinal cord

b) in the posterior horns of the gray substance of the spinal cord

c) in the lateral horns of the gray substance of the spinal cord

d) in the spinal nodes

33. THE DORSAL ROOTS OF SPINAL CORD ARE CONSIDERED TO BE

a) motor

b) sensitive

c) neither the one, nor the other

d) mixed

34. WHEN THE ANTERIOR GROUP OF THE HYPOTHALAMIC NUCLEI IS IRRITATED, THE FOLLOWING IS OBSERVED

a) parasympathetic effect

b) sympathetic effect

c) complex of emotional reactions

d) metabolic disorders

35. WHEN THE POSTERIOR GROUP OF THE HYPOTHALAMIC NUCLEI IS IRRITATED, THE FOLLOWING IS OBSERVED

a) parasympathetic effect

b) metabolic disorders

c) sympathetic effect

d) pain syndrome

36. THE SOMATIC NERVOUS SYSTEM PROVIDES

a) smooth muscle contraction

b) adaptation and trophicity

c) skeletal muscle contraction

d) metabolism

37. THE VALUE OF THE CENTRAL NERVOUS SYSTEM FOR THE BODY IS THAT ...

a) the central nervous system provides paracrine regulation

b) the central nervous system connects glands of APUD-system against each other

c) the central nervous system realizes only humoral regulation

d) all answers are incorrect

38. THE PARASYMPATHETIC PART OF THE VEGETATIVE NERVOUS SYSTEM HAS THE FOLLOWING EFFECTS

a) increases the heart's activity

b) decreasing the bronchi tonus

c) expand the pupil

d) all answers are incorrect

39. THE LOCATION OF CHOLINORECEPTORS

a) in all internal organs

- b) on effectors of sympathetic arc
- c) in spinal cord only
- d) all answers are incorrect

40. THE ROLE OF CHOLINESTERASE IN SYNAPSES IS THAT THIS ENZYME

- a) transmits excitation from presynaptic to postsynaptic membrane tiring the synapse
- b) participates in the synthesis of acetylcholine
- c) causes inhibition in the synapse
- d) prepares the postsynaptic membrane for the perception of the next mediator quantum

41. THE ANTERIOR ROOTS OF SPINAL CORD ARE CONSIDERED TO BE

- a) motor
- b) sensitive
- c) neither the one, nor the other
- d) mixed

42. THE ORGANISM'S RESPONSE, MEDIATED THROUGH THE CENTRAL NERVOUS SYSTEM, IS CALLED ....

- a) a reflex
- b) irritability
- c) the threshold of excitation
- d) local response

43. BY THEIR LOCALIZATION RECEPTORS ARE DIVIDED INTO:

- a) chemoreceptors, thermoreceptors, baroreceptors
- b) exteroreceptors, interoreceptors, proprioreceptors
- c) adrenoreceptors, cholinoreceptors
- d) baroreceptors, proprioreceptors

44. AXOSOMATIC SYNAPSE IS TRANSFER THE EXCITATION BETWEEN:

- a) soma and dendrites of the neuron
- b) two axons of different neurons
- c) axon and soma of the neuron
- d) two dendrites of different neurons.

45. FOR THE REFLEX ARC TO FUNCTION IT IS NECESSARY TO HAVE:

- a) only sensitive receptors
- b) only afferent and efferent nerve fibers
- c) only the nerve centers
- d) all components

46. A SENSITIVE THE NEURON IS LOCATED IN:

- a) anterior horns of the spinal cord
- b) white matter of the spinal cord
- c) the spinal ganglia
- d) the posterior horns of the spinal cord

47. A REFLEX ARC OF THE AUTONOMIC (VEGETATIVE) SYSTEM CONSISTS OF AT LEAST:

- a) one neuron
- b) two neurons
- c) three neurons
- d) four neurons

48. A NEUROTRANSMITTER OF THE NEUROMUSCULAR SYNAPSE TO THE SOMATIC NERVOUS SYSTEM IS:

- a) norepinephrine
- b) acetylcholine
- c) serotonin
- d) glycine

49. PREGANGLIONIC AUTONOMIC NEURONS ARE LOCATED:

- a) in the anterior nerve roots
- b) in the lateral horns of the spinal cord
- c) inside the organs (intramurally)
- d) in the sympathetic trunk

50. THE METASYMPATHETIC NERVOUS SYSTEM IS A COMPLEX:

- a) nerve formations located in hollow internal organs
- b) neurons of the somatic system of the spinal cord
- c) autonomic neurons of the spinal cord
- d) the neurons of the brain

51. THE FUNCTION OF THE AUTONOMIC NERVOUS SYSTEM IS:

- a) regulation of skeletal muscle contractions
- b) performing arbitrary movements
- c) regulation of exchange processes
- d) maintaining posture

52. WHEN THE PARASYMPATHETIC NERVOUS SYSTEM IS IRRITATED, WHAT OF THE LISTED IS NOTED:

- a) pupil constriction, bradycardia
- b) pupil dilation, tachycardia
- c) tachycardia, increased blood pressure
- d) pupil constriction, tachycardia

53. IN STRESS, THE ACTIVITY OF THE SYMPATHETIC SYSTEM INCREASES, AS IT:

- a) causes inhibition of the cardiovascular system
- b) has an adaptive-trophic effect
- c) increases the secretory activity of the gastrointestinal tract
- d) lowers blood pressure

54. THE MAIN MEDIATOR(S) OF THE EFFERENT PART OF THE AUTONOMIC NERVOUS SYSTEM ARE:

- a) acetylcholine, dopamine
- b) norepinephrine, glycine
- c) acetylcholine
- d) gamma-aminobutyric acid, glycine

55. ACCORDING TO THE NATURE OF PERCEPTING STIMULUS, THE RECEPTORS CAN BE:

- a) chemo -, mechano-, thermo-
- b) primary receptors and secondary receptors
- c) contact, distant
- b) extero -, intero-, proprioceptors

56. PROPRIORECEPTORS ARE LOCATED ...

- a) in the internal organs
- b) on the skin
- c) in the joints and muscles
- d) in the retina

57. RECEPTORS LOCATED IN THE MUSCLES AND LIGAMENTS ARE CALLED:

- a) tactile
- b) proprioceptors
- c) chemoreceptors
- d) baroreceptors

58. THE MAIN MECHANISMS OF REGULATING THE BODY FUNCTIONS ARE ...

- a) nervous and humoral
- b) sympathetic and parasympathetic
- c) central and peripheral
- d) threshold and pre-threshold

## Vegetative nervous system

### 1. What organs do not have parasympathetic innervation?

- a) lungs, liver, kidneys, adrenal glands;
- b) salivary glands, stomach, small intestine, spleen;
- c) skeletal muscles, CNS, the most part of blood vessels, uterus, sweat glands;
- d) pancreas, bronchi, heart, esophagus.

### 2. Sympathetic and parasympathetic departments of vegetative nervous system are in relations of ...

- a) full synergism;
- b) full antagonism;
- c) relative antagonism and synergism;
- d) inhibition.

### 3. What functions of an organism do not concern to vegetative functions?

- a) digestive;
- b) blood circulations;
- c) respiration;
- d) skeletal muscles contraction.

### 4. What is the higher center of VNS and all major vegetative functions?

- a) cerebellum;
- b) hypothalamus;
- c) medulla;
- d) spinal cord.

### 5. Centers of parasympathetic nervous system are located in...

- a) department of spinal cord and reticular formation;
- b) sacral department of spinal cord and medulla;
- c) basal nucleus;
- d) cortex.

### 6. Division of VNS into departments is not based on...

- a) on the features of a sensitive neuron;
- b) on localizations of the centers in brain;
- c) on characters of influence on function of organs;
- d) on mediators.

### 7. How do noradrenaline influence on formation of urine?

- a) decrease;
- b) increase;
- c) do not change;
- d) all answers are correct.

### 8. How does noradrenaline influences on a pupil?

- a) narrows;
- b) expands;
- c) does not influence;
- d) all answers are incorrect.

### 9. What mediator decreases the motor activity of intestines?

- a) luteinizing hormone;
- b) noradrenalin;
- c) glucagons;
- d) acetylcholine.

### 10. What mediator decreases the secretion of gastric juice?

- a) prolactin;
- b) noradrenalin;
- c) thyroxin.

d) acetylcholine.

11. WHERE ARE THE SEGMENTAL CENTERS OF THE VEGETATIVE NERVOUS SYSTEM LOCATED?

a) in intermediate horns of the gray matter of the spinal cord, the medulla oblongata, and the mesencephalon

b) in the cerebral cortex and hypothalamus

c) in the medulla oblongata and the mesencephalon

d) in the hypothalamus

12. WHERE ARE THE SEGMENTAL CENTERS OF THE SYMPATHETIC NERVOUS SYSTEM LOCATED?

a) in medulla oblongata and the spinal cord

b) in the thoraco-lumbar section of the spinal cord

c) in the caudal part of the spinal cord

d) in the area of the pons and cerebellum

13. WHERE ARE THE SEGMENTAL CENTERS OF THE PARASYMPATHETIC NERVOUS SYSTEM LOCATED?

a) in medulla oblongata and the spinal cord

b) in the area of the pons and cerebellum

b) in the thoraco-lumbar section of the spinal cord

d) in the sacral part of the spinal cord, the medulla oblongata and the mesencephalon

14. WHAT ORGANS (TISSUES) DON'T GET PARASYMPATHETIC INNERVATION?

a) most blood vessels

b) muscles of the iris

c) the heart

d) the stomach and intestines

15. WHAT RATIO OF THE LENGTH OF PRE- AND POSTGANGLIONIC NERVE FIBERS IS NOT CHARACTERISTIC FOR THE SYMPATHETIC NERVOUS SYSTEM?

a) preganglionic fiber is equal to postganglionic fiber

b) preganglionic fiber is longer than postganglionic fiber

c) preganglionic fiber is shorter than postganglionic fiber

d) there is no correct answer

16. WHAT IS THE DIRECT EFFECT OF PARASYMPATHETIC NERVES ON THE CORONARY ARTERIES?

a) positive inotropic effect

b) positive bathmotropic effect

c) tone reduction

d) tone increase

17. WHAT IS THE DIRECT EFFECT OF PARASYMPATHETIC NERVES ON INTESTINAL SECRETION?

a) depends on a baseline

b) negative inotropic effect

c) reduction

d) increase

18. HOW DOES THE SYMPATHETIC CENTERS EFFECT ON BRONCHI TONUS?

a) causes dilatation

b) promotes contraction

c) does not affect

d) increases trophotropic behavioral responses

19. HOW DOES IRRITATION OF THE SYMPATHETIC NERVES AFFECT THE VOLUME OF SALIVA RELEASED?

a) increases

b) reduces

- c) does not affect
  - e) first increases, then decreases
20. HOW DOES IRRITATION OF THE SYMPATHETIC NERVES AFFECT THE DIAMETER OF THE PUPIL?
- a) increases
  - b) reduces
  - c) does not affect
  - e) first increases, then decreases
21. HOW DOES IRRITATION OF THE PARASYMPATHETIC NERVES AFFECT THE HEART?
- a) positive bathmo-, dromo-, ino-, chronotropic effects
  - b) negative bathmo-, dromo-, ino-, chronotropic effects
  - c) positive bathmo-, dromotropic effects and negative ino-, chronotropic effects
  - e) negative bathmo-, dromotropic effects and positive ino-, chronotropic effects
22. WHAT ORGANS (TISSUES) DON'T GET PARASYMPATHETIC INNERVATION?
- a) vessels of the heart
  - b) muscles of the gaster
  - c) vessels of central nervous system
  - d) muscles of the heart
23. WHAT MEDIATOR IS SECRETED BETWEEN THE FIRST AND THE SECOND MOTORNEURONS OF THE PARASYMPATHETIC NERVOUS SYSTEM?
- a) acetylcholine
  - b) noradrenaline
  - c) adrenaline
  - d) serotonin
24. WHAT MEDIATOR IS SECRETED BETWEEN THE FIRST AND THE SECOND MOTORNEURONS OF THE SYMPATHETIC NERVOUS SYSTEM?
- a) acetylcholine
  - b) noradrenaline
  - c) adrenaline
  - d) serotonin
25. WHAT MEDIATOR IS SECRETED ON THE EFFECTOR OF THE PARASYMPATHETIC REFLEX ARC?
- a) acetylcholine
  - b) noradrenaline
  - c) adrenaline
  - d) serotonin
26. WHAT MEDIATOR IS SECRETED ON THE EFFECTOR OF THE SYMPATHETIC REFLEX ARC?
- a) acetylcholine
  - b) noradrenaline
  - c) adrenaline
  - d) serotonin
27. WHICH RECEPTORS ARE LOCATED ON THE SECOND PARASYMPATHETIC NEURON?
- a) serotoninoreceptors
  - b)  $\alpha$ - or  $\beta$ -adrenoreceptors
  - c) M-cholinoreceptors
  - d) N-cholinoreceptors
28. WHICH RECEPTORS ARE LOCATED ON THE SECOND SYMPATHETIC NEURON?
- a) serotoninoreceptors
  - b)  $\alpha$ - or  $\beta$ -adrenoreceptors



c) M-cholinoreceptors

d) N-cholinoreceptors

29. WHICH RECEPTORS ARE LOCATED ON THE EFFECTOR OF THE SYMPATHETIC REFLEX ARC?

a) serotoninoreceptors

b)  $\alpha$ - or  $\beta$ -adrenoreceptors

c) M-cholinoreceptors

d) N-cholinoreceptors

30. WHICH RECEPTORS ARE LOCATED ON THE EFFECTOR OF THE PARASYMPATHETIC REFLEX ARC?

a) serotoninoreceptors

b)  $\alpha$ - or  $\beta$ -adrenoreceptors

c) M-cholinoreceptors

d) N-cholinoreceptors

31. WHICH RECEPTORS ARE LOCATED ON THE EFFECTOR OF THE SOMATIC REFLEX ARC?

a) serotoninoreceptors

b)  $\alpha$ - or  $\beta$ -adrenoreceptors

c) M-cholinoreceptors

d) N-cholinoreceptors

32. WHAT MEDIATOR IS SECRETED ON THE EFFECTOR OF THE SOMATIC REFLEX ARC?

a) acetylcholine

b) noradrenaline

c) adrenaline

d) serotonin

33. WHAT MEDIATOR IS SECRETED ON THE EFFECTOR OF THE SOMATIC REFLEX ARC?

a) no correct answer

b)  $\alpha$ - or  $\beta$ -adrenoreceptors

c) M-cholinoreceptors

d) N-cholinoreceptors

34. WHICH RECEPTORS ARE LOCATED ON THE EFFECTOR OF THE SOMATIC REFLEX ARC?

a) acetylcholine

b) noradrenaline

c) adrenaline

d) no correct answer

35. WHICH RECEPTORS ARE LOCATED ON THE EFFECTOR OF THE PARASYMPATHETIC REFLEX ARC?

a) acetylcholine

b) noradrenaline

c) adrenaline

d) no correct answer

36. WHICH RECEPTORS ARE LOCATED ON THE EFFECTOR OF THE SYMPATHETIC REFLEX ARC?

a) acetylcholine

b) noradrenaline

c) adrenaline

d) no correct answer

37. WHAT MEDIATOR IS SECRETED BETWEEN THE FIRST AND THE SECOND MOTORNEURONS OF THE SYMPATHETIC NERVOUS SYSTEM?

- a) no correct answer
- b)  $\alpha$ - or  $\beta$ -adrenoreceptors
- c) M-cholinoreceptors
- d) N-cholinoreceptors

38. WHAT MEDIATOR IS SECRETED BETWEEN THE FIRST AND THE SECOND MOTORNEURONS OF THE PARASYMPATHETIC NERVOUS SYSTEM?

- a) no correct answer
- b)  $\alpha$ - or  $\beta$ -adrenoreceptors
- c) M-cholinoreceptors
- d) N-cholinoreceptors

39. WHAT PART OF THE CENTRAL NERVOUS SYSTEM REGULATES THE INTERNAL ORGANS ACTIVITY?

- a) somatic
- b) metasymphathetic
- c) vegetative
- d) humoral

40. WHAT MEDIATOR PROVIDES NEUROMUSCULAR TRANSMISSION IN THE PARASYMPATHETIC REFLEX ARC?

- a) acetylcholine
- b) noradrenalin
- c) glycine
- d) gamma-aminobutyric acid

41. WHAT MEDIATOR PROVIDES NEUROMUSCULAR TRANSMISSION IN THE SYMPATHETIC REFLEX ARC?

- a) acetylcholine
- b) noradrenalin
- c) glycine
- d) gamma-aminobutyric acid

42. THE HIGHEST CENTER OF THE SOMATIC NERVOUS SYSTEM IS:

- a) the anterior nuclei of the hypothalamus
- b) the posterior nuclei of the hypothalamus
- c) the spinal cord
- d) the cortex of the major hemispheres

43. MOTOR NEURONS OF ANY SOMATIC REFLEX ARC ARE LOCATED IN ...

- a) in the intermediate horns of the gray matter of the brain
- b) in the ventral funiculi
- c) in the ventral horns of the spinal cord
- d) in the panterior central gyrus of the cerebral cortex

44. MOTOR NEURONS OF THE VEGETATIVE REFLEX ARCS ARE LOCATED IN ...

- a) in the intermediate horns of the gray matter of the brain
- b) in the intermediate horns of the gray matter and the nuclei of medulla oblongata
- c) in the ventral horns of the spinal cord
- d) in the anterior central gyrus of the cerebral cortex

45. THE MOTOR PART OF THE REFLEX ARC OF SOMATIC NERVOUS SYSTEM CONSISTS OF:

- a) one neuron
- b) two neurons
- c) the nerve center
- d) three neurons

46. N-CHOLINORECEPTORS ARE LOCATED ON THE EFFECTOR OF

- a) somatic reflex arc
- b) sympathetic reflex arc

- c) parasympathetic reflex arc  
 d) the autonomic reflex arc
47. M-CHOLINORECEPTORS ARE LOCATED ON THE EFFECTOR OF
- a) somatic reflex arc  
 b) sympathetic reflex arc  
 c) parasympathetic reflex arc  
 d) the autonomic reflex arc
48. ADRENORECEPTORS ARE LOCATED ON THE EFFECTOR OF
- a) somatic reflex arc  
 b) sympathetic reflex arc  
 c) parasympathetic reflex arc  
 d) the autonomic reflex arc
49. THE PART OF THE SPINAL CORD CONTAINING A PAIR OF SPINAL NERVES IS CALLED:
- a) metamere  
 b) segment  
 c) thickening  
 d) ponytai.
50. A REFLEX ARC CONTAINING 2 NEURONS IN THE EFFERENT PART, SHORT PREGANGLIONIC FIBERS, LONG POSTGANGLIONIC FIBERS, ADRENORECEPTORS ON THE EFFECTOR, CORRESPONDS TO:
- a) the somatic part of the nervous system  
 b) to the autonomic nervous system  
 c) the sympathetic part of the autonomic nervous system  
 d) the parasympathetic part of the autonomic nervous system
51. A REFLEX ARC CONTAINING 2 NEURONS IN THE EFFERENT PART, LONG PREGANGLIONIC FIBERS, SHORT POSTGANGLIONIC FIBERS, CHOLINORECEPTORS ON THE EFFECTOR, CORRESPONDS TO:
- a) the somatic part of the nervous system  
 b) to the autonomic nervous system  
 c) the sympathetic part of the autonomic nervous system  
 d) the parasympathetic part of the autonomic nervous system

## **Blood**

### **1. Buffer properties of blood provide...**

- a) maintenance of osmotic pressure;  
 b) decrease of concentration of hydrogen ions in blood;  
 c) metabolism in blood;  
 d) maintenance of the constancy of concentration of hydrogen ions in blood.

### **2. What function of blood is caused by presence of antibodies and phagocytosis activity of leukocytes in blood?**

- a) protective;  
 b) trophic;  
 c) transport;  
 d) respiratory.

### **3. Respiratory function of blood is provided by...**

- a) heparin;  
 b) plasma;  
 c) hemoglobin;  
 d) thrombin.

### **4. What does the color indicator of blood reflect?**

- a) total amount of hemoglobin in blood;

- b) the amount of hemolysed erythrocytes;
- c) the amount of erythrocytes in 1 liter of blood;
- d) the content of hemoglobin in erythrocytes.

**5. Destruction of the membrane of erythrocytes and the exit of hemoglobin into the plasma under action of various factors is named...**

- a) plasmolysis;
- b) hemolysis;
- c) fibrinolysis;
- d) hemostasis.

**6. What pressure is created by the proteins of blood plasma?**

- a) osmotic;
- b) hydrostatic;
- c) oncotic;
- d) hemodynamic.

**7. What factors participate in maintenance of acid-alkaline balance of blood plasma?**

- a) osmotic pressure;
- b) buffer systems;
- c) ions and nutrients;
- d) all answers are correct.

**8. Carboxyhemoglobin is...**

- a) a bond of hemoglobin with  $\text{CO}_2$ ;
- b) a bond of hemoglobin with  $\text{H}_2\text{CO}_3$ ;
- c) a bond of hemoglobin with  $\text{CO}$ ;
- d) a bond of hemoglobin with  $\text{Ca}_2\text{CO}_3$ .

**9. What protein of blood plasma provides transport of iron?**

- a) albumin;
- b) transferrin;
- c) transcobalamin II;
- d) no one of named.

**10. The most powerful buffer system is...**

- a) carbonate;
- b) phosphate;
- c) hemoglobin;
- d) acidic.

**11. In 1939 G. F. Lang has formulated representation about blood system, it includes ...**

- a) peripheral blood, organs of haemopoiesis, organs of blood destruction;
- b) peripheral blood, organs of haemopoiesis, organs of blood destruction, only humoral mechanism of regulation;
- c) peripheral blood, organs of haemopoiesis, organs of blood destruction, neurohumoral apparatus of regulation;
- d) peripheral blood, organs of haemopoiesis, organs of blood destruction, neural regulation.

**12. Hematocrit characterizes...**

- a) system of hemostasis;
- b) the volumetric ratio of formed elements and plasma of blood;
- c) the quantitative ratio of formed elements of blood;
- d) the ratio of uniform elements and serum of blood.

**13. Set of the reactions which provide maintenance or restoration of a constancy of the internal environment of an organism is...**

- a) haemopoiesis;
- b) homeostasis;
- c) hemostasis;
- d) hemolysis.

**14. Pathological compounds of hemoglobin include:**

- a) carboxyhemoglobin and methemoglobin
- b) myoglobin and fetal hemoglobin,
- c) deoxyhemoglobin and carbhemoglobin,
- d) oxyhemoglobin and myoglobin.

**15. How is named the force with which a dissolved substance holds or attracts water?**

- a) hemolysis;
- b) hemostasis;
- c) osmotic pressure;
- d) hydrostatic pressure.

**16. Osmotic pressure of blood of 7,3-7,6 atmospheres is called:**

- a) hypoosmia;
- b) hyperosmia;
- c) isoosmia;
- d) supraosmia.

**17. Choose one of the main depots of blood in the body.**

- a) liver;
- b) spleen;
- c) atrial auricles;
- d) veins.

**18. Which two processes are involved in maintaining a blood protective functions?**

- a) immunity and arrest of bleeding;
- b) transport of O<sub>2</sub> and CO<sub>2</sub>;
- c) excretion of intermediate and final products of metabolism;
- d) thermoregulation and trophic function.

**19. Which constant is the most rigid?**

- a) hydrogen carbonate<sup>-</sup>;
- b) creatinine;
- c) chlorine<sup>-</sup>;
- d) free calcium<sup>2+</sup>

**20. Participation in blood pH is the specific function of:**

- a) Cl<sup>-</sup>;
- b) Mg<sup>2+</sup>;
- c) K<sup>+</sup>;
- d) HCO<sub>3</sub><sup>-</sup>.

**21. What is the amount of blood in the body of an adult?**

- a) 10% or 1/10 of body weight;
- b) 6-8% or 1/12 of body weight;
- c) 7-9% or 1/11 of body weight;
- d) 11-12% or 1/9 of the body weight.

**22. What does not apply to the formed elements of blood?**

- a) red blood cells;
- b) neutrophils;
- c) leukocytes;
- d) platelets.

**23. What is the value of the hematocrit?**

- a) 15-20%;
- b) 20-35%;
- c) 35-40%;
- d) 40-45%.

**24. Red blood cell norm in males is ...**

- a)  $3.0-3.5 \cdot 10^{12}/l$ ;
- b)  $4.0-5.5 \cdot 10^{12}/l$ ;
- c)  $3.0-3.5 \cdot 10^9/l$ ;
- d)  $4.0-5.5 \cdot 10^9/l$ .

**25. Leukocytes norm is ...**

- a)  $4.0-9.0 \cdot 10^9/l$ ;
- b)  $4.0-5.5 \cdot 10^{12}/l$ ;
- c)  $3.0-3.5 \cdot 10^{12}/l$ ;
- d)  $4.0-5.5 \cdot 10^9/l$ .

**26. Norm of hemoglobin (Hb) in males is ...**

- a) 110-120 g/l;
- b) 130-170 g/l;
- c) 180-200 g/l;
- d) 0.8-1.0.

**27. Norm of hemoglobin (Hb) in females is ...**

- a) 0.8-1.0;
- b) 110-120 g/l;
- c) 180-190 g/l;
- d) 120-150 g/l.

**28. Norm of erythrocyte sedimentation rate (ESR) in males is ...**

- a) 2-15 g/l;
- b) 1-10 g/l;
- c) 2-15 mm/h;
- d) 1-10 mm/h.

**29. Norm of erythrocyte sedimentation rate (ESR) in females is ...**

- a) 2-15 g/l;
- b) 1-10 g/l;
- c) 2-15 mm/h;
- d) 1-10 mm/h.

**30. Platelets norm is ...**

- a)  $320-360 \cdot 10^9/g/l$ ;
- b)  $180-320 \cdot 10^9/g/l$ ;
- c)  $320-360 \cdot 10^9/l$ ;
- d)  $180-320 \cdot 10^9/l$ .

**31. Red blood cell norm in females is ...**

- a)  $3.7-4.9 \cdot 10^{12}/l$ ;
- b)  $4.0-5.5 \cdot 10^{12}/l$ ;
- c)  $3.7-4.9 \cdot 10^{12}g/l$ ;
- d)  $4.0-5.5 \cdot 10^{12}g/l$ .

**32. Content of total protein in blood is ...**

- a) 65-85 g/l;
- b) 45-65 g/l;
- c) 35-50 g/l;
- d) 85-95 g/l.

**33. Content of albumins in blood is ...**

- a) 65-85 g/l;
- b) 45-65 g/l;
- c) 35-50 g/l;
- d) 85-95 g/l.

**34. Content of globulins in blood is ...**

- a) 20-30 g/l;
- b) 45-65 g/l;

- c) 20-30 %;
- d) 8.5-9.5 %.

**35. Content of fibrinogen in blood is ...**

- a) 20-30 g/l;
- b) 2-4 %;
- c) 20-30 %;
- d) 2-4 g/l.

**36. Total bilirubin norm is ...**

- a) 30.5-42.5 g/l;
- b) 8.5-20.5 g/l;
- c) 30.5-42.5  $\mu\text{mol/l}$ ;
- d) 8.5-20.5  $\mu\text{mol/l}$ .

**37. Triglycerides (lipids) norm is ...**

- a) 0.45-2.5 mmol/l;
- b) 2.55-4.5 mmol/l;
- c) 5.45-6.5 mmol/l;
- d) 0.1-0.45 mmol/l.

**38. Normal range of glucose in blood is ...**

- a) 3.3-5.5 g/l;
- b) 0.1-2.5 g/l.
- c) 3.3-5.5 mmol/l;
- d) 0.1-2.5 mmol/l.

**39. Normal content of sodium ions in blood is ...**

- a) 135-150 g/l;
- b) 105-130 g/l;
- c) 135-150 mmol/l;
- d) 105-130 mmol/l.

**40. Normal content of potassium<sup>+</sup> in blood is ...**

- a) 3.5-5.0 g/l;
- b) 5.5-7.0 g/l;
- c) 3.5-5.0 mmol/l;
- d) 5.5-7.0 mmol/l.

**41. Normal content of Mg<sup>2+</sup> in blood is ...**

- a) 0.7-1.2 mmol/l;
- b) 1.3-1.8 mmol/l;
- c) 0.7-1.2 g/l;
- d) 1.3-1.8 g/l.

**42. Normal content of chlorine ions in blood is ...**

- a) 135-150 mmol/l;
- b) 75-90 mmol/l;
- c) 95-110 mmol/l;
- d) 115-130 mmol/l.

**43. Normal content of hydrocarbonate<sup>-</sup> in blood is ...**

- a) 20-30 g/l;
- d) 10-20 g/l;
- c) 20-30 mmol/l;
- d) 10-20 mmol/l.

**44. Normal content of protein anions<sup>-</sup> in blood is ...**

- a) 135-150 mmol/l;
- b) 2.25-2.75 mmol/l;
- c) 15-20 g/l;
- d) no correct answers.

**45. Normal content of total calcium in blood is ...**

- a) 3.25-3.75 g/l;
- b) 2.25-2.75 g/l;
- c) 3.25-3.75 mmol/l;
- d) 2.25-2.75 mmol/l.

**46. Respiratory function of blood is provided by...**

- a) heparin;
- b) plasma;
- c) hemoglobin;
- d) thrombin.

**47. Carboxyhemoglobin is...**

- a) a bond of hemoglobin with CO<sub>2</sub>;
- b) a bond of hemoglobin with CO;
- c) a bond of hemoglobin with H<sub>2</sub>CO<sub>3</sub>;
- d) a bond of hemoglobin with Ca<sub>2</sub>CO<sub>3</sub>.

**48. Carbohemoglobin is...**

- a) a bond of hemoglobin with CO<sub>2</sub>;
- b) a bond of hemoglobin with CO;
- c) a bond of hemoglobin with H<sub>2</sub>CO<sub>3</sub>;
- d) a bond of hemoglobin with Ca<sub>2</sub>CO<sub>3</sub>.

**49. Mass of peripheral blood is ... % of body weight.**

- a) 3-4 %;
- b) 6-8%;
- c) 10-12%;
- d) 13-15%.

**50. Blood-forming organs is ...**

- a) red bone marrow, spleen, lymph nodes;
- b) red bone marrow, kidneys, intestine;
- c) spleen, lungs, kidneys;
- d) intestine, uterus, red bone marrow.

**51. What does «excretory function of blood» mean?**

- a) transport of O<sub>2</sub> from the lungs to tissues and CO<sub>2</sub> from tissues to lungs;
- b) transport of basic nutrients from digestive organs to body tissues;
- c) delivery of the hormones, peptides, ions and other substances having regulatory effects on different target cells;
- d) transport of intermediate and final products of metabolism and water excesses to organs of their excretion.

**52. Calculating of reference circulating blood volume performed using the following formula:**

- a)  $M \cdot k$ ;
- b) plasma /total blood mass;
- c)  $Hb \cdot 3 /$  first three figures of Er amount;
- d)  $SV \cdot$  heart rate.

**53. What is the normal white blood cell count?**

- a)  $4.5-5.5 \cdot 10^{12}$  pieces/liter;
- b)  $4-9 \cdot 10^9$  /liter;
- c)  $200-300 \cdot 10^9$  /liter;
- d) 130-170 g/liter.

**54. What is the normal red blood cell count?**

- a)  $4.5-5.5 \cdot 10^{12}$  pieces/liter;
- b)  $4-9 \cdot 10^9$  /liter;
- c)  $200-300 \cdot 10^9$  /liter;



d) 130-170 g/liter.

**55. Formed elements of blood are...**

- a) sodium, potassium, chlorine;
- b) erythrocytes, leukocytes, platelets;
- c) plasma, serum, hematocrit;
- d) albumins, globulins, fibrinogen.

**56. Plasma consists of ...**

- a) water and solids;
- b) erythrocytes, leukocytes, platelets;
- c) myoglobin, hemoglobin;
- d) carbon monoxide, carbon dioxide.

**57. Normal red blood cell count:**

- a)  $4.0-5.5 \cdot 10^{12}/L$ ;
- b)  $4.0-9.0 \cdot 10^9/L$ ;
- c)  $180-320 \cdot 10^9/L$ ;
- d) 130-170 g/L.

**58. Normal white blood cell count:**

- a)  $4.0-5.5 \cdot 10^{12}/L$ ;
- b)  $4.0-9.0 \cdot 10^9/L$ ;
- c)  $180-320 \cdot 10^9/L$ ;
- d) 130-170 g/L.

**59. Inorganic substances of plasma are ...**

- a) main cations and anions;
- b) non-protein nitrogen bonds, proteins;
- c) erythrocytes, leukocytes, platelets;
- d) myoglobin, hemoglobin.

**60. Osmotic pressure of blood is ... of atmospheres.**

- a) 7.6;
- b) 7.1;
- c) 8.0;
- d) 8.15.

**61. The specific function of sodium is ...**

- a) a formation of membrane potentials;
- b) a depolarization and repolarization of cardiomyocytes;
- c) a regulation of plasma osmotic pressure;
- d) participation in blood pH regulation.

**62. The specific function of calcium is ...**

- a) a formation of membrane potentials;
- b) a depolarization and repolarization of cardiomyocytes;
- c) a regulation of plasma osmotic pressure;
- d) participation in blood pH regulation.

**63. The specific function of hydrocarbonate anion is ...**

- a) a formation of membrane potentials;
- b) a depolarization and repolarization of cardiomyocytes;
- c) a regulation of plasma osmotic pressure;
- d) participation in blood pH regulation.

**64. Acidosis -**

- a) pH is lower than 7.35;
- b) pH is more than 7.47;
- c) pH is 7.35-7.47;
- d) pH is more than 7.8.

**65. Alkalosis -**

- a) pH is lower than 7.35;
- b) pH is more than 7.47;
- c) pH is 7.35-7.47;
- d) pH is more than 7.8.

**66. Where are erythrocytes mostly deposited?**

- a) liver;
- b) vessels of pulmonary circulation;
- c) spleen;
- d) skin vessels.

**67. What is the main blood depot of an organism?**

- a) liver and spleen;
- b) veins system and vessels of pulmonary circulation;
- c) ears of the heart and vessels of the abdominal cavity;
- d) skeletal muscles and their vessels.

**68. What is the proportion of plasma in the blood?**

- a) 55%;
- b) 35%;
- c) 60%;
- d) 45%.

**69. Which two processes are involved by blood in maintaining its protective function?**

- a) maintaining the immunity, arrest of bleeding;
- b) transport of O<sub>2</sub> and CO<sub>2</sub>, thermoregulation;
- c) excretion of intermediate and final products of metabolism, thermoregulation;
- d) all answers are correct.

**70. Choose correct enumeration of blood formed elements.**

- a) granulocytes, platelets, reticulocytes;
- b) reticulocytes, prolymphocytes, platelets;
- c) megakaryocytes, agranulocytes, erythrocytes;
- d) erythrocytes, leukocytes, platelets.

**71. What function of blood is caused by presence of antibodies and phagocytosis activity of leukocytes in blood?**

- a) immune;
- b) trophic;
- c) transport;
- d) respiratory.

**72. What does the color indicator of blood reflect?**

- a) total amount of hemoglobin in blood;
- b) the amount of hemolysed erythrocytes;
- c) the amount of erythrocytes in 1 liter of blood;
- d) the content of hemoglobin in erythrocytes.

**73. Destruction of the membrane of erythrocytes and the exit of hemoglobin into the plasma under action of various factors is named...**

- a) plasmolysis;
- b) hemolysis;
- c) fibrinolysis;
- d) homeostasis.

**74. What pressure is created by the proteins of blood plasma?**

- a) osmotic;
- b) hydrostatic;
- c) oncotic;
- d) hemodynamic.

**75. What factors participate in maintenance of acid-alkaline balance of blood plasma?**

- a) osmotic pressure;
- b) buffer systems;
- c) ions and nutrients;
- d) all answers are correct.

**76. What proteins of blood plasma provides mainly transport function?**

- a) albumins;
- b) globulins;
- c) transcobolamin II;
- d) no one of named.

**77. The most powerful buffer system is...**

- a) hydrocarbonate;
- b) phosphate;
- c) hemoglobin;
- d) protein.

**78. In 1939 G. F. Lang has formulated representation about blood as the system including...**

- a) peripheral blood, organs of haemopoiesis, organs of blood destruction;
- b) peripheral blood, organs of haemopoiesis, organs of blood destruction, only humoral mechanism of regulation;
- c) peripheral blood, organs of haemopoiesis, organs of blood destruction, neurohumoral apparatus of regulation;
- d) peripheral blood, organs of haemopoiesis.

**79. Hematocrit characterizes...**

- a) system of hemostasis;
- b) the volumetric ratio of uniform elements and plasma of blood;
- c) the quantitative ratio of uniform elements of blood;
- d) the ratio of uniform elements and serum of blood.

**80. Set of the reactions which provide maintenance or restoration of a constancy of the internal environment of an organism is...**

- a) haemopoiesis;
- b) homeostasis;
- c) hemostasis;
- d) hemolysis.

**81. Pathological compounds of hemoglobin include:**

- a) carboxyhemoglobin and methemoglobin;
- b) myoglobin and fetal hemoglobin;
- c) deoxyhemoglobin and carbhemoglobin;
- d) oxyhemoglobin and myoglobin.

**82. How is named the force with which a dissolved substance holds or attracts water?**

- a) hemolysis;
- b) hemostasis;
- c) osmotic pressure;
- d) oncotic pressure.

**83. Osmotic pressure of blood of 7.6 atmospheres is called:**

- a) hypoosmia;
- b) hyperosmia;
- c) isoosmia;
- d) anosmia.

**84. Which constant is the most rigid?**

- a) hydrogen carbonate;
- b) creatinine;
- c) chlorine;
- d) free calcium<sup>2+</sup>.

**85. Participation in blood pH is the specific function of:**

- a)  $\text{Cl}^-$ ;
- b)  $\text{Mg}^{2+}$ ;
- c)  $\text{K}^+$ ;
- d)  $\text{HCO}_3^-$ .

### **Blood groups. Blood transfusion**

**1. Who was the first to describe the blood groups?**

- a) I. Pavlov;
- b) K. Landsteiner;
- c) R. Descartes;
- d) F.A. Bainbridge.

**2. What special substances did K. Landsteiner describe for the first time?**

- a) agglutinins and agglutinogens;
- b) mediators;
- c) noradrenoline and acetylcholine;
- d) inotropic and chronotropic.

**3. Where are agglutinogens located?**

- a) on erythrocytes;
- b) in erythrocytes;
- c) in plasma;
- d) on formed elements of blood.

**4. How many types of agglutinogens are taken into account in practical medicine for dividing blood into groups?**

- a) 1;
- b) 2;
- c) 15;
- d) 250.

**5. How many people have blood groups A and O?**

- a) approximately more than 10%;
- b) approximately more than 80%;
- c) about 30%;
- d) about 60%.

**6. How many people have B and AB blood groups?**

- a) approximately more than 10%;
- b) approximately more than 80%;
- c) about 30%;
- d) about 60%.

**7. Where are agglutinins located?**

- a) on erythrocytes;
- b) in erythrocytes;
- c) in plasma;
- d) on formed elements of blood.

**8. What names were 2 types of clinically significant agglutinins given?**

- a) anti-A (or alpha) and anti-B (or beta);
- b) A (or anti-alpha) and B (or anti-beta);
- c) A and B;
- d) AB and ABO.

**9. What names were 2 types of clinically significant agglutinogens given?**

- a) anti-A (or alpha) and anti-B (or beta);
- b) A (or anti-alpha) and B (or anti-beta);
- c) A and B;

d) AB and ABO.

**10. The blood group A contains ...**

- a) no agglutinogens,  $\alpha$  and  $\beta$ ;
- b) A and B, no agglutinins;
- c) A,  $\beta$ ;
- d) B,  $\alpha$ .

**11. The blood group B contains ...**

- a) no agglutinogens,  $\alpha$  and  $\beta$ ;
- b) A and B, no agglutinins;
- c) A,  $\beta$ ;
- d) B,  $\alpha$ .

**12. The blood group AB contains ...**

- a) no agglutinogens,  $\alpha$  and  $\beta$ ;
- b) A and B, no agglutinins;
- c) A,  $\beta$ ;
- d) B,  $\alpha$ .

**13. The blood group O contains ...**

- a) no agglutinogens,  $\alpha$  and  $\beta$ ;
- b) A and B, no agglutinins;
- c) A,  $\beta$ ;
- d) B,  $\alpha$ .

**14. What they call Landsteiner's rule?**

- a) stated by formula  $I = U / R$ ;
- b) the strength of the contraction of muscle is directly proportional to its initial expansion;
- c) one blood group must not have self-tilted agglutinins and agglutinogens;
- d) that is the law of anatomical and physiological integrity.

**15. Can one blood group contain in norm the self-tilted agglutinogens and agglutinins?**

- a) no;
- b) yes;
- c) it depends on a situation;
- d) after blood transfusion.

**16. In what of following cases the self-tilted agglutinins and agglutinogens can be found in the blood of concrete person?**

- a) in some situations after a blood transfusion;
- b) must be in no situation;
- c) every time after blood transfusion;
- d) always in impregnate.

**17. In what case is rhesus conflict possible in natural conditions?**

- a) in some case, when a Rh-negative woman is pregnant;
- b) it can't be under any circumstances;
- c) every time after blood transfusion;
- d) always in impregnate.

**18. In what case is rhesus conflict possible in natural conditions?**

- a) when a Rh-positive woman is pregnant with a Rh-negative fetus;
- b) when a Rh-negative woman is pregnant with a Rh-positive fetus;
- c) it can't be under any circumstances;
- d) always in impregnate.

**19. What substances determine the blood group?**

- a) antibodies on the membranes of red blood cells
- b) antigens on the membranes of red blood cells;
- c) antibodies in plasma;
- d) antigens in plasma.

**20. What happens if self-tilted agglutinogens and agglutinins contact to each other?**

- a) hemolysis;
- b) coagulation;
- c) homeostasis;
- d) agglutination.

**21. What is agglutination?**

- a) an antigen-antibody reaction in relation to blood groups;
- b) a highly specific kind of irritability associated with the ability of a cell or a tissue to generate action potential;
- c) a response of an organism mediated through the central nervous system;
- d) a blood coagulation.

**22. What may agglutination result in?**

- a) formation of antigen-antibody complexes in plasma;
- b) a clumping of erythrocytes and burst of them;
- c) hemocoagulation;
- d) changing the course of blood function (or processes) with a purpose of achieving a particular result.

**23. What can be used for blood transfusions?**

- a) only whole blood;
- b) only whole blood or only RBCs;
- c) whole blood or RBCs only or blood plasma only;
- d) whole blood or RBCs only or blood plasma only or serum only.

**24. Where can a blood transfusions be made into?**

- a) into a recipient blood stream or it's red bone marrow;
- b) into a recipient blood stream or it's red bone marrow or intramuscularly;
- c) only into a recipient blood;
- d) only intramuscularly.

**25. Is it possible to transfuse different blood groups in case of a clinic according to Ottenberg rule?**

- a) yes;
- b) no;
- c) yes, under certain circumstances;
- d) yes, if the patient dies without a transfusion.

**26. In what case blood transfusion can be done in accordance with the Ottenberg principle?**

- a) in military environment or field conditions, if it can save the patient's life;
- b) in any case, if it can save the patient's life;
- c) in any case, if transfusion is necessary;
- d) at the present time blood transfusion according to the Ottenberg principle is strictly prohibited.

**27. Identify all pre-transfusion tests.**

- a) blood typing and biochemical;
- b) blood typing, crossmatching, biological;
- c) blood typing and crossmatching;
- d) blood typing, crossmatching, biological and biochemical.

**28. According to the Ottenberg principle, the AB blood group is defined as ...**

- a) universal transfusion;
- b) universal donor;
- c) universal recipient;
- d) universal idler.

**29. How much blood can be transfused in accordance with the Ottenberg principle?**

- a) not more than 0.5 l;
- b) not more than 1.0 l;
- c) not more than 2.0 l;

d) there is no restriction.

**30. What symptom(s) can't occur as a hazard of blood transfusion?**

a) pain elsewhere in the body, mainly in chest;

b) hemolytic jaundice;

c) hypotension or fever;

d) myosis and hypertension.

**31. Which of the Rh-antigens is clinically significant?**

a) A;

b) B;

c) C;

d) D.

**32. How many options are there for the relationship between donor and recipient blood, which under any circumstances can't lead to Rh-conflict, if the recipient has no blood transfusions or pregnancy in background?**

a) 1;

b) 2;

c) 3;

d) 4.

**33. Transfusion of what has the least amount of risks?**

a) whole blood;

b) components of a blood;

c) transfusions of whole blood or its components have the same number of risks;

d) transfusions of whole blood or its components have no risks at all.

## Respiratory system

**1. Automaticity of the respiratory center is located in...**

a) cortex of cerebrum;

b) spinal cord;

c) medulla oblongata;

d) pons varolii.

**2. In what form is oxygen transported by blood?**

a) only in dissolved state;

b) only in connection with hemoglobin;

c) in dissolved state and in connection with hemoglobin;

d) as salts of H<sub>2</sub>CO<sub>3</sub>.

**3. How will the respiration be changed after total dissecting away mesencephalon from medulla oblongata (the Hering-Breuer reflex will realize only)?**

a) it will become frequent and superficial;

b) it will become frequent and deep;

c) it will become rare and superficial;

d) it will become rare and deep.

**4. Exchange of oxygen and carbon dioxide between blood and tissues is carried out by ....**

a) active transport;

b) participation of transmitting membrane proteins;

c) osmosis;

d) simple diffusion.

**5. Maximal volume of air which can be present in lungs is named...**

a) vital capacity of lungs;

b) functional residual capacity;

c) general capacity of lungs;

d) reserve volume of lungs.

**6. Can oxygen, physically dissolved in blood, provide needs of an organism in usual conditions?**

- a) yes;
- b) can, in conditions of rest;
- c) no;
- d) can, in conditions of the basal metabolism.

**7. What valency does iron have in structure of a molecule of hemoglobin?**

- a) 3;
- b) 4;
- c) 2;
- d) 1.

**8. What factor provides about 2/3 of elastic resistance of lungs?**

- a) lysozyme;
- b) heparin;
- c) histamine;
- d) surfactant.

**9. Elastic traction of lungs is...**

- a) the force directed on increase of volume of lungs;
- b) the passive strain of elastic fibres of lungs tissue;
- c) the tonus of bronchial muscles;
- d) the force directed on decrease of volume of lungs.

**10. Name correct sequence of stages of respiration.**

- a) ventilation of lungs, gas exchange in lungs, transport of gases by blood, biological oxidation, gas exchange between blood and tissues;
- b) gas exchange in lungs, ventilation of lungs, transport of gases by blood, gas exchange between blood and tissues, biological oxidation;
- c) ventilation of lungs, gas exchange in lungs, transport of gases by blood, gas exchange between blood and tissues, biological oxidation;
- d) gas exchange in lungs, biological oxidation, ventilation of lungs, transport of gases by blood, gas exchange between blood and tissues.

**11. Activity of the respiratory centers mainly depends on...**

- a) pCO<sub>2</sub>, pO<sub>2</sub>, pH of arterial blood;
- b) amount of uniform elements of blood;
- c) hematocrit;
- d) H<sub>2</sub>CO<sub>3</sub> concentration, HbO<sub>2</sub> and HbCO<sub>2</sub> content.

**12. Peripheral chemoreceptors, which participate in regulation of respiration, are located mainly...**

- a) in pleura;
- b) in carotid sinus;
- c) in respiratory muscles;
- d) in trachea.

**13. In what form carbonic gas is transported by blood?**

- a) in form of bicarbonates;
- b) in connection with proteins (carbocompounds);
- c) in dissolved state;
- d) all answers are correct.

**14. What is the name of the condition at which air penetrate into a pleural cavity?**

- a) hemothorax;
- b) pneumothorax;
- c) hydrothorax;
- d) plevritis.

**15. Name correct sequence of stages of respiration.**



- a) ventilation of lungs, gas exchange in lungs, transport of gases by blood, biological oxidation, gas exchange between blood and tissues;
- b) gas exchange in lungs, ventilation of lungs, transport of gases by blood, gas exchange between blood and tissues, biological oxidation;
- c) ventilation of lungs, gas exchange in lungs, transport of gases by blood, gas exchange between blood and tissues, biological oxidation.

**16. What is a direction of transpulmonary pressure during resting expiration?**

- a) transpulmonary pressure is absent;
- b) from trachea to alveoli;
- c) from the outside to alveoli;
- d) from alveoli to the outside.

**17. Exchange of oxygen and carbonic gas between blood and tissues is carried out by ....**

- a) active transport;
- b) participation of transmitting membrane proteins;
- c) osmosis;
- d) simple diffusion.

**18. In what form is oxygen transported by blood?**

- a) only in dissolved state;
- b) only in connection with hemoglobin;
- c) in dissolved state and in connection with hemoglobin;
- d) as salts of  $H_2CO_3$ .

**19. Transpulmonary pressure is...**

- a) the force directed on increase of volume of lungs;
- b) the passive strain of elastic fibres of lungs tissue;
- c) the tonus of bronchial muscles;
- d) the force directed on decrease of volume of lungs.

**20. The conducting airways with the air that does not undergo respiratory exchange are known as the ...**

- a) inspiratory volume;
- b) expiratory reserve volume;
- c) total capacity of lungs;
- d) respiratory dead space.

**21. Tidal volume:**

- a) the volume exchanged in normal inspiration or expiration;
- b) the volume that can still be inhaled at the end of a quiet inspiration;
- c) the volume that can still be exhaled at the end of a quiet expiration;
- d) the volume remaining in the lungs after maximal expiration.

**22. Inspiratory reserve volume:**

- a) the volume exchanged in normal inspiration or expiration;
- b) the volume that can still be inhaled at the end of a quiet inspiration;
- c) the volume that can still be exhaled at the end of a quiet expiration;
- d) the volume remaining in the lungs after maximal expiration.

**23. Expiratory reserve volume:**

- a) the volume exchanged in normal inspiration or expiration;
- b) the volume that can still be inhaled at the end of a quiet inspiration;
- c) the volume that can still be exhaled at the end of a quiet expiration;
- d) the volume remaining in the lungs after maximal expiration.

**24. Residual volume:**

- a) the volume exchanged in normal inspiration or expiration;
- b) the volume that can still be inhaled at the end of a quiet inspiration;
- c) the volume that can still be exhaled at the end of a quiet expiration;
- d) the volume remaining in the lungs after maximal expiration.

**25. Vital capacity:**

- a) the greatest volume that can be exhaled after maximal inspiration;
- b) the greatest volume that can be inhaled after quite expiration;
- c) the volume remaining in the lung after quite expiration;
- d) the volume in the lung after maximal inspiration.

**26. Inspiratory capacity:**

- a) the greatest volume that can be exhaled after maximal inspiration;
- b) the greatest volume that can be inhaled after quite expiration;
- c) the volume remaining in the lung after quite expiration;
- d) the volume in the lung after maximal inspiration.

**27. Functional residual capacity:**

- a) the greatest volume that can be exhaled after maximal inspiration;
- b) the greatest volume that can be inhaled after quite expiration;
- c) the volume remaining in the lung after quite expiration;
- d) the volume in the lung after maximal inspiration.

**28. Total capacity:**

- a) the greatest volume that can be exhaled after maximal inspiration;
- b) the greatest volume that can be inhaled after quite expiration;
- c) the volume remaining in the lung after quite expiration;
- d) the volume in the lung after maximal inspiration.

**29. This is the sum of the residual and the expiratory reserve volume.**

- a) total lung capacity;
- b) functional residual capacity;
- c) inspiratory capacity;
- d) vital capacity.

**30. This is the sum of the tidal and the inspiratory reserve volume.**

- a) total lung capacity;
- b) functional residual capacity;
- c) inspiratory capacity;
- d) vital capacity.

**31. This is the sum of the tidal, the inspiratory reserve and the expiratory reserve volume.**

- a) total lung capacity;
- b) functional residual capacity;
- c) inspiratory capacity;
- d) vital capacity.

**32. These are cells of the alveoli that produces surfactant.**

- a) type I alveolar cells;
- b) type II alveolar cells;
- c) surface cells;
- d) macrophages.

**33. The first stage of breathing is ...**

- a) ventilation of lungs;
- b) gas exchange in lungs;
- c) transport of gases by blood;
- d) gas exchange between blood and tissues.

**34. The second stage of breathing is ...**

- a) gas exchange in lungs;
- b) ventilation of lungs;
- c) transport of gases by blood;
- d) gas exchange between blood and tissues.

**35. The third stage of breathing is ...**

- a) ventilation of lungs;

- b) gas exchange in lungs;
- c) gas exchange between blood and tissues;
- d) transport of gases by blood.

**36. The fourth stage of breathing is ...**

- a) ventilation of lungs;
- b) gas exchange in lungs;
- c) gas exchange between blood and tissues;
- d) transport of gases by blood.

**37. What is the volume of respiratory dead space of the lungs?**

- a) 50 ml;
- b) 150 ml;
- c) 500 ml;
- d) 1500 ml.

**38. Quite exhalation begins when ...**

- a) inspiratory muscles relax;
- b) diaphragm contracts;
- c) blood circulation is the lowest;
- d) inspiratory muscles relax, diaphragm contracts and blood circulation is the lowest.

**39. Which is the dominant method of carbon dioxide transport?**

- a) bound to haemoglobin;
- b) bound to oxygen;
- c) dissolved in plasma as a gas;
- d) in plasma as bicarbonate.

**40. This is direction of diffusion of gases at the alveoli of the lungs.**

- a) oxygen into blood, carbon dioxide into blood;
- b) oxygen out of blood, carbon dioxide into blood;
- c) oxygen into blood, carbon dioxide out of blood;
- d) oxygen out of blood, carbon dioxide out of blood.

**41. This is direction of diffusion of gases at capillaries near cells.**

- a) oxygen into blood, carbon dioxide into blood;
- b) oxygen out of blood, carbon dioxide into blood;
- c) oxygen into blood, carbon dioxide out of blood;
- d) oxygen out of blood, carbon dioxide out of blood.

**42. This structure prevents food or water from entering the trachea.**

- a) epiglottis;
- b) nasopharynx;
- c) paranasal sinus;
- d) thyroid cartilage.

**43. Which is a factor that does not affect haemoglobin's affinity for oxygen?**

- a) pH of blood;
- b) partial pressure of the oxygen;
- c) amount of oxygen available;
- d) respiratory rate.

**44. Which of the following is not a factor that the rate of pulmonary and systemic gas exchange depends on?**

- a) partial pressure difference of the gases;
- b) force of contraction of diaphragm;
- c) molecular weight and solubility of the gases;
- d) diffusion distance.

## Cardiovascular system

**1. Complete the phrase: "The process of periodic spontaneous excitation of heart is ...".**

- a) automaticity;
- b) conduction;
- c) refracterity;
- d) contraction.

**2. The big duration of potential of cardiomyocytes depends on the phase of a plateau caused by...**

- a) prolonged time of sodium activation during diastolic depolarization;
- b) opening of calcium channels of a cellular membrane and current of  $\text{Ca}^{2+}$  into a cell during repolarization;
- c) delay of process of sodium activation during hyperpolarization;
- d) delay of opening of calcium channels of a membrane during hypopolarization.

**3. What humoral factor stimulates work of heart?**

- a) acetylcholine;
- b) adrenaline and metabolites;
- c) potassium ions and moderate hyperoxia;
- d) endothelin.

**4. What effects does vagus nerves produce on a cardiac muscle?**

- a) positive inotropic, negative chronotropic;
- b) negative inotropic, positive chronotropic;
- c) negative inotropic, negative chronotropic;
- d) positive inotropic, positive chronotropic.

**5. Which of the following dependencies exists and is named «the stairs of Boydich»?**

- a) decrease of force of heart contractions at rhythmic simulation with growing frequency;
- b) increase of frequency of heart contractions at rhythmic action of identical irritants;
- c) increase of force of heart contractions at rhythmic simulation with growing frequency;
- d) increase of excitability of heart at rhythmic action of identical irritants.

**6. At humans spontaneous impulses in synoatriacular node arise with frequency...**

- a) 20 impulses/minute;
- b) 40–50 impulses/minute;
- c) 30–40 impulses/minute;
- d) 60–80 impulses/minute.

**7. Synchronous contraction of cardiomyocytes is provided by...**

- a) an intracardial peripheral reflex;
- b) features of intercellular interactions (nexuses);
- c) endocellular regulation;
- d) influence of vagus nerve.

**8. Strengthening of contraction of left ventricle at the moderate stretching of walls of the right atrium is provided by...**

- a) intercellular interaction;
- b) endocellular regulation;
- c) an intracardial peripheral reflex;
- d) influence of adrenaline.

**9. Bathmotropic effect on activity of heart is a change of...**

- a) rhythm of heart contractions;
- b) rate of conduction of excitation in myocardium;
- c) excitability of myocardium;
- d) force of heart contraction.

**10. Inotropic effect on activity of heart is a change of...**

- a) excitability of myocardium;
- b) rhythm of heart contractions;
- c) rate of conduction of excitation in myocardium;
- d) force of heart contraction.

**11. Chronotropic effect on activity of heart is a change of...**

- a) force of heart contraction;
- b) excitability of myocardium;
- c) rhythm of heart contractions;
- d) rate of conduction of excitation in myocardium.

**12. What effect do sympathetic nerves produce on the cardiac muscle?**

- a) positive inotropic, negative chronotropic;
- b) positive inotropic, positive chronotropic;
- c) negative inotropic, positive chronotropic;
- d) negative inotropic, negative chronotropic.

**13. The terminia (the ends of the nerve endings) of the sympathetic nerve, which innervate the heart, release...**

- a) acetylcholine;
- b) histamine;
- c) noradrenalin;
- d) serotonin.

**14. The terminia (the ends of the nerve endings) of the vagus nerve, which innervate the heart, release...**

- a) adrenaline;
- b) serotonin;
- c) histamine;
- d) acetylcholine.

**15. In what department of the central nervous system is cardiovascular center situated?**

- a) in spinal cord;
- b) in hypothalamus;
- c) in medulla oblongata;
- d) in thalamus.

**16. Which type of cardiomyocytes make up 99% of myocardium mass?**

- a) contractile;
- b) conductive;
- c) secretory;
- d) nervous.

**17. Choose non-specific properties of the heart:**

- a) excitability, conductivity, contractility;
- b) long refractory period, inability to tetanic contraction;
- c) automatism;
- d) work according to the law "all or nothing".

**18. Complete the phrase: "Ability to get self-excitement, without getting outside-cell irritation from neurons is named ..."**

- a) conductivity;
- b) automatism;
- c) long refractory period;
- d) contractility;

**19. In what part of a healthy heart does the excitation arise?**

- a) sino-atrial node;
- b) atrio-ventricular node;
- c) right bundle branch;
- d) intermodal tract

**20. Complete the phrase "The enlargement of an organ or a tissue from the increase of its cells is named..."**

- a) atrophy;
- b) hypotrophy;

c) hypertrophy

d) dystrophy.

**21. What is the name of the next dependency – the strength of the contraction of muscle (cardiomuscle) is directly proportional to its expansion”?**

a) the Frank Starling law;

b) the law “all or nothing”;

c) the Bainbridge reflex;

d) the Anrep phenomenon.

**22. In what department of CNS is the cardiac center located?**

a) in pons;

b) in medulla oblongata;

c) in midbrain;

d) in spinal cord.

**23. Which conditions cause positive chronotropic effect?**

a) moderate hyperoxia;

b) hypercapnia;

c) hyponatremia;

d) hyperkalemia.

**24. Choose a correct time of systolic period in auricles:**

a) 0.1 sec.;

b) 1 sec.;

c) 0.5 sec.;

d) 0.7 sec.

**25. Choose the correct sequence of periods of systole in ventricles**

a) rapid ejection, slow ejection, asynchronous contraction, isometric contraction;

b) slow ejection, asynchronous contraction, isometric contraction, rapid ejection;

c) isometric contraction, rapid ejection, slow ejection, asynchronous contraction;

d) asynchronous contraction, isometric contraction, rapid ejection, slow ejection.

**26. Choose specific properties of the heart:**

a) conductivity, contractility, inability to tetanic contraction, work according to the law “all or nothing”;

b) long refractory period, inability to tetanic contraction, automatism, work according to the law “all or nothing”;

c) excitability, automatism, contractility, long refractory period;

d) excitability, conductivity, contractility.

**27. Choose the correct sequence of periods of diastole in ventricles**

a) protodiastolic – presystolic – iso(volu)metric relaxation – filling with blood;

b) protodiastolic – iso(volu)metric relaxation – filling with blood – presystolic;

c) presystolic – protodiastolic – iso(volu)metric relaxation – filling with blood;

d) iso(volu)metric relaxation – filling with blood – presystolic – protodiastolic.

**28. The terminations of the sympathetic nerve, which innervate the heart, release ...**

a) acetylcholine;

b) histamine;

c) noradrenalin;

d) serotonin.

**29. The terminations of the vagus nerve, which innervate the heart, release...**

a) adrenaline;

b) serotonin;

c) histamine;

d) acetylcholine.

**30. Which of these vessels carries deoxygenated blood from the heart?**

a) the pulmonary artery;

- b) the pulmonary vein;
- c) the aorta;
- d) the inferior vena cava.

**31. What kind of signal does the cardiac pacemaker use?**

- a) hormonal;
- b) chemical;
- c) electrical;
- d) hormonal and chemical.

**32. What does the pulmonary vein supply the heart?**

- a) oxygenated blood from the lungs;
- b) deoxygenated blood from the body;
- c) oxygenated blood from the body;
- d) deoxygenated blood from the lungs.

**33. The muscle of the heart is called ...**

- a) septum;
- b) myocardium;
- c) endocardium;
- d) pericardium.

**34. The heart pumps an average of how many times per minute**

- a) 50;
- b) 80;
- c) 110;
- d) 160.

**35. Where does the blood enter immediately when it leaves the heart?**

- a) lungs;
- b) inferior vena cava;
- c) aorta;
- d) capillaries.

**36. Which chamber does carbon dioxide rich blood enter the heart?**

- a) left ventricle;
- b) left atrium;
- c) right atrium;
- d) there are no right answers.

**37. What part of healthy heart is responsible for providing the electricity of the heart?**

- a) sinoatrial (SA) node;
- b) atrioventricular (AV) node;
- c) tricuspid Valve;
- d) left ventricle.

**38. Where is the blood oxygenated?**

- a) the left ventricle;
- b) the right atrium;
- c) the AV node;
- d) the lungs.

**39. Through which structure does blood pass from the right atrium to the right ventricle?**

- a) bicuspid valve;
- b) tricuspid valve;
- c) mitral valve;
- d) interventricular septum,

**40. This electrical event triggers contraction of the atria.**

- a) R wave;
- b) T wave;
- c) S wave;

d) P wave.

**41. This term refers to the period of time during a cardiac cycle when contraction occurs and blood pressure rises.**

- a) systole;
- b) repolarization;
- c) diastole;
- d) depolarization.

**42. From the left ventricle, where does blood pass?**

- a) right atrium;
- b) right ventricle;
- c) bicuspid valve;
- d) aortic semilunar valve.

**43. Where does blood move as each atrium contracts?**

- a) into an auricle;
- b) into a vein;
- c) through an atrioventricular valve;
- d) through a semilunar valve.

**44. Add correct word to the phrase: "By comparison, cardiac muscle cells have \_\_\_ contraction plateau time than skeletal muscle cells".**

- a) a shorter;
- b) a longer;
- c) no difference in;
- d) a higher.

**45. This electrical event represents repolarization of the ventricle.**

- a) R wave;
- b) T wave;
- c) S wave;
- d) P wave;

**46. Stimulation of this nerve reduces heart rate.**

- a) cardiac accelerator nerve;
- b) hypoglossal nerve;
- c) medulla oblongata nerve;
- d) vagus nerve.

**47. Which of the below reduces heart rate?**

- a) increased noradrenaline hormone;
- b) increased thyroid hormone;
- c) increased potassium levels;
- d) increased calcium levels.

**48. This is the correct sequence of structures that allows the normal sequence of excitation to progress through the heart.**

- a) Bundle of His - Purkinje fibres - AV node;
- b) SA node - Purkinje fibres - AV node - Bundle of His;
- c) Purkinje fibres - AV node - SA node - Bundle of His;
- d) SA node - AV node - Bundle of His - Purkinje fibres.

**49. How does the state of the channels of the cell membrane of cardiomyocytes change during the plateau phase?**

- a) sodium channels close, calcium channels open, potassium channels open;
- b) sodium channels close, calcium channels open, potassium channels close;
- c) sodium channels open, calcium channels open, potassium channels open;
- d) sodium channels close, calcium channels close, potassium channels open.

## Heart regulation



1. CHOOSE THE CORRECT VERSION OF ALL THE MECHANISMS AND LEVELS OF INTRACARDIAC REGULATION.
  - a) reflexory and humoral mechanisms
  - b) reflexory and humoral levels
  - c) intracellular mechanism and extracellular one, as well as reflexory and humoral levels
  - d) intracellular level and extracellular one, as well as reflexory and humoral mechanisms
2. CHOOSE THE CORRECT VERSION OF ALL THE MECHANISMS AND LEVELS OF INTRACARDIAC REGULATION.
  - a) intracellular mechanism and extracellular level
  - b) intracellular level and extracellular mechanism
  - c) intracellular mechanism and extracellular one, as well as reflexory and humoral levels
  - d) intracellular level and extracellular one, as well as reflexory and humoral mechanisms
3. CHOOSE THE CORRECT VERSION OF ALL THE MECHANISMS AND LEVELS OF INTRACARDIAC REGULATION.
  - a) intracellular level and extracellular one, as well as sympathetic and paracrine mechanisms
  - b) intracardiac level and extracardiac one, as well as reflexory and humoral mechanisms
  - c) intracellular mechanism and extracellular one, as well as reflexory and humoral levels
  - d) intracellular level and extracellular one, as well as reflexory and humoral mechanisms
4. CHOOSE THE CORRECT VERSION OF ALL THE MECHANISMS AND LEVELS OF EXTRACARDIAC REGULATION.
  - a) the question was asked incorrectly (mistakenly)
  - b) reflexory and humoral levels
  - c) intracellular mechanism and extracellular one, as well as reflexory and humoral levels
  - d) reflexory and humoral mechanisms
5. CHOOSE THE CORRECT VERSION OF ALL THE MECHANISMS AND LEVELS OF EXTRACARDIAC REGULATION.
  - a) intracellular level and extracellular one, as well as reflexory and humoral mechanisms
  - b) intracellular mechanism and extracellular one, as well as reflexory and humoral levels
  - c) reflexory and humoral levels
  - d) reflexory and humoral mechanisms
6. WHAT IS INTRACARDIAC REGULATION?
  - a) relating to the mechanisms, tissues, cells, organs which are situated outside the heart
  - b) relating to the mechanisms, tissues, cells, parts which are situated within the heart
  - c) relating to the mechanisms which are situated within the cardimyocytes
  - d) mechanisms which realizes due to nexuses
7. WHAT IS EXTRACARDIAC REGULATION?
  - a) relating to the mechanisms, tissues, cells, organs which are situated outside the heart
  - b) relating to the mechanisms, tissues, cells, parts which are situated within the heart
  - c) relating to the mechanisms which are situated within the cardimyocytes
  - d) mechanisms which realizes due to nexuses
8. WHAT IS INTRACELLULAR REGULATION OF THE COR?
  - a) relating to the mechanisms, tissues, cells, organs which are situated outside the heart
  - b) relating to the mechanisms, tissues, cells, parts which are situated within the heart
  - c) relating to the mechanisms which are situated within the cardimyocytes
  - d) mechanisms which realizes due to nexuses
9. WHAT IS EXTRACELLULAR REGULATION OF THE COR?
  - a) relating to the mechanisms, tissues, cells, organs which are situated outside the heart
  - b) relating to the mechanisms, tissues, cells, parts which are situated within the heart
  - c) relating to the mechanisms which are situated within the cardimyocytes
  - d) mechanisms which realizes due to heart syncytium nexuses
10. NOTE THE MECHANISMS THAT ARE IMPLEMENTED AT THE INTRACELLULAR LEVEL OF CARDIAC REGULATION.

- a) increasing or decreasing of nexuses excitability
- b) atrophy and direct dependence of strength on heart rate
- c) reflexes of the cardiac center
- d) gases and hormonal influences

11. NOTE THE MECHANISMS THAT ARE IMPLEMENTED AT THE INTRACELLULAR LEVEL OF CARDIAC REGULATION.

- a) increasing or decreasing of nexuses excitability
- b) hypertrophy and Frank-Starling law
- c) sympathetic and parasympathetic influences
- d) gases and hormonal influences

12. NOTE THE MECHANISMS THAT ARE IMPLEMENTED AT THE EXTRACELLULAR LEVEL OF CARDIAC REGULATION.

- a) increasing or decreasing of nexuses excitability
- b) hypertrophy and Frank-Starling law
- c) sympathetic and parasympathetic influences
- d) gases and hormonal influences

13. NOTE THE MECHANISMS THAT ARE IMPLEMENTED AS NEURAL INTRACARDIAC REGULATION.

- a) increasing or decreasing of nexuses excitability
- b) hypertrophy and Frank-Starling law
- c) Bainbridge reflex as cardio-cardiac one

d) reflexes of vegetative nervous system as any gastro-, respiratory-, vessel-cardiac reflexes or from some other organs

14. NOTE THE MECHANISMS THAT ARE IMPLEMENTED AS EXTRANEURAL CARDIAC REGULATION.

- a) increasing or decreasing of nexuses excitability
- b) hypertrophy and Frank-Starling law
- c) sympathetic and parasympathetic influences
- d) gases and hormonal influences

15. NOTE THE MECHANISMS THAT ARE IMPLEMENTED AS EXTRANEURAL CARDIAC REGULATION.

- a) increasing or decreasing of nexuses excitability
- b) hypertrophy and Frank-Starling law
- c) accelerating or inhibiting medulla oblongata influences

d) gases and hormonal influences

16. NOTE THE MECHANISMS THAT ARE IMPLEMENTED AS EXTRACARDIAC HUMORAL REGULATION.

- a) increasing or decreasing of nexuses excitability
- b) hypertrophy and Frank-Starling law
- c) accelerating or inhibiting medulla oblongata influences
- d) gases and hormonal influences

18. NOTE THE MECHANISMS THAT ARE IMPLEMENTED AS EXTRACARDIAC HUMORAL REGULATION.

- a) increasing or decreasing of nexuses excitability
- b) hypertrophy and Frank-Starling law
- c) accelerating or inhibiting medulla oblongata influences
- d) hyper- and hypoxia, hyper- and hypocapnia

19. NOTE THE MECHANISMS THAT ARE IMPLEMENTED AS EXTRAHUMORAL CARDIAC REGULATION.

- a) increasing or decreasing of nexuses excitability
- b) hypertrophy and Frank-Starling law
- c) accelerating or inhibiting medulla oblongata influences

d) hyper- or hypokalaemia or changes in the content of other ions

20. ATROPHY OR HYPERTROPHY OF MYOCARDIUM REFERS TO THE FOLLOWING LEVEL OF CARDIAC REGULATION ...

a) extracellular

b) intracellular

c) intracardiac reflexes

d) extracardiac

21. ATROPHY OR HYPERTROPHY OF MYOCARDIUM REFERS TO THE FOLLOWING LEVEL OF CARDIAC REGULATION ...

a) extracellular

b) intracellular reflexes

c) intracardiac

d) extracardiac

22. FUNCTIONAL SYNCYTIUM OF MYOCARDIUM MEANS ...

a) some special type of neurons

b) it is a tissue but it works like one cell

c) a feature of the structure of the heart cells that allows them to work according to the law of force

d) function of the valvular heart apparatus

23. THE STRENGTH OF A MUSCLE CONTRACTION (CARDIOCYTES) IS DIRECTLY PROPORTIONAL TO AN EXPANSION OF THIS MUSCLE DURING ITS PREVIOUS RELAXATION ...

a) that is absurd statement

b) that is Bainbridge reflex

c) that is the law of force

d) that is the Frank-Starling law

24. THE STRENGTH OF A MUSCLE CONTRACTION (CARDIOCYTES) IS OPPOSITELY PROPORTIONAL TO AN INCREASE OF VENOUS RETURN TO A RIGHT ATRIUM ...

a) that is absurd statement

b) that is Bainbridge reflex

c) that is the law of force

d) that is the Frank-Starling law

25. WHAT IS THE MECHANISM OF STIMULATING EFFECT ON THE HEART OF METABOLITES?

a) no correct answers

b) activation of N-cholinoreceptor

c) blocking of  $\alpha$ -adrenoreceptors

d) blocking of  $\beta$ -adrenoreceptors

26. WHAT IS THE MECHANISM OF STIMULATING EFFECT ON THE HEART OF METABOLITES?

a) no correct answers

b) blocking of N-cholinoreceptor

c) activation of  $\alpha$ -adrenoreceptors

d) blocking of  $\beta$ -adrenoreceptors

27. DETERMINE CORRECT CAUSAL RELATIONSHIPS IN THE HEART ACTIVITY.

a) source – the mechanical activity, effect – the electrical work

b) source – the electrical activity, effect – the mechanical work

c) dromo- and bathmotropy activities that is the mechanical work

d) ino- and chronotropy activities that is the electrical work

28. DETERMINE CORRECT CAUSAL RELATIONSHIPS IN THE HEART ACTIVITY.

a) source – the mechanical activity, effect – the electrical work

b) source – the mechanical activity, effect – dromo- and bathmotropy activities

- c) dromo- and bathmotropy activities that is the electrical work  
 d) ino- and chronotropy activities that is the electrical work
29. DETERMINE CORRECT CAUSAL RELATIONSHIPS IN THE HEART ACTIVITY.  
 a) no correct answers  
 b) source – the mechanical activity, effect – the electrical work  
 c) ino- and chronotropy activities that is the mechanical work  
 d) ino- and chronotropy activities that is the electrical work
30. DETERMINE CORRECT CAUSAL RELATIONSHIPS IN THE HEART ACTIVITY.  
 a) no correct answers  
 b) source – the mechanical activity, effect – the electrical work  
 c) source – the mechanical activity, effect – dromo- and bathmotropy activities  
 d) ino- and chronotropy activities that is the electrical work
31. WHAT PARAMETERS OF HOMEOSTASIS ARE PREDOMINANTLY MONITORED BY THE CARDIAC CENTER?  
 a) hormones and ions content  
 b) blood pressure and gas concentration  
 c) hydrostatic and osmotic pressure  
 d) number of hair and teeth
32. WHAT STRUCTURE OF THE HEART HAS NO PARASYMPATHETIC INNERVATION?  
 a) each ventricle cardiomyocyte  
 b) SA node  
 c) AV node  
 d) atrial muscle
33. ACCELERATOR NERVES OF THE HEART ARE ...  
 a) sympathetic  
 b) parasympathetic  
 c) dromotropic  
 d) chronotropic

## Digestion

- 1. In what department of CNS is the center of salivation situated?**  
 a) in intermediate brain;  
 b) in medulla oblongata;  
 c) in midbrain;  
 d) in spinal cord.
- 2. Enzymes of saliva basically split ...**  
 a) fibers;  
 b) fats;  
 c) carbohydrates;  
 d) proteins.
- 3. Denaturation and swelling of proteins in a stomach is caused by ...**  
 a) pepsin;  
 b) pepsinogen;  
 c) lipase;  
 d) hydrochloric acid.
- 4. Trypsinogen is activated under the influence of ...**  
 a) secretin;  
 b) hydrochloric acid;  
 c) enterokinase;  
 d) gastrin.
- 5. What enzymes of pancreas does trypsin activate?**

- a) only chymotrypsinogen;
- b) all enzymes, except for trypsinogen;
- c) amylase, motrypsinogen;
- d) chymotrypsinogen, trypsinogen.

**6. What enzymes of pancreas are secreted in an active condition?**

- a) trypsinogen, chymotrypsinogen;
- b) procarboxypeptidases;
- c) proteases;
- d) amylase, nucleases.

**7. What enzymes of pancreas are secreted in the form of zymogens (inactive predecessors)?**

- a) amylase;
- b) trypsin;
- c) nucleases;
- d) lipase.

**8. What process constantly takes place in a hepatocytes ...**

- a) production of bile;
- b) excretion of bile;
- c) production and excretion of bile.
- d) all answers correct.

**9. Fats in the duodenum are emulsificated by...**

- a) bile;
- b) lipase;
- c) mucous;
- d) hydrochloric acid.

**10. What is the normal active reaction pH of intestinal secret?**

- a) neutral;
- b) alkaline;
- c) acid
- d) depends on the composition of the food.

**11. The basic department of gastrointestinal tract, in which absorption of products of food hydrolysis and water occurs, is...**

- a) stomach;
- b) small intestines;
- c) rectum;
- d) large intestines.

**12. Pepsinogen in a stomach it is synthesized by...**

- a) parietal cells;
- b) mucocytes;
- c) chief cells;
- d) G-cells.

**13. What department of gastrointestinal tract carries out the function of deposition of food?**

- a) small intestines;
- b) stomach;
- c) large intestines;
- d) rectum.

**14. At what kind of digestion hydrolysis of substances is carried out due to enzymes of microorganisms?**

- a) autolytic;
- b) at all types;
- c) symbiotic;
- d) parietal digestion.

**15. What food substances are basically digested by enzymes in a stomach?**

- a) only fats;
- b) only proteins;
- c) proteins, insignificant amount of carbohydrates;
- d) all types of food.

**16. What component of the gastric juice protects the mucous membrane of a stomach from self-digestion?**

- a) pepsin;
- b) lipase;
- c) gastricsin;
- d) mucin.

**17. What conditions are necessary for transformation of pepsinogens into pepsins?**

- a) presence of mucins;
- b) absence of gastric lipase;
- c) presence of hydrochloric acid;
- d) absence of nutrients.

**18. What is the effect of irritation of vagus nerve on gastric secretion?**

- a) sharp decreasing of secretion;
- b) the termination of secretion;
- c) increasing of secretion;
- d) the vagus nerve does not influence on gastric secretion.

**19. What function does not concern to functions of digestive system?**

- a) secretory;
- b) hemopoietic;
- c) excretory;
- d) respiratory.

**20. Increasing of excretion of bile into duodenum will affect on digestion of...**

- a) proteins;
- b) carbohydrates;
- c) proteins and carbohydrates;
- d) fats.

**21. In what department of gastrointestinal tract there is parietal digestion?**

- a) in a stomach;
- b) in large intestines;
- c) in oral cavity;
- d) in small intestines.

**22. What is the basic role of parietal digestion?**

- a) realization of initial stages of hydrolysis of nutrients;
- b) hydrolysis of fats and carbohydrates;
- c) absorption of vitamins;
- d) final hydrolysis and absorption of nutrients.

**23. What processes mainly occur in large intestines?**

- a) intensive absorption of water, synthesis of vitamins;
- b) intensive hydrolysis of food substances;
- c) intensive membrane digestion;
- d) secretion of hydrochloric acid.

**24. What enzyme of a pancreas do not participate in hydrolysis of proteins?**

- a) carboxypeptidase A;
- b) trypsin;
- c) chymotrypsin;
- d) amylase.

**25. What do parietal cells of the mucous membrane of a stomach produce?**

- a) pepsinogens;
- b) mucin;
- c) lysozyme;
- d) hydrochloric acid.

**26. What is the influence of irritation of sympathetic nerves on pancreatic secretion?**

- a) increase of secretion;
- b) decrease of secretion;
- c) sympathetic nerves do not influence on pancreatic secretion
- d) it can either increase or decrease depending on the initial state of an organism.

**27. What happens with proteolytic enzymes of gastric juice in the alkaline environment?**

- a) they are activated;
- b) they are destructed;
- c) they do not change their properties;
- d) it depends on food content.

**28. Which is the quantity of pancreatic juice per 24 hours?**

- a) 2.0 l
- b) 150 ml
- c) 5-7 l
- d) 0.1 l

**29. Choose a symbiotic microflora.**

- a) Escherichia Coli, bifidum bacteria, staphylococci;
- b) bacteroids, bifidum bacteria, Lactic;
- c) Lactic, streptococci, staphylococci;
- d) bifidum bacteria, Lactic, sporeforming anaerobes.

**30. The cellulose in intestines is digested by...**

- a) trypsinogen;
- b) hydrochloric acid;
- c) symbiotic microflora;
- d) amylase, lipase.

**31. What is the influence of irritation of parasympathetic nerves on pancreatic secretion?**

- a) increases a volume of juice and decrease the content of enzymes in it;
- b) decrease a content of hydrocarbonates and enzymes;
- c) parasympathetic nerves do not influence on pancreatic secretion
- d) it can either increase or decrease pancreas activity which depends on the initial state of an organism.

**32. Enzymes in saliva are ...**

- a) amylase, maltase;
- b) pepsin, gastricsin, chemosin, gelatinase, lipase;
- c) trypsin, chymotrypsin, enterokinase, lipases, amylase;
- d) amylase, lipases.

**33. Enzymes of gastric juice are ...**

- a) amylase, maltase;
- b) pepsin, gastricsin, chemosin, gelatinase;
- c) trypsin, chymotrypsin, enterokinase, lipases, amylase;
- d) amylase, lipases.

**34. Saliva contains the enzyme amylase, which breaks down ...**

- a) starch;
- b) maltose;
- c) protein;
- d) fats.

**35. What pH has gastric acid (HCl)?**

- a) 1-2;

- b) 4-6;
- c) 6-8;
- d) 8-11.

**36. What is the name of the muscular process for moving food down the oesophagus?**

- a) peristalsis;
- b) mass movements;
- c) mastication;
- d) digestion.

**37. Proteins are hydrolyzed by ...**

- a) pepsin;
- b) lipase;
- c) amylase;
- d) maltase.

**38. Lipase degrades ...**

- a) fats;
- b) proteins;
- c) sugars;
- d) sugars and proteins.

**39. Which of the following is not an advantage of stomach acid?**

- a) destroys most pathogens;
- b) optimum pH for amylase;
- c) optimum pH for pepsin;
- d) denaturation of proteins.

**40. The basic type of digestion at humans is ...**

- a) symbiotic;
- b) autolytic;
- c) hemotrophic;
- d) parietal.

**41. Nutrients are ...**

- a) proteins, fats and carbohydrates;
- b) water, inorganic compounds, vitamins;
- c) inorganic compounds, organic compounds;
- d) carbohydrates, sulphates.

**42. Examples of proteins:**

- a) polypeptides, amino acids, peptides;
- b) triglycerides, glycerol and fatty acids;
- c) cellulose, maltose, glucose, fructose;
- d) triglycerides, glucose.

**43. Examples of fats:**

- a) cellulose, maltose, glucose, fructose;
- b) triglycerides, glycerol and fatty acids;
- c) polypeptides, amino acids, peptides;
- d) triglycerides, glucose.

**44. Examples of carbohydrates:**

- a) cellulose, maltose, glucose, fructose;
- b) triglycerides, glycerol and fatty acids;
- c) polypeptides, amino acids, peptides;
- d) triglycerides, glucose.

**45. In what form can food be adsorbed?**

- a) in monomers;
- b) in polymers;
- c) in oligomers;



d) in oligomers and monomers.

**46. Glands of the digestive system are called ...**

a) exocrine glands;

b) endocrine glands;

c) digestive glands;

d) thyroid and parathyroid glands.

**47. Which of these is not related to the advantages of parietal digestion?**

a) economy of enzymes;

b) bactericidal property;

c) high intensity of breakdown (splitting to monomers);

d) the splitting of polymers to oligomers.

### Laboratory works

1. ONE OF THE MOST RIGID BLOOD CONSTANT IS ...

a) blood pH

b) volume of circulating blood

c) the level of chlorine ions in the blood

d) the level of hemoglobin

2. RIGID BLOOD CONSTANTS DO NOT INCLUDE ...

a) the level of calcium ions in the blood

b) oncotic pressure of blood plasma

c) hemoglobin level

d) blood pH

3. RIGID CONSTANTS INCLUDE ...

a) respiratory rate

b) volume of circulating blood

c) blood pressure level

d) oncotic pressure of blood plasma

4. RIGID CONSTANTS DO NOT INCLUDE ...

a) oncotic pressure of blood plasma

b) blood pH

c) volume of circulating blood

d) the level of calcium ions in the blood

5. WHAT SOLUTION IS USED FOR PREVENTING OF THE NEUROMUSCULAR PREPARATION DRYING OUT?

a) 0.9% sodium chloride solution

b) 5% glucose solution

c) 5% sodium chloride solution

d) distilled water

6. WHAT METALS ARE THE JAWS OF BIMETALLIC TWEEZERS IN THE FIRST GALVANI'S EXPERIMENT MADE OF?

a) tin and nickel

b) lithium and iron

c) iron and copper

d) chrome and nickel

7. WHAT COMPONENTS OF A NEUROMUSCULAR PREPARATION DO YOU KNOW?

a) gastrocnemius muscle, myoneural synapse, sciatic nerve

b) calf muscle, cannon-bones, spinal cord

c) nerve and muscle

d) spinal cord, sciatic nerve, sartorius

8. ROUGH TETANUS IS

a) summation of contractions in the relaxation phase

- b) slowing down of relaxation as a result of fatigue
- c) summation of contractions in the contraction phase
- d) single contractions

9. SMOOTH TETANUS IS ...

- a) summation of contractions in the relaxation phase
- b) slowing down of relaxation as a result of fatigue
- c) summation of contractions in the contraction phase
- d) single contractions

10. WHAT IS THE PURPOSE OF GALVANI'S FIRST EXPERIMENT?

- a) to prepare a nervous-muscular preparation
- b) verify the existence of animal electricity
- c) show the presence of a potential difference between the excited and non-excited part of the muscle
- d) show the possibility of conducting bio-flows through excitable tissues

11. WHAT IS THE PURPOSE OF GALVANI'S SECOND EXPERIMENT?

- a) to prepare a nervous-muscular preparation
- b) verify the existence of animal electricity
- c) show the presence of a rest potential
- d) show the possibility of conducting bio-flows through excitable tissues

12. WHAT IS THE PURPOSE OF GALVANI'S SECOND EXPERIMENT?

- a) to prepare a nervous-muscular preparation
- b) verify the existence of animal electricity
- c) show the presence of a potential difference between the damaged and non-damaged part of the muscle cell membrane
- d) show the possibility of conducting bio-flows through excitable tissues

13. WHAT IS THE PURPOSE OF MATTEUCHI'S EXPERIMENT?

- a) to prepare a nervous-muscular preparation
- b) verify the existence of animal electricity
- c) show the presence of a potential difference between the excited and non-excited part of the muscle
- d) show an action potential existence

14. A KNEE REFLEX IS ...

- a) knee flexion upon tapping on the patellar tendon
- b) foot flexion upon tapping on the tendon of the triceps muscle of the pelvic limb
- c) forearm extension upon hitting the triceps tendon of the shoulder
- d) forearm extension upon hitting the biceps brachii tendon

15. ACHILLES REFLEX IS ...

- a) knee flexion upon tapping on the patellar tendon
- b) foot flexion upon tapping on the tendon of the triceps muscle of the pelvic limb
- c) forearm extension upon hitting the triceps tendon of the shoulder
- d) forearm extension upon hitting the biceps brachii tendon

16. THE ELBOW REFLEX IS ...

- a) knee flexion upon tapping on the patellar tendon
- b) foot flexion upon tapping on the tendon of the triceps muscle of the pelvic limb
- c) forearm extension upon hitting the triceps tendon of the shoulder
- d) forearm extension upon hitting the biceps brachii tendon

17. GOLTZ REFLEX IS ...

- a) decrease in heart rate upon stimulation of the mechanoreceptors of the peritoneum or abdominal cavity
- b) heart rate slowing and blood pressure decrease upon pressing on the side surface of the eyeball

- c) increasing of the heart rate and its contraction strength upon pressure increasing in hollow veins and atria
- d) foot flexion upon tapping on the tendon of the triceps muscle of the pelvic limb

18. DAGNINI-ASCHNER REFLEX IS ...

- a) decrease in heart rate upon stimulation of the mechanoreceptors in the peritoneum or abdominal cavity
- b) heart rate slowing and blood pressure decrease upon pressing on the side surface of the eyeball
- c) increasing of the heart rate and its contraction strength upon pressure increasing in hollow veins and atria
- d) foot flexion upon tapping on the tendon of the triceps muscle of the pelvic limb

19. BAINBRIDGE REFLEX IS ...

- a) decrease in heart rate upon stimulation of the mechanoreceptors in the peritoneum or abdominal organs
- b) heart rate slowing and blood pressure decrease upon pressing on the side surface of the eyeball
- c) increasing of the heart rate and its contraction strength upon pressure increasing in hollow veins and atria
- d) foot flexion upon tapping on the tendon of the triceps muscle of the pelvic limb

20. WHAT PROVES THE EXPERIMENT WITH DIRECT AND INDIRECT IRRITATION OF MUSCLE?

- a) an excitability of the nerves is higher than a same of the muscles
- b) skeletal muscles have both isometry and isotony contractions types
- c) an excitation can spread only in the presence of both anatomical and physiological integrity
- d) nerve has an ability of two-way excitation spreading

21. WHAT PROVES ONE OF A SERIES OF EXPERIMENTS WITH OBTAINING DIFFERENT TYPES OF MUSCLE CONTRACTIONS?

- a) an excitability of the nerves is higher than a same of the muscles
- b) skeletal muscles have both isometry and isotony contractions types
- c) an excitation can spread only in the presence of both anatomical and physiological integrity
- d) nerve has an ability of two-way excitation spreading

22. WHAT PROVES THAT EXPERIMENT IN WHICH OBSERVES THE FUNCTIONING OF A NEURO-MUSCULAR PREPARATION UNDER NOVOCAINE OR/AND DISTRACT INFLUENCES?

- a) an excitability of the nerves is higher than a same of the muscles
- b) skeletal muscles have both isometry and isotony contractions types
- c) an excitation can spread only in the presence of both anatomical and physiological integrity
- d) nerve has an ability of two-way excitation spreading

23. WHAT PROVES THE EXPERIMENT IN WHICH THE NERVES OF TWO NEURO-MUSCULAR PREPARATIONS WE PLACED CROSSWISE?

- a) an excitability of the nerves is higher than a same of the muscles
- b) skeletal muscles have both isometry and isotony contractions types
- c) an excitation can spread only in the presence of both anatomical and physiological integrity
- d) nerve has an ability of two-way excitation spreading