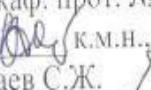


МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ КЫРГЫЗСКОЙ РЕСПУБЛИКИ  
ОШСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ  
МЕЖДУНАРОДНЫЙ МЕДИЦИНСКИЙ ФАКУЛЬТЕТ

Кафедра анатомии, гистологии и нормальной физиологии

«СОГЛАСОВАНО»   
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доц. Кенешбаев Б.К.

«УТВЕРЖДЕНО»  
на засед. каф. прот. № 3 от  
зав. каф.  К.М.И., доц.  
Джолдубаев С.Ж.

ФОНД ТЕСТОВЫХ ЗАДАНИЙ

Для итогового контроля по дисциплине  
«Human Physiology 1»  
на 2021-2022 учебный год  
по специальности «560001-Лечебное дело»

курс-1, семестр-2

Наименование дисциплины	Всего	Кредит	Аудиторные занятия		СРС
			Лекции	Практические	
Human Physiology 1	120 ч	4кп	24 ч	36 ч	60 ч
Кол-во тестовых вопросов	358				

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## Physiology of excitable tissues - 88 questions

1. The active zone consists of:
  - A) the presynaptic dense band around which calcium channels and synaptic vesicles are arranged in rows \*
  - B) actin filaments and microtubules
  - C) a reserve pool of synaptic vesicles
  - D) mitochondria
2. The amplitude of the postsynaptic potential of the neuromuscular synapse
  - A) does not depend on the amount of released neurotransmitter
  - B) it depends on the amount of released neurotransmitter only up to the threshold level
  - C) is directly proportional to the amount of released neurotransmitter \*
  - D) none of the above
3. A biological process characterized by temporary depolarization of cell membranes and changes in metabolic processes is called
  - A) contraction
  - B) conduction
  - C) inhibition
  - D) excitation \*
4. In which phase of a single contraction of a muscle fiber does the action potential end?
  - A) In the phase of shortening
  - B) In the latent period \*
  - C) the relaxation phases
  - D) none of the above
5. Pessimal tetanus is obtained in the muscle. How should the irritation frequency be changed so that the amplitude of contraction increases?
  - A) Decrease \*
  - B) Increase
  - C) Not changed
  - D) none of the above
6. The accomodation process is based on the following processes: inactivation of potassium and increase of sodium permeability
  - A) inactivation of sodium and increase of potassium permeability \*
  - B) potassium permeability decrease
  - C) increase of sodium permeability
  - D) all of the above.
7. During the rapid depolarization phase of the action potential, membrane permeability to ions increases:
  - A) potassium
  - B) magnesium
  - C) sodium \*
  - D) chlorine
8. What is the special importance of lipids in excitable cells?
  - A) Lipids are a major constituent of cell membranes\*
  - B) Lipids provide action potential generation
  - C) Lipids provide an insulating function
  - D) lipids are a part of ion channels of cell membranes
9. In an experiment, a toothed tetanus was obtained. Is it necessary to change the irritation frequency to get a smooth tetanus?
  - A) You don't need to change the irritation frequency, but increase the current strength.
  - B) You need to increase the frequency \*
  - C) You need to decrease the frequency
  - D) First increase then decrease the frequency

10. The inner surface of the cell membrane is charged relative to the outer surface in the physiological resting state:

- A) not charged
- B) negatively charged\*
- C) positively
- D) the same as outer.

11. Excitation in unmyelinated nerve fibers spreads:

- A) in a jumping manner, jumping over areas covered with myelin
- B) in the direction of axoplasm motion
- C) electrotonically
- D) continuously along the whole membrane from the excited area to the unexcited area next to it\*

12. Excitation in myelinated nerve fibers spreads:

- A) continuously along the entire membrane from the excited area to the unexcited area
- B) in the direction of axoplasm motion
- C) electrotonic
- D) in a jumping manner, jumping over fiber areas covered with myelin \*

13. The excited area of the tissue is charged relative to the unexcited area:

- A) negatively charged \*
- B) not charged
- C) the same as unexcited.
- D) positively

14. The occurrence of the inhibitory postsynaptic potential (PPSP) is determined by ions:

- A) potassium and chlorine \*
- B) calcium and chlorine
- C) sodium
- D) phosphate

15. The upward phase of the action potential is associated with increased permeability to ions:

- A) sodium \*
- B) chlorine
- C) calcium
- D) potassium

16. A protein molecule embedded in the cell membrane that ensures the selective transfer of ions across the membrane with ATP energy:

- A) ion pump \*
- B) leak channel
- C) non-specific ion channel
- D) specific ion channel

17. Secondary-active transport provides reabsorption of substances from the renal tubule into the blood:

- A) against a concentration gradient, but without energy expenditure\*
- B) against the electrochemical gradient with energy expenditure
- C) against the concentration gradient with energy input
- D) against the concentration gradient without expenditure of energy

18. Choose a substance that blocks inhibitory synapses.

- A) Strychnine \*
- B) adrenaline
- C) acetylcholinesterase
- D) none of the above

19. Select the second intermediary that is synthesized by adenylate cyclase.

- A) inositol triphosphate
- B) cGMP
- C) cAMP\*
- D) arachidonic acid

20. Select the second intermediary that is synthesized by guanylate cyclase.

- A) inositol triphosphate
- B) cGMP \*
- C) cAMP
- D) arachidonic acid

21. Select the major receptor for calcium signaling in all cells.

- A) cyclooxygenase
- B) Protein kinase A
- C) Protein kinase C
- D) Calmodulin \*

22. Select the correct sequence of phases of a single muscle contraction.

- A) Latent period - contraction phase - relaxation phase \*
- B) Relaxation phase - contraction phase - latent period
- C) Contraction phase - latent period - relaxation phase.
- D) Latent period - relaxation phase.

23. Where is the highest concentration of calcium ions in muscle at rest?

- A) In the cisterns of the sarcoplasmic reticulum\*
- B) In the axoplasm
- C) In sarcoplasm
- D) in sarcolemma

24. Where does a muscle fiber action potential occur?

- A) In the perisynaptic region \*
- B) Near the location of cholinoreceptors
- C) At the basal membrane of the neuromuscular synapse
- D) In the terminal plate of a muscle fiber

25. Where is the highest concentration of calcium ions during muscle excitation?

- A) In sarcoplasmic reticulum cisterns
- B) In the axoplasm
- C) In the sarcoplasm\*
- D) In the sarcolemma

26. For which ions is the muscle fiber membrane impermeable at rest?

- A) Potassium
- B) sodium \*
- C) chlorine
- D) phosphate

27. For which ions is the muscle fiber membrane permeable at rest?

- A) Potassium \*
- B) Sodium
- C) chlorine
- D) phosphate

28. At the expense of what, when post-synaptic membrane chemoexcitable channels open, is the flux of sodium ions into the cell greater than the opposite flux of potassium ions?

- A) Due to the presence of a higher concentration gradient for sodium ions \*
- B) there is a potential difference at the membrane
- C) channels for sodium ions open more quickly
- D) The channels of the postsynaptic membrane are more permeable to sodium ions

29. The law according to which an excitable structure responds to threshold and suprathreshold stimuli with the maximum possible response:

- A) The all-or-nothing law \*
- B) physical electroton
- C) cathodic depression
- D) the law of force

30. The filling of large synaptic vesicles with neuropeptides occurs in:

- A) mitochondria

B) the active zone

C) nerve endings

D) nerve cell body \*

31. Ions are released from the sarcoplasmic reticulum upon excitation:

A) calcium \*

B) chlorine

C) sodium

D) potassium

32. Which type of response includes the excitatory postsynaptic potential (EPSP) and the inhibitory postsynaptic potential (IPSP)?

A) A local response \*

B) A solitary response

C) To a spreading action potential

D) none of the above

33. Which type includes motor nerve fibers going to skeletal muscles and afferent fibers from muscle spindles?

A) A-alpha \*

B) C

C) B

D) none of the above

34. What type of electrophysiological response to stimulus do endplate potentials belong to?

A) Local response \*

B) Electrotonic potential

C) Inhibitory postsynaptic potential (IPSP)

D) To the propagating action potential

35. What does salient (jumping) conduction of excitation in fleshy nerve fibers lead to?

A) An increase in the rate of action potential (AP) conduction \*

B) Decrease in amplitude of AP

C) leading to an increase in AP amplitude

D) Decrease in velocity of AP conduction

36. How do acetylcholinesterase inhibitors affect the amplitude and shape of the endplate potential?

A) Increase and stretch \*

B) Raise and shorten

C) have no significant effect

D) Decrease and shorten

37. How will the amplitude of the action potential change as it propagates through the nerve fibers?

A) It will not change \*

B) It will increase

C) It will decrease

D) none of the above

38. How does the ion permeability in the membrane of the excitatory nerve ending change if the inhibitory neuron in contact with it is triggered?

A) Permeability to chlorine ions increases\*

B) Permeability to sodium ions increases

C) permeability to calcium ions increases

D) permeability to calcium ions decreases

39. What is the method of recording the electrical activity of an entire skeletal muscle called?

A) Electromyogram\*

B) Electrocardiogram

C) Electroencephalogram

D) Electroencephalogram.

40. What is the value to which the membrane potential of a neuron must be decreased for an action potential to occur?

A) The critical level of depolarization \*

B) Positive potential

C) Equilibrium potential

D) none of the above

41. What are substances that block the action of a neurotransmitter called?

A) antagonists \*

B) Secondary mediators

C) Neuropeptides

D) agonists

42. What are substances that mimic the action of a neurotransmitter called?

A) Secondary mediators

B) Agonists\*

C) antagonists

D) G-proteins

43. What is the muscle tetanic contraction that has the greatest amplitude called?

A) Optimal \*

B) Isometric

C) Isotonic

D) Pessimal

44. What is the period of complete absence of excitability during the rapid depolarization phase?

A) Absolute refractoriness \*

B) Relative refractoriness

C) Hyperpolarization

D) Subnormal excitability

45. What is the postsynaptic membrane called?

A) Cholinoreceptive\*.

B) Potentially sensitive

C) Ionoselective

D) electrogenic

46. What is the phenomenon by which the contractile effects of individual myofibrils are added together?

A) Summation\*.

B) Generation

C) Adaptation

D) Accomodation

47. How is the rate of fatigue related to the diameter of nerve fibers?

A) Thinner nerve fibers fatigue faster \*

B) Thicker nerve fibers fatigue faster

C) There is no relationship

D) Thicker and thinner nerve fibers' rates are same

48. How are the magnitude of the threshold strength of a stimulus and the excitability of a cell related?

A) Inversely proportional to \*

B) There is no such relationship

C) directly proportional

D) none of the above

49. Which second mediator system mediates the effects of dopamine?

A) phospholipase A-alpha system

B) phospholipase C system

C) cGMP-dependent

D) cAMP-dependent \*.

50. Which phase of excitability corresponds to the trace hyperpolarization phase of the action potential?

A) Subnormal excitability \*

B) Supernormal excitability

C) Relative refractoriness

D) absolute refractoriness

51. Which phase of excitability is characteristic of the rapid depolarization phase of action potential generation?

A) absolute refractoriness \*

B) supernormal excitability

C) subnormal excitability

D) relative refractoriness

52. Which of the following receptors are classified as metabotropic receptors?

A) glutamate ionotropic

B) NMDA receptors

C) Muscarinic

D) nicotinic \*

53. Which ions are located in the cistern of the sarcoplasmic reticulum?

A) Calcium \*

B) Chlorine

C) Potassium

D) Sodium

54. What types of ion channels does the postsynaptic membrane of the neuromuscular synapse contain?

A) Chemically-excitatory\*.

B) Mechano-excitatory

C) electroexcitable

D) none of the above

54. Which types of nerve fibers have a myelin sheath?

A) A and B \*.

B) A and C

C) A, B and C

D) B and C

55. What is the mechanism of blockade of excitation through the synapse by the drug curare?

A) Formation of a strong bond with cholinoreceptors \*

B) Blockade of neurotransmitter release from nerve endings

C) Blockade of sodium channels

D) Acetylcholinesterase inhibition

56. What is the mechanism of action of botulinum toxin venom on synaptic transmission?

A) Blockade of neurotransmitter release from nerve endings\*

B) Inhibition of acetylcholinesterase enzyme

C) blockade of sodium channels

D) Formation of firm connection to cholinoreceptors

57. What is the membrane potential of excitable cells?

A) From -50 to -90 mV \*

B) -60 to -100 mV

C) -30 to -50 mV

D) -100 to -120 mV.

58. What is the duration of the action potential in muscle cells?

A) 3 to 5 ms \*

B) 0.5 to 1 ms

C) 300 ms

D) 20-30 ms.

59. What is the duration of the action potential in nerve cells?

A) 0.5-1 ms \*

B) 300 ms

C) 5-10 ms

D) 20-30 ms.

60. What is the duration of the contraction phase of a single muscle contraction?

- A) 0.05 s \*
- B) 3 s
- C) 0.5 s
- D) 10 s

61. What is the ionic nature of the excitatory postsynaptic potential (EPSP)?

- A) Local process of depolarization \*
- B) Local hyperpolarization process
- C) Local repolarization process
- D) Local hyperpolarization and repolarization processes

62. What is the ionic nature of the inhibitory postsynaptic potential (IPSP)?

- A) The local process of hyperpolarization, i.e., the output of potassium ions (or the input of chlorine ions) increases \*
- B) Local repolarization process
- C) local depolarization process, i.e., input of sodium ions into the cell
- D) Local depolarization and repolarization processes

63. What is the relationship between excitation conduction rate and nerve fiber diameter?

- A) Directly proportional \*
- B) Inversely proportional
- C) there is no relationship
- D) none of the above

64. What is the excitation conduction velocity in type B fibers?

- A) 3-18 m/s \*
- B) 1-18 m/s
- C) 0.5-3 m/s
- D) 100-150 m/s

65. What is the excitation conduction velocity in type C fibers?

- A) 0.5-3 m/s \*
- B) 20-50 m/s
- C) 3-18 m/s
- D) 50-100 m/s

66. What is the fate of the bulk of choline in the synaptic cleft during acetylcholine cleavage?

- A) It is trapped back in the nerve terminal \*
- B) Is cleaved by acetylcholinesterase
- C) escapes into intercellular space
- D) Remains in synaptic cleft

67. Which link in the neuromuscular drug fatigues faster?

- A) Synapse \*
- B) Nerve ending
- C) muscle
- D) nerve

68. Which chemical compound inhibits the sodium-potassium pump?

- A) ouabain \*
- B) Bivalent cations
- C) Verapamil
- D) Tetrodotoxin

69. Which type of ion channel is blocked by divalent calcium and magnesium cations and verapamil?

- A) Calcium \*
- B) Chlorine
- C) sodium
- D) potassium

70. Which type of ion channel is blocked by tetraethylammonium and aminopyridines?

- A) Potassium \*

B) sodium

C) Calcium

D) Chlorine

71. Which type of ion channel is blocked by tetrodotoxin and local anesthetics?

A) Sodium \*

B) Chlorine

C) Calcium

D) potassium

72. Which type of ion transport provides the rapid depolarization phase?

A) Passive \*

B) Passive and active

C) Active

D) none of the above

73. Which type of ion transport is involved in the repolarization phase of the action potential?

A) Active \*

B) Passive and active

C) Passive

D) none of the above

74. What type of ion channels does the presynaptic membrane contain?

A) Electrically-excitatory \*

B) Mechanically-excitatory

C) Chemically-excitatory

D) none of the above

75. Which ion is involved in the active transport of many monomers?

A) Chlorine

B) calcium

C) Sodium \*

D) Potassium

76. What is the maximum frequency that a neuromuscular synapse can conduct?

A) 100 Hz \*

B) 300 Hz

C) 10 Hz

D) 500 Hz

77. What is the maximum frequency of a rhythmic stimulus that a nerve can reproduce?

A) 500 Hz \*

B) 300 Hz

C) 20 Hz

D) 200 Hz

78. What is the maximum frequency of rhythmic stimulation a muscle can produce?

A) 200 Hz \*

B) 400 Hz

C) 10 Hz

D) 100 Hz

79. A short-term weak depolarization of the postsynaptic membrane when individual quanta of a neurotransmitter are released - a potential:

A) a miniature endplate potential \*

B) terminal lamina

C) inhibitory postsynaptic \*

D) excitatory postsynaptic

80. Who formulated the principle that a neuron releases the same neurotransmitter at all of its synaptic endings?

A) Dale \*

B) Sherrington

C) Sechenov

D) none of the above

8.1 The membrane covering a nerve ending is called:

A) presynaptic \*

B) synaptic cleft

C) subsynaptic

D) postsynaptic

82. Metabotropic ATP receptors are associated with:

A) phospholipase A-alpha

B) guanylate cyclase

C) adenylate cyclase

D) phospholipase C \*

83. The mechanism of exocytosis is characterized by:

A) opening of ion channels

B) activation of protein kinases

C) formation of a temporary pore (channel) in the presynaptic membrane \*

D) incorporation of synaptic vesicle membrane into presynaptic

84. The molecular mechanism that ensures the removal of sodium ions from the cytoplasm and the introduction of potassium ions into it is called a molecular mechanism:

A) sodium-potassium pump \*

B) critical level of depolarization

C) membrane potential

D) sodium selective channel

85. Nitrogen and carbon monoxides participate in cell metabolism by activating:

A) guanylate cyclase \*

B) adenylate cyclase

C) phospholipase C

D) phospholipase A

86. A muscle is fixed at its ends. What type of contraction can be observed when it is excited?

A) Isometric \*

B) eccentric

C) Concentric

D) isotonic

87. Name examples of inhibitory neurotransmitters.

A) GABA, glycine \*

B) serotonin, acetylcholine

C) catecholamines, substance P

D) acetylcholine, histamine

88. Name the enzyme that breaks down acetylcholine in the synaptic cleft.

A) monoamine oxidase

B) Acetyl coenzyme A

C) Acetylcholinesterase\*

D) choline acetyltransferase

### **Physiology of the endocrine system - 55 questions**

1. The adrenal glands synthesize in the medullary layer:

A) sex hormones

B) glucocorticoids

C) mineralocorticoids

D) adrenaline, noradrenaline \*.

2. Parathyroid glands synthesize:

A) thyrocalcitonin

B) thyroidin

C) parathyroidin \*

D) thyrotropin

3. The anterior lobe of the pituitary gland synthesizes:

A) melanocyte-stimulating hormone

B) oxytocin

C) antidiuretic hormone

D) growth hormone\*.

4. Hormones influence on intracellular structures by means of:

A) potassium and chlorine ions

B) cAMP and cGMP

C) hydrogen protons

D) intracellular proteins

5. All of the following serve as the site of estrogen formation except for:

A) adrenal medulla \*

B) testicles

C) placenta

D) mature ovarian follicles

6. The release of hormones from the body occurs through:

A) endocrine glands

B) cerebrospinal fluid

C) kidneys, sweat and salivary glands\*

D) lungs

7. Glucocorticoids have the following functions:

A) regulate calcium and phosphorus

B) regulate water-salt metabolism

C) act on carbohydrate and fat metabolism\*

D) participate in maintaining potassium and sodium concentrations

8. The hormone melatonin is synthesized in:

A) hypothalamus

B) posterior lobe of the pituitary gland

C) anterior pituitary lobe

D) epiphysis\*

9. Hormones that have a direct effect on the cell genome are represented by:

A) peptide hormones

B) parathyreocrine

C) catecholamines

D) steroid hormones\*.

10. The action of which hormones leads to an intensive breakdown of fat?

A) parathyreocrine

B) aldosterone

C) adrenaline and noradrenaline\*

D) vasopressin and oxytocin

11. Sodium retention in the body is directly related to the effects of:

A) aldosterone \*

B) insulin

C) glucagon

D) antidiuretic hormone

12. Non-glandular organs that contain endocrine cells and have the ability to synthesize and secrete hormones include:

A) parathyroid gland

B) pituitary gland

C) pancreas

D) placenta and hypothalamus \*.

13. Steroid hormones include:

- A) insulin and adrenaline
- B) glucagon and ACTH
- C) thyroxine and adrenalin
- D) glucocorticoids, mineralocorticoids, sex hormones \*.

14. The functions of the placenta include all of the following except:

- A) testosterone secretion \*
- B) secretion of gonadotropin, female sex hormones
- C) removal of fetal waste products
- D) fetal nutrition

15. Amino acid derivative hormones include:

- A) growth hormone
- B) thyroid hormones and adrenaline\*
- C) insulin and glucagon
- D) sex hormones and glucocorticoids.

16. How do parathyroidine and calcitonin affect diuresis?

- A) Increase \*
- B) Do not significantly alter it
- C) Decrease
- D) First increase then decrease

17. Which hormones increase protein breakdown in tissues (especially muscles)?

- A) Glucocorticoids \*
- B) Oxytocin and prostaglandins
- C) growth hormone
- D) vasopressin and angiotensin

18. Which cells are particularly sensitive to lower blood glucose levels?

- A) smooth muscle cells
- B) skeletal muscle fibers
- C) Cardiomyocytes
- D) CNS neurons \*

19. What effect does parathormone have?

- A) Regulates carbohydrate metabolism
- B) Decreases blood calcium content
- C) Regulates calcium and phosphorus metabolism\*
- D) Enhances metabolism and energy

20. What effect does thyrocalcitonin have?

- A) Enhances calcium reabsorption in nephron tubules
- B) Decreases blood calcium content, activates osteoblasts\*
- C) Increases calcium content in blood
- D) Regulates carbohydrate metabolism, stimulates protein synthesis

21. What effect does oxytocin have predominantly?

- A) Activates metabolic processes in uterine endometrial cells
- B) Regulates diuresis
- C) Controls secondary sexual characteristics
- D) Stimulates uterine smooth muscle \*

22. Which compound in the liver serves as a glucose reserve depot?

- A) Glucagon
- B) cortisol
- C) insulin
- D) glycogen \*

23. Which hormone regulates the second half of the menstrual cycle?

- A) follicle stimulating hormone
- B) growth hormone

C) Luteinizing hormone \*

D) thyrotropic \*.

24. Which hormone regulates the release of glucocorticoids?

A) oxytocin

B) Prolactin

C) growth hormone

D) ACTH \*

25. Which hormone regulates the first half of the menstrual cycle?

A) growth hormone

B) Progesterone

C) Luteinizing hormone

D) follicle-stimulating hormone \*

26. Which hormone is secreted by the cardiomyocytes of the atria of the heart?

A) oxytocin

B) aldosterone

C) antidiuretic hormone

D) atriopeptin \*

27. Which hormone can effectively lower blood glucose levels?

A) Insulin \*

B) antidiuretic

C) aldosterone

D) oxytocin

28. Which hormone stimulates protein synthesis in the body?

A) Aldosterone

B) oxytocin

C) Growth hormone\*

D) vasopressin

29. Luteinizing hormone stimulates:

A) follicle growth and maturation

B) development of the corpus luteum \*

C) urine formation

D) urination

30. The menstrual cycle lasts on average:

A) 20-35 days

B) 15-20 days

C) 25-36 days

D) 21-28 days \*

31. Mineralocorticoids are synthesized in:

A) the glomerular zone of the adrenal cortex \*

B) reticular zone of adrenal cortex

C) adrenal medulla

D) bundle zone of adrenal cortex

32. Male sex hormones provide all of the following in the body except:

A) stimulation of leukopoiesis \*

B) spermatogenesis

C) development of primary and secondary sexual characteristics

D) differentiation processes in embryogenesis.

33. Normal blood glucose content:

A) 40-50 mmol/L

B) 3.58-6.05 mmol/l\*

C) 1-2 mmol/l

D) 10-20 mmol/l

34. Oxytocin is synthesized in:

- A) the ovary
- B) adenohypophysis
- C) hypothalamus\*
- D) neurohypophysis

35. The main form of transport of hormones by the blood is their transport:

- A) as a hemoglobin-iron complex
- B) as a complex with specific proteins and trace elements of plasma\*
- C) as a complex with cellular elements of blood
- D) as free form.

36. The main hormone that mainly affects carbohydrate metabolism:

- A) parathormone
- B) insulin\*
- C) aldosterone
- D) thyroxine

37. In hypofunction of the adrenal cortex, there is:

- A) increased excretion of sodium from the body \*
- B) increased excretion of glucose from the body
- C) decrease in calcium excretion from the body
- D) decrease in sodium excretion from the body.

38. Emotional stress increases catecholamines in the blood because it:

- A) the tone of the sympathetic nervous system increases \*
- B) secretory activity of chromaffin tissue decreases
- C) skeletal muscle tone increases
- D) tone of parasympathetic nervous system decreases

39. Progesterone is synthesized in:

- A) the bundle zone of the adrenal cortex
- B) corpus luteum\*
- C) pituitary gland
- D) adrenal medulla

40. Regulating influence of CNS on endocrine glands is carried out through:

- A) cerebellum
- B) cerebellum
- C) thalamus
- D) hypothalamus\*.

41. Hormone receptors are located in:

- A) fibrinogen
- B) target organ cell membrane \*
- C) blood transport protein
- D) hemoglobin

42. Testosterone secretion is regulated by:

- A) all organs listed
- B) thyroid gland
- C) pituitary gland\*
- D) pancreas

43. Aldosterone secretion is increased in:

- A) hyponatremia and hyperkalemia \*
- B) hypercalcemia and hyperkalemia
- C) hypernatremia and hypokalemia
- D) hypocalcemia and hypernatremia.

44. The structure that synthesizes the hormone necessary to prepare the uterine mucosa for fertilization is called:

- A) fallopian tubes
- B) follicle

C) corpus luteum\*

D) placenta

45. A normal pregnancy lasts an average of:

A) 310 days

B) 240 days

C) 350 days

D) 270 days \*

46. Pregnancy significantly increases the activity of all of the organs listed except for:

A) thyroid and parathyroid glands

B) pancreas \*

C) pituitary gland

D) ovaries

47. Thyroxine is synthesized in:

A) adrenal glands

B) pituitary gland

C) thyroid gland \*

D) parathyroid gland

48. Tropic hormones are hormones that affect the synthesis and secretion of:

A) hormones of the peripheral endocrine glands \*

B) gastric juice

C) hypothalamic hormones

D) pituitary hormones.

49. Follicle-stimulating hormone regulates:

A) increase in mammary gland growth

B) development of the corpus luteum

C) uterine hyperplasia

D) growth and development of the follicle \*

50. Center of neurohumoral regulation of female reproductive function:

A) subcortical nuclei

B) large hemisphere cortex

C) thalamus

D) hypothalamus\*

51. Endothelin, formed in the vascular endothelium as a local hormone, has:

A) vasoconstrictor and vasodilator effects

B) has no significant effect

C) vasodilator effect

D) vasoconstrictor action \*.

52. Estrogens are required for all of the following processes except:

A) fetal development and differentiation

B) stimulation of erythropoiesis \*

C) fertilization and implantation

D) implementation of sexual behavior

53. The rule for calculating the estimated date of delivery is based on all of these statements, EXCEPT:

A) Menstrual cycles are regular

B) Length of pregnancy is 280 days

C) Before the pregnancy, oral contraceptives were used \*

D) Conception occurred in the middle of the cycle

54. Which of the following substances is most likely to be deficient in a pregnant vegetarian woman?

A) calcium

B) folic acid

C) Protein

D) vitamin B12 \*

55. A woman tested positive for pregnancy when she visited her doctor on June 12, 2020. She has a regular 35-day cycle and her last menstrual period was from April 1 to April 4, 2020. Estimated due date:  
A) January 1, 2021.  
B) January 8, 2021.  
C) January 15, 2021. \*  
D) January 22, 2021.

### **Physiology of the nervous system - 75 questions**

1. Adaptation of a receptor under prolonged action on it of a stimulus consists in:  
A) a decrease in the stimulus threshold  
B) a decrease in the excitability of the receptor \*  
C) increase in the excitability of the receptor  
D) does not change

2. Which retinal cell axons form the optic nerve?  
A) amacrine cells  
B) Horizontal  
C) Bipolar  
D) ganglion cells \*

3. The analyzer is a single system including:  
A) sensory organs  
B) peripheral receptor apparatus, conductive division and central cortical division \*  
C) peripheral receptor apparatus and conductive division  
D) conductive division and central cortical division

4. Binocular vision provides:  
A) focusing the rays on the retina  
B) focusing the rays in front of the retina  
C) focusing of rays behind the retina  
D) volumetric vision \*.

5. Myopia is corrected with:  
A) cylindrical lenses  
B) astigmatic lenses  
C) biconvex lenses  
D) biconvex lenses \*

6. Pain receptors:  
A) Meissner's corpuscles  
B) Krause bulbs  
C) free nerve endings \*  
D) Ruffini's corpuscles

7. The skin is more deeply localized:  
A) cold receptors  
B) heat receptors \*  
C) Pacini bodies  
D) Meissner bodies

8. In which area of the cortex does the analysis of gustatory information take place?  
A) In the precentral gyrus  
B) In the hippocampus  
C) In the postcentral gyrus\*  
D) In the dentate gyrus

10. In what sequence is olfactory information sent to the brain?  
A) Olfactory nerves - olfactory bulbs - olfactory tract - olfactory triangle - anterior piercing matter - hippocampus \*  
B) Olfactory tract - olfactory bulbs - olfactory nerves - olfactory triangle - anterior piercing matter - hippocampus  
C) Olfactory bulbs - olfactory triangle - anterior piercing matter - olfactory nerves - hippocampus

205. In the receptor of the visual analyzer, when the receptor potential is formed, the membrane:

- A) repolarizes
- B) depolarizes
- C) is hyperpolarized\*
- D) does not change

11. In the receptor of the auditory analyzer, when a receptor potential is formed, the membrane:

- A) repolarizes
- B) is depolarized \*
- C) is hyperpolarized
- D) does not change

12. Excitation of receptors in the cortical organ occurs during:

- A) deformation of the tympanic membrane
- B) deformation of the hair cells\*
- C) swaying of the tympanic membrane
- D) perilymph oscillation

13. Excitation of the Golgi tendon organ will result in:

- A) contraction of the extrafusional muscle fibers
- B) relaxation of the extrafusional muscle fibers\*
- C) contraction of intrafusional muscle fibers
- D) contraction of extrafusional muscle fibers

14. The perception of pain resulting from damage to body tissues is called:

- A) nociception \*
- B) irradiation
- C) analgesia
- D) perception

15. The highest level of analyzer interaction:

- A) bulbar
- B) trunk
- C) cortical\*
- D) thalamic.

16. A record of the total electrical activity of the retinal photoreceptors is called an electroretinogram:

- A) electroretinogram \*
- B) electrocardiogram
- C) electroencephalogram
- D) kymogram.

17. Selective sensitivity of a receptor to the action of a certain stimulus is called:

- A) specificity \*
- B) accommodation
- C) excitability
- D) adaptation

18. Intrafusal muscle fibers have the function of:

- A) provide weak contraction
- B) providing sensitivity of the muscle spindle to stretch\*
- C) relaxing the muscle
- D) muscle contraction

19. The sound-conducting structures of the auditory analyzer include:

- A) the eardrum, hammerhead, anvil, and stirrup \*
- B) the Eustachian tube, the vestibule
- C) organ of Corti, semicircular ducts
- D) auricle, Eustachian tube

20. Which flavor is the fastest to adapt to?

- A) sweet \*
- B) bitter

C) glutamate taste.

D) sour.

21. What type is olfactory perception considered to be?

A) Interoreceptive

B) Proprioreceptive

C) Contact

D) Distant\*

22. What is the type of receptor cells of the taste analyzer?

A) To both of them

B) None of them

C) Secondary sensory cells\*

D) Primary sense cells

23. What type of receptor cells of the olfactory analyzer are referred to?

A) To both of them

B) None of them

C) Secondary sensitive

D) Primary sensory cells\*

24. Primary sensory receptors include:

A) taste buds

B) hair cells in cochlea

C) tactile receptors

D) retinal photoreceptors\*

25. Receptors with practically no adaptation include:

A) temperature

B) vestibular \*

C) taste

D) tactile

26. The receptor section of the auditory analyzer includes:

A) hair cells \*

B) tympanic membrane

C) semicircular ducts

D) a set of formations of the inner ear

27. Which receptors make up the yellow spot of the retina?

A) rods

B) cones\*

C) hair cells

D) taste cells

28. Which cortical structures are involved in the analysis of olfactory information?

A) Hippocampus, hook \*

B) The superior temporal gyrus

C) Postcentral gyrus

D) precentral gyrus

29. Which ions are thought to play a major role in generating the receptor potential in the sensation of salty taste?

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

B)  $\text{K}^+$  and  $\text{Cl}^-$

C)  $\text{Na}^+$  and  $\text{Ca}^{2+}$  \*

D)  $\text{Na}^+$  and  $\text{Cl}^-$

30. Which ions are considered to play a major role in generating the receptor potential for the sensation of sourness?

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

B)  $\text{H}^+$  \*

C)  $\text{Na}^+$

D) CI-

31. Secondary sensory receptors include:

- A) intrafusal muscle fibers
- B) retinal photoreceptors\*
- C) tactile
- D) olfactory

32. The cortical representation of the taste analyzer is located in:

- A) the postcentral gyrus \*
- B) hippocampus, pear-shaped cortex
- C) occipital cortex
- D) cerebellum

33. The cortical representation of the olfactory analyzer is located in:

- A) hippocampus, pear-shaped cortex \*
- B) occipital cortex
- C) parietal cortex
- D) somatosensory cortex area

34. The cortical representation of the auditory analyzer is located in:

- A) temporal region \*
- B) parietal lobes
- C) occipital area
- D) somatosensory cortex

35. The cortical representation of the temperature analyzer is located in:

- A) the sensory zone of the cortex \*
- B) hippocampus
- C) occipital cortex area
- D) temporal cortex area

36. The maximum spatial threshold possesses:

- A) back \*
- B) forearm
- C) back side of the hand
- D) toe

37. The place where the optic nerve leaves the eyeball is called the blind spot:

- A) blind spot \*
- B) central fossa
- C) terminal pathway
- D) yellow spot

38. The mechanism of accommodation of the eye consists of a change in:

- A) the curvature of the lens \*
- B) the number of rods
- C) the number of active receptors
- D) pupil diameter

39. The minimum distance between two points, the simultaneous irritation of which results in the sensation of two touches, is called the spatial threshold:

- A) spatial threshold \*
- B) threshold force
- C) threshold of irritation
- D) threshold of sensitivity

40. The minimum spatial threshold possesses:

- A) the finger of the hand \*
- B) forearm
- C) plantar part of the foot
- D) back

41. There are more:

- A) heat receptors
- B) cold receptors\*
- C) pain receptors
- D) mechanical receptors

42. There are more of them in the periphery of the retina:

- A) cones
- B) rods\*
- C) bipolar cells
- D) amacrine cells

43. The neurotransmitter most frequently secreted in secondary sensory receptors:

- A) acetylcholine \*
- B) histamine
- C) serotonin
- D) noradrenaline

44. Unequal refraction of the rays by different parts of the cornea is called A) astigmatism \*:

- A) astigmatism\*.
- B) presbyopia
- C) accommodation
- D) refraction

45. The area of human perception of sound vibrations is in the range:

- A) 16-20,000 Hz \*
- B) 1-10,000 Hz
- C) 10-2000 Hz
- D) 6-2000 Hz

46. Increased sensitivity of the eye in the dark is associated with:

- A) breakdown of iodopsin \*
- B) synthesis of iodopsin
- C) rhodopsin synthesis
- D) rhodopsin disintegration

47. Correct sequence of information processing in the olfactory analyzer:

- A) olfactory bulb - forebrain \*
- B) olfactory bulb - midbrain - forebrain
- C) olfactory bulb - thalamus - forebrain
- D) olfactory bulb - medulla oblongata

48. The conversion of a stimulus into a nerve impulse in a receptor is called:

- A) primary coding \*
- B) sensitization
- C) decoding
- D) adaptation

49. In myopia (nearsightedness), the main focus is:

- A) in front of the retina \*
- B) on the retina
- C) behind the retina
- D) in the blind spot

50. In presbyopia (farsightedness), the main focus is:

- A) behind the retina \*
- B) in front of the retina
- C) on the retina
- D) in the blind spot

51. The space seen by one eye when fixing the gaze is called:

- A) the field of vision\*.
- B) the receptive field
- C) spatial threshold

D) visual acuity

52. The reaction of the pupil to the action of light, which manifests itself in its constriction, is called:

A) the pupillary reflex \*

B) refraction of vision

C) astigmatism

D) accommodation

53. Receptor olfactory cells are classified as:

A) secondary sensitive

B) primary sensory cells\*.

C) interoreceptors

D) proprioceptors

54. Receptor potential in structures of the taste bulb occurs:

A) in the taste cell \*

B) in microvilli

C) in supporting cells

D) in taste canal

55. Muscle stretch receptors:

A) muscle spindles \*

B) Krause bulbs

C) Merkel discs

D) Meissner's corpuscles.

56. Receptors specialized to the perception of more than one type of stimulus:

A) polymodal \*.

B) effector

C) sensory

D) specific

58. Which ions are associated with the mechanisms of adaptation of the olfactory analyzer to odorous substances?

A) Cl -

B) Ca 2+ \*

C) K+

D) Na+

59. Which event starts the process that leads to the onset of impulses in primary sensing receptors?

A) The onset of a receptor potential \*

B) Electrotonic propagation of the receptor potential to the axon of the sensory neuron

C) Interaction of the stimulus with the membrane

D) Action potential generation

60. The strength of the stimulus is encoded in the neuron:

A) pulse frequency \*

B) pulse duration

C) pulse amplitude

D) amplitude of the receptor potential

61. The aggregate of receptors whose irritation causes excitation of a single retinal ganglion cell is called a receptor field:

A) the receptive field \*

B) blind spot

C) yellow spot

D) central fossa

62. Specialized structures that perceive the action of a stimulus:

A) synapses

B) sensory systems

C) receptors\*

D) analyzers

63. The ability of the eye to adjust to seeing objects clearly depending on their distance is called accommodation:

- A) accommodation \*
- B) visual acuity
- C) presbyopia
- D) astigmatism

64. The ability of the eye to distinguish between two luminous points whose projections fall on the retina at an angle of one minute is referred to as:

- A) normal visual acuity \*
- B) refraction of the eye
- C) presbyopia
- D) astigmatism

65. The ability of receptors to adapt to a constantly acting stimulus is called:

- A) accommodation
- B) modality
- C) adaptation\*
- D) coding

66. Old age farsightedness is caused by:

- A) loss of elasticity of the lens \*
- B) refraction of vision
- C) unequal radius of curvature of the crystalline lens
- D) decrease in the number of sticks

67. The tendinous organ of Golgi is located:

- A) in the tendons of the muscles \*
- B) among extrafusal muscle fibers
- C) in distal parts of intrafusal fibers
- D) in the nuclear pouch of intrafusal fibers

68. Specify the receptor olfactory structure:

- A) Epithelial cells
- B) Bipolar neurons\*.
- C) Pseudounipolar neurons
- D) Olfactory bulbs

69. The center of the visual analyzer is localized in the cortex:

- A) occipital \*
- B) parietal
- C) temporal
- D) somatosensory

70. The frequency of impulses in the receptors during their adaptation:

- A) decreases \*
- B) remains unchanged
- C) increases
- D) strongly increases

71. Long-term memory is based on:

- A) the emergence of a dominant focus in the large hemisphere cortex
- B) circulation of impulse flows through closed neuronal circuits
- C) reciprocal inhibition
- D) activation of mRNA and protein synthesis\*

72. The rapid phase of sleep is characterized by all of the above except:

- A) increase in BP
- B) increase in respiration rate
- C) slowed heartbeat \*
- D) rapid eye movements

73. Which rhythm is characteristic of the slow phase of sleep?

A) delta rhythm \*

B) beta rhythm

C) alpha rhythm

74. The mechanism of short-term memory is represented by:

A) reverberation of excitations along closed neuronal circuits \*

B) posttetanic potentials

C) activation of protein synthesis

D) mRNA resynthesis and transcription

75. Memory mechanisms are implemented with the participation of neurotransmitters:

A) glycine, GABA

B) dopamine, ATP

C) acetylcholine, glutamate\*

D) mRNA resynthesis and transcription

76. The ability of an organism to record events that have occurred in a person's life is called:

A) memory \*

B) motivation

C) consciousness

D) emotions.

77. The state of activity and wakefulness reflects on the electroencephalogram:

A) alpha rhythm \*

B) beta rhythm

C) gamma rhythm

D) delta rhythm

#### **Physiology of the central nervous system - 84 questions**

1. In which horns of the spinal cord are the alpha-motoneuron bodies located?

A) In the posterior

B) In the lateral

C) In the anterior \*

D) Dorsal

2. In which part of a neuron does an action potential occur?

A) In the axon membrane

B) In the nerve ending

C) In the axon hilum \*

D) In the body of the neuron

3. The spinal cord closes the arcs of all the reflexes listed except for:

A) ulnar

B) plantar

C) extensor \*

D) flexor

4. Influence of the red nucleus on the Deuterus nucleus (lateral vestibular):

A) inconsequential

B) excitatory

C) inhibitory \*

D) has no effect

5. Excitation in the nerve center spreads:

A) from the efferent neuron through the intermediate to the afferent neuron

B) from intermediate neurons through efferent to afferent neurons

C) from intermediate neurons through afferent to efferent neuron

D) from afferent neuron through intermediate neurons to efferent neuron \*.

6. Excitation of gamma motoneurons will lead to:

A) contraction of the extrafusal muscle fibers

B) relaxation of extrafusal muscle fibers

C) contraction of intrafusal muscle fibers

D) relaxation of intrafusional muscle fibers \*.

7. Select the name of the motoneuron and the muscle fibers it innervates.

- A) Motor unit \*
- B) Synapse
- C) Respirone
- D) axon

8. Where is the body of the afferent neuron located?

- A) In the spinal ganglia\*
- B) In the lateral horns of the spinal cord
- C) In the anterior horns of the spinal cord
- D) in the posterior horns of the spinal cord\*

9. Where is the body of an efferent (motor) neuron located?

- A) In the spinal ganglia
- B) In the lateral horns of the spinal cord
- C) In the anterior horns of the spinal cord\*
- D) In the spinal ganglia

10. Neurons of the dominant focus of excitation are characterized by all of the above except:

- A) low lability \*
- B) ability to transform the excitation rhythm
- C) ability to summate excitations
- D) high lability

11. The significance of reciprocal inhibition lies in:

- A) ensuring coordination of the work of the antagonist muscle centers \*
- B) release of CNS from processing of irrelevant information
- C) a protective function
- D) contraction of antagonist muscles

12. Which neurons make up the two-neuron reflex arc?

- A) The afferent and efferent \*.
- B) Motor and insertion neurons
- C) Contact and afferent
- D) From motor and contact

13. The integrative activity of a neuron consists in:

- A) summation of all postsynaptic potentials arising on its membrane
- B) communication with other neurons by means of the neuron's outgrowths\*
- C) posttetanic potentials
- D) generation of AP

14. What type of reflexes does the tendon reflex, or stretch reflex, belong to?

- A) monosynaptic\*
- B) polysynaptic
- C) Central
- D) protective

15. The main structures of the midbrain do not include:

- A) vagus and trigeminal nuclei, quadriceps
- B) dentate and intermediate nuclei
- C) the quattrochanter, the red nucleus, the black matter, the nuclei of the oculomotor and block nerves, and the reticular formation\*
- D) All of the above

16. What does the overlap of the synaptic fields of the nerve centers formed by the afferent parts of the interacting reflexes lead to?

- A) Occlusion of reflexes \*
- B) Does not affect the interaction of reflexes
- C) It affects the facilitation of reflexes
- D) To the strengthening of reflexes

17. What does irritation of the frog's midbrain structure in Sechenov's experiment lead to?

- A) Inhibition of spinal reactions\*
- B) An increase in spinal cord reflexes
- C) Disinhibition of spinal reflexes.
- D) To stop the frog's heart.

18. What are the neurons that perceive signals in the receptors of the sensory organs and transmit them to the CNS?

- A) Afferent \*
- B) Autonomic
- C) Efferent
- D) inter

19. What are the nerve fibers that carry information from the CNS to the periphery called?

- A) Afferent
- B) Efferent \*
- C) Autonomic
- D) Inter

20. What are the nerve fibers that carry information from the periphery to the CNS called?

- A) efferent\*
- B) afferent
- C) autonomic
- D) inter

23. What is the ability of a motoneuron to make multiple synaptic connections called?

- A) Divergence \*
- B) Convergence
- C) Occlusion
- D) Irradiation

24. What is the convergence of different nerve impulse pathways on the same nerve cell?

- A) Divergence
- B) Convergence\*.
- C) Occlusion
- D) irradiation

25. Which types of summation are characteristic of central neurons?

- A) Spatial and temporal \*
- B) Summation of action potentials
- C) Complete and incomplete
- D) Excitation summation

26. Which vital centers are located in the medulla oblongata?

- A) protective reflexes, pain, oculomotor
- B) respiratory, motor coordination
- C) respiratory, vasomotor, regulation of cardiac activity, digestion, protective reflexes \*
- D) coordination of movements, pain, oculomotor.

27. Which functions are not characteristic of the hypothalamus?

- A) regulation of water-salt metabolism
- B) thermoregulation
- C) Regulation of autonomic functions
- D) Implementation of statokinetic reflexes \*

28. Which functions are not characteristic of the limbic system?

- A) Memory and emotion formation
- B) Regulation of homeostasis
- C) Participation in formation of conditioned reflexes
- D) Regulation of autonomic processes

29. Which neurotransmitter excites Renshaw cells?

- A) Acetylcholine \*

B) Glycine

C) Serotonin

D) noradrenaline

30. Which neurotransmitter is secreted by nerve cells of the black matter?

A) Dopamine \*

B) Noradrenaline

C) serotonin

D) acetylcholine

31. Which neurotransmitter is released by the nerve endings of Renshaw insertion cells?

A) Glycine \*

B) Acetylcholine

C) GABA

D) serotonin

32. Which neuron of the large hemisphere cortex is involved in the formation of the corticospinal tract?

A) Stellate cell

B) Purkinje cell

C) Beetz's giant pyramidal cell \*

D) Renshaw cell

33. Which spinal cord neuron is involved in the formation of inhibition?

A) The alpha-motoneuron

B) pyramidal cell

C) Purkinje cell

D) Renshaw cell \*

34. Which efferent neuron of the anterior horns of the spinal cord innervates the contractile elements of the intrafusal muscle fibers?

A) gamma-motoneuron \*

B) beta-motoneuron

C) alpha-motoneuron

D) pyramidal cell

35. Which efferent neuron of the anterior horns of the spinal cord innervates the extrafusional muscle fibers?

A) alpha motoneuron \*

B) gamma-motoneuron

C) Renshaw cell

D) pyramidal cell

36. Who discovered the phenomenon of inhibition in the CNS?

A) Sechenov \*

B) Sherrington

C) Vedensky

D) Pavlov

37. Which CNS structures are affected by sleeping pills?

A) On the cerebellar nuclei

B) On the ascending activating system of reticular formation\*

C) On the descending activating system of reticular formation

D) On the brain stem

38. Name the cerebellar cortex neuron that inhibits the activity of the cerebellar nuclei itself and the vestibular nuclei of the medulla oblongata.

A) Purkinje cell \*

B) Golgi cell

C) Renshaw cell

D) Pyramidal cell

39. A neurotransmitter released by the presynaptic endings of inhibitory synapses changes the properties of the postsynaptic membrane so that the neuron's ability to generate excitation is suppressed. What is this phenomenon called?

- A) Postsynaptic inhibition \*
- B) pessimal inhibition
- C) presynaptic inhibition
- D) inhibition

40. Nerve centers do not possess the property of:

- A) bilateral conduction of excitation \*
- B) ability to transform a rhythm
- C) high sensitivity to chemical stimuli
- D) plasticity

41. Nerve center:

- A) performs analysis and synthesis of information received \*
- B) delivers information about effector functioning
- C) perceives and stores information
- D) perceives energy of stimulus and transforms it into nerve impulse

42. The nerve center is the morpho-functional association of nerve cells:

- A) necessary and sufficient for regulation of a certain function \*
- B) necessary and sufficient for perception and storage of information
- C) necessary for perception of information
- D) delivers information about effector's work.

43. The development of inhibition in Sechenov's experiment on the frog is judged by:

- A) an increase in the time of the spinal reflex \*
- B) slowing of heartbeat followed by cardiac arrest
- C) appearance of leg cramps
- D) all of the above.

44. A single motor neuron can receive impulses from several afferent neurons due to:

- A) convergence\*
- B) divergence
- C) afferent fusion
- D) irradiation

45. The primary function of axons:

- A) carrying information from the nerve cell body to the effector \*
- B) neurotransmitter inactivation
- C) carrying information to nerve cell body
- D) all of the above

46. The main function of dendrites:

- A) carrying information to the nerve cell body \*
- B) release of neurotransmitter
- C) carrying information from nerve cell body to effector
- D) all of the above

47. The main nuclei of the cerebellum are:

- A) dentate, supraoptic
- B) red, vestibular
- C) blue, globular
- D) dentate, cork-shaped, globe-shaped, globular nucleus \*

48. According to the Bell-Majandi law:

- A) the anterior horns of the spinal cord are motor; the posterior horns are sensory \*
- B) the lateral horns of the spinal cord are sensory, the anterior horns are motor
- C) anterior horns of the spinal cord - sensory, posterior - motor
- D) lateral horns of the spinal cord are motor, anterior horns are sensory

49. Transformation of the excitation rhythm is understood as:

- A) increase or decrease in the number of impulses \*
- B) disorderly spread of excitation in CNS
- C) circulation of impulses through closed neuronal circuits
- D) direction of excitation propagation in CNS.

50. The excess of the effect of simultaneous action of two weak afferent excitations over the sum of their separate effects is called:

- A) facilitation \*
- B) irradiation
- C) transformation
- D) summation

51. During prolonged irritation of the skin of the frog's paw, reflex yanking of the paw stops due to the development of fatigue in:

- A) the nerve center of the reflex \*
- B) neuromuscular synapses
- C) paw muscles
- D) in the skin receptors

52. In cerebellar insufficiency, there is no observation of:

- A) loss of consciousness \*
- B) autonomic disorders
- C) changes in muscle tone
- D) disturbance of movement coordination

53. When the anterior roots of the spinal cord are transected, the muscle tone:

- A) will disappear \*
- B) will significantly decrease
- C) extensors will increase
- D) practically will not change

54. When the pathways between the red nucleus and the vestibular nucleus (Dater's nucleus) are cut, the muscle tone

- A) the extensor muscles will become higher than the tone of the flexors \*
- B) will significantly decrease
- C) will vanish
- D) will be practically unchanged.

55. When irritation intensifies, the receptive field of the reflex expands and more central neurons become involved in the reflex. What is this phenomenon called?

- A) Irradiation \*
- B) Temporal summation
- C) Spatial summation
- D) Coordination

56. Give examples of inhibitory neurons.

- A) Purkinje pear neurons and Renshaw cells\*
- B) Basal ganglia and pyramidal neurons
- C) Autonomic ganglion neurons and Renshaw cells
- D) Neurons of autonomic ganglia

57. The principle of a common terminal pathway in coordination activity is characteristic of:

- A) for any section of the CNS \*
- B) only for higher CNS divisions
- C) only for spinal motor neurons
- D) all of the above.

58. Irritation of which part of the frog brain in Sechenov's experiment leads to inhibition of spinal reflexes?

- A) structures of the midbrain \*
- B) The medulla oblongata
- C) the cortex of the large cerebral hemispheres

D) hypothalamus

59. Reflexes that occur to maintain posture while moving are called:

- A) somatic
- B) kinetic
- C) statokinetic \*
- D) static

60. Reflexes that occur to maintain posture are called:

- A) static \*
- B) statokinetic
- C) kinetic
- D) somatic

61. Which reflex arcs close at the level of the spinal cord?

A) Tendon reflexes, stretch reflexes, flexion reflexes, extensor reflexes\*.

- B) Statokinetic
- C) Extension, labyrinthine, tentative
- D) conditioned

62. The reflex center of involuntary urination is located in the

A) the sacral spinal cord\*

B) cerebellum

C) medulla oblongata

D) thalamus

63. The role of the afferent feedback link is to provide:

- A) evaluation of the result of the reflex \*
- B) propagation of excitation from the afferent link to the efferent link
- C) morphological connection of the nerve center with the effector
- D) all of the above.

64. With which higher CNS department does the black matter communicate?

- A) With the basal ganglia \*
- B) With the thalamus
- C) With the hypothalamus
- D) With the large hemisphere cortex

65. A symptom-complex characterized by restriction of voluntary movements and limb trembling at rest-Parkinson's syndrome-is associated with:

- A) GABA deficiency in the nervous system
- B) excessive and prolonged activation of neurons
- C) increased activity of dopaminergic neurons
- D) degeneration of dopaminergic neurons \*.

66. How many insertion (contact) neurons does a reflex arc consisting of four neurons contain?

- A) Two \*
- B) Three
- C) four
- D) ten

67. How many neurons does the simplest reflex arc contain?

- A) Two \*
- B) Four
- C) three
- D) eight

68. How many central synapses does the simplest reflex arc contain?

- A) One \*
- B) two
- C) three
- D) none

69. Contraction of the flexor muscles with simultaneous relaxation of the extensor muscles is possible as a result of:

- A) active rest
- B) relief
- C) negative induction
- D) reciprocal inhibition \*.

70. The midbrain:

- A) participates in regulation of muscle tone, coordination of movements, regulation of autonomic functions
- B) serves as the main collector of information from sensory organs to the large hemisphere cortex
- C) takes part in regulation of muscle tone, rectilatory, statokinetic, orientational visual and aural reflexes\*
- D) regulates circadian rhythm

71. The thalamus is involved in the analysis of all types of sensation except:

- A) pain
- B) tactile
- C) taste
- D) olfactory \*

72. Thalamus:

- A) serves as the main collector of sensory information \*
- B) participates in regulation of muscle tone, coordination of movements, regulation of autonomic functions
- C) serves as the major subcortical center of autonomic nervous system
- D) takes part in regulation of muscle tone, rectilatory, statokinetic, orientational visual and auditory reflexes

73. Inhibition is a process:

- A) local \*
- B) always spreading
- C) spreading if inhibitory postsynaptic potential (PPSP) reaches a critical level
- D) unnecessary.

74. The inhibitory effect of glycine is related to:

- A) increased sodium conductance
- B) decreased calcium current
- C) decrease in potassium conductivity
- D) increase in chlorine conductivity \*

75. Identify the brain neurotransmitters that carry out synaptic transmission at inhibitory synapses:

- A) ATP
- B) Glycine
- C) GABA
- D) glutamate\*

76. Enhancement of the reflex response cannot occur as a result of:

- A) occlusion
- B) facilitation \*
- C) posttetanic potentiality
- D) when the stimulus impulse is increased

77. Participation of the same efferent neurons and effectors in different reflex reactions is a consequence of:

- A) a common terminal pathway \*
- B) the presence of polyfunctional neurons
- C) presence of multipolar neurons
- D) plasticity of nerve centers

78. Through specific thalamic nuclei, all types of sensitivity are switched, except

- A) olfactory\*
- B) auditory
- C) visual
- D) all of the above

79. What happens during presynaptic inhibition of an excitatory nerve ending?

- A) Persistent depolarization of the nerve ending and a decrease in neurotransmitter release\*
- B) Decreased sensitivity of postsynaptic membrane to neurotransmitter
- C) Disruption of neurotransmitter synthesis
- D) all of the above

80. What is reciprocal inhibition in the CNS?

- A) Inhibition involving Renshaw cells \*
- B) Excessive depolarization of nerve endings
- C) Inhibition caused by the action of an inhibitory neurotransmitter

81. What is the receptive field of a reflex?

- A) A set of receptors whose irritation causes a certain reflex \*.
- B) A set of afferent neurons involved in a reflex
- C) A set of neurons involved in a particular reflex

82. What is the phenomenon of dominance?

- A) Formation of a center of increased excitability in the CNS \*
- B) Appearance of a new nerve center in CNS
- C) Formation of a center of decreased excitability in CNS
- D) fatigue

83. The efferent fibers of the cerebellum, represented by the axons of Purkinje cells, are not connected to:

- A) the hypothalamus \*
- B) nuclei of the reticular formation
- C) red and vestibular nuclei
- D) motor area of the cortex and thalamus

84. The phenomenon in which excitation of the center of one muscle is accompanied by inhibition of the center of the antagonist muscle is called:

- A) occlusion
- B) relief
- C) fatigue
- D) reciprocal inhibition\*

### **Physiology of the ANS - 22 questions**

1. The interaction of adrenaline with the alpha-adrenoreceptors of the smooth muscle cells of the arterial wall causes:

- A) dilation of the vascular lumen
- B) dilation and then narrowing of the vascular lumen
- C) narrowing of the vascular lumen \*
- D) does not affect the vascular lumen

2. The interaction of adrenaline with the beta-adrenoreceptors of smooth muscle cells in the arterial wall causes:

- A) dilation of the vascular lumen \*
- B) dilation and then narrowing of the vascular lumen
- C) narrowing of the vascular lumen
- D) does not affect the vascular lumen.

3. Where do the outgrowths of the first neurons of the parasympathetic nerves of the heart end?

- A) In all parts of the cardiac conduction system
- B) In the intramural ganglia of the heart\*
- C) In the working muscles of the heart
- D) In the sinus-atrial node

4. Where do the outgrowths of the first neurons of the sympathetic innervation of the heart end?

- A) In the cervical and upper thoracic sympathetic ganglia\*
- B) In the crevicular contacts
- C) In the intramural ganglia of the heart
- D) In elements of the cardiac conduction system

5. How does tapping the frog's intestine (Goltz's experiment) affect the frog's heart?

- A) Causes the heart to stop beating or decrease its heart rate\*.
- B) Does not alter heart function
- C) Strengthens heart function
- D) Causes an increase in heart rate

6. Where do the axons of the second neurons of the motor sympathetic innervation of the heart terminate?

- A) In all parts of the heart \*
- B) Among the cardiomyocytes of the ventricles
- C) In the working muscle of the left atrium
- D) In the sinus-atrial and atrial-ventricular nodes of the conduction system

7. The action of catecholamines on vascular smooth muscle cells is mediated through:

- A) sodium ions
- B) glucose
- C) cGMP
- D) cAMP\*

8. Which autonomic system slows down fat synthesis and increases fat breakdown?

- A) Sympathetic \*
- B) parasympathetic
- C) metasympathetic
- D) all of the above.

9. Which effects of the vagus nerves are called negative inotropic and dromotropic?

- A) Decrease in frequency and force of contractions
- B) Decrease in force and conduction\*
- C) Decrease in force and excitability
- D) Decrease in force and heart rate

10. Which effects of the vagus nerves of the heart are called negatively chronotropic and bathmotropic?

- A) Decrease in contractility and conduction
- B) Increased myocardial frequency and contractility
- C) Decrease in myocardial frequency and excitability\*
- D) Decrease in heart muscle frequency and conduction

11. How do adrenaline and noradrenaline increase the force of heart contraction?

- A) affect the baroreceptors
- B) Decrease the tone of the vagus nerves
- C) Excite beta-adrenoceptors\*
- D) Cause excitation of baroreceptors.

12. Which neurotransmitter is released when the sympathetic nerves of the heart are stimulated?

- A) Acetylcholine
- B) noradrenaline \*
- C) Dopamine
- D) adrenaline.

13. Which neurotransmitter is secreted by the endings of the postganglionic fibers of the vagus nerves?

- A) Acetylcholine \*
- B) noradrenaline
- C) Dopamine
- D) adrenaline.

14. The Aschner reflex consists in:

- A) stopping the heart when struck in the epigastric region
- B) a decrease in heart rate when pressure is applied to the eyeballs \*
- C) change in heart activity upon irritation of carotid sinus chemoreceptors
- D) change in cardiac activity upon irritation of carotid sinus baroreceptors

15. What causes the tone of the vagus nerve center?

- A) Influence of acetylcholine

B) Influence of noradrenaline and K<sup>+</sup> ions

C) by centripetal impulses to the center of the vagus nerves from the receptors of the aortic arch and carotid sinuses, as well as by the influence of adrenaline and Ca<sup>2+</sup> ions \*

16. Which of the following is correct regarding the autonomic nervous system (ANS)?

- A. Afferent neurons carry signals from the CNS to the effector organs
- B. The neurotransmitter at the parasympathetic ganglion is norepinephrine (NE).
- C. The neurotransmitter at the sympathetic ganglion is acetylcholine (ACh)\*
- D. Sympathetic neurons release ACh in the effector organs

17. Which of the following is correct regarding somatic motor neurons?

- A. The neurotransmitter at the somatic motor neuron ganglion is acetylcholine.
- B. The neurotransmitter at the somatic motor neuron ganglion is norepinephrine.
- C. Somatic motor neurons innervate smooth muscles
- D. Somatic motor neurons do not have ganglia. \*

18. Which of the following statements is correct regarding the sympathetic and parasympathetic systems?

- A. Acetylcholine activates muscarinic receptors. \*
- B. Acetylcholine activates adrenergic receptors.
- C. Norepinephrine activates muscarinic receptors.
- D. Activation of the sympathetic system causes a drop in blood pressure.

19. Which of the following statements concerning the parasympathetic nervous system is correct?

- A The parasympathetic system uses norepinephrine as a neurotransmitter.
- B. The parasympathetic system often discharges as single, functional system
- C. The parasympathetic division is involved in accommodation of near vision, movement of food, and urination\*
- D. The postganglionic fibers of the parasympathetic division are long compared to those of the sympathetic nervous system

20. Which of the following is correct regarding neurotransmitters and neurotransmission?

- A Neurotransmitters are released from the presynaptic nerve terminals. \*
- B. Neurotransmitter release is triggered by the arrival of action potentials in the postsynaptic cell
- C. Intracellular calcium levels drop in the neuron before the neurotransmitter is released,
- D. Serotonin and dopamine are the primary neurotransmitters in the ANS.

21. All of the following statements regarding central control of autonomic functions are correct except.

- A. Baroreceptors are pressure sensors located at various cardiovascular sites.
- B. The parasympathetic system is activated by the CNS in response to a sudden drop in blood pressure\*.
- C. The parasympathetic system is activated by the CNS in response to a sudden increase in blood pressure.
- D. The sympathetic system is activated by the CNS in response to a sudden drop in blood pressure.

22. Which of the following is correct regarding membrane receptors and signal transduction?

- A. ANS neurotransmitters bind to membrane receptors on the effector cells, which leads to intracellular events\*
- B. Cholinergic muscarinic receptors are examples of ionotropic receptors
- C. Cholinergic nicotinic receptors are examples of metabolic receptors
- D. Metabolic receptors activate ion channels directly

### **Physiology of Higher Nervous Activity - 30 questions.**

1. What is a set of complex unconditioned reflexes called?

- a) dynamic stereotype;
- b) instinct; \*
- c) conditioned reflex switching.
- d) none of the above.

2. What is provided by the ability to perceive and utter words that arise in the process of human social life?

- a) by instinct;
- b) the first signaling system;
- c) the auditory analyzer;
- d) the second signal system\*.

3. Which inhibition causes a guard dog to stop eating when a stranger appears?

- a) reciprocal;
- b) external; \*
- c) conditioned inhibition;
- d) differentiation inhibition.

4. According to Hippocrates, which temperament is characteristic of a person who has the ability to produce conditioned reflexes quickly and firmly?

- a) choleric;
- b) melancholic;
- c) phlegmatic;
- d) sanguine. \*

5. Which section of the CNS dominates the analysis and synthesis of specific signals?

- a) left hemisphere;
- b) right hemisphere; \*
- c) reticular formation of the midbrain;
- d) hypothalamus.

6. Which section of the CNS dominates the analysis and synthesis of abstract (verbal) signals?

- a) left hemisphere; \*
- b) right hemisphere;
- c) thalamus;
- d) limbic system;
- e) hypothalamus.

7. Which functions dominate in the left hemisphere?

- a) regulation of left hemisphere functions;
- b) analysis and synthesis of the 1st signal system signals;
- c) speech, writing, and counting. \*
- D) none of the above

8. What functions dominate in the right hemisphere?

- a) Regulation of functions of the right side of the body;
- b) Analysis and synthesis of signals from the 1st signal system; \*
- c) speech, writing, and counting.
- d) none of the above.

9. Which EEG rhythm is characteristic of active wakefulness?

- a) alpha;
- b) delta;
- c) beta; \*
- d) theta.

10. Which EEG rhythm is characteristic of calm wakefulness (rest, eyes closed)?

- a) alpha; \*
- b) delta;
- c) beta;
- d) theta.

11. Which EEG rhythm is characteristic of deep sleep?

- a) alpha;
- b) delta\*;
- c) beta;
- d) theta.

12. How does sleep duration change with age?

- a) increases;
- b) does not change significantly;
- c) decreases. \*
- D) none of the above

13. What is the inhibition that develops over the course of an individual's life in response to various stimuli called?

- a) The orienting-exploratory reaction;
- b) inhibitory inhibition;
- c) reciprocal inhibition;
- d) conditioned inhibition. \*

14. Conditioned inhibition includes.

- a) reciprocal, lateral, return;
- b) extinction, differential, conditional inhibition, delayed inhibition; \*
- c) inhibitory, extinguishing inhibition;
- d) postsynaptic, presynaptic.

15. What is the inhibition of reflex activity under the action of an excessively strong stimulus?

- a) differentiation;
- b) conditioned inhibition;
- c) delaying;
- d) inhibitory. \*

16. What is the significance of external and internal inhibition of conditioned reflexes?

- a) the organism protects itself from intolerable stimuli;
- b) all answers are correct; \*
- c) provides concentration on the most important activity at the moment;
- d) improves the body's activity in relation to changing environmental conditions.

17. Are dreams associated with a certain phase of sleep?

- a) Dreams are more often observed in the phase of slow sleep;
- b) Dreams are more often observed in the phase of fast sleep; \*
- C) dreams are independent of the phase of sleep.
- D) does not depend.

18. Which method of determining TMD types is the most accurate in animals and humans?

- a) observation;
- b) psychological testing;
- c) self-assessment;
- d) conditioned reflexes\*.

19. Can blood pressure change by conditioned reflex mechanism?

- a) blood pressure changes only unconditionally reflexively;
- b) it cannot
- c) it does, if an appropriate conditioned reflex\* has been developed.
- D) none of the above.

20. What is the biological significance of REM sleep?

- a) activation of plastic processes in the nervous system of internal organs;
- b) processing and depositing information into long-term memory, restoration of mental processes; \*
- c) increase of sensitivity to external stimuli;
- d) increase of protein, DNA and RNA synthesis in the organism.

21. What reflex is the closing of the eyelids in a flash of light?

- a) conditioned;
- b) unconditioned; \*
- c) artificial;
- d) vegetative.

22. What is inhibition that occurs under the influence of stimuli extraneous to the reflex in question?

- a) internal;
- b) external; \*
- c) lateral;
- d) withdrawal.

23. What are the qualities of a conditioned reflex?

- a) acquired, permanent, individual;
- b) acquired, temporary, individual\*.
- c) innate, permanent, specific;
- d) innate, temporary, individual.

24. What qualities does the unconditioned reflex have?

- a) acquired, permanent, individual;
- b) acquired, temporary, individual;
- c) innate, permanent, specific\*.
- d) innate, temporary, individual.

25. The rate of development and strength of conditioned reflexes increases:

- a) motivational arousal; \*
- b) external inhibition;
- c) absence of emotions;
- d) fatigue of nerve centers.

26. A student did not repeat the blood constants and could not recall them for credit. These are:

- a) permanent inhibition;
- b) extinction inhibition; \*
- c) differential inhibition;
- d) conditioned inhibition.

27. Specify what a student must do to memorize very complex information:

- a) read it once carefully;
- b) read once before going to bed;
- c) read once after sleep;
- d) read it several times and repeat it sometime later. \*

28. Orientational-research reactions:

- a) arise on a familiar stimulus;
- b) arise to a new unexpected stimulus; \*
- c) have a prolonged character;
- d) indicate the development of the situation.

29. Students are accustomed to crossing the street in front of the medical school building, although there is no traffic light there. This is based on:

- a) instinctive behavior;
- b) a disinhibition reaction;
- c) sequential dynamic stereotype;
- d) spatial dynamic stereotype. \*

30. The student is the first to pull his hand in class, shouts out answers from his seat, does not finish and therefore studies unevenly. He has a dominant type of HNI:

- a) choleric; \*
- b) phlegmatic;
- c) sanguine;
- d) melancholic