**现代生命科学导论C**

**课后习题四**

单项选择题（共50题）

1) Innate immunity \_\_\_\_\_.

A) is found only in vertebrate animals

B) depends on an infected animal's previous exposure to the same pathogen

C) is based on recognition of antigens that are specific to different pathogens

D) is activated immediately upon infection

2) A fruit fly, internally infected by a potentially pathogenic fungus, is protected by its \_\_\_\_\_.

A) antimicrobial peptides

B) immunoglobulins

C) antibodies

D) B cells

3) The cells and signaling molecules involved in the initial stages of the inflammatory response are \_\_\_\_\_.

A) phagocytes and chemokines

B) dendritic cells and interferons

C) lymphocytes and interferons

D) mast cells and histamines

4) Mammals have Toll-like receptors (TLRs) that can recognize a kind of macromolecule that is absent from vertebrates but present in or on certain groups of pathogens, such as viral \_\_\_\_\_.

A) double-stranded RNA

B) double-stranded DNA

C) glycoproteins

D) phospholipids

5) A boy falls while riding his bike. A scrape on his hand almost immediately begins to bleed and becomes red, warm, and swollen. What response is occurring?

A) lytic response

B) inflammatory response

C) adaptive immune response

D) autoimmune response

6) Mucus occurs in both the respiratory and digestive tracts. What is its main immunological function?

A) sweeping away debris

B) increasing oxygen absorption

C) destruction of pathogens because it is acidic

D) physically trapping pathogens

7) Clonal selection and differentiation of B cells activated by antigen exposure leads to the production of \_\_\_\_\_.

A) large quantities of the antigen initially recognized

B) vast numbers of B cells with random antigen-recognition receptors

C) short-lived plasma cells that secrete antibodies for the antigen

D) long-lived erythrocytes that can later secrete antibodies for the antigen

8) A newborn who is accidentally given a drug that destroys the thymus would most likely \_\_\_\_\_.

A) lack innate immunity

B) be unable to differentiate and mature T cells

C) be unable to genetically rearrange antigen receptors

D) have a reduced number of B cells and be unable to form antibodies

9) An immunoglobulin (Ig) molecule, of whatever class, with regions symbolized as C or V, H or L, has a light chain made up of \_\_\_\_\_.

A) one H region and one L region

B) one C region and one V region

C) three H regions and one L region

D) two C regions and two V regions

10) Vaccination increases the number of \_\_\_\_\_.

A) macrophages specific for a pathogen

B) epitopes that the immune system can recognize

C) lymphocytes with receptors that can bind to the pathogen

D) major histocompatability (MHC) molecules that can present an antigen

11) If a patient is missing B and T cells, what would be absent from the immune response?

A) defense against bacteria

B) lysozymes

C) cytokines

D) memory

12) Lymphocytes mature in the \_\_\_\_\_.

I) thymus

II) spleen

III) bone marrow

A) only I and III

B) only I and II

C) only II and III

D) I, II, and III

13) What major advantage is conveyed by having a system of adaptive immunity?

A) It results in effector cells with specificity for a large number of antigens.

B) It enables an animal to counter most pathogens almost instantly the first time they are encountered.

C) It enables a rapid defense against an antigen that has been previously encountered.

D) It allows for the destruction of antibodies.

14) Which of the following is a difference between B cells and T cells?

A) One binds a receptor called BCR (B-cell receptor), while the other recognizes a receptor called TCR (T-cell receptor).

B) One has a major role in antibody production, while the other has a major role in cytotoxicity.

C) B cells are activated by free-floating antigens in the blood or lymph. T cells are activated by membrane-bound antigens.

D) T cells are produced in the thymus and B cells are produced in the bone marrow.

15) A certain cell type has existed in the blood and tissue of its vertebrate host's immune system for over twenty years. One day, it recognizes a newly arrived antigen and binds to it, subsequently triggering a secondary immune response in the body. Which of the following cell types most accurately describes this cell?

A) plasma cell

B) thyroid cell

C) macrophage

D) memory cell

16) Which of the following statements about epitopes are correct?

I) B-cell receptors bind to epitopes.

II) T-cell receptors bind to epitopes.

III) There can be 10 or more different epitopes on each antigen.

IV) There is a one-to-one correspondence between antigen and epitope.

A) only I and III

B) only II and IV

C) only I, II, and III

D) only II, III, and IV

17) Which of the following pairs of proteins shares the most overall similarity in structure?

A) B-cell receptors and antibodies

B) B-cell receptors and T-cell receptors

C) T-cell receptors and antibodies

D) antibodies and antigens

18) Arrange in the correct sequence these components of the mammalian immune system as it first responds to a pathogen.

I) Pathogen is destroyed.

II) Lymphocytes secrete antibodies.

III) Antigenic determinants from pathogen bind to antigen receptors on lymphocytes.

IV) Lymphocytes specific to antigenic determinants from pathogen become numerous.

V) Only memory cells remain.

A) I → III → II → IV → V

B) II → I → IV → III → V

C) III → IV → II → I → V

D) IV → II → III → I → V

19) A bone marrow transplant may not be appropriate from a given donor (Jane) to a given recipient (Jane's cousin Bob), even though Jane has previously given blood for one of Bob's needed transfusions, because \_\_\_\_\_.

A) Jane's MHC class II genes are not expressed in bone marrow

B) a blood type match is less stringent than a match required for transplant because blood is more tolerant of change

C) for each gene, there is only one blood allele but many tissue alleles

D) even though Jane's blood type is a match to Bob's, her MHC proteins may not be a match

20) Which of the following is crucial to activation of the adaptive immune response?

A) memory cells

B) somatic hypermutation

C) presentation of MHC (major histocompatibility complex)-antigen complex on a cell surface

D) phagocytosis of antibody-antigen complex by macrophages in the blood (the humoral response)

21) Which of the following components of the immune system destroys bacteria in a way similar to an antitank weapon destroying armored military tanks by punching holes in the wall of the bacteria?

A) plasma cells

B) macrophages

C) complement protein

D) major histocompatibility complex proteins

22) Which of the following would help a virus avoid triggering an effective adaptive immune response?

I) producing proteins very similar to those of other viruses

II) building the viral shell from host proteins

III) infecting and killing helper T cells

IV) having frequent mutations in genes for surface proteins

A) only I and III

B) only I, II, and IV

C) only I, II, and III

D) only II, III, and IV

23) Which of the following is the best definition of autoimmune disease?

A) a condition in which B cells and T cells respond independently to antigens and do not interact correctly

B) a condition in which the adaptive immune system fails to recognize the second infection by the same antigen

C) a condition in which the immune system creates random antibodies without being triggered by an antigen

D) a condition in which self molecules are treated as non-self

24) Which of the following would prevent allergic attacks?

A) blocking the antigenic determinants of the IgM antibodies

B) blocking the attachment of the IgE antibodies to the mast cells

C) reducing the number of helper T cells in the body

D) reducing the number of cytotoxic cells

25) The point of connection between two communicating neurons is called the \_\_\_\_\_.

A) axon hillock

B) synapse

C) dendrite

D) cell body

26) In a simple synapse, neurotransmitter chemicals are released by \_\_\_\_\_.

A) cell bodies

B) axon hillocks

C) the presynaptic membrane

D) ducts on the smooth endoplasmic reticulum

27) In a simple synapse, neurotransmitter chemicals are received by \_\_\_\_\_.

A) the presynaptic membrane

B) the postsynaptic membrane

C) axon hillocks

D) cell bodies

28) The operation of the sodium-potassium "pump" moves \_\_\_\_\_.

A) sodium and potassium ions into the cell

B) sodium and potassium ions out of the cell

C) sodium ions out of the cell and potassium ions into the cell

D) sodium ions into the cell and potassium ions out of the cell

29) In a resting potential, an example of a cation that is more abundant as a solute in the cytosol of a neuron than it is in the interstitial fluid outside the neuron is \_\_\_\_\_.

A) Cl-

B) K+

C) Na+

D) Ca2+

30) The concentrations of ions are very different inside and outside a nerve cell due to \_\_\_\_\_.

A) osmosis

B) diffusion

C) symports and antiports

D) sodium-potassium pumps

31) For a neuron with an initial membrane potential at -70 mV, an increase in the movement of potassium ions out of that neuron's cytoplasm would result in the \_\_\_\_\_.

A) hyperpolarization of the neuron

B) depolarization of the neuron

C) replacement of potassium ions with sodium ions

D) replacement of potassium ions with calcium ions

32) If you experimentally increase the concentration of K+ inside a cell while maintaining other ion concentrations as they were, what would happen to the cell's membrane potential?

A) The membrane potential would become less negative.

B) The membrane potential would become more negative.

C) The membrane potential would remain the same.

33) Neurotransmitters are released from axon terminals via \_\_\_\_\_.

A) osmosis

B) exocytosis

C) diffusion

D) active transport

34) The following steps refer to various stages in transmission at a chemical synapse.

1. Neurotransmitter binds with receptors associated with the postsynaptic membrane.

2. Calcium ions rush into neuron's cytoplasm.

3. An action potential depolarizes the membrane of the presynaptic axon terminal.

4. The ligand-gated ion channels open.

5. The synaptic vesicles release neurotransmitter into the synaptic cleft.

Which sequence of events is correct?

A) 1 → 2 → 3 → 4 → 5

B) 2 → 3 → 5 → 4 → 1

C) 3 → 2 → 5 → 1 → 4

D) 4 → 3 → 1 → 2 → 5

35) The activity of acetylcholine in a synapse is terminated by its\_\_\_\_\_.

A) degradation on the postsynaptic membrane

B) active transport across the postsynaptic membrane

C) diffusion across the postsynaptic membrane

D) diffusion across the presynaptic membrane

36) Receptors for neurotransmitters are of primary functional importance in assuring one-way synaptic transmission because they are mostly found on the \_\_\_\_\_.

A) axonal membrane

B) axon hillock

C) presynaptic membrane

D) postsynaptic membrane

37) Neurotransmitters affect postsynaptic cells by \_\_\_\_\_.

I) initiating signal transduction pathways in the cells

II) causing molecular changes in the cells

III) affecting ion-channel proteins

IV) altering the permeability of the cells

A) I and III

B) II and IV

C) III and IV

D) I, II, III, and IV

38) The amino acid that operates at most inhibitory synapses in the brain is \_\_\_\_\_.

A) acetylcholine

B) gamma-aminobutyric acid (GABA)

C) nitric oxide

D) endorphin

39) The heart rate decreases in response to the arrival of \_\_\_\_\_.

A) endorphin

B) acetylcholine

C) nitric oxide

D) gamma-aminobutyric acid (GABA)

40) A chemical that affects neuronal function but is not stored in presynaptic vesicles is \_\_\_\_\_.

A) acetylcholine

B) nitric oxide

C) epinephrine

D) gamma-aminobutyric acid (GABA)

41) Motor neurons release the neurotransmitter acetylcholine (ACh) and acetylcholinesterase degrades ACh in the synapse. If a neurophysiologist applies onchidal (a naturally occurring acetylcholinesterase inhibitor produced by the mollusc *Onchidella binneyi*) to a synapse, what would you expect to happen?

A) paralysis of muscle tissue

B) decrease in the frequency of action potentials

C) convulsions due to constant muscle stimulation

D) no effect

42) Preparation for the fight-or-flight response includes activation of the \_\_\_\_\_ nervous system

A) somatic

B) sympathetic

C) central

D) parasympathetic

43) Exercise and emergency reactions include \_\_\_\_\_.

A) increased activity in all parts of the peripheral nervous system

B) decreased activity in the sympathetic, and increased activity in the parasympathetic divisions

C) increased activity in the sympathetic, and decreased activity in the parasympathetic divisions

D) increased activity in the enteric nervous system

44) The activation of the parasympathetic branch of the autonomic nervous system is associated with \_\_\_\_\_.

A) release of epinephrine into the blood

B) resting and digesting

C) increased metabolic rate

D) intensive aerobic exercise

45) Imagine you are resting comfortably on a sofa after dinner. This could be described as a state with \_\_\_\_\_.

A) increased activity in the sympathetic, parasympathetic, and enteric nervous systems

B) decreased activity in the sympathetic, parasympathetic, and enteric nervous systems

C) increased activity in the sympathetic nervous system, and decreased activity in the parasympathetic and enteric nervous systems

D) decreased activity in the sympathetic nervous system, and increased activity in the parasympathetic and enteric nervous systems

46) Calculation, contemplation, and cognition are human activities associated with increased activity in the \_\_\_\_\_.

A) hypothalamus

B) cerebellum

C) cerebrum

D) spinal cord

47) The coordination of groups of skeletal muscles is driven by activity in the \_\_\_\_\_.

A) cerebellum

B) cerebrum

C) thalamus

D) medulla oblongata

48) The regulation of body temperature derives from the activity of the \_\_\_\_\_.

A) cerebrum

B) cerebellum

C) hypothalamus

D) thalamus

49) When Phineas Gage had a metal rod driven into his frontal lobe, or when someone had a frontal lobotomy, they would \_\_\_\_\_.

A) lose their sense of balance

B) lose all short-term memory

C) have greatly increased long-term memory

D) have greatly altered emotional responses

50) The point of connection between two communicating neurons is called the \_\_\_\_\_.

A) axon hillock

B) dendrite

C) glia

D) synapse