Biology · Structure and Function in Living Organisms · Immunity in Living Organisms

Immunity in Humans

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Multiple choice questions — 76 questions

1 Which of the following could be a reason for the number of red blood cells dropping below the normal level?

(A) Overactivity of the bone marrow
(B) Overactivity of the spleen
(C) Underactivity of the thymus gland
(D) An increase in the number of natural killer cells

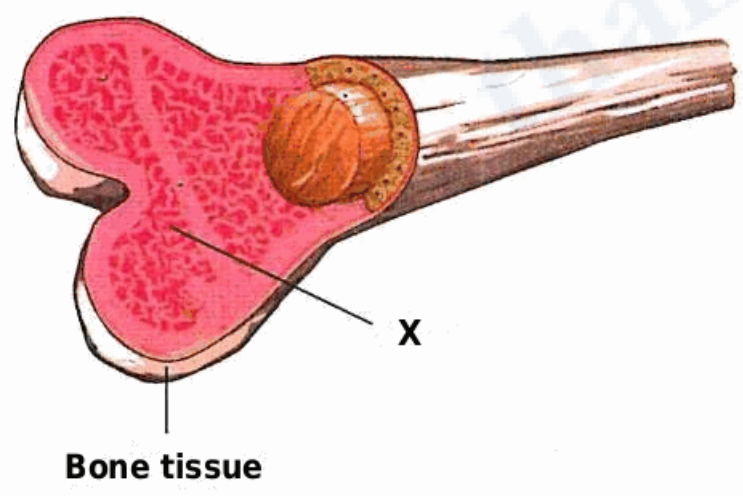
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2 Which of the following systems is the most similar to the lymphatic system in how its organs are anatomically connected to each other?

(A) The digestive system
(B) The circulatory system
(C) The skeletal system
(D) The endocrine system

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3 Which of the following statements does NOT describe structure (X) correctly?



(A) It contains lymphatic stem cells
(B) Maturation and differentiation of some immune cells
(C) It produces all types of white blood cells
(D) It stores lymphocytes

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4 In which of the following lymphatic organs do lymphocytes acquire their immune ability?

(A) Peyer's patches and the tonsils

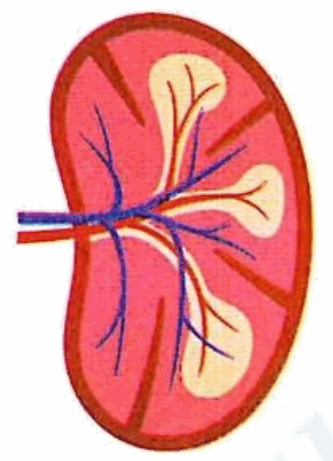
(B) The bone marrow and the thymus gland

(C) The bone marrow only

(D) The thymus gland only

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5 Which of the following statements is NOT correct about the structure shown in the opposite figure?



(A) It contains white blood cells

(B) It produces lymphocytes

(C) It is a source of iron supply for the body

(D) It is a secondary lymphatic organ

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6 Which of the following is a primary lymphatic organ and structurally belongs to another system in the human body?

(A) The appendix

(B) The spleen

(C) Peyer's patches

(D) The thymus gland

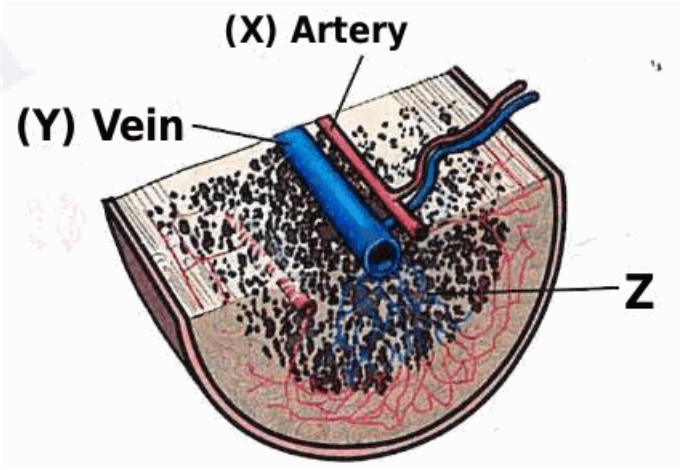
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7 During the embryonic stages, blood cells are produced by the liver and the spleen. As the embryo develops, this function moves to the .....

(A) thymus gland (B) bone marrow (C) lymph nodes (D) tonsils

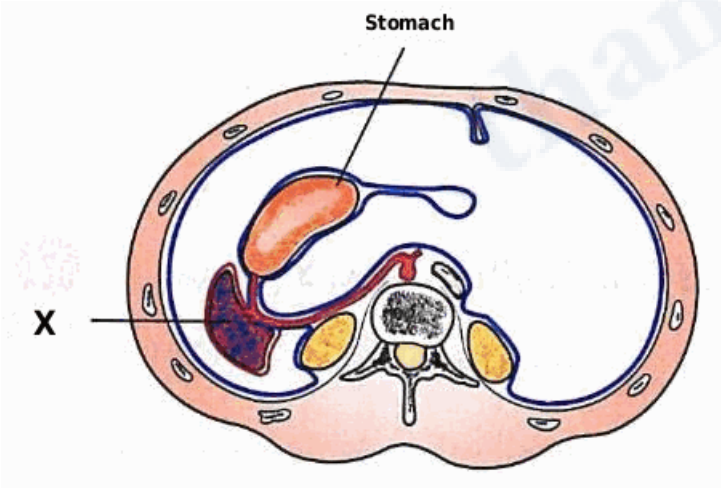
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8 If you know that an artery carries blood to an organ while a vein carries blood away from the organ, which of the structures in the opposite figure do NOT contain lymphatic stem cells?



(A) (X) only (B) (Y) only (C) (X) , (Z) (D) (Y) , (Z)

9 The opposite diagram shows a cross section in the abdominal region. Which of the following is correct about structure (X)?



(A) It contains the basic components of red blood cells

(B) It helps in the differentiation of lymphocytes

(C) It belongs to the circulatory system

(D) It belongs to the digestive system

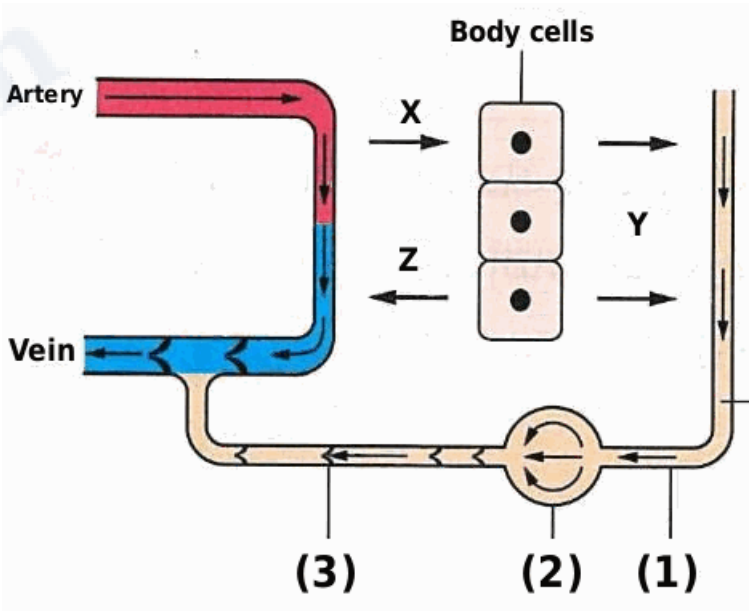
10 Which of the following stores most types of immune cells?

(A) The appendix (B) The lymph nodes

(C) Peyer's patches (D) The thymus gland

11 Study the opposite diagram, then deduce:

What do the numbers (1), (2), (3) represent, respectively?



(A) Afferent lymph vessel / lymph node / vein

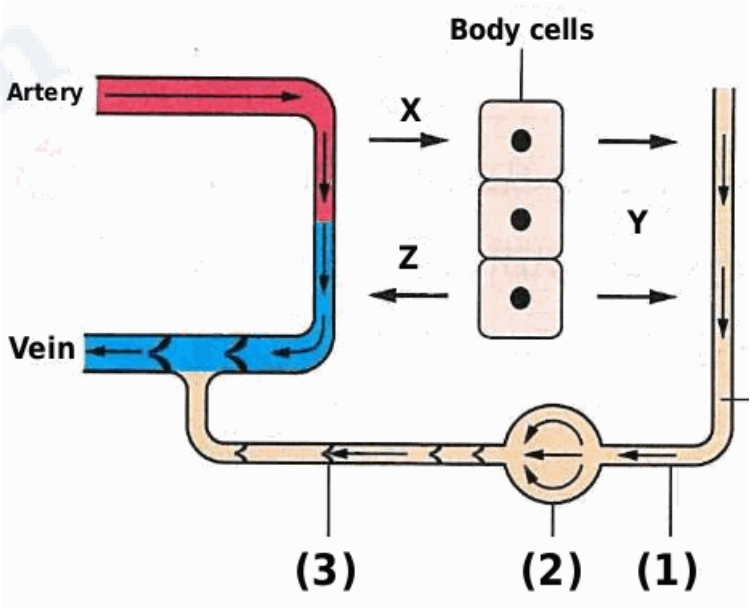
(B) Artery / lymph node / vein

(C) Efferent lymph vessel / lymph node / afferent lymph vessel

(D) Afferent lymph vessel / lymph node / efferent lymph vessel

12 Study the opposite diagram, then deduce:

Which of the following substances represent (X), (Y), (Z), respectively?



(A) Glucose / pure plasma / CO2

(B) Oxygen / impure lymph / nitrogenous wastes

(C) Glucose / pure blood / CO2

(D) Oxygen / impure lymph / pure lymph

13 Which of the following is NOT correct about the tonsils?

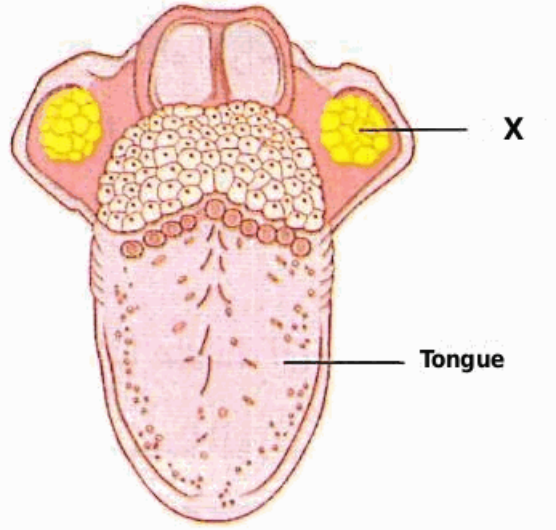
(A) They protect the respiratory and digestive systems

(B) They contain white blood cells

(C) They are secondary lymphatic organs

(D) They are primary lymphatic organs

14 In the opposite figure, which of the following statements is correct about structure (X)?



(A) A structure in the digestive system that takes part in the work of the lymphatic system

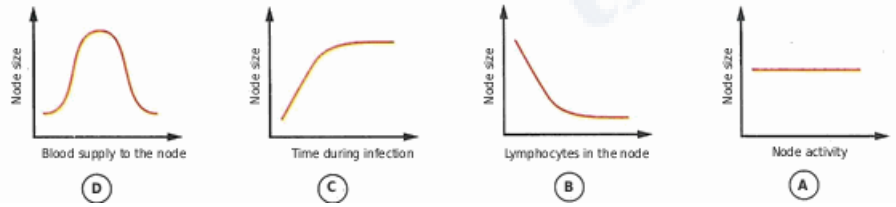
(B) A structure in the lymphatic system that takes part in the work of the digestive system

(C) A structure in the lymphatic system that helps protect the digestive system

(D) A structure shared between the digestive and respiratory systems

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15 Which of the following graphs is correct for a lymph node?



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16 Which of the following is NOT one of the main functions of the lymphatic system?

(A) Producing lymphocytes

(B) Filtering lymph from microbes

(C) Regulating body temperature

(D) Storing lymphocytes

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17 Some children are born with severe combined immunodeficiency (SCID), a rare genetic disease in which the body lacks lymphocytes and cannot fight even simple diseases. How can these children be treated?

(A) Bone marrow transplant

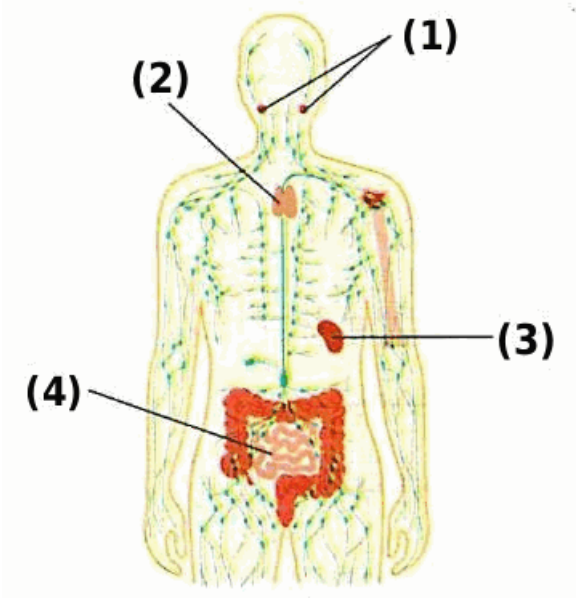
(B) Continuous use of antibiotics

(C) Injection with antibodies

(D) Vaccination against all diseases

---

18 The opposite figure shows the lymphatic system in humans. Which of the following lymphatic organs have a direct role in killing the harmful bacteria that enter the body when a contaminated meal is eaten?



(A) (1) only (B) (2) only (C) (1) , (4) (D) (2) , (3) , (4)

19 Which of the following statements is correct about the thymus gland?

(A) It is an exocrine (duct) gland
(B) It is a mixed gland
(C) It belongs to the lymphatic system and the endocrine system
(D) It secretes a hormone that affects the bone marrow

20 Which lymphatic organ is called the graveyard of red blood cells?

(A) The spleen (B) The bone marrow
(C) The thymus gland (D) The tonsils

21 Which of the following cells have receptors for the hormone thymosin on their plasma membranes?

(A) Thymus gland cells (B) Helper T cells
(C) Mature B cells (D) Lymphatic stem cells

22 Which of the following does NOT apply to lymphocytes?

(A) They originate in the red bone marrow

(B) All of them mature in the thymus gland

(C) Some of them suppress the immune response

(D) They become active in the presence of the microbe

23 Which of the following cells activate both B cells and T cells?

(A) Activated B cells (B) Cytotoxic T cells

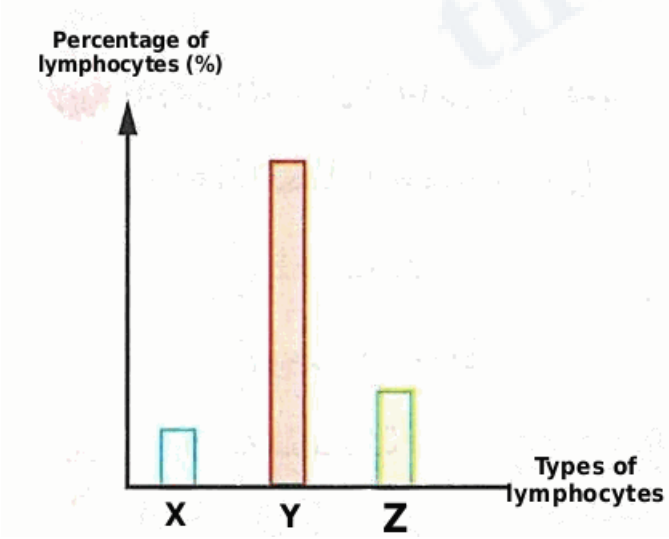
(C) Natural killer cells (D) Helper T cells

24 Why are T lymphocytes given this name?

(A) They are produced in the bone marrow (B) They mature in the thymus gland

(C) They are stored in the lymph nodes (D) They flow in the lymph

25 The opposite graph shows the percentages of the types of lymphocytes in a blood sample. Which of them produce antibodies?



(A) (X) only (B) (Z) only (C) (X) , (Y) (D) (Y) , (Z)

26 Which of the following immune cells has a multilobed nucleus?

(A) Lymphocytes (B) Monocytes (C) Eosinophils (D) Neutrophils

27 Which of the following lymphocytes has no immune role against microbes?

(A) (B) cells (B) (TH) cells (C) (TC) cells (D) (TS) cells

28 Which of the following cells are granular?

(A) Monocytes (B) T cells (C) B cells (D) Mast cells

29 Which of the following cells are non-granular and non-specific?

(A) T cells (B) B cells
(C) Natural killer cells (D) Mast cells

30 Which of the following white blood cells can change into another type of immune cell?

(A) Lymphocytes (B) Monocytes (C) Eosinophils (D) Neutrophils

31 Which of the following is NOT affected by cytotoxic T cells?

(A) A transplanted liver lobe (B) Cancer cells
(C) Toxins secreted by bacteria (D) Cells infected with the influenza virus

32 Which of the following lymphocytes become active when toxins enter the body?

(A) B cells (B) Natural killer cells
(C) Cytotoxic T cells (D) Mast cells

33 Which of the following cells secrete the enzymes that break down hemoglobin (the protein of red blood cells)?

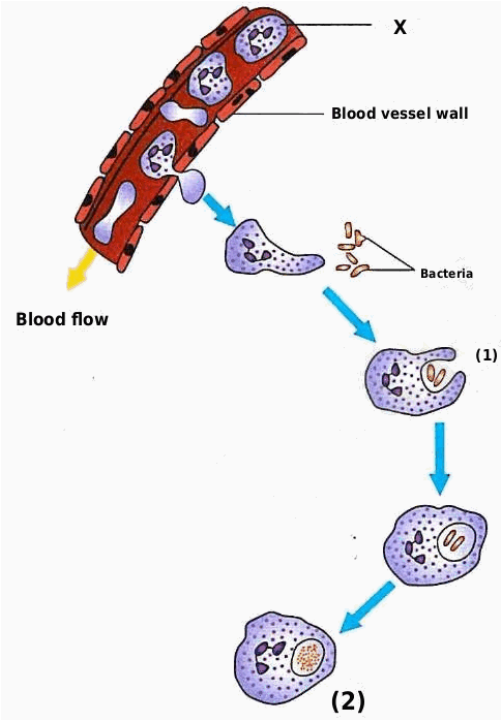
(A) B cells (B) Natural killer cells
(C) Macrophages (D) Suppressor T cells

34 If the number of lymphocytes in a drop of blood is 8000 cells / mm^3, what is the average number of the cells responsible for producing antibodies?

(A) 400 (B) 1000 (C) 1200 (D) 6400

35 Study the opposite figure, then answer:

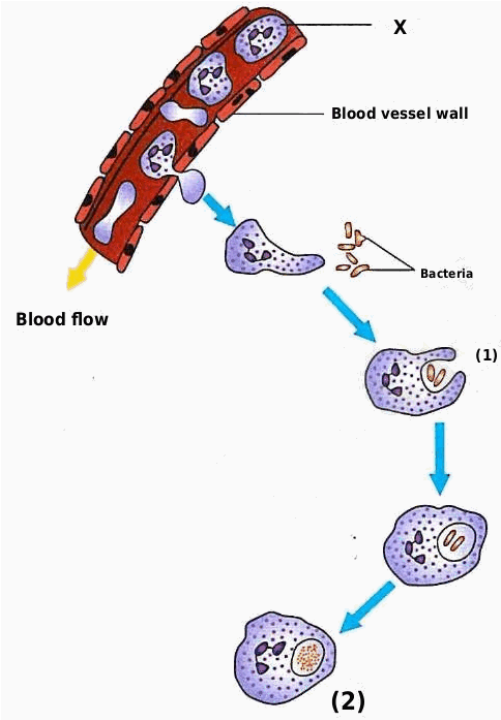
What does cell (X) represent?



(A) Macrophage (B) Monocyte (C) Neutrophil (D) Eosinophil

36 Study the opposite figure, then answer:

What are processes (1), (2) called, respectively?



(A) Digestion / endocytosis
(B) Nutrition / digestion
(C) Exocytosis / engulfing
(D) Engulfing / digestion

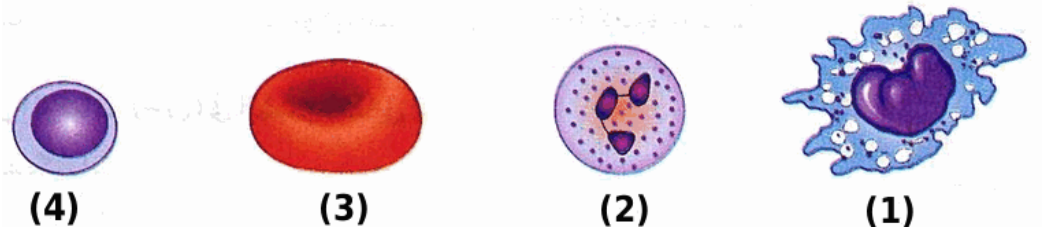
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37 Which of the following is NOT a phagocytic cell?

(A) Macrophages (B) Mast cells (C) Basophils (D) Eosinophils

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38 The following figures show some types of blood cells. Which of the following choices represents cells (1) to (4), respectively?



(A) Phagocytic cell / red blood cell / macrophage / lymphocyte
(B) Macrophage / phagocytic cell / red blood cell / lymphocyte
(C) Lymphocyte / phagocytic cell / red blood cell / macrophage
(D) Macrophage / phagocytic cell / lymphocyte / red blood cell

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39 Which of the following pairs have opposite effects to each other?

(A) T cells and B cells
(B) Plasma cells and memory cells
(C) Helper T cells and suppressor T cells
(D) Natural killer cells and macrophages

40 If the average number of B cells in a person's drop of blood is about 400 cells, what is the average number of T cells in the same drop of blood?

(A) 1000 (B) 1500 (C) 2000 (D) 2500

41 Neutrophils are classified as .....

(A) granular and specific
(B) granular and non-specific
(C) non-granular and specific
(D) non-granular and non-specific

42 Red blood cells were transferred from a vertebrate to another vertebrate of the same species after making sure their blood was compatible. If the number of lymphocytes in the spleen of the receiving animal before the injection was about 5 thousand cells, what will the number of lymphocytes be one week after the injection?

(A) Zero (B) 5 thousand (C) 10 thousand (D) 20 thousand

43 Which of the following is correct about lymphocytes?

(A) All of them are granular cells
(B) All of them mature in the same lymphatic organ
(C) All of them are formed in the same lymphatic organ
(D) All of them mature under a hormonal effect

44 What immune role do complement proteins play?

(A) Engulfing the pathogen
(B) Attracting phagocytic cells
(C) Linking the different cells of the immune system
(D) Making it easier to engulf the pathogen

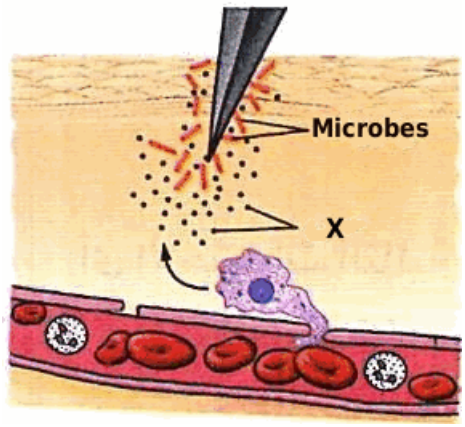
45 Which cells must be present for complement proteins to do their work?

(A) TC (B) TS (C) NK (D) Plasma B cells

46 Detoxification enzymes in plants correspond in humans to .....

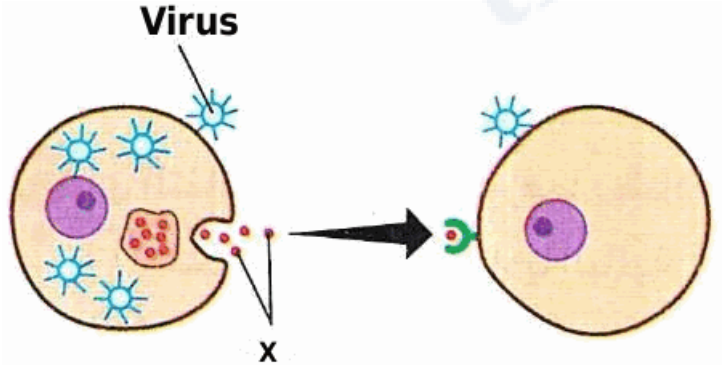
(A) complement proteins
(B) chemokines
(C) interferons
(D) interleukins

47 What do compounds (X) in the opposite figure represent?



(A) Lymphokines
(B) Cytokines
(C) Complement proteins
(D) Chemokines

48 From the opposite figure, which of the following describes compounds (X)?



(A) Chemokines that attract phagocytic cells
(B) Interleukins that bind to healthy living cells
(C) Interferons that prevent viruses from multiplying
(D) Complement proteins that break down the virus envelope

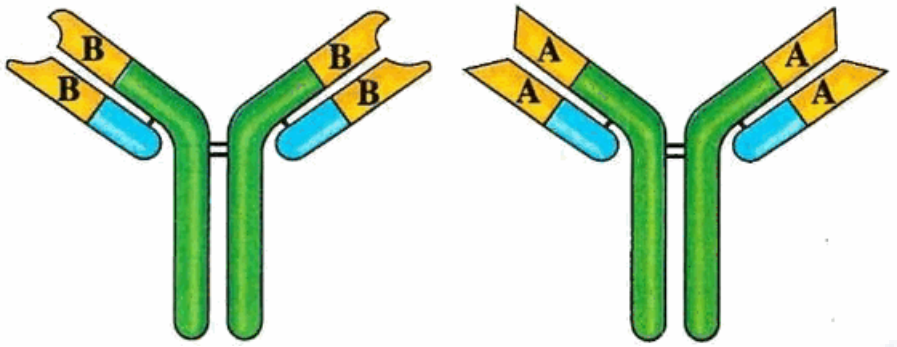
49 Which of the following is a property of interferon?

(A) A protective substance
(B) A specific protein
(C) A toxic substance
(D) A digestive protein

50 Which chemical substances may be used to inhibit the activity of the hepatitis (C) virus in liver tissues?

(A) Chemokines
(B) Interleukins
(C) The complement series
(D) Interferons

51 The two opposite figures show the structure of an antibody. In what are the building units of part (A) and part (B) similar?



(A) Their sequence
(B) Their types
(C) Their 3D shape
(D) The type of chemical bonds in them

52 From the following table, which choice describes the antigen and the antibody correctly?

(A) Antigen: made of amino acids / Antibody: made of fatty acids
(B) Antigen: varied in shape and structure / Antibody: identical in shape and structure
(C) Antigen: a substance foreign to the body / Antibody: an immune response in the body
(D) Antigen: found outside cells / Antibody: found inside cells

53 Which of the following statements is NOT correct about the antibody (IgG)?

(A) The variable region of the heavy chain is partly responsible for binding to the antigen
(B) The variable region of the light chain is partly responsible for binding to the antigen
(C) The hinge region binds to the antigen of the pathogen
(D) It has two identical antigen-binding sites

54 If plasma (B) cells produce about 2 million antibodies of the IgG type daily, and these break down within 3 weeks, what is the maximum number of antigens these antibodies can bind to within one week?

(A) 4 million
(B) 7 million
(C) 14 million
(D) 28 million

55 Types of antibodies differ from each other in .....

(A) the place where the cells that produce them are formed

(B) the place where the cells that produce them mature

(C) the types of bonds in each of them

(D) the order of the amino acids in each of them

56 What stimulates the formation of antibodies?

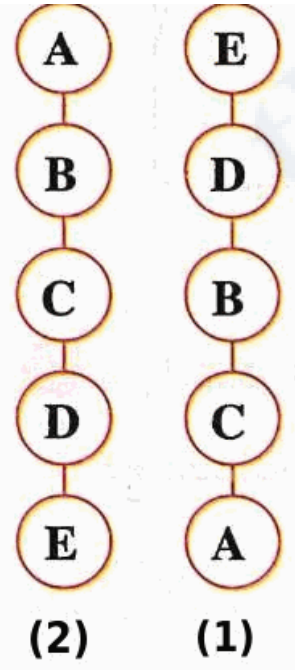
(A) The response to a particular antigen entering the blood

(B) An increase in the activity of cytotoxic T cells

(C) A decrease in the activity of B cells

(D) A lack of the thymus gland hormone

57 How does the antibody that contains chain (1) differ from the antibody that contains chain (2)?



(A) The number of amino acids

(B) The number of peptide bonds

(C) The order of the amino acids

(D) The types of amino acids

58 Which of the following is NOT a property of the antibody (IgM)?

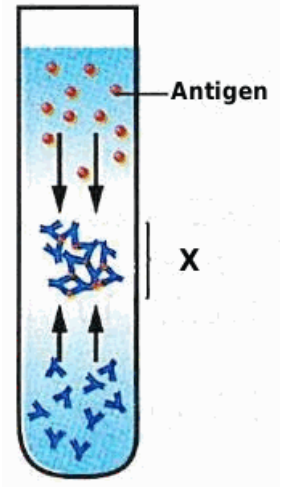
(A) It has 10 antigen-binding sites

(B) It has 10 heavy protein chains

(C) It has 5 hinge regions

(D) It contains peptide bonds

59 In the opposite figure, which of the following is an incorrect description of part (X)?



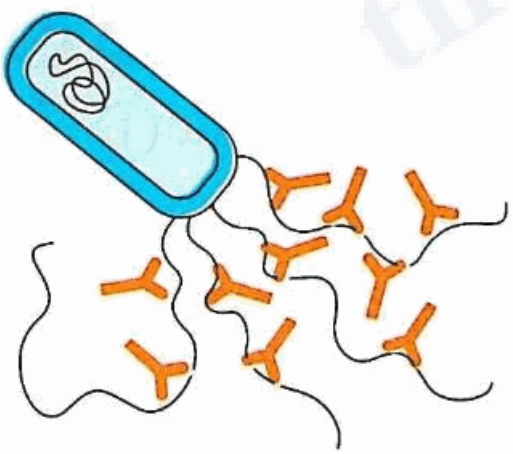
(A) It is an easy target for phagocytic cells

(B) The antigen-antibody complex is formed

(C) The antibody dissolves the antigen

(D) It prevents the antigen from harming the cell

60 What is the direct aim of the action of the antibodies in the opposite figure?



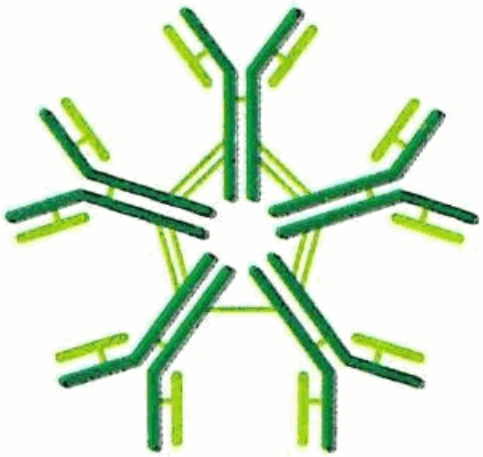
(A) Getting rid of the metabolic toxins of the microbe

(B) Restricting the microbe

(C) Carrying out phagocytosis

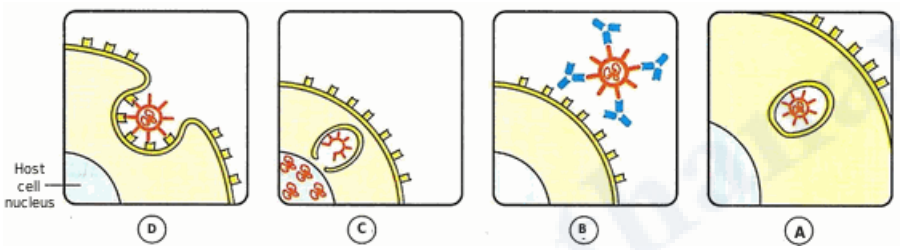
(D) Producing memory cells to fight this microbe

61 In the opposite figure, how many pairs of antigen-binding sites are there?

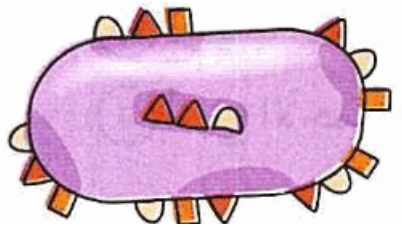


(A) 2 (B) 4 (C) 5 (D) 10

62 Which of the following figures shows the stage at which the cell secretes interferons?

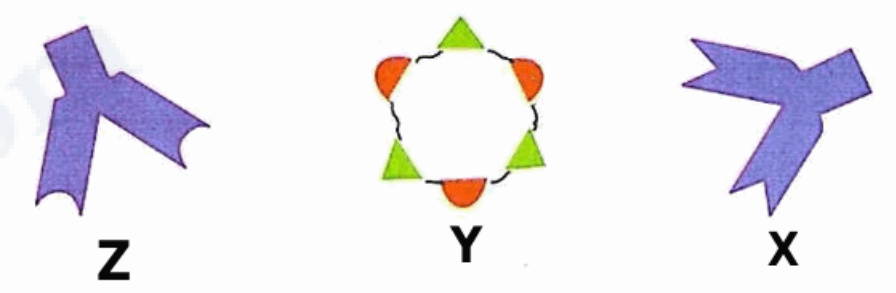


63 From the opposite figure, how many types of antibodies can bind to this bacterial cell?



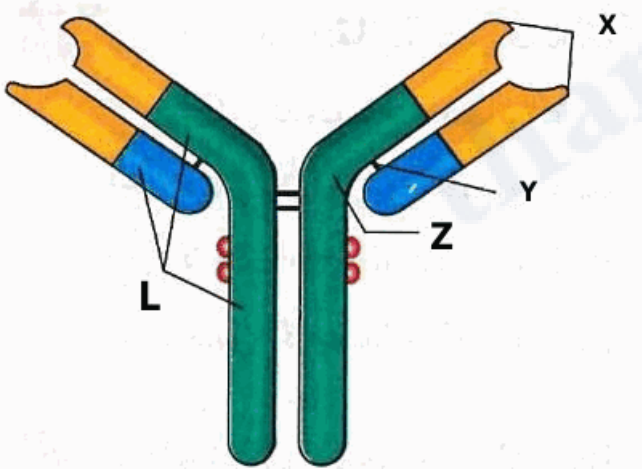
(A) 1 (B) 15 (C) 3 (D) 18

64 Using the following figures, if (X) and (Z) are both found in the blood plasma of a vertebrate, and (Y) is a pathogen of this organism, what do you expect to happen?



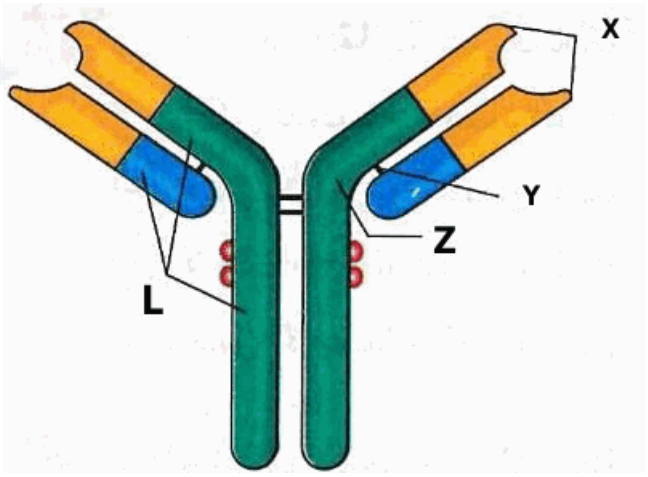
(A) Both (X) and (Y) bind to (Z)
(B) Both (Y) and (Z) bind to (X)
(C) Both (X) and (Z) bind to (Y)
(D) None of them binds to another

65 From the opposite figure, which shows the structure of an antibody:
Which of the following parts allows the distance between the two antigen-binding sites to change?



(A) X
(B) Y
(C) Z
(D) L

66 From the opposite figure, which shows the structure of an antibody:
Which of the following structures is the specificity of the antibody due to?

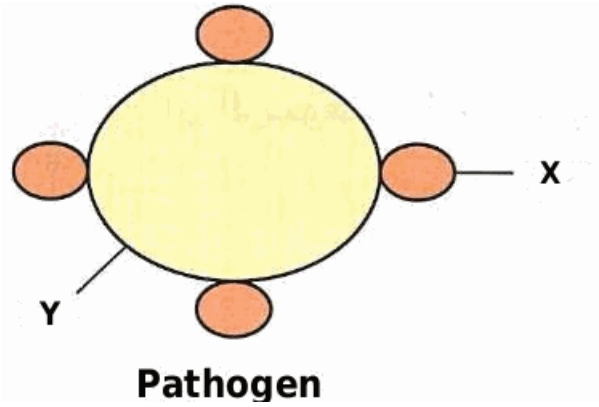


(A) X (B) Y (C) Z (D) L

67 Which of the following substances are found in blood and lymph and can recognize the antigen and bind to it?

(A) Interleukins
(B) Complement proteins
(C) Antibodies
(D) Chemokines

68 How is the body protected from the pathogen shown in the figure in front of you?



(A) Structure (X) binds to the constant region of the antibody
(B) Structure (Y) binds to the antigen-binding site of the antibody
(C) A complex forms from structure (X) and the antibody
(D) A complex forms from structure (X) and complement proteins

69 If a plasma B cell produced 2 million antibodies of the IgM type, how many light chains are needed to form them?

(A) 2 million (B) 4 million (C) 10 million (D) 20 million

70 Which of the following statements is correct?

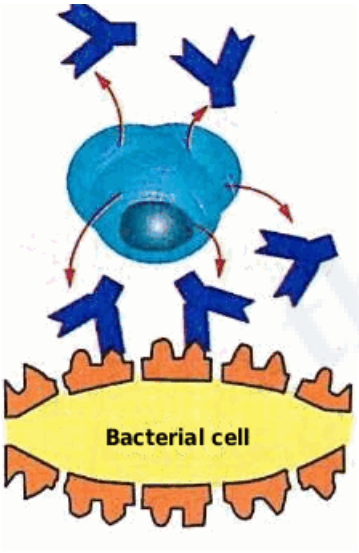
(A) B cells are found in the lymph nodes only

(B) Antibodies are active in blood plasma and in the cytoplasm of cells

(C) Antibodies neutralize the spread of viruses

(D) Interferons inhibit the enzymes that copy the viral nucleic acid in the infected cell

71 Where does the process shown in the opposite figure take place?



(A) In the blood only (B) In the lymph only

(C) In the red bone marrow and the lymph (D) In the blood and the lymph

72 To make phagocytosis easier, which of the following must be present?

(A) Antigens only

(B) Antibodies only

(C) Antigens and complement proteins only

(D) Antigens bound to antibodies that are attached to complement proteins

73 Which of the following statements is NOT correct about the properties of the antibody?

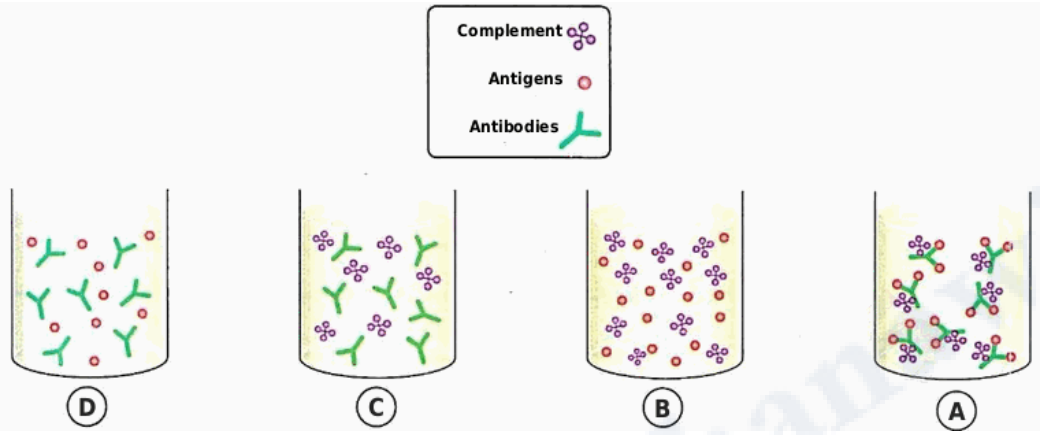
(A) One antibody can bind to more than one antigen

(B) More than one antibody can bind to one microbe

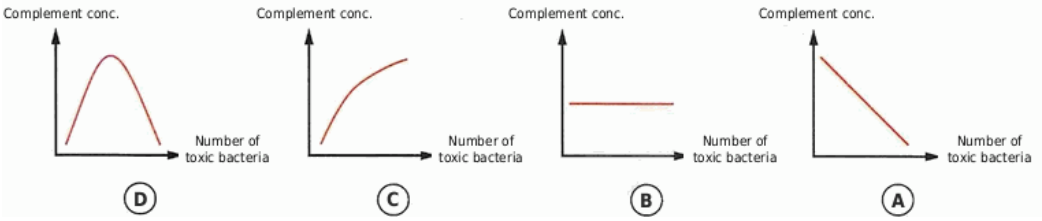
(C) Antibodies are always bivalent (two binding sites)

(D) Antibodies enhance phagocytosis

74 Which of the cases shown in the following figures represents a blood sample in which macrophages become active?



75 Which of the following graphs is correct?



76 To treat a person bitten by a poisonous snake, which of the following substances is it better to inject him with?

(A) Interferons (B) Antibodies (C) Interleukins (D) Chemokines

Essay questions — 8 questions

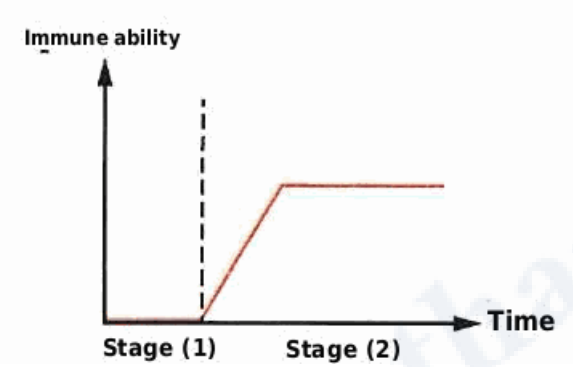
1 Study the following diagram, which shows some stages that a type of lymphocyte goes through in the human body, then state:

(1) What do cells (Y) and (L) refer to?

(2) What do stages (1) and (2) refer to?

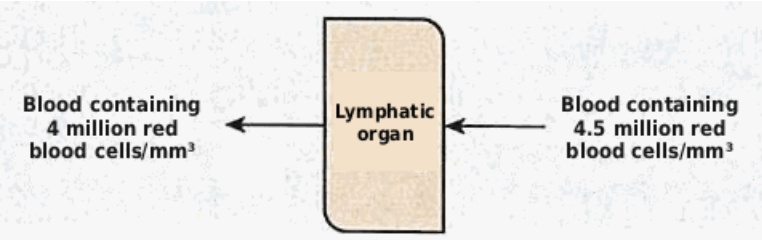


2 The opposite graph shows the development of the immune ability of one type of white blood cell, which makes up most of the lymphocytes. Where does stage (1) take place?



3 A person was exposed to radiation that destroyed the red bone marrow and the thymus gland, then he had a new bone marrow transplant. Which cells will not take part in the immune response when the person is infected with a microbe? Explain your answer.

4 From the opposite diagram, what can be concluded about the function of this organ?



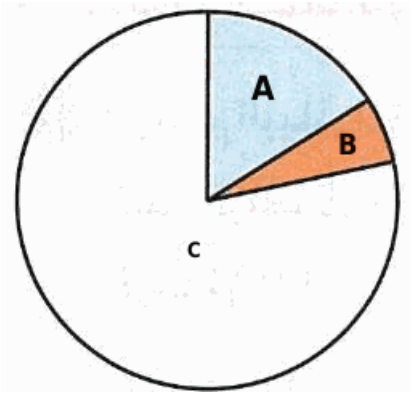
5 Study the opposite figure, which shows the percentages of the types of lymphocytes in human blood:

(1) State the symbol that refers to:

(a) Cells that are formed in the bone marrow and mature in the thymus gland.

(b) Cells that are able to produce antibodies.

(2) What immune substances do cells (B) secrete?



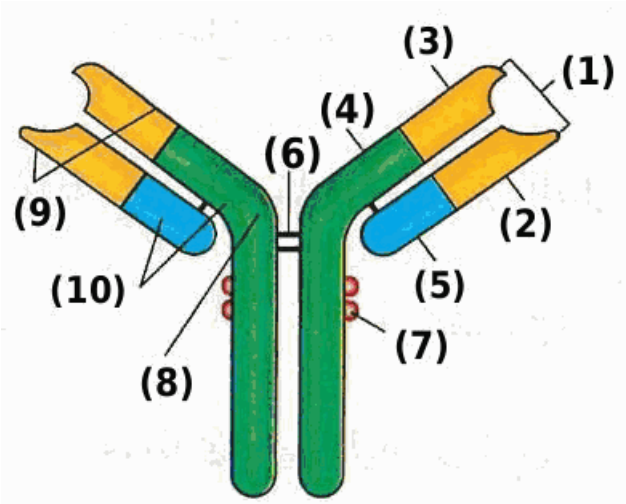
6 The opposite figure represents one of the immunoglobulins:

(1) What is the number of the variable part of the long chain?

(2) What is the number of the part that activates the lysis reactions?

(3) What is the number of the part which, if broken, splits the antibody into two halves, each the mirror image of the other?

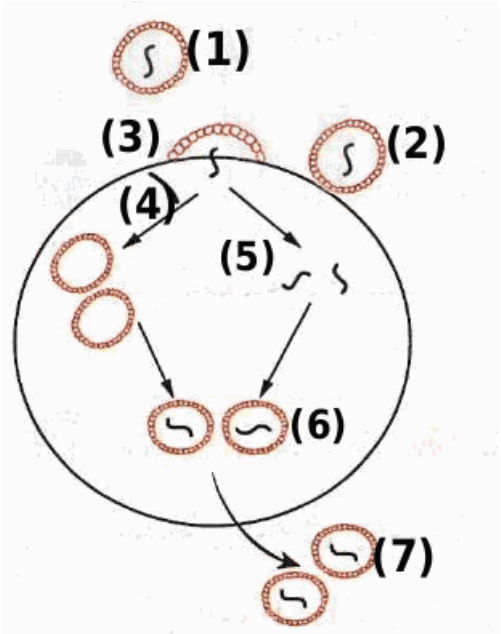
(4) What happens if the amino acid sequence in region (4) changes?



7 The opposite figure shows the stages of a virus attacking a cell and multiplying inside it:

(1) In which of these stages will the antibody have no role in protecting the cell from this virus? Explain your answer.

(2) Which of these stages will be affected by the presence of interferons? Explain your answer.

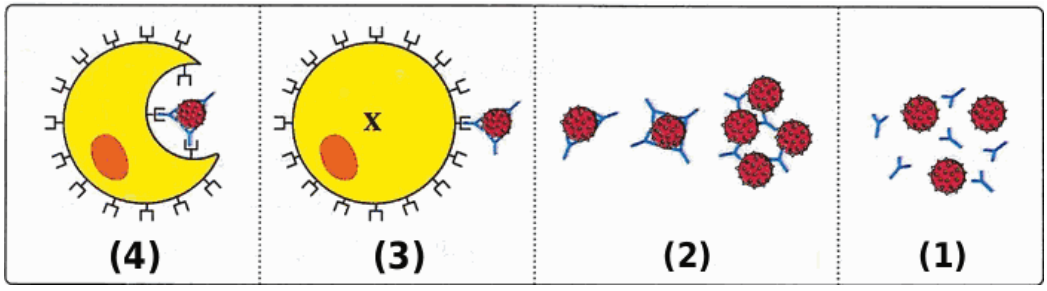


8 The following figures show one of the mechanisms of antibody action:

(1) What does this mechanism represent?

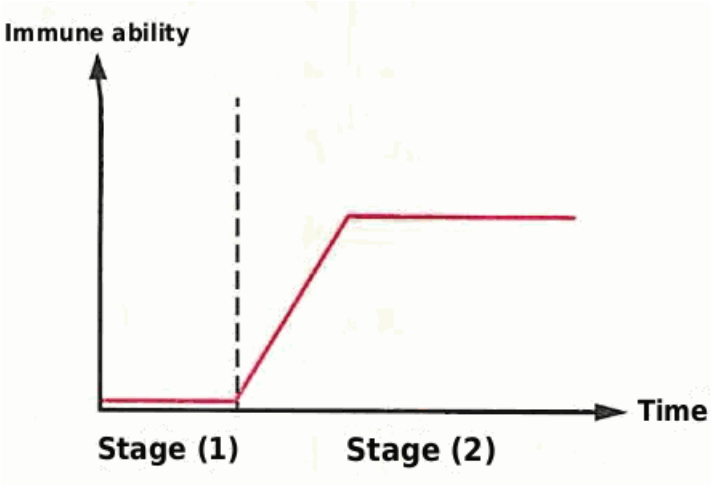
(2) In which case can this mechanism happen?

(3) What does the cell marked with the symbol (X) represent?



Past exam questions — 50 questions

1 The opposite graph shows the development of the immune ability of one type of white blood cell, which makes up most of the lymphocytes. Where does stage (2) take place? (1st session 2021)



(A) The thymus gland
(B) The lymph node
(C) The bone marrow
(D) The spleen

---

2 Study the following diagram, which shows the stages of forming one type of lymphocyte in the human body, then state:
What do symbols (X) and (Z) refer to, respectively? (2nd session 2021)



(A) The thymus gland / the bone marrow
(B) The bone marrow / the spleen
(C) The bone marrow / the thymus gland
(D) The thymus gland / the spleen

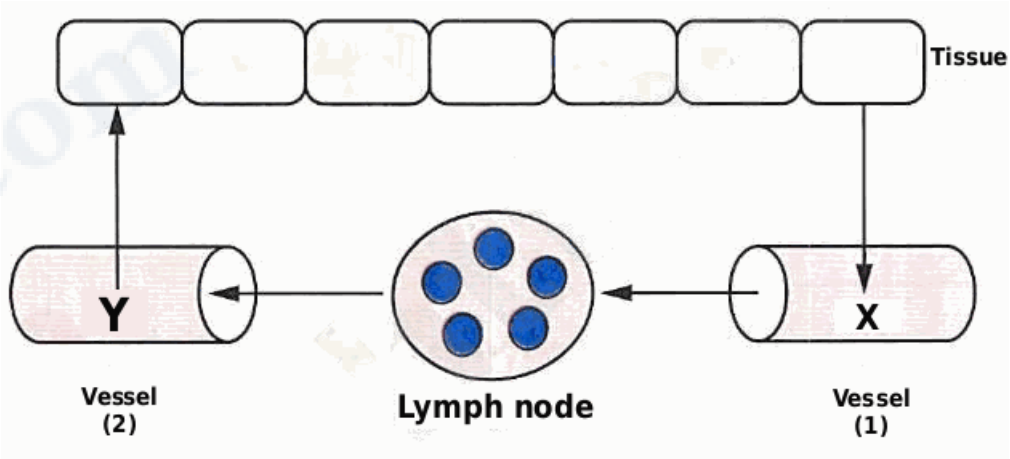
---

3 In which of the following embryonic stages does the formation of lymphocytes begin? (1st session 2022)

(A) At the moment of fertilization
(B) The second
(C) The third
(D) At the moment of birth

---

4 Study the opposite diagram, which shows the role of a lymph node in the human body. What is the relation between the components of the two fluids (X) and (Y)? (1st session 2022)



(A) The number of white blood cells in each of them is equal

(B) There are no white blood cells in (Y)

(C) The number of white blood cells in (X) is less than in (Y)

(D) There is no relation between the number of white blood cells in each of them

---

5 What is the result of removing the spleen? (Trial exam 2023, Sample exam 2025)

(A) A decrease in the number of memory cells in the blood

(B) An increase in the number of old red blood cells in the blood

(C) Inability to produce antibodies

(D) The thymus gland cannot differentiate lymphocytes

---

6 What is the similarity between the bone marrow and the thymus gland? (1st session 2023)

(A) Trapping foreign bodies

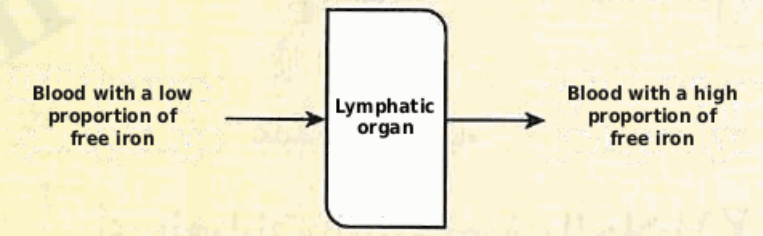
(B) Forming lymphocytes

(C) Maturation of lymphocytes

(D) Storing basophils

---

7 If you know that the protein hemoglobin is formed by amino acids binding to the element iron, study the opposite diagram, then state the function of the lymphatic organ as the diagram shows. (2nd session 2023)



(A) Destroying red blood cells
(B) Destroying white blood cells
(C) Producing new red blood cells
(D) Producing antibodies

---

8 Which of the following lymphatic organs structurally belongs to another system of the human body in addition to being a lymphatic organ? (1st session 2024)

(A) The spleen
(B) The thymus gland
(C) The lymph nodes
(D) The tonsils

---

9 Which of the following is NOT a function of the lymphatic organs? (1st session 2024)

(A) Producing immune cells
(B) Storing immune cells
(C) Maturation and differentiation of immune cells
(D) Protecting immune cells

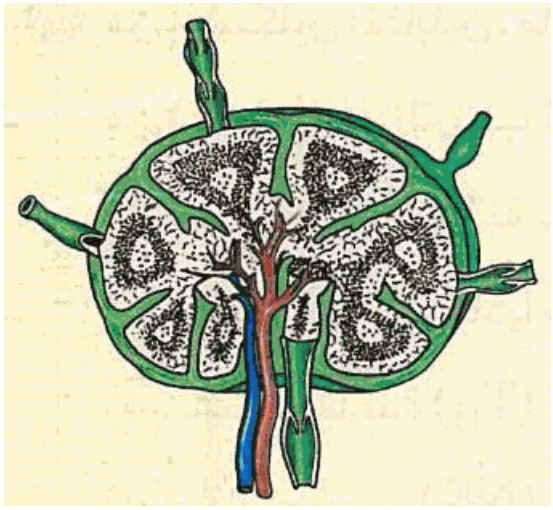
---

10 Which of the following is the most important lymphatic organ? (2nd session 2024)

(A) The bone marrow
(B) The spleen
(C) The thymus gland
(D) The tonsils

---

11 For which of the following white blood cells is the organ in front of you NOT a home? (2nd session 2024)



(A) Neutrophils
(B) B cells
(C) T cells
(D) Natural killer cells

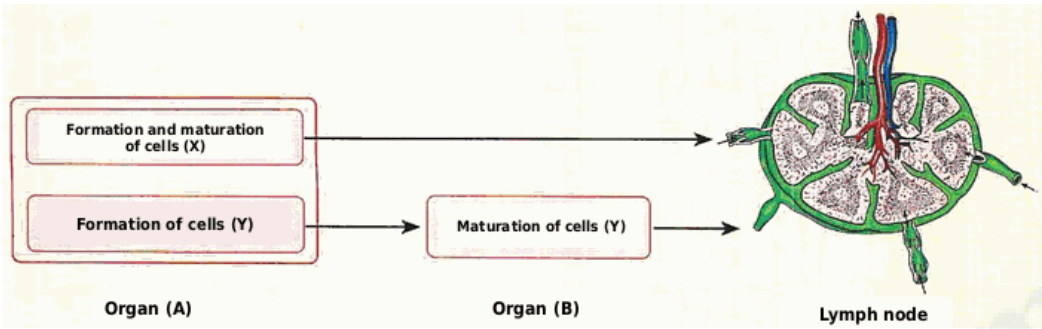
---

12 What is the similarity between the spleen and the lymph nodes? (Sample exam 2025)

(A) They take part in forming lymphocytes
(B) They take part in the maturation of lymphocytes
(C) They take part in storing lymphocytes
(D) They take part in producing different types of blood cells

---

13 From the following diagram, if (X) and (Y) are two types of lymphocytes: (2nd session 2025) Which of the following statements describes cells (Y) correctly?



(A) One type of specific cells
(B) Two types of specific cells
(C) Three types of specific cells
(D) Two types of specific cells and one type of non-specific cells

14 Which of the following bones produce immune cells in an adult? (Sample exam 2026)

(A) The phalanges (B) The tarsals (C) The carpals (D) The sternum

15 Which of the following immune organs can protect the beginning of the alimentary canal and part of its end? (Sample exam 2026)

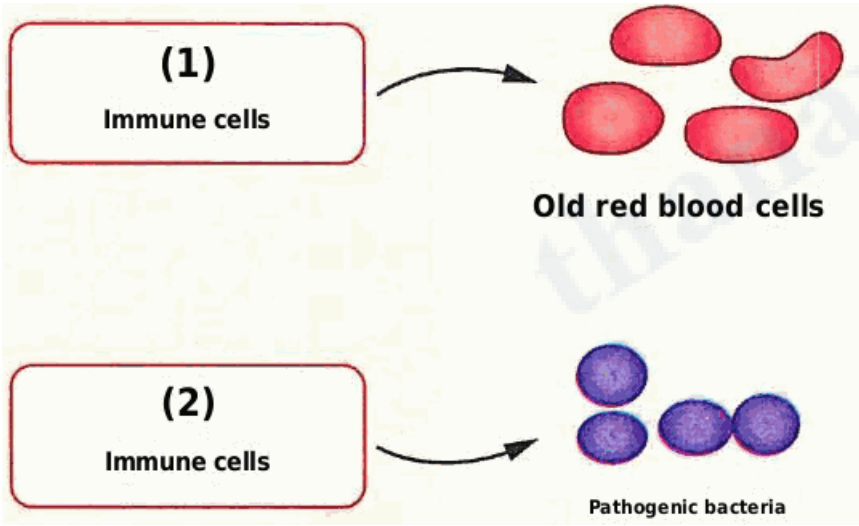
(A) The spleen and Peyer's patches

(B) The thymus gland and the salivary glands

(C) The tonsils and Peyer's patches

(D) The tonsils and the stomach

16 From the two opposite figures, what is the type of immune cells in each of (1) and (2), respectively? (Trial exam / May 2021)



(A) Monocyte / cytotoxic (Tc)

(B) Macrophage / cells with granular cytoplasm

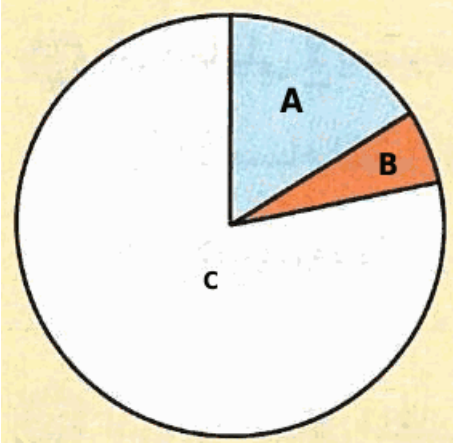
(C) Helper T (TH) / natural killer (NK)

(D) Natural killer (NK) / helper T (TH)

17 Which of the following cells does NOT increase in number in a person who has cancer? (Trial exam / June 2021)

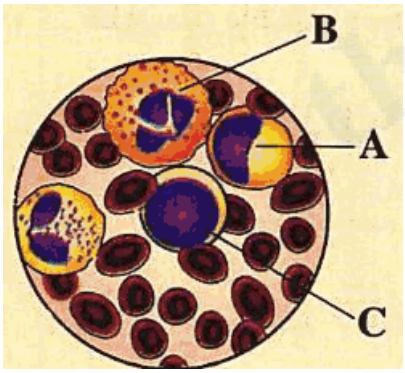
(A) Natural killer (B) Cytotoxic (C) B cells (D) Helper T

18 Study the opposite figure, which shows the percentages of the types of lymphocytes in human blood. Which symbol refers to cells whose work is linked to the presence of complement proteins? (1st session 2021)



(A) (A) and (C) (B) (B) and (C) (C) (B) (D) (A)

19 Study the opposite figure, which shows some types of immune cells, then deduce the type of the immune cell marked with the letter (C). (1st session 2023, Sample exam 2025)



(A) Monocyte (B) Lymphocyte (C) Eosinophil (D) Basophil

20 What property is shared by the immune cells that attack cancer cells? (2nd session 2023)

(A) The place where they mature

(B) The place where they are formed

(C) Having the same receptors on their surface

(D) Having granules in their cytoplasm

21 What is the reason for the failure of a liver lobe transplant in a person? (Sample exam 2025)

(A) Natural killer cells attack the transplanted cells

(B) Antibodies attack the transplanted cells

(C) Macrophages engulf the transplanted cells

(D) Basophils destroy the transplanted cells

---

22 Which immune cells are NOT formed in the bone marrow? (1st session 2025)

(A) Monocytes (B) Memory T cells

(C) B cells (D) Natural killer cells

---

23 Which of the following cells mature after leaving the red bone marrow? (Sample exam 2026)

(A) Mast cells (B) Eosinophils

(C) Natural killer cells (D) Helper T cells

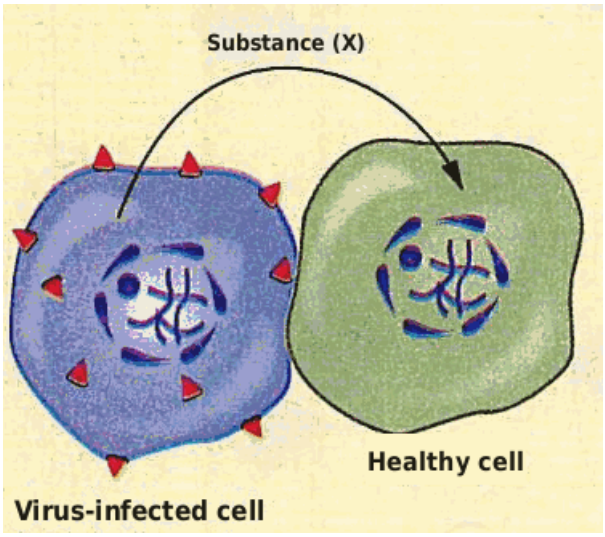
---

24 Which of the following is NOT a component of the immune system? (Sample exam 2026)

(A) Red blood cells (B) The spleen (C) White blood cells (D) The tonsils

---

25 Study the two opposite figures, then deduce what substance (X) is. (Trial exam / May 2021)



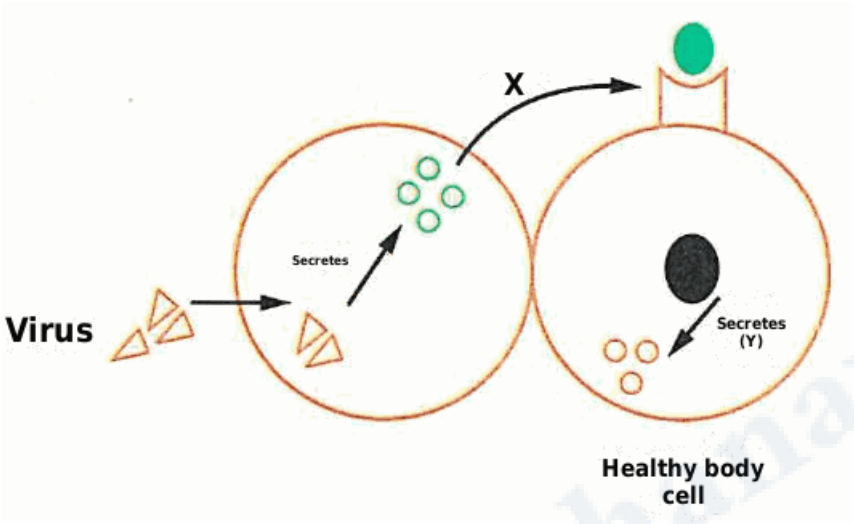
(A) Interferons (B) Chemokines (C) Interleukins (D) Histamine

---

26 Which of the following is NOT a component of the immune system in humans? (Trial exam / June 2021)

(A) Antibodies
(B) Complement proteins
(C) Interferons
(D) Antigens

27 Study the opposite figure, which shows a group of cells that secreted a group of chemical substances, then state what substances (X) and (Y) are, respectively. (2nd session 2022)

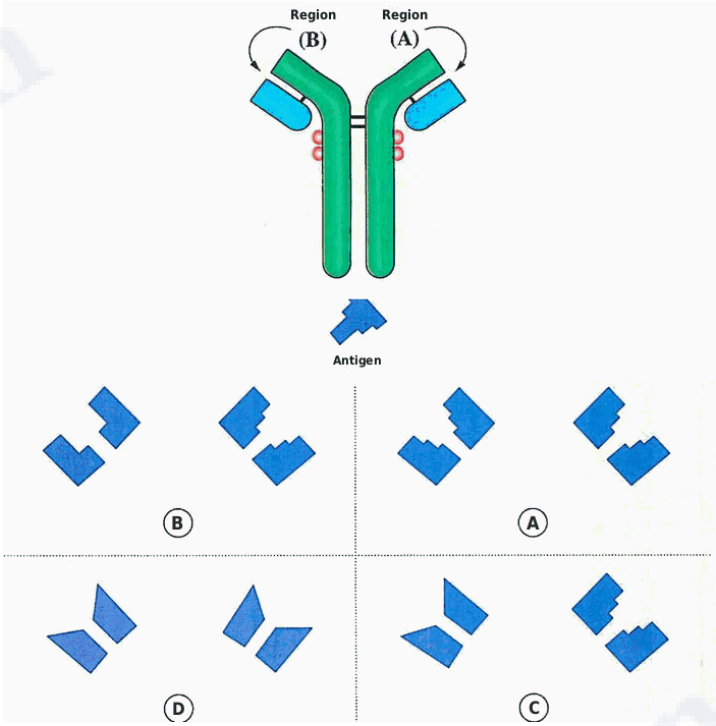


(A) Chemokines / antibodies
(B) Complement proteins / antibodies
(C) Enzymes copying the genetic material / interferons
(D) Interferons / enzymes

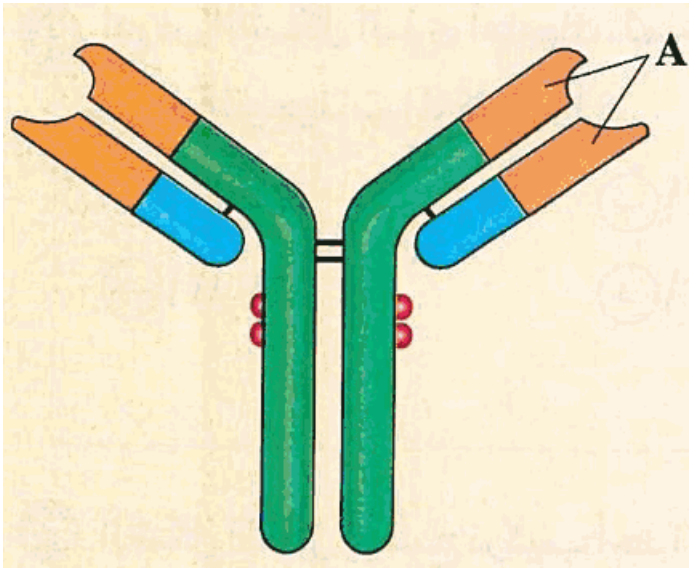
28 Complement proteins complete the work of which component of the immune system? (1st session 2025)

(A) All types of phagocytic cells
(B) The helper chemical substances
(C) B cells and T cells
(D) Antibodies

29 The figure in front of you shows the structure of one of the components of the immune system. Which figure describes regions (A) and (B)? (Trial exam / May 2021)



30 The opposite figure shows the structure of one of the components of the immune system. What is the result of replacing one amino acid with another in region (A)? (Trial exam / May 2021)



(A) It becomes unsuitable for its own antigen

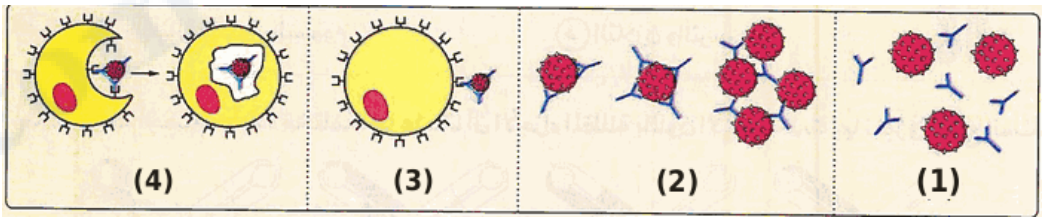
(B) It can bind to its own antigen

(C) No change happens to it

(D) A change happens in its own antigen

31 The following stages show one of the mechanisms of antibody action:

What most distinguishes this mechanism from the other mechanisms of antibody action? (Trial exam / June 2021)



(A) It needs the presence of complement proteins

(B) It happens only with one type of antibody

(C) It does not need the work of macrophages

(D) Whether it happens depends on the nature of the antigen

---

32 What immune role do cells infected with viruses whose genetic content is RNA play inside the human body? (Trial exam / June 2021)

(A) Secreting enzymes that kill pathogens inside the cells

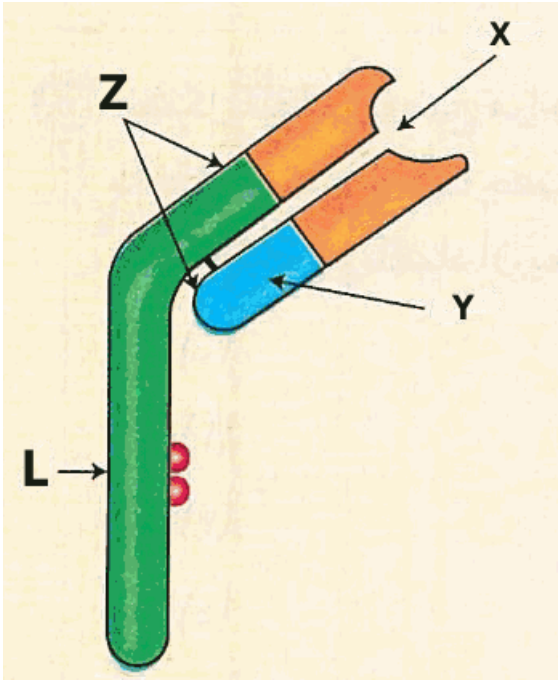
(B) Producing chemical substances that are toxic to the pathogen

(C) Stimulating plasma B cells to form antibodies

(D) Secreting protein substances that stimulate the neighbouring healthy cells

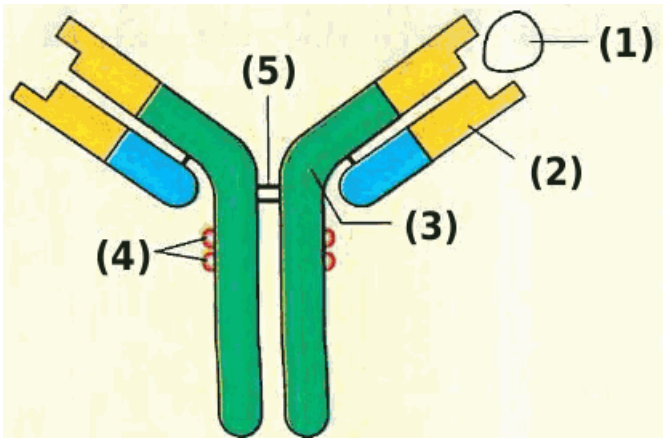
---

33 Look at the opposite figure, which shows the structure of one half of an antibody in human blood. Identify structures (X), (Y), (Z), (L), then state the symbol of the structural part that distinguishes this type of antibody from the other globulins. (1st session 2021)



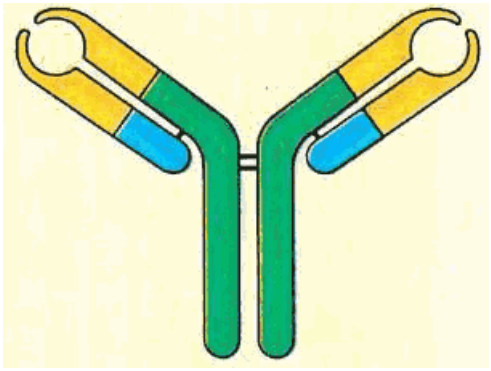
(A) (X) (B) (Y) (C) (Z) (D) (L)

34 Study the figure in front of you, then state which sites help break down the antigens of compound (1). (2nd session 2021)



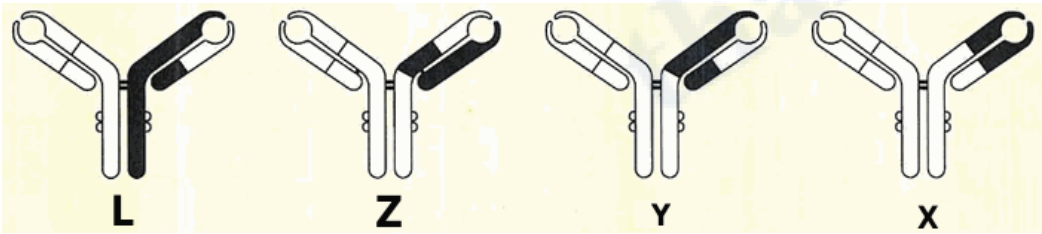
(A) (4) only (B) (2) only (C) (2) , (3) (D) (3) , (5)

35 The opposite figure shows the structure of an antibody. Deduce which mechanisms cannot be completed using this antibody. (2nd session 2021)



(A) Agglutination and neutralization
(B) Neutralization and precipitation
(C) Lysis and neutralizing toxins
(D) Agglutination and precipitation

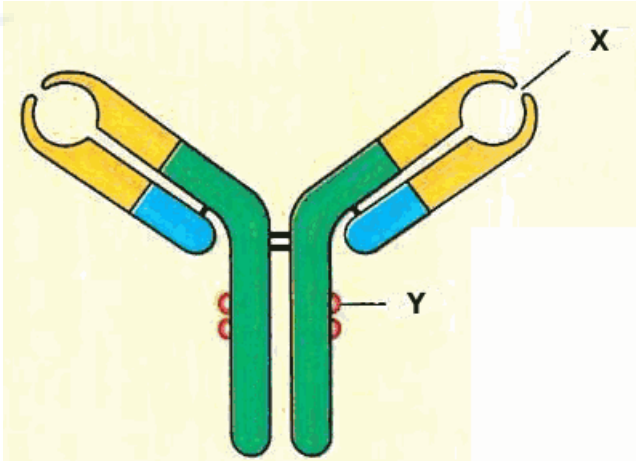
36 In front of you are four different antibodies. If you know that the parts shaded in black had a change in the sequence of the chain:
Which of the following represents the antibody that does its work efficiently? (1st session 2022)



(A) (X)
(B) (Y)
(C) (Z)
(D) (L)

37 Look at the opposite figure, which shows the structure of one type of antibody in human blood. Identify it, then deduce:

(1) What type of chains is site (X) made of? (2nd session 2022)

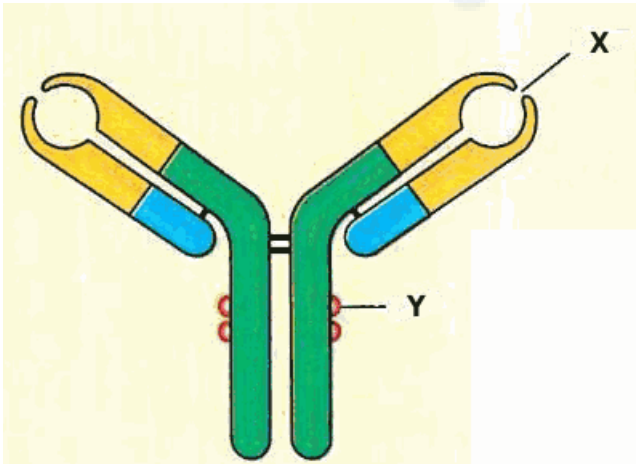


(A) The long constant
(B) The short and the long constant
(C) The short and the long variable
(D) The long variable

---

38 Look at the opposite figure, which shows the structure of one type of antibody in human blood. Identify it, then deduce:

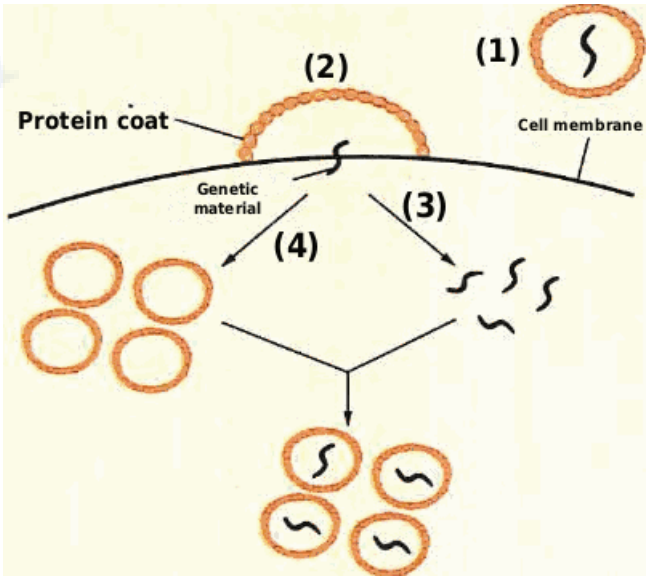
(2) What is the chemical structure of the substance that (Y) is made of? (Trial exam 2023)



(A) Sulfur
(B) Sugars
(C) Proteins
(D) Steroids

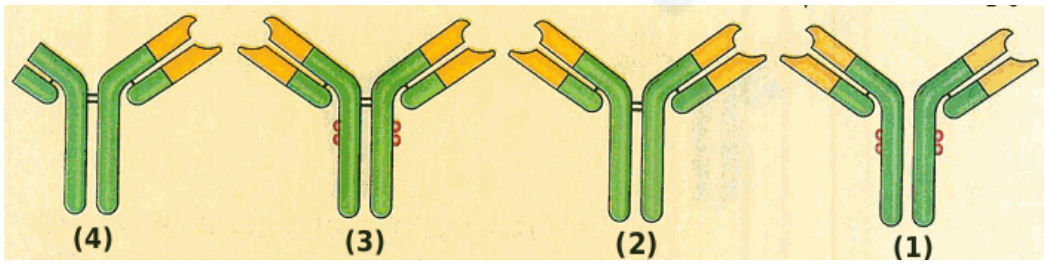
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39 The opposite figure shows the stages of a virus multiplying inside a human body cell. In which stage can the antibody work? (2nd session 2022)



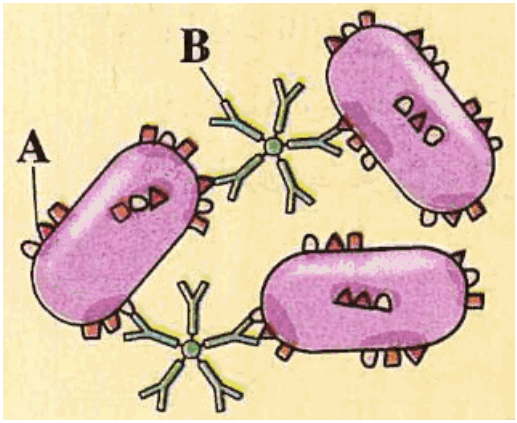
Ⓐ (1) Ⓑ (2) Ⓒ (3) Ⓓ (4)

40 Study the following figures, then state:
Which of the antibodies above helps destroy the toxins resulting from infection with a type of bacteria? (2nd session 2022)



Ⓐ (1) Ⓑ (2) Ⓒ (3) Ⓓ (4)

41 Study the opposite figure, then deduce which structure is NOT represented by the letter (A). (1st session 2023, Sample exam 2025)



(A) The antigen-binding site
(B) The antigen
(C) The antibody-binding site
(D) A protein on the surface of the pathogen

42 Which of the following immune cells will work with complement proteins to break down microbes and engulf them? (1st session 2024)

(A) Plasma B cells only
(B) Macrophages only
(C) Plasma B cells and macrophages
(D) Plasma B cells, cytotoxic T cells and macrophages

43 Antibodies have the same chemical structure as the receptors of ..... cells. (Sample exam 2025)

(A) plasma (B) B (C) helper T (D) T and B

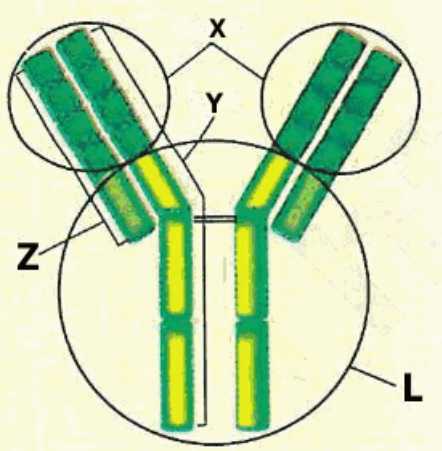
44 In which of the following ways of antibody action do complement proteins take part? (1st session 2025)

(A) Neutralization and lysis
(B) Lysis and neutralizing toxins
(C) Neutralization and precipitation
(D) Precipitation and agglutination

45 Which of the following is NOT a component of the antibody? (2nd session 2025)

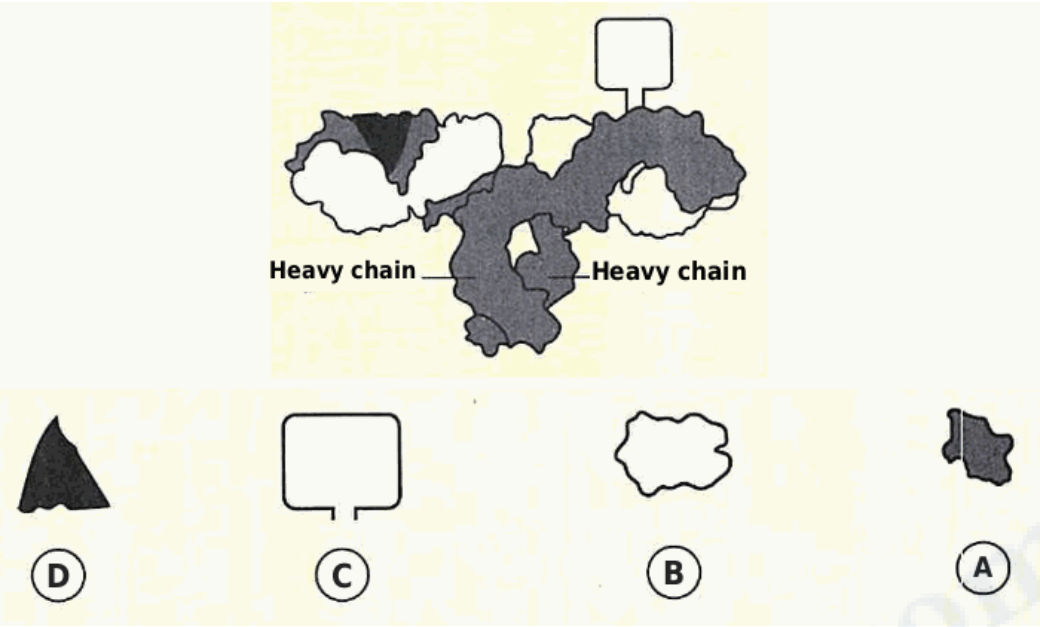
(A) The complement-binding site
(B) The antigen
(C) The antigen recognition site
(D) The hinge regions

46 The opposite figure represents an antibody. Which of the following is constant in structure and shape in all antibodies? (Sample exam 2026)



(A) (X)
(B) (Y)
(C) (Z)
(D) (L)

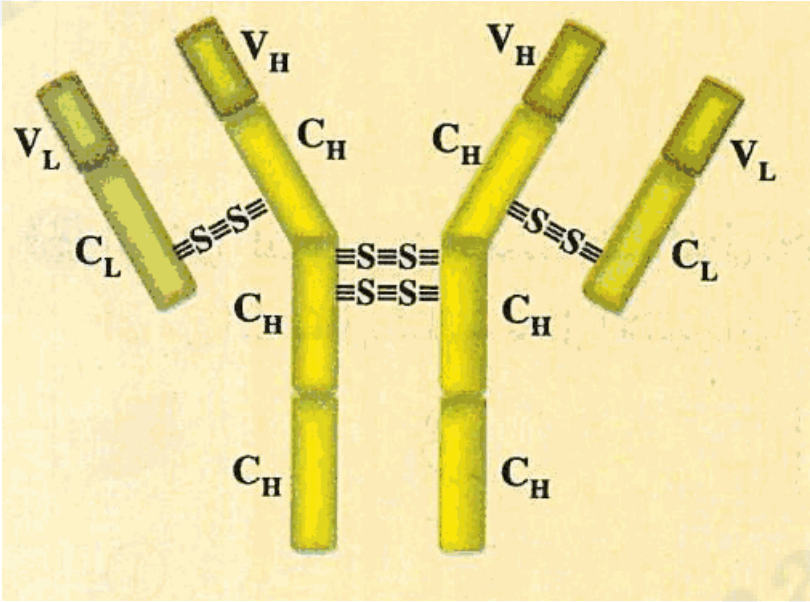
47 The opposite figure represents a 3D antibody. Which of the following figures represents the antigen? (Sample exam 2026)



48 Study the opposite figure, then deduce: (Trial exam 2023)

(1) What chemical bonds are found in region (VH)?

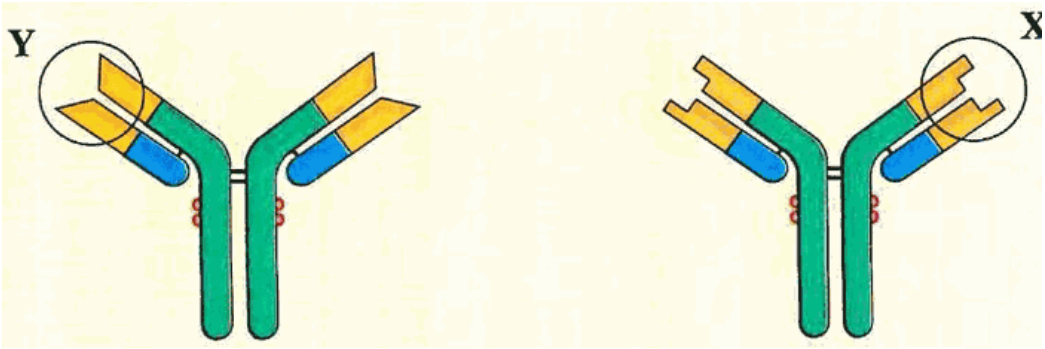
(2) What type of building units take part in forming the disulfide bonds between the two heavy chains of the molecule?



49 Study the following figure, which shows two different types of antibodies, then answer: (1st session 2024)

(1) What is the chemical difference between region (X) and region (Y)?

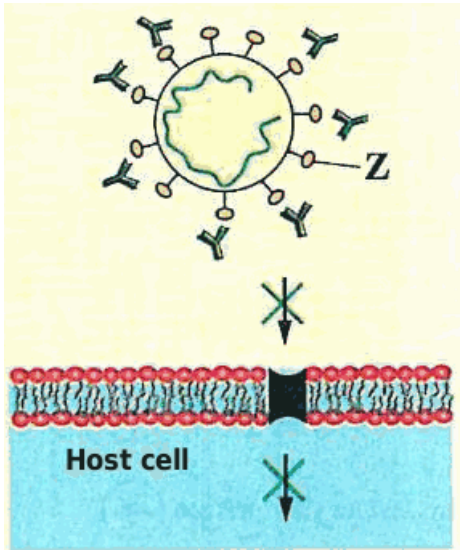
(2) How many types of plasma B cells produced these antibodies?



50 Study the opposite figure, which shows one of the mechanisms of antibody action, then deduce: (2nd session 2024)

(1) What type of pathogen can be eliminated using this mechanism?

(2) What does the symbol (Z) refer to?



Answer key and solutions

Multiple choice questions

1 B	2 D	3 D	4 B	5 B	6 D	7 B	8 A	9 A	10 B
11 D	12 B	13 D	14 C	15 C	16 C	17 A	18 C	19 C	20 A
21 D	22 B	23 D	24 B	25 B	26 D	27 D	28 D	29 C	30 B
31 C	32 A	33 C	34 B	35 C	36 D	37 B	38 B	39 C	40 D
41 B	42 B	43 C	44 D	45 D	46 A	47 D	48 C	49 A	50 D
51 D	52 C	53 C	54 D	55 D	56 A	57 C	58 C	59 C	60 B
61 C	62 C	63 C	64 C	65 C	66 A	67 C	68 C	69 D	70 C
71 D	72 D	73 C	74 A	75 C	76 B				

1 **Answer (B)**

The spleen destroys red blood cells, so their number decreases when it is overactive.

2 **Answer (D)**

The organs of the lymphatic system and of the endocrine system are not anatomically connected to each other.

3 **Answer (D)**

The bone marrow produces lymphocytes but does not store them.

4 **Answer (B)**

Lymphocytes acquire their ability in the bone marrow (B cells) and in the thymus gland (T cells).

5 **Answer (B)**

Lymphocytes are produced in the bone marrow, and the spleen is a secondary organ.

6 **Answer (D)**

The thymus gland also belongs to the endocrine system.

7 **Answer (B)**

The bone marrow then takes over forming blood cells.

8 **Answer (A)**

The vein carries the cells leaving the marrow, while the artery only carries blood to the organ.

9 **Answer (A)**

The spleen breaks down old red blood cells into their basic components.

10 **Answer (B)**

The lymph nodes contain most types of immune cells.

11 **Answer (D)**

Lymph enters the node through an afferent vessel and leaves it through an efferent vessel.

12 **Answer (B)**

(X) is oxygen entering the cells, (Y) is impure lymph around them, and (Z) is nitrogenous wastes leaving them.

13 **Answer (D)**

The tonsils are secondary organs, not primary ones.

14 **Answer (C)**

The tonsils belong to the lymphatic system and protect the digestive system.

15 **Answer (C)**

The size of the node increases during infection and then levels off.

16 **Answer (C)**

Regulating temperature is not a function of the lymphatic system.

17 **Answer (A)**

A bone marrow transplant supplies the body with lymphocytes.

18 **Answer (C)**

The tonsils and Peyer's patches kill the bacteria that enter with food.

19 **Answer (C)**

The thymus gland secretes a hormone into the blood, and it also belongs to the lymphatic system.

20 **Answer (A)**

The spleen engulfs old red blood cells and breaks them down.

21 **Answer (D)**

Thymosin activates lymphatic stem cells to mature and change into T cells.

22 **Answer (B)**

Only T cells mature in the thymus gland.

23 **Answer (D)**

Helper T cells activate both B cells and T cells.

24 **Answer (B)**

T cells mature in the thymus gland (Thymus).

25 **Answer (B)**

T cells are the most numerous, then B cells (Z), and B cells are the ones that produce antibodies.

26 **Answer (D)**

Neutrophils have a multilobed nucleus.

27 **Answer (D)**

Suppressor T cells suppress the immune response and do not attack microbes.

28 **Answer (D)**

Mast cells contain granules.

29 **Answer (C)**

Natural killer cells are not granular and attack any infected cell without specificity.

30 **Answer (B)**

Monocytes change into macrophages.

31 **Answer (C)**

Toxins are not cells, so cytotoxic T cells do not kill them.

32 **Answer (A)**

B cells produce the antibodies that bind to toxins.

33 **Answer (C)**

Macrophages break down the hemoglobin of old red blood cells.

34 **Answer (B)**

35 **Answer (C)**

Cell (X) has a lobed nucleus and leaves the blood vessel, so it is a neutrophil.

36 **Answer (D)**

(1) is engulfing the bacteria, and (2) is digesting them inside the cell.

37 **Answer (B)**

Mast cells secrete histamine and do not engulf microbes.

38 **Answer (B)**

(1) is a macrophage, (2) is a granular phagocytic cell, (3) is a red blood cell, and (4) is a lymphocyte.

39 **Answer (C)**

Helper T cells activate the immune response and suppressor T cells stop it.

40 **Answer (D)**

41 **Answer (B)**

Neutrophils are granular and are not specific to a particular microbe.

42 **Answer (B)**

Compatible red blood cells do not change the number of lymphocytes.

43 **Answer (C)**

All lymphocytes are formed in the bone marrow.

44 **Answer (D)**

Complement proteins bind to the microbe and make it easier to engulf.

45 **Answer (D)**

Complement proteins are activated by the antibodies produced by plasma cells.

46 **Answer (A)**

Complement proteins neutralize toxins, like detoxification enzymes in plants.

47 **Answer (D)**

Chemokines attract phagocytic cells to the place where the microbe entered.

48 **Answer (C)**

The infected cell secretes interferons to protect the neighbouring cells from the virus multiplying.

49 **Answer (A)**

Interferon is a non-specific protective protein.

50 **Answer (D)**

Interferons prevent viruses from multiplying in neighbouring cells.

51 **Answer (D)**

Both parts are built from amino acids linked by peptide bonds.

52 **Answer (C)**

An antigen is a substance foreign to the body, and the antibody is the immune response to it.

53 **Answer (C)**

The hinge region does not bind to the antigen.

54 **Answer (D)**

2 million × 7 days = 14 million antibodies, and each antibody has two sites: 14 × 2 = 28 million.

55 **Answer (D)**

The different order of the amino acids gives each antibody its own shape.

56 **Answer (A)**

A particular antigen entering the blood is what stimulates the formation of antibodies against it.

57 **Answer (C)**

The two chains are made of the same amino acids in a different order.

58 **Answer (C)**

The IgM antibody has no hinge regions.

59 **Answer (C)**

The antibody binds to the antigen and does not dissolve it.

60 **Answer (B)**

The antibodies bind to the flagella of the microbe and restrict its movement.

61 **Answer (C)**

The IgM antibody is made of five units, so it has 5 pairs of binding sites.

62 **Answer (C)**

(C) shows the infected cell after the virus has multiplied inside it, and at this stage it secretes interferons.

63 **Answer (C)**

There are 3 types of antigens on the cell surface, and each type has its own antibody.

64 **Answer (C)**

(X) and (Z) are antibodies that bind to the antigens on the surface of the pathogen (Y).

65 **Answer (C)**

The hinge region (Z) allows the distance between the two binding sites to change.

66 **Answer (A)**

The variable region (X) is what gives the antibody its specificity.

67 **Answer (C)**

Antibodies recognize the antigen and bind to it.

68 **Answer (C)**

The antigen (X) binds to the antibody and a complex is formed.

69 **Answer (D)**

IgM has 10 light chains, so the number is $2 \times 10 = 20$ million.

70 **Answer (C)**

Antibodies bind to viruses and neutralize their spread.

71 **Answer (D)**

Antibodies spread in the blood and the lymph.

72 **Answer (D)**

Phagocytosis is made easier by antibodies bound to the antigen and attached to complement proteins.

73 **Answer (C)**

IgM has 10 binding sites, so not all antibodies are bivalent.

74 **Answer (A)**

Macrophages become active when the antigen, the antibody and complement proteins are present together.

75 **Answer (C)**

An increase in toxic bacteria activates complement proteins, so their concentration increases.

76 **Answer (B)**

Antibodies bind to the venom and neutralize its effect.

Essay questions

1 **Model answer**

(1) (Y): lymphatic stem cells, (L): mature T cells.

(2) (1) the stage of producing lymphatic stem cells, (2) the stage of maturation and differentiation of T cells.

2 **Model answer**

In the red bone marrow.

3 **Model answer**

T cells, because the lymphatic stem (immature) cells mature into T cells and differentiate into their different types in the thymus gland, while B cells and natural killer (NK) cells mature in the bone marrow, which was newly transplanted.

Because the thymus gland was destroyed, T cells do not take part in the immune response when the body is infected with the microbe.

4 **Model answer**

We conclude that this organ (the spleen) breaks down old red blood cells into their basic components so that the body gets rid of them, and so the number of red blood cells decreases.

5 **Model answer**

(1) (a): C, (b): A

(2) The protein perforin (the pore maker).

6 **Model answer**

(1) (3).

(2) (7).

(3) (6).

(4) The structure of the antibody changes, but it can still recognize its own type of antigen, because this change did not include the variable region, which is its antigen-binding site.

7 **Model answer**

(1) In stages (3), (4), (5), (6), because the genetic material of the virus has passed into the cell and started to multiply and form new viruses inside the cell. During these stages it is hard for the antibody to pass through the plasma membrane of the cell because it is relatively large.

(2) Stage (5), because during this stage the genetic material of the virus is copied, so the infected cell secretes interferons, which bind to the living cells next to the infected cell that are not infected with the virus and stimulate them to produce a type of enzyme that inhibits the enzymes copying the viral nucleic acid, so they prevent the virus from multiplying and spreading.

8 **Model answer**

(1) Precipitation.

(2) When the antigens are soluble.

(3) A macrophage.

Past exam questions

1	2	3	4	5	6	7	8	9	10
A	C	B	C	B	C	A	B	D	A
11	12	13	14	15	16	17	18	19	20
A	C	C	D	C	B	C	D	B	B
21	22	23	24	25	26	27	28	29	30
A	B	A	A	A	D	D	D	A	A

31	32	33	34	35	36	37	38	39	40
D	D	D	A	C	C	C	C	A	C
41	42	43	44	45	46	47	48	49	50
A	C	B	B	B	D	D	—	—	—

1 **Answer (A)**

Stage (2) is the increase in immune ability as T lymphocytes (most of the lymphocytes) mature, and this happens in the thymus gland.

2 **Answer (C)**

(X) is the bone marrow, where lymphatic stem cells (Y) are formed.

(Z) is the thymus gland, where T cells mature.

3 **Answer (B)**

The formation of lymphocytes begins in the second embryonic stage.

4 **Answer (C)**

The lymph node stores lymphocytes and adds them to the lymph passing through it, so their number in (X) is less than in (Y).

5 **Answer (B)**

The spleen gets rid of old red blood cells, so removing it increases their number in the blood.

6 **Answer (C)**

B cells and natural killer cells mature in the bone marrow, and T cells mature in the thymus gland.

7 **Answer (A)**

The blood leaving the organ has a higher proportion of free iron, so the organ (the spleen) destroys old red blood cells and frees the iron from hemoglobin.

8 **Answer (B)**

The thymus gland is a lymphatic organ, and it is also an endocrine gland that belongs to the endocrine system.

9 **Answer (D)**

The lymphatic organs produce immune cells, make them mature and store them, but they do not protect them.

10 **Answer (A)**

The bone marrow is the most important lymphatic organ because it produces all blood cells.

11 **Answer (A)**

The organ is a lymph node, which is a home for lymphocytes (B cells, T cells and natural killer cells).

Neutrophils are not lymphocytes.

12 **Answer (C)**

The spleen and the lymph nodes store lymphocytes.

13 **Answer (C)**

(Y) is formed in the bone marrow (A) and matures in the thymus gland (B), so it is the T cells.

They are three types: helper, cytotoxic and suppressor.

14 **Answer (D)**

In an adult, red bone marrow is limited to flat bones such as the sternum.

15 **Answer (C)**

The tonsils protect the beginning of the alimentary canal, and Peyer's patches protect the small intestine.

16 **Answer (B)**

(1) engulfs old red blood cells: macrophage.

(2) attacks bacteria: cells with granular cytoplasm (neutrophils).

17 **Answer (C)**

B cells do not attack cancer cells directly, so their number does not increase.

18 **Answer (D)**

(C) the largest percentage: T cells, (A): B cells, (B): natural killer cells.

Complement proteins work with the antibodies produced by B cells (A).

19 **Answer (B)**

Cell (C) is small with a large round nucleus that fills most of it: a lymphocyte.

20 **Answer (B)**

Natural killer cells and cytotoxic cells attack cancer cells, and both are formed in the bone marrow.

21 **Answer (A)**

Natural killer cells attack cells that are foreign to the body, such as transplanted cells.

22 **Answer (B)**

Memory T cells are formed from T cells after exposure to the antigen, not in the bone marrow.

23 **Answer (A)**

24 **Answer (A)**

Red blood cells are not a component of the immune system.

25 **Answer (A)**

The cell infected with the virus secretes interferons, which protect the neighbouring healthy cells.

26 **Answer (D)**

Antigens are foreign substances that stimulate the immune system; they are not part of it.

27 **Answer (D)**

(X) is secreted by the cell infected with the virus: interferons.

(Y) is secreted by the healthy cell in response to them: enzymes that inhibit the virus from multiplying.

28 **Answer (D)**

Complement proteins complete the work of antibodies.

29 **Answer (A)**

Regions (A) and (B) are the antigen-binding sites; they are identical and fit the shape of the antigen.

30 **Answer (A)**

Region (A) is the antigen-binding site, and changing its amino acids makes it unsuitable for its own antigen.

31 **Answer (D)**

The mechanism is precipitation, which happens when the antigens are soluble, so whether it happens depends on the nature of the antigen.

32 **Answer (D)**

Cells infected with viruses secrete interferons, which are proteins that stimulate the neighbouring healthy cells.

33 **Answer (D)**

(L) is the constant region of the long chain, and it is what distinguishes the type of immunoglobulin from the others.

34 **Answer (A)**

Site (4) is the complement-binding site, and complement proteins break down the antigens.

35 **Answer (C)**

The antibody in the figure has no complement-binding site, so the lysis mechanism cannot be completed with it.
And covering the whole body (of the antigen) means neutralizing toxins cannot be completed.

36 **Answer (C)**

The change in antibody (Z) did not include the variable region (the antigen-binding site) or the complement-binding site, so it does its work efficiently.

37 **Answer (C)**

Site (X) is the antigen-binding site, and it is made of the variable parts of the short and long chains.

38 **Answer (C)**

(Y) is the complement-binding site and is part of the long chain, so it is made of proteins.

39 **Answer (A)**

The antibody works outside the cell, so it binds to the virus in stage (1) before it enters the cell.

40 **Answer (C)**

Antibody (3) has the complete structure (it has the antigen-binding site and the complement-binding site), so it helps destroy the toxins.

41 **Answer (A)**

(A) is a protein on the surface of the bacteria (an antigen) that the antibody (B) binds to, so it does not represent the antigen-binding site.

42 **Answer (C)**

Complement proteins work with the antibodies produced by plasma B cells, and make it easier for macrophages to engulf the microbes.

43 **Answer (B)**

Antibodies have the same structure as the receptors on the surface of B cells.

44 **Answer (B)**

Complement proteins take part in the lysis mechanism.

45 **Answer (B)**

The antigen is not a component of the antibody; it binds to it.

46 **Answer (D)**

(L) is the constant region of the long chain, and it is constant in structure and shape.

47 **Answer (D)**

The antigen is the shape that binds to the antibody at the binding site, which is figure (D).

48 **Model answer**

(1) Peptide bonds.
(2) Amino acids.

49 **Model answer**

(1) The number, types and order of the amino acids in the two regions.
(2) Two types of plasma B cells.

50 **Model answer**

(1) A virus.
(2) An antigen.