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

How the Human Immune System Works

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Multiple choice questions — 137 questions

1 Which of the following first line of defense means failed to prevent the coronavirus from entering the body?

(A) Skin and sweat (B) Mucus and cilia (C) Tears and earwax (D) HCl and saliva

2 Which immune structure has an exocrine secretion inside the body?

(A) Salivary glands (B) Sweat glands (C) Thymus gland (D) Lacrimal gland

3 What type of glands are the lacrimal glands in humans?

(A) Duct glands with an exocrine secretion outside the body
(B) Mixed
(C) Duct glands with an exocrine secretion inside the body
(D) Endocrine

4 Which of the following choices expresses the means of the first line of defense in the body?

(A) Skin / tears / HCl acid / white blood cells
(B) Tears / mucous membranes / HCl acid / basophils
(C) Skin / tears / mucous membranes / HCl acid
(D) Tears / mast cells / white blood cells / HCl acid

5 Which of the following statements is correct about the immune enzymes of saliva?

(A) They activate complement proteins
(B) They break down the nucleic acids of bacteria
(C) They break down bacterial cell walls
(D) They are secreted from ductless glands

6 Which of the following properties makes mucus play an immune role?

(A) It kills all microbes (B) It activates immune cells
(C) It is an acidic substance (D) It is a sticky substance

7 What is the name of the substance responsible for moving some phagocytic cells and natural killer cells from the blood plasma to the infected tissue?

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

8 An increase in the hydrogen ion concentration in human urine gives the urinary bladder and the urethra ..... immunity.

(A) natural
(B) specific
(C) acquired humoral
(D) acquired cell-mediated

9 How do ciliated cells work in the first line of defense in humans?

(A) They secrete mucus to protect the lungs from pathogens
(B) They protect the female reproductive system from diseases
(C) They expel dust and pathogens to prevent them from entering the lungs
(D) They secrete HCl acid to destroy pathogens

10 Which of the following substances is foreign to the body?

(A) Interferons
(B) Antigens
(C) Immunoglobulins
(D) Immune receptors

11 Which of the following is one of the mechanisms of innate immunity?

(A) Neutrophils engulfing the pathogen
(B) Formation of memory cells
(C) Neutralizing toxins by antibodies
(D) Division of B cells

12 Which of the following applies to natural immunity?

(A) Some of its means work the moment the microbe reaches the body tissues
(B) It depends on previous exposure to the same pathogen
(C) It depends on recognizing the antigen
(D) It is found only in vertebrates and humans

13 From the following figure, what is the type of the cell and the type of the immune response against the pathogens?



(A) B lymphocyte – producing antibodies
(B) Macrophage – swallowing pathogens
(C) Neutrophil – engulfing bacteria
(D) Mast cell – secreting histamine

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14 How many substances do T cells produce during the activity of non-specific immunity?

(A) Zero (B) 1 (C) 3 (D) 5

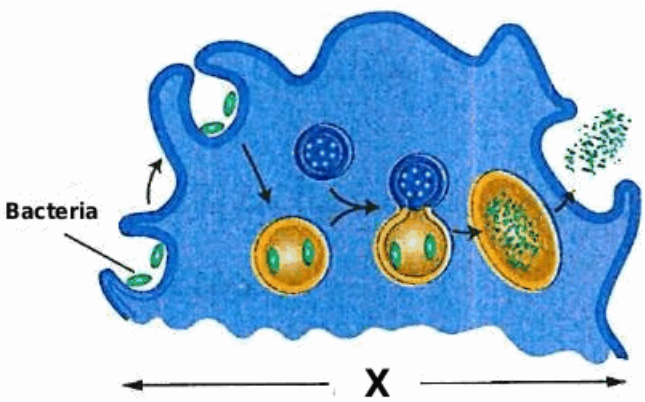
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15 Which of the following does not apply to non-specific immune defenses?

(A) They include physical and chemical barriers
(B) They include natural killer cells and phagocytes
(C) They include inflammatory responses
(D) They require the presence of an antigen to happen

---

16 From the opposite figure, what does cell (X) represent?



(A) Macrophage (B) Mast cell (C) Memory B cell (D) Helper T cell

---

17 Which of the following statements is correct?

(A) All white blood cells are produced in the bone marrow
(B) Mast cells are active in the blood and body tissues
(C) The inflammatory response belongs to the first line of defense
(D) All blood cells leave the bone marrow fully mature

18 What happens when bacteria enter the body through a small wound in the skin?

(A) The flow of red blood cells to the wound decreases

(B) All body cells secrete interferons

(C) Cytotoxic T cells are activated

(D) The permeability of small blood vessels to plasma increases in the infected part

19 Which of the following statements is not correct?

(A) Antibodies are relatively large molecules

(B) Histamine increases the permeability of antibodies into infected cells

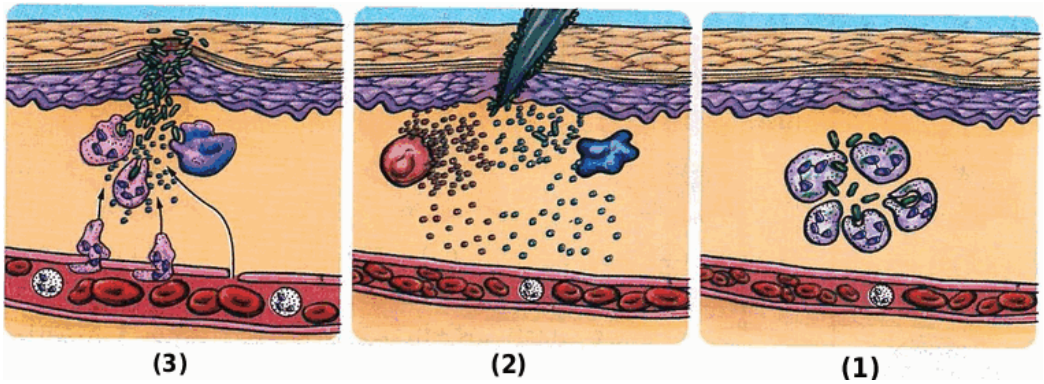
(C) The antibody IgG consists of 4 protein chains

(D) Antibodies contain peptide bonds

20 What chemical substance is secreted by some types of white blood cells and causes the temperature of the infected part of the body to rise?

(A) Perforin (B) Histamine (C) Antibodies (D) Cytokines

21 The following figures show the steps of the inflammatory response. Which of the following choices represents the correct order of these steps?



(A) (1) → (2) → (3)

(B) (3) → (2) → (1)

(C) (2) → (1) → (3)

(D) (2) → (3) → (1)

22 Which of the following is not related to the secretion of histamine?

(A) Dilation of blood vessels

(B) Allowing B cells to move towards the site of infection

(C) Increasing the permeability of small blood vessels

(D) Swelling and redness at the site of infection

---

23 The inflammatory response is characterized by being .....

(A) fast and specific

(B) fast and non-specific

(C) slow and specific

(D) slow and non-specific

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24 Which of the following cells does not work in the second line of defense?

(A) Mast cells

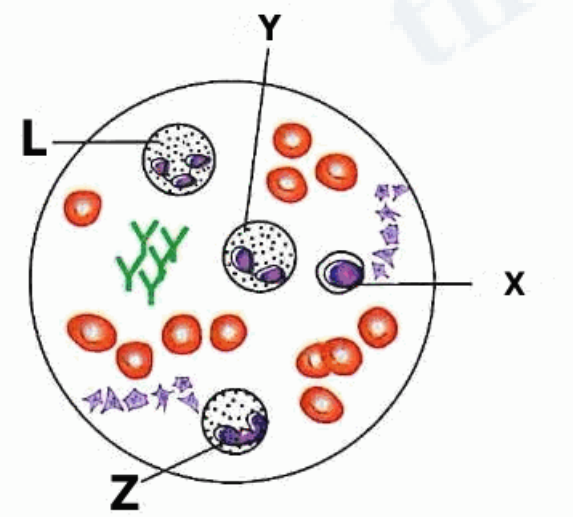
(B) Macrophages

(C) B cells

(D) Natural killer cells

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25 The opposite figure represents some blood components in humans:
Which of the following cells secretes histamine?



(A) X

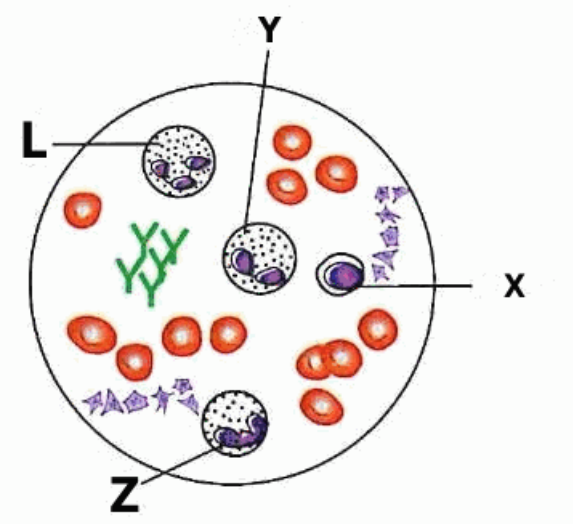
(B) Y

(C) Z

(D) L

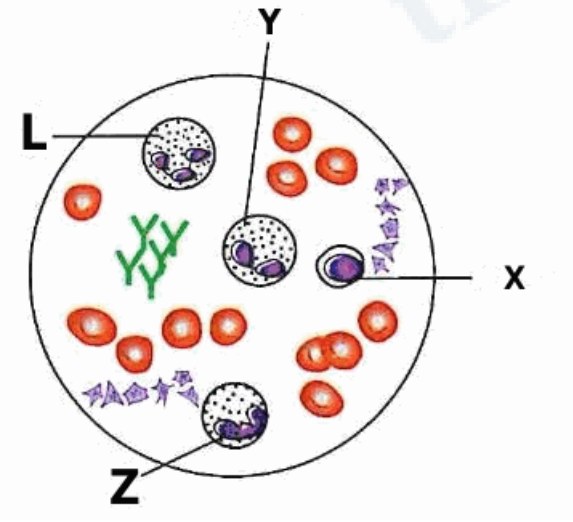
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26 The opposite figure represents some blood components in humans:
Which of the following cells differentiate, some in the thymus gland and others in the red bone marrow?



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

27 The opposite figure represents some blood components in humans:
Which of the following represents an eosinophil (acidophil) white blood cell?

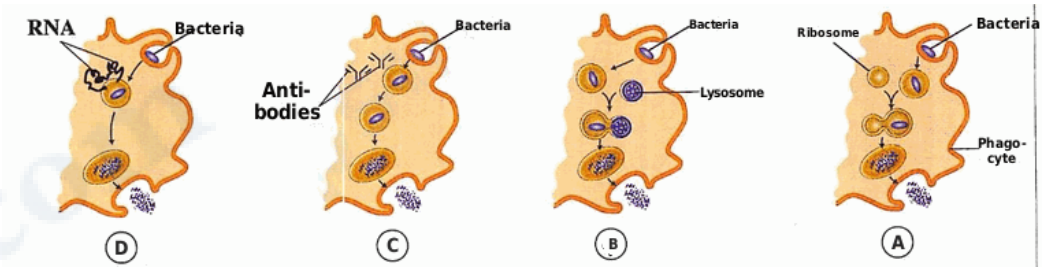


(A) X (B) Y (C) Z (D) L

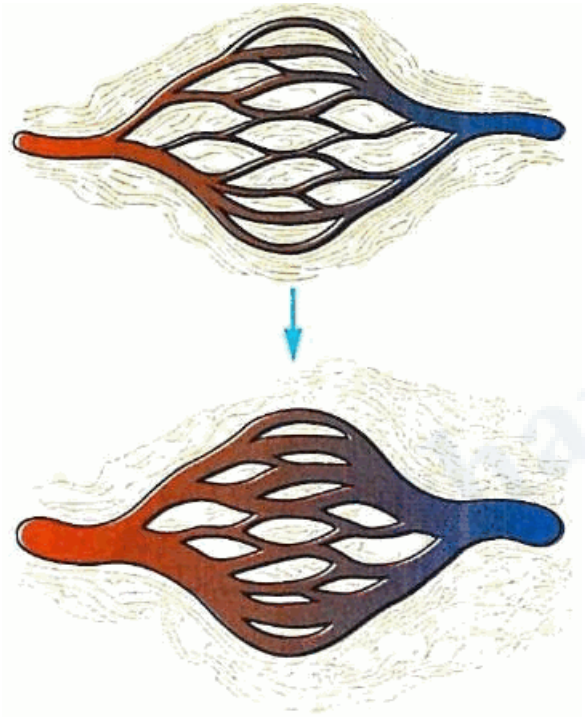
28 Which of the following is not one of the aims of the inflammatory response?

(A) Preventing the microbe from reaching the blood
(B) Killing the pathogenic organisms
(C) Limiting the reproduction of the pathogenic microbe
(D) Identifying the type of the microbe

29 Which of the following responses correctly represents non-specific immunity?



30 What is the cause of the response shown in the two opposite figures?



(A) The body trying to prevent the pathogen from penetrating the body surface

(B) Secretion of chemokines to attract phagocytes

(C) The secretory activity of basophils and mast cells

(D) A rise in the osmotic pressure of the blood

31 Which of the following represents both the cells and the immune substances used by the body during the early stages of the inflammatory response?

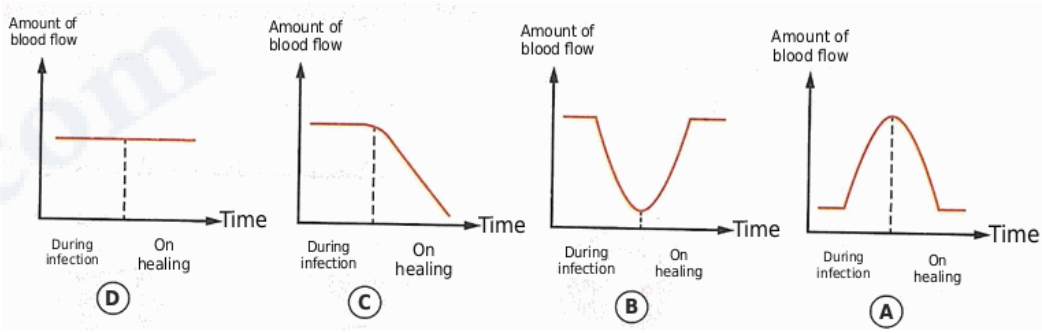
(A) Phagocytes and cytokines

(B) Mast cells and interferons

(C) Basophils and histamine

(D) Lymphocytes and interferons

32 Which of the following graphs shows the amount of blood flowing in the blood vessels of a tissue when an inflammatory response happens?



33 The following choices show stages of the inflammatory response. Which of them, if it does not happen, prevents all the other stages from being completed?

(A) Leakage of plasma into the infected area

(B) Increase in the permeability of small blood vessels

(C) Increase in the number of phagocytes in the infected area

(D) Secretion of histamine

34 Which of the following chemical substances increases at the wound site during the first stage of the inflammatory response?

(A) Chemokines

(B) Antibodies

(C) Interferons

(D) Complement proteins

35 Some people get inflammation of the mucous membranes lining the nose when they breathe air polluted with dust, so the doctor prescribes a drug against .....

(A) lymphokine (B) histamine (C) interleukin (D) perforin

36 Where and when are specific lymphocytes activated?

(A) The blood – in the presence of the microbe

(B) The thymus gland – in the presence of MHC protein

(C) The bone marrow – in the presence of the antigen

(D) The lymph nodes – in the presence of lymphokines

37 Which of the following is one of the body's responses during specific immunity?

(A) Production of chemokines
(B) Production of antibodies
(C) Movement of the cilia of the trachea
(D) Inflammation

38 What is the effect of a defect in the immune receptor on the surface of helper T cells?

(A) No binding to the antigens of viruses in the blood
(B) The inflammatory response stops
(C) No binding with the complex of the antigen and the MHC protein
(D) Secretion of interferons stops

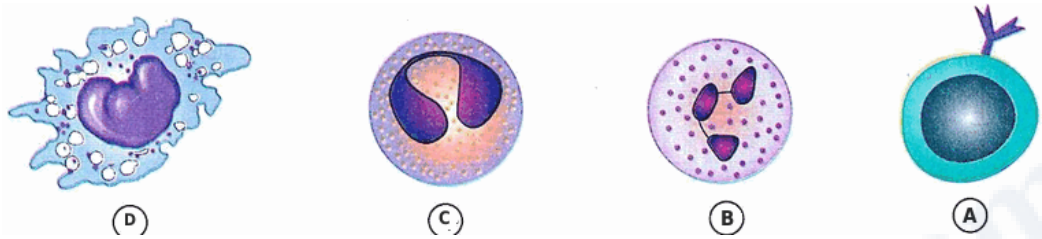
39 What happens after helper T cells recognize the antigen displayed on the surface of phagocytes?

(A) They divide and their numbers multiply
(B) They move from the thymus gland to the blood
(C) They release interferons
(D) They release antibodies

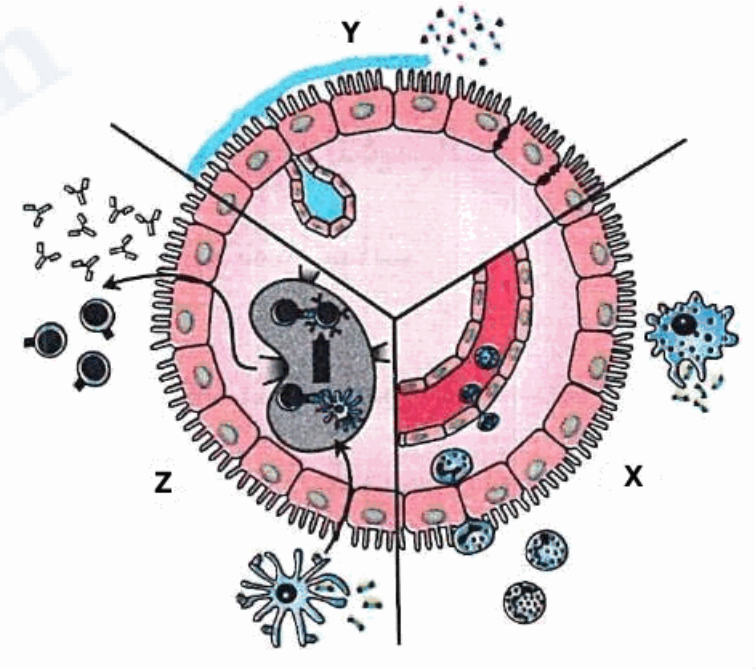
40 Which of the following does the function of the MHC protein depend on?

(A) The type of the microbe
(B) The presence of an immune receptor on the membrane of TH cells
(C) Displaying the antigen on the nuclear membrane
(D) Binding with the antigen

41 Which of the following immune cells is specific?



42 From the opposite figure, what do the lines of defense (X), (Y) and (Z) represent, respectively, in the human body?



(A) Second / first / third
(B) First / second / third
(C) First / third / second
(D) Third / second / first

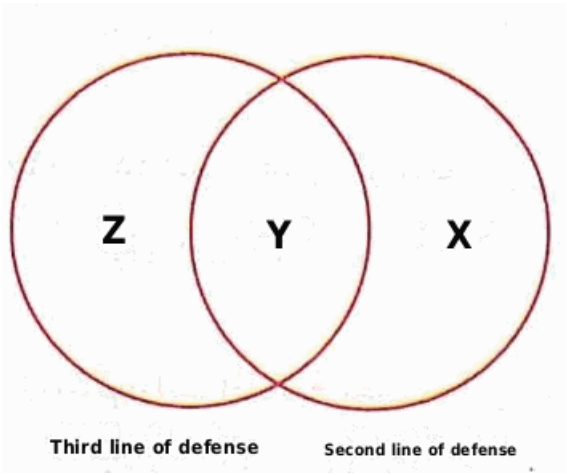
43 Which of the following is one of the features of adaptive immunity?

(A) Redness and swelling at the site of infection
(B) Secretion of inflammation-causing substances
(C) Secretion of cytokines
(D) Increase of mucus in the respiratory system

44 What is the main role of acquired humoral immunity?

(A) Protecting the body from pathogens in the body fluids
(B) Preventing the microbe from entering the body
(C) Rejecting transplanted organs
(D) Protecting the body from cancer cells

45 From the opposite figure, which of the following choices is correct about (X), (Y) and (Z)?



(A) X: NK cells / Y: phagocytes / Z: mast cells

(B) X: NK cells / Y: mast cells / Z: B cells

(C) X: phagocytes / Y: NK cells / Z: mast cells

(D) X: mast cells / Y: phagocytes / Z: T cells

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46 The following stages happen when the human immune system meets a pathogen:

X: The pathogen is destroyed.

Y: Lymphocytes secrete antibodies.

Z: Antigens bind to the receptors of lymphocytes.

L: Memory cells are formed.

What is the correct order of these stages?

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

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47 Which of the following choices is correct?

(A) Cell: mast / secreted substance: histamine / line of defense: first

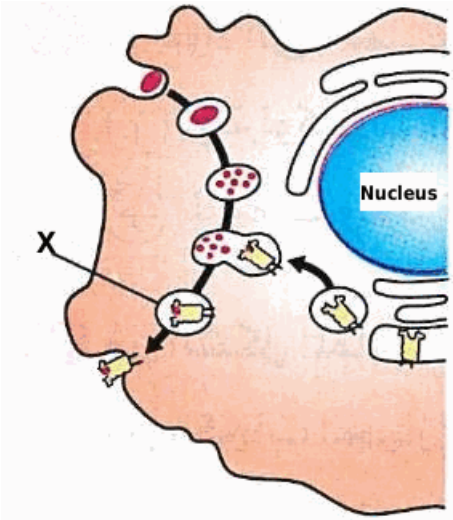
(B) Cell: TH / secreted substance: interleukins / line of defense: second

(C) Cell: TC / secreted substance: lymphotoxins / line of defense: third

(D) Cell: NK / secreted substance: cytokines / line of defense: second

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48 Which of the following statements correctly describes stage (X) in the opposite figure?



(A) Displaying the antigen on the surface of the phagocyte
(B) Lysosome enzymes breaking the antigen into pieces
(C) Binding of the antigen with the MHC protein
(D) The cell releasing interferons

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49 Which of the following pairs are similar in that both stimulate certain cells?

(A) Lymphokines and complement proteins
(B) Cytokines and interferons
(C) Complement proteins and interferons
(D) Antibodies and lymphokines

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50 Which cells do not take part in the work of the third line of defense?

(A) Mast cells
(B) B cells
(C) Helper T cells
(D) Suppressor T cells

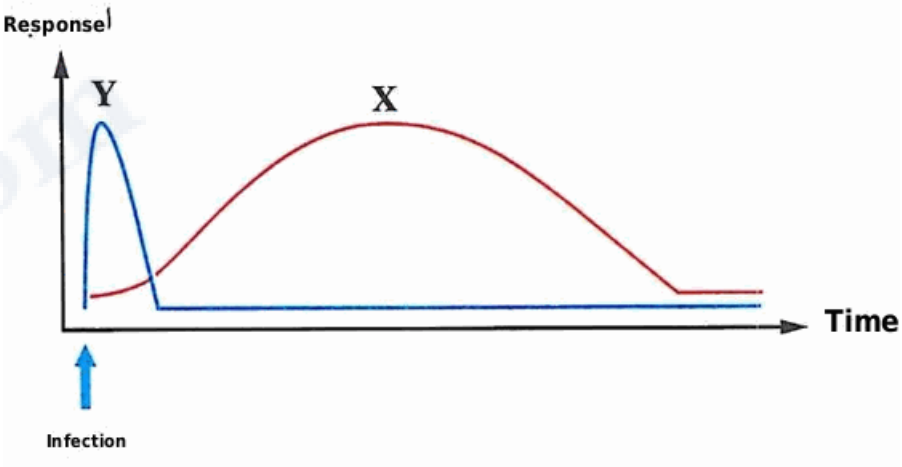
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51 What substance acts as a mediator between two similar body cells if one of them is infected by a virus?

(A) Cytokines
(B) Lymphokines
(C) Interferons
(D) Lymphotoxins

---

52 Which of the following statements correctly describes the opposite graph?



(A) (X) and (Y) represent the first line of defense

(B) (Y) represents innate immunity, (X) represents acquired immunity

(C) (Y) represents humoral immunity, (X) represents cell-mediated immunity

(D) (X) represents an inflammatory response, (Y) represents an antibody response

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53 Genes in the nuclei of cancer cells are activated, leading to their destruction; this is known as programmed cell death. Which of the following is responsible for that?

(A) Lymphotoxins (B) Perforin (C) Interferons (D) Antibodies

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54 During the immune response, which of the following lymphocytes produces substances that tear the cell membrane of cancer cells?

(A) B cells (B) Plasma B cells

(C) Killer T cells (D) Suppressor T cells

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55 A person took a chemical substance that increased the rate of division of liver cells without the body's control, which increased the size of the liver. Which of the following cells are expected to increase in number in this case?

(A) Memory B cells and suppressor T cells

(B) Natural killer cells and suppressor T cells

(C) Plasma B cells and killer T cells

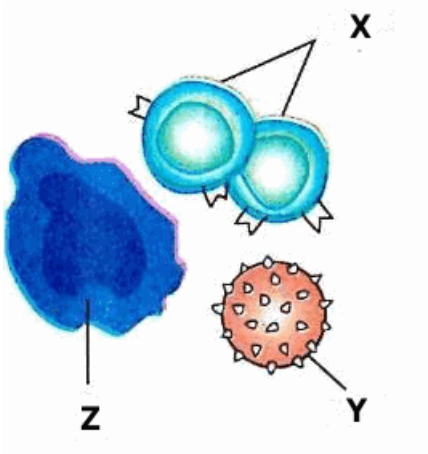
(D) Cytotoxic T cells and natural killer cells

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56 What substances activate B cells?

(A) Interleukins only
(B) Cytokines only
(C) Complement proteins and interleukins
(D) Interleukins and cytokines

57 From the opposite figure, which of the following is a component of the immune system?



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

58 Which of the following can explain the importance of the antigen on the surface of bacteria for the immune system?

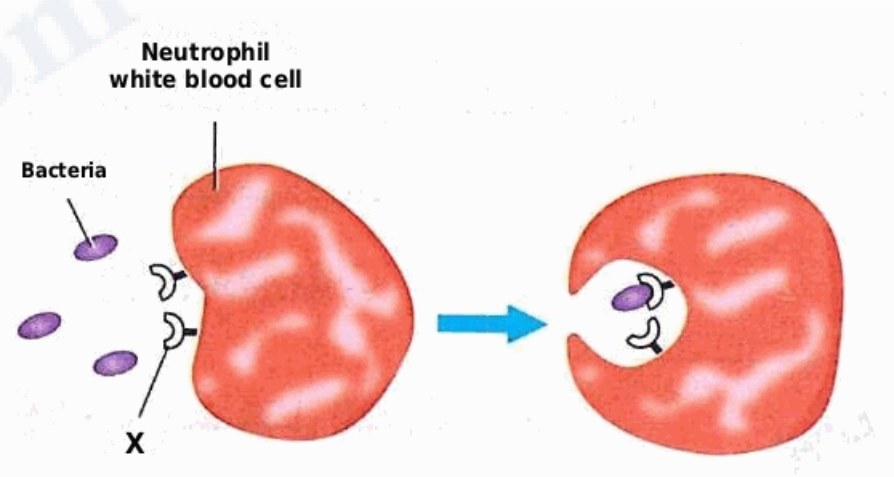
(A) Antibodies bind to it
(B) Infected cells are destroyed
(C) TS recognize it
(D) Plasma (B) cells bind to it

59 Which substance depends in its work on the activity of helper T cells (TH) indirectly?

(A) Interleukins
(B) Histamine
(C) Complement proteins
(D) Cytokines

60 The opposite figure shows a neutrophil white blood cell while doing its immune role in the body. Study it, then answer:

What is the process shown in the figure called?

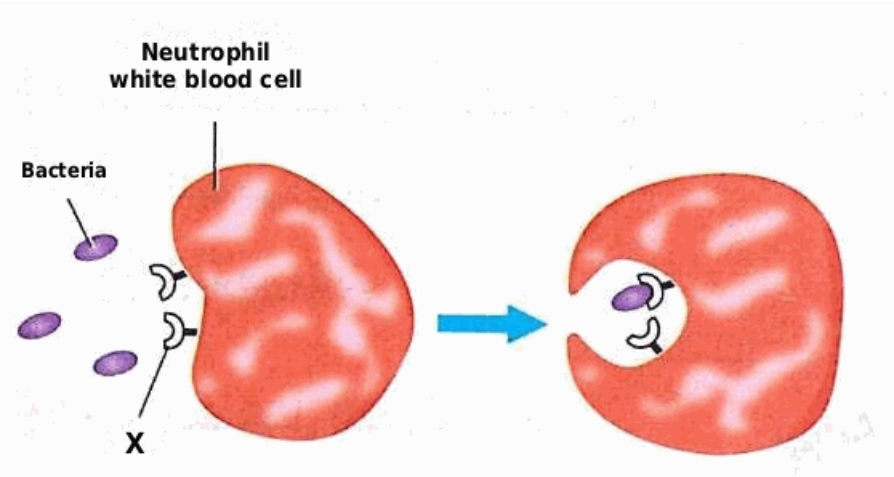


(A) Engulfing
(B) Feeding
(C) Agglutination
(D) Engulfing and digestion

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61 The opposite figure shows a neutrophil white blood cell while doing its immune role in the body. Study it, then answer:

What is the importance of structure (X)?



(A) It prevents the pathogen from entering the white blood cell
(B) It binds to antibodies
(C) It displays the complex of the antigen and the MHC protein
(D) It binds to the pathogen

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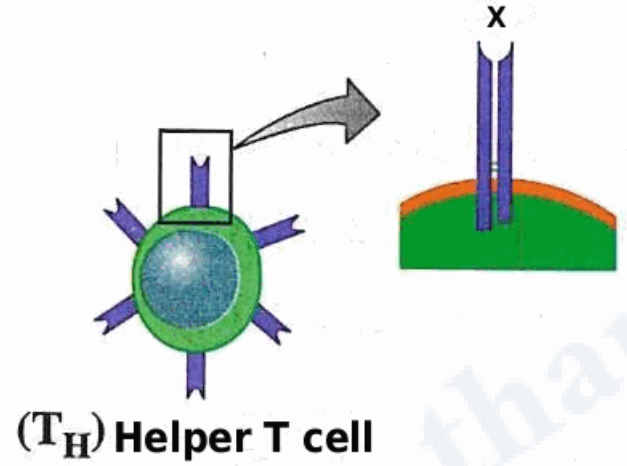
62 Which of the following cells does not increase in number during a viral infection?

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

63 Comparing the speed of the innate immune response with the acquired one, we find that the acquired immune response is .....

(A) faster (B) slower
(C) the same speed (D) sometimes faster and sometimes slower

64 From the opposite figure, which of the following does structure (X) bind to?



(A) The antigen (B) The antibody
(C) The MHC protein (D) The antigen bound to the MHC protein

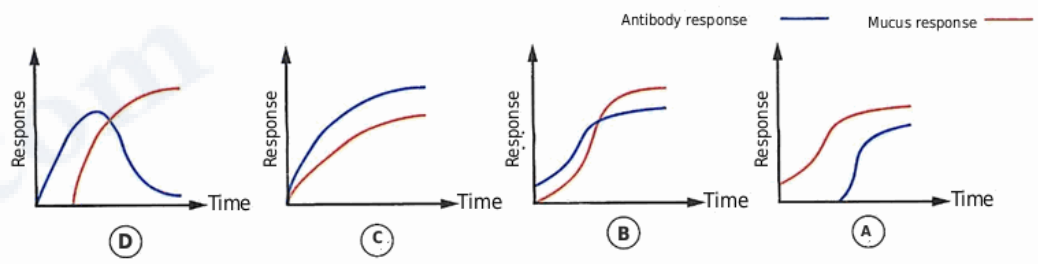
65 Which of the following chemical substances increases at the same time as plasma (B) cells increase?

(A) Lymphokines (B) Perforin
(C) Interferons (D) Complement proteins

66 Which of the following statements is not correct?

(A) TS cells are active during the infection
(B) The activity of TH cells is affected by TS cells
(C) The activity of TS cells is affected by TH cells
(D) The secretions of TS cells affect B cells

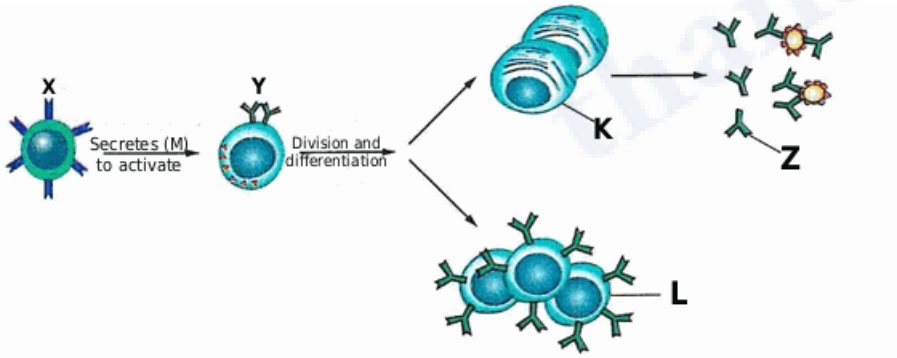
67 Which of the following graphs expresses the amount of both mucus and antibodies when catching a cold?



68 Which of the following chemical substances, when it increases, decreases the activity of plasma (B) cells?

(A) Lymphokines
(B) Perforin
(C) Interferons
(D) Complement proteins

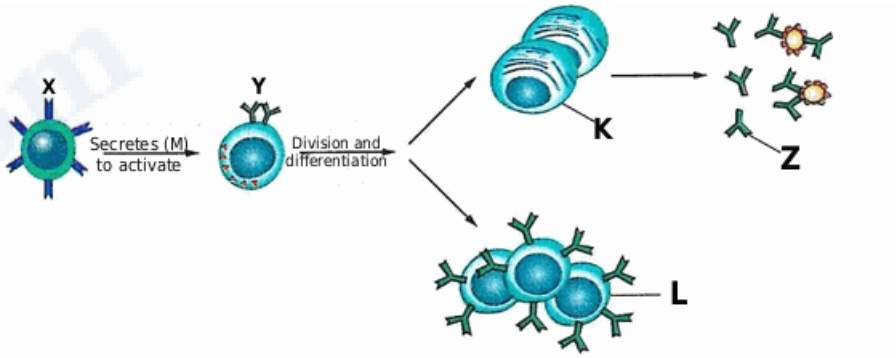
69 From the figure in front of you:
Which of the choices in the following table represents (X), (Y), (Z) and (L)?



(A) X: antibody / Y: T cell / Z: antigen / L: plasma (B) cell
(B) X: helper T cell / Y: B cell / Z: antibody / L: memory (B) cell
(C) X: helper T cell / Y: killer T cell / Z: antibody / L: B cell
(D) X: bacterium / Y: B cell / Z: antibody / L: T cell

70 From the figure in front of you:

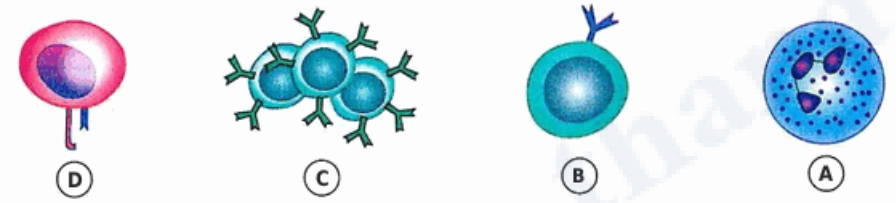
Which of the following represents the letter (M) and the letter (K), respectively?



(A) Interleukins / plasma (B) cell
(B) Cytokines / B cell
(C) Complement proteins / plasma (B) cell
(D) Lymphokines / B cell

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71 Which of the following immune cells has the shortest life and works in cases of acute inflammation?



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72 «Hypoplasia» is a disease caused by a genetic disorder that leads to atrophy of the thymus gland. What are the most important symptoms that appear on the patient?

(A) A decrease in the number of plasma B cells
(B) A decrease in the number of B cells
(C) A decrease in the number of lymphoid stem cells
(D) A decrease in innate immunity

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73 What response may lead to the human body rejecting a transplanted organ?

(A) Secretion of chemokines
(B) Humoral immunity
(C) Cell-mediated immunity
(D) Secretion of interferons

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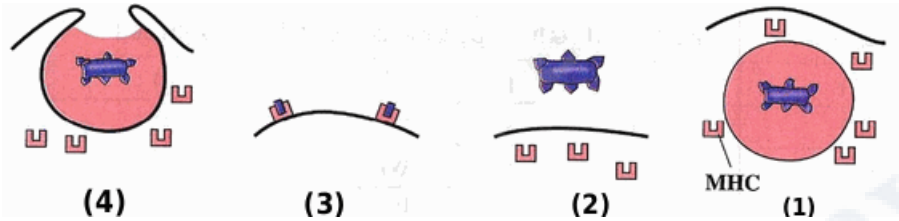
74 The breakdown of red blood cells in a person with malaria releases some toxic substances in the body, and they are dealt with immunologically by .....

(A) the inflammatory response
(B) the humoral response
(C) the cell-mediated response
(D) suppressor T cells

75 Which of the following cells must have its activity stopped for a liver transplant to succeed?

(A) TC (B) TS (C) Macrophages (D) Mast cells

76 The following figures show the stages of the work of the macrophage in destroying the pathogen. Which of the following represents the correct order of events?



(A) (4) → (2) → (1) → (3)
(B) (2) → (4) → (1) → (3)
(C) (1) → (2) → (3) → (4)
(D) (4) → (3) → (2) → (1)

77 Which of the following substances has no role in the work of the third line of defense?

(A) Histamine
(B) Interleukins
(C) Complement proteins
(D) Perforin

78 Which of the following represents the correct immune response of the body when a pathogen enters it?

(A) Killer T cells make holes in infected cells and produce antibodies
(B) Killer T cells secrete cytokines and infected cells produce interferons
(C) Memory T cells produce antibodies and helper T cells secrete cytokines
(D) Helper T cells secrete cytokines and plasma cells produce antibodies

79 Which of the following represents a similarity between cytotoxic T cells and suppressor T cells?

(A) Recognizing the microbe

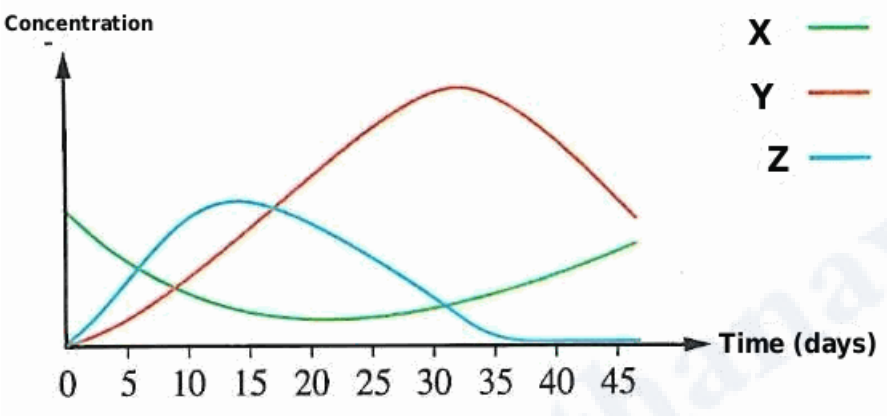
(B) The ability to produce lymphokines

(C) The ability to suppress the immune response

(D) The presence of an immune receptor on the cell surface

---

80 A person was infected by a virus for the first time. Which of the curves in the opposite graph represent the antigens and the antibodies, respectively?



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

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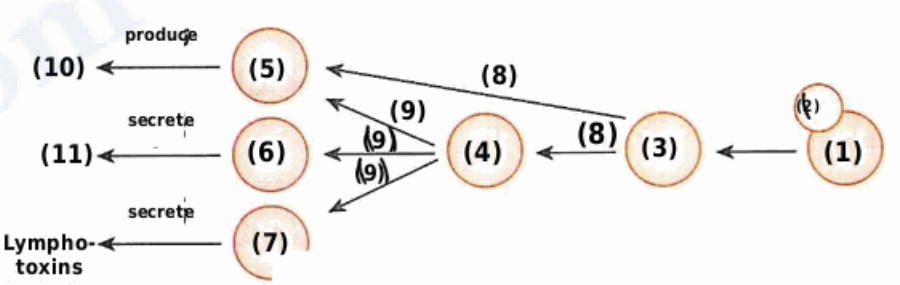
81 Which of the following plays a role in attracting macrophages to the site of infection?

(A) Chemokines and cytokines (B) Interleukins and interferons

(C) Cytokines and interleukins (D) Chemokines and interferons

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82 The opposite diagram shows the relationship between different types of lymphocytes, where the numbers from (8) to (11) represent secreted substances. Which of the choices in the following table can represent these cells?



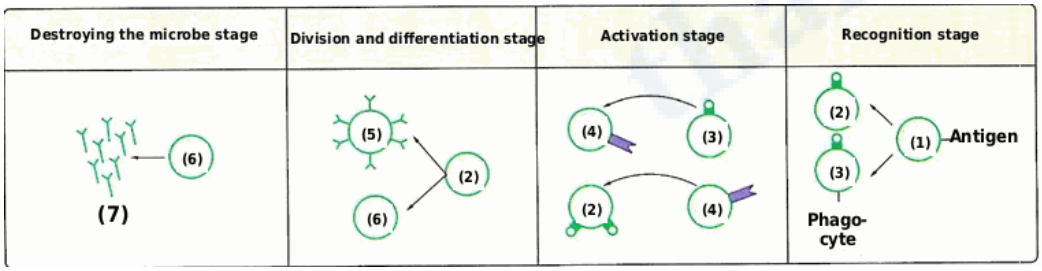
(A) B: (6) / natural killer: (7) / cytotoxic T: (5) / phagocyte: (1)

(B) B: (5) / natural killer: (7) / cytotoxic T: (1) / phagocyte: (6)

(C) B: (1) / natural killer: (7) / cytotoxic T: (6) / phagocyte: (5)

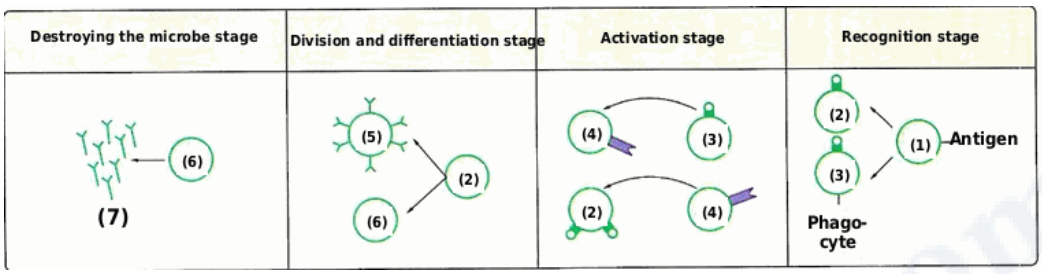
(D) B: (5) / natural killer: (6) / cytotoxic T: (7) / phagocyte: (1)

83 Using the data in the opposite table, answer:
What does cell (2) represent?



(A) Helper T (B) B (C) Killer T (D) Memory B

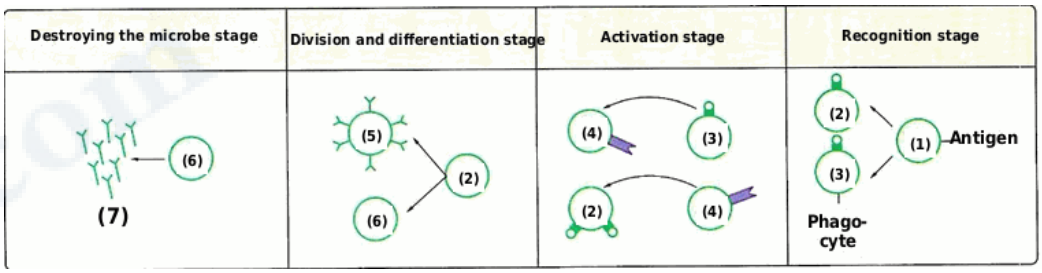
84 Using the data in the opposite table, answer:
What does cell (4) represent?



(A) Plasma B (B) Memory B (C) Helper T (D) Phagocyte

85 Using the data in the opposite table, answer:

What does cell (6) represent?



(A) Helper T (B) Plasma B (C) B (D) Macrophage

86 Which of the following cells does TS not affect?

(A) Mast cells (B) Plasma B cells (C) Helper T cells (D) Cytotoxic T cells

87 Which of the following does not affect the permeability of cell membranes?

(A) Insulin (B) Acetylcholine (C) Histamine (D) Lymphotoxins

88 Which of the following is not related to cell-mediated immunity?

(A) MHC protein (B) TC (C) TH (D) Histamine

89 What chemical substance has its formation directly affected by the activity of helper T cells (TH)?

(A) Interleukins (B) Histamine

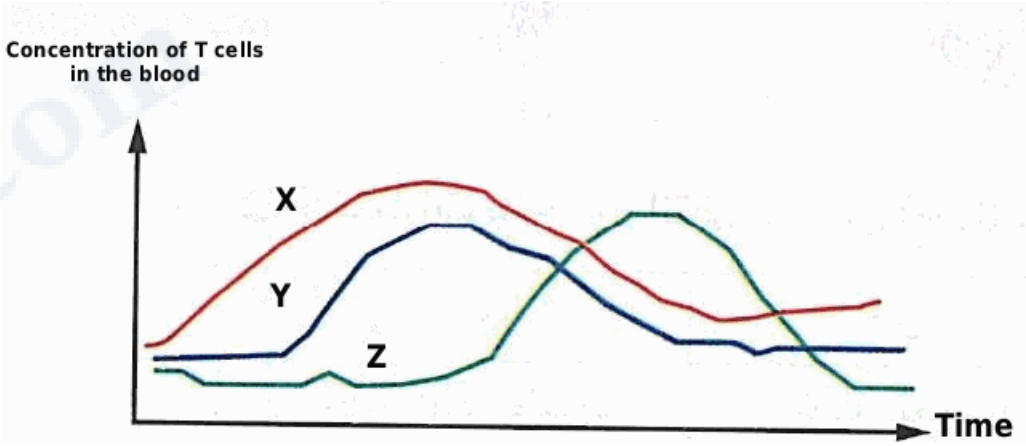
(C) Complement proteins (D) Chemokines

90 Which of the following cells has no shared role in humoral immunity and cell-mediated immunity?

(A) Macrophages (B) Helper T cells

(C) Cytotoxic T cells (D) Suppressor T cells

91 The following graph shows the concentration of the three types of T cells in the blood of a person after a pathogen entered. Which of the following choices can represent these cells?



(A) X: TC / Y: TH / Z: TS
(B) X: TS / Y: TC / Z: TH
(C) X: TH / Y: TC / Z: TS
(D) X: TC / Y: TS / Z: TH

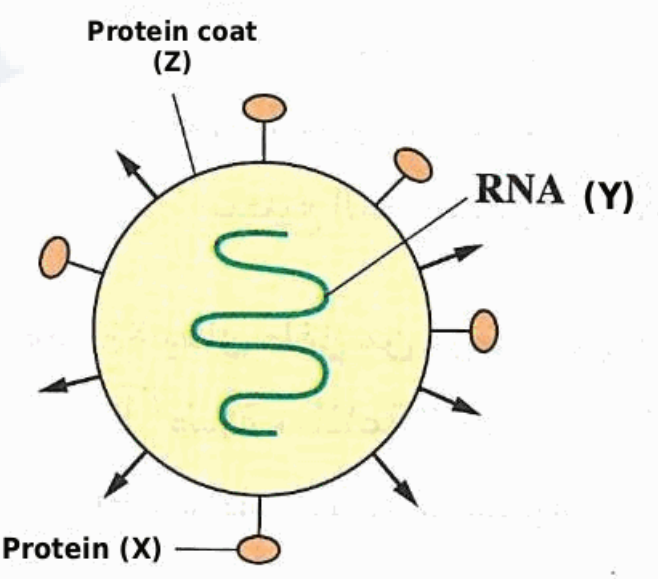
92 What process directly precedes displaying the antigen on the surface of the macrophage?

(A) The macrophage swallowing the pathogen
(B) Breaking down the pathogen into antigens
(C) Binding of the MHC protein with the antigen
(D) TH cells recognizing the antigen

93 Which of the following is correct about cytotoxic T lymphocytes?

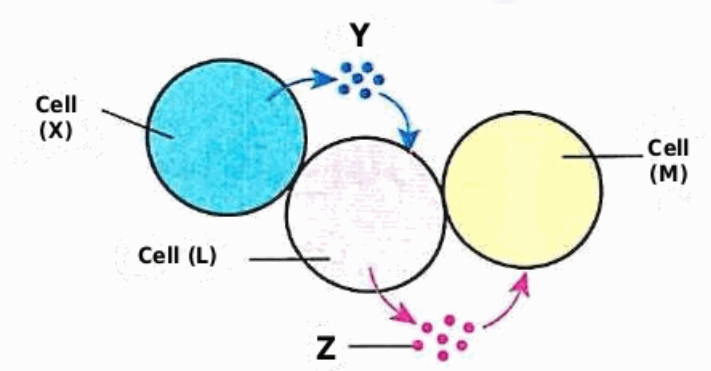
(A) Mature cells that are active in cell-mediated immunity
(B) Mature cells that are active in humoral immunity
(C) Immature cells that are active in cell-mediated immunity
(D) Immature cells that are active in humoral immunity

94 The opposite figure shows the structure of a virus. Through which structure can B cells recognize this virus?



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

95 The opposite drawing shows one of the mechanisms of the immune system in humans, and (M) represents a body cell. What are the types of the two cells (X), (L) and the two substances (Y), (Z), respectively?



(A) Infected cell, TC cell / interferons, perforin

(B) TH cell, TC cell / cytokines, perforin

(C) Infected cell, TC cell / perforin, interferons

(D) TC cell, infected cell / interleukins, perforin

96 Which of the following statements is correct for natural killer (NK) cells?

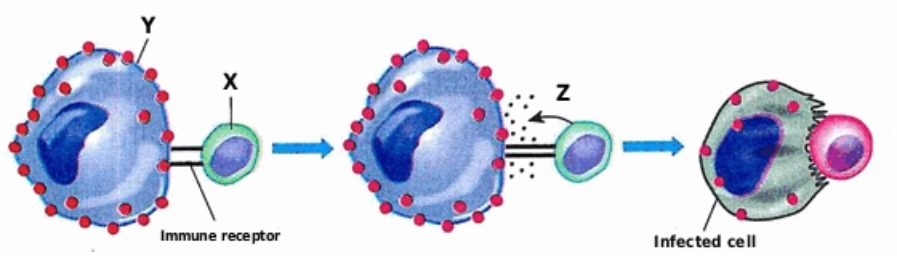
(A) They are not specific to a certain type of antigen

(B) They do not contain lytic enzymes

(C) They are a type of T cell

(D) They belong to the third line of defense only

97 The figure in front of you shows the mechanism of work of one of the immune cells:
Which of the following choices expresses (X), (Y) and (Z)?



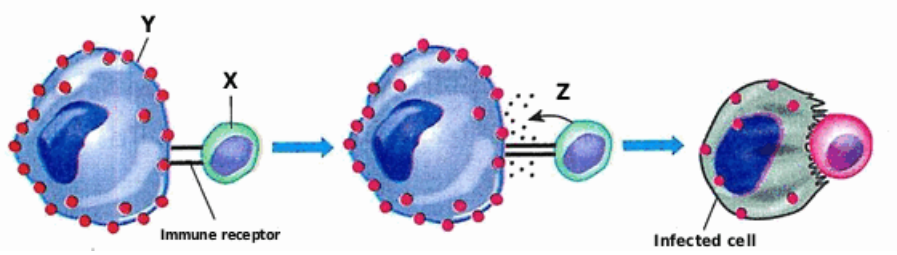
(A) X: natural killer cell / Y: phagocyte / Z: perforin

(B) X: cytotoxic T cell / Y: virus-infected cell / Z: perforin

(C) X: B cell / Y: transplanted tissue / Z: lymphotoxins

(D) X: killer T cell / Y: cancer cell / Z: lymphotoxins

98 The figure in front of you shows the mechanism of work of one of the immune cells:
What chemical substances does cell (Y) produce?



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

99 Which of the following statements is not correct about (TH) cells?

(A) They control the work of (B) and (TC) lymphocytes

(B) They do not control the work of all white blood cells

(C) They secrete interleukins when they bind to (B) cells

(D) They can recognize the antigen without the need for the MHC protein

100 A child suffers from a genetic disease that caused atrophy of part of the thymus gland. What is the result of this?

(A) Weak humoral immunity only

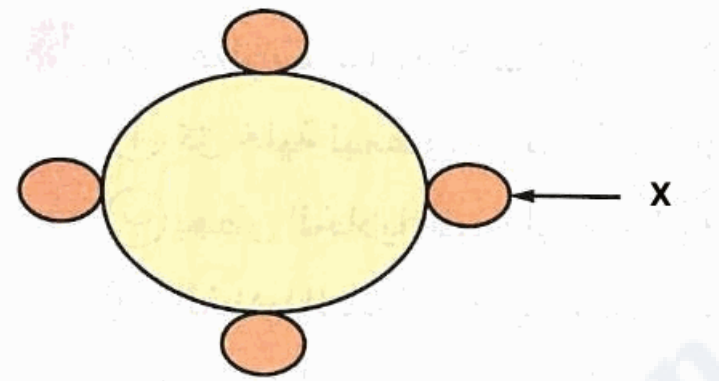
(B) Weak cell-mediated immunity only

(C) Weak acquired immunity

(D) Disappearance of the MHC protein from immune cells

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101 The figure shows a pathogen. Which of the following can bind directly to structure (X)?



(A) Receptors of B cells and helper T cells

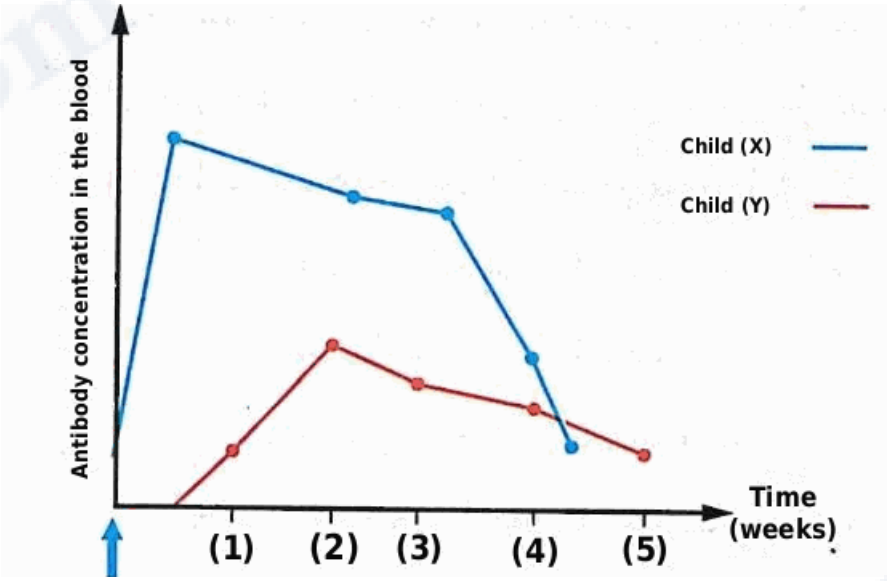
(B) Receptors of B cells and complement proteins

(C) Receptors of helper T cells and the antibody

(D) Receptors of B cells and the antibody

---

102 The opposite graph shows the concentration of antibodies formed after vaccinating two children (X) and (Y) against yellow fever. Which of the following choices cannot be a possible explanation?



(A) Child (X): lives in an area where the disease is endemic / Child (Y): lives in an area free of this disease

(B) Child (X): got the same vaccination before / Child (Y): gets the vaccination for the first time

(C) Child (X): vaccinated with the vaccine (weakened microbe) / Child (Y): vaccinated with the serum (ready-made antibodies)

(D) Child (X): secondary immune response / Child (Y): primary immune response

---

103 What is the function of memory (B) cells?

(A) Swallowing bacteria that attack the body again

(B) Producing antibodies

(C) Producing plasma B cells

(D) Killing virus-infected cells

---

104 Which of the following distinguishes adaptive immunity from natural immunity?

(A) The inflammatory response

(B) Memory cells

(C) Lysosomes

(D) Natural killer cells

---

105 Which of the following statements is correct about the immune response?

- (A) It produces immunoglobulins
- (B) It always leads to the destruction of pathogens
- (C) It depends mainly on mast cells
- (D) It takes place only through innate immunity

106 A person may catch influenza several times in one year because of the high rate of change in the genetic material of the influenza virus. What is the immune cause of the repeated infection?

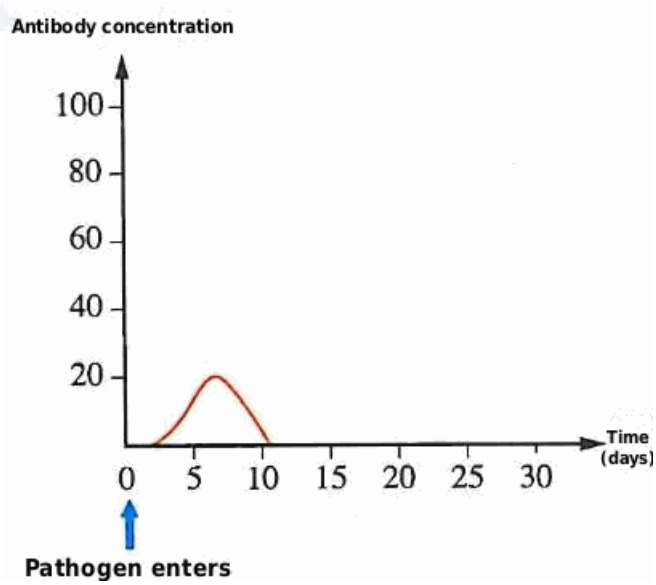
- (A) Primary immunity is not effective in destroying the virus
- (B) Secondary immunity is not effective in destroying the virus
- (C) Inhibition of memory cells
- (D) Inhibition of (B) cells

107 Which of the following statements does not apply to lymphocytes?

- (A) Each memory B lymphocyte can produce different types of antibodies
- (B) Some B and T lymphocytes differentiate into memory cells
- (C) Plasma B cells produce antibodies that circulate in the blood
- (D) Some T lymphocytes secrete substances that attract phagocytes to the site of infection

108 The opposite graph shows the concentration of antibodies in the blood plasma of a person exposed to a pathogen for the first time:

Why are there no antibodies in the first three days?



(A) The immune cells cannot recognize the antigens of the pathogen

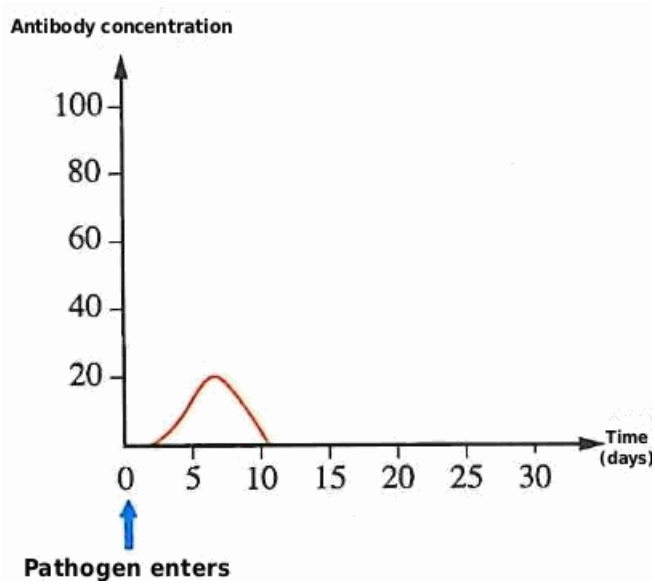
(B) The phagocytes cannot engulf the pathogen

(C) Plasma B cells have not been formed

(D) The strength of the pathogen at the moment it enters the body

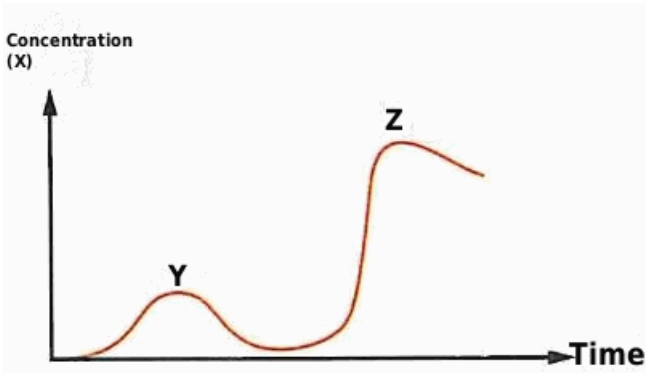
109 The opposite graph shows the concentration of antibodies in the blood plasma of a person exposed to a pathogen for the first time:

If the same pathogen attacked this person on the fifteenth day, what do you expect the antibody concentration to be on the seventeenth day?



(A) Zero (B) 10 (C) 20 (D) More than 20

110 The opposite graph shows the immune response in humans. Which of the choices in the following table is correct about (X), (Y) and (Z)?



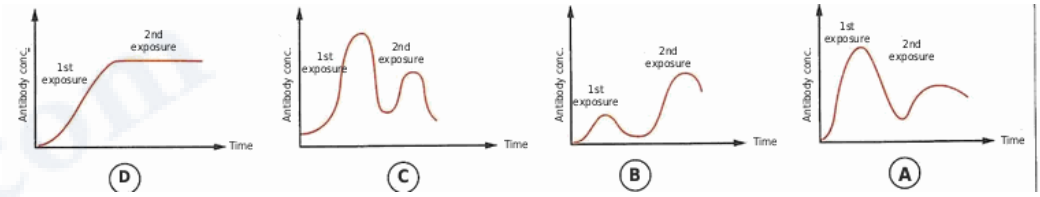
(A) X: antibodies / Y: may result from vaccination / Z: fast response

(B) X: lymphokines / Y: results from the response of memory (B) cells / Z: fast response

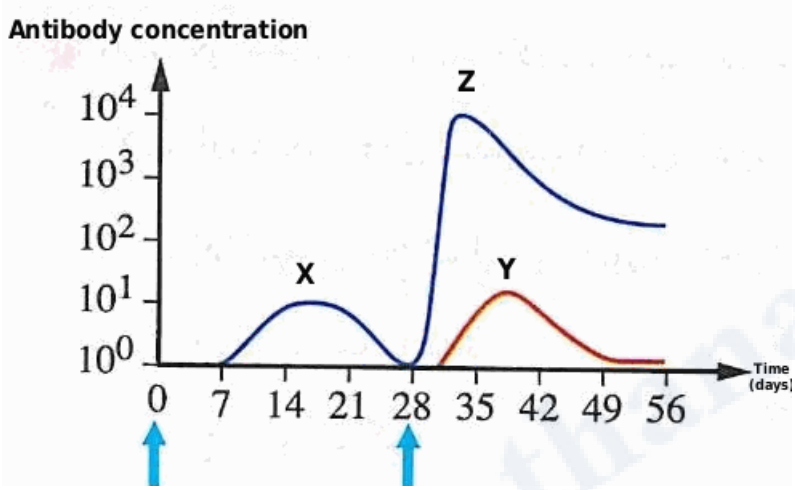
(C) X: antibodies / Y: fast response / Z: results from the response of (T) cells

(D) X: histamine / Y: results from the first infection / Z: produces memory cells

111 Which of the following graphs represents the stages of acquired immunity of a person exposed to the same pathogen again?



112 The opposite graph shows the concentration of some antibodies in the blood of a person. In which of the following cases are memory cells responsible for the immune response?



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

113 The presence of 50 types of memory (B) cells confirms that ..... entered the blood.

(A) 50 types of antigens
(B) 50 antigens of the same type
(C) the same vaccine 50 times
(D) 50 different foreign bodies

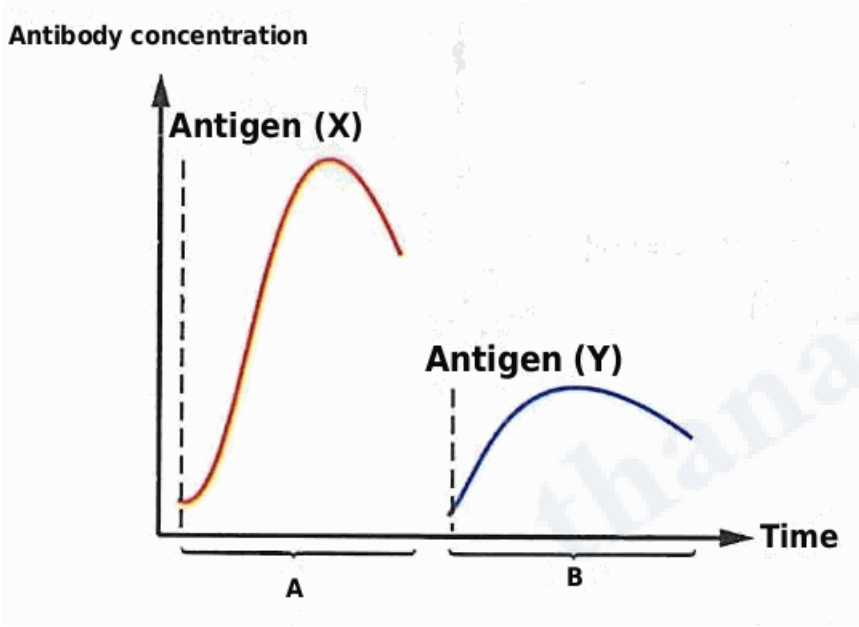
114 Which of the following is correct if a change in the structure of the gene responsible for forming the protein coat of the (COVID-19) virus led to the formation of a protein similar in its chemical structure to the protein coat of a virus that was vaccinated against before?

(A) Helper T cells cannot recognize it
(B) It is recognized by memory cells and antibodies are produced against it
(C) B cells cannot recognize it
(D) It is recognized by phagocytes without being destroyed

115 In a family, the older brother was infected by a microbe and recovered from it very slowly, so the parents decided to inject the younger brother with a vaccine for this microbe. Which of the following lymphocytes will produce antibodies against the antigens of this weakened microbe in the younger brother's blood?

(A) Plasma B cells (B) B cells (C) Memory B cells (D) Memory T cells

116 The opposite graph shows the amount of some antibodies in the blood of a person in January (A) and March (B). Which of the following statements applies to the two antigens (X) and (Y)?



(A) The two antigens are different and each attacks the body for the first time

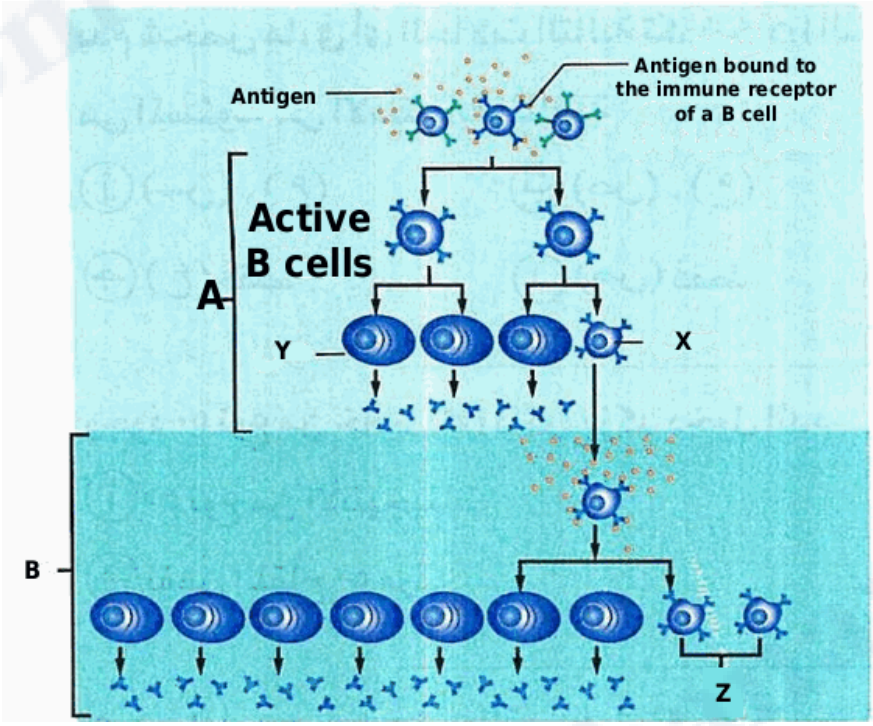
(B) The two antigens belong to the same microbe attacking the body for the first time

(C) The two antigens belong to the same microbe attacking the body for the second time

(D) The two antigens are different; (X) attacks the body for the second time, while (Y) attacks the body for the first time

117 The opposite figure represents the immune response of the human body when a pathogen enters. Study it, then answer:

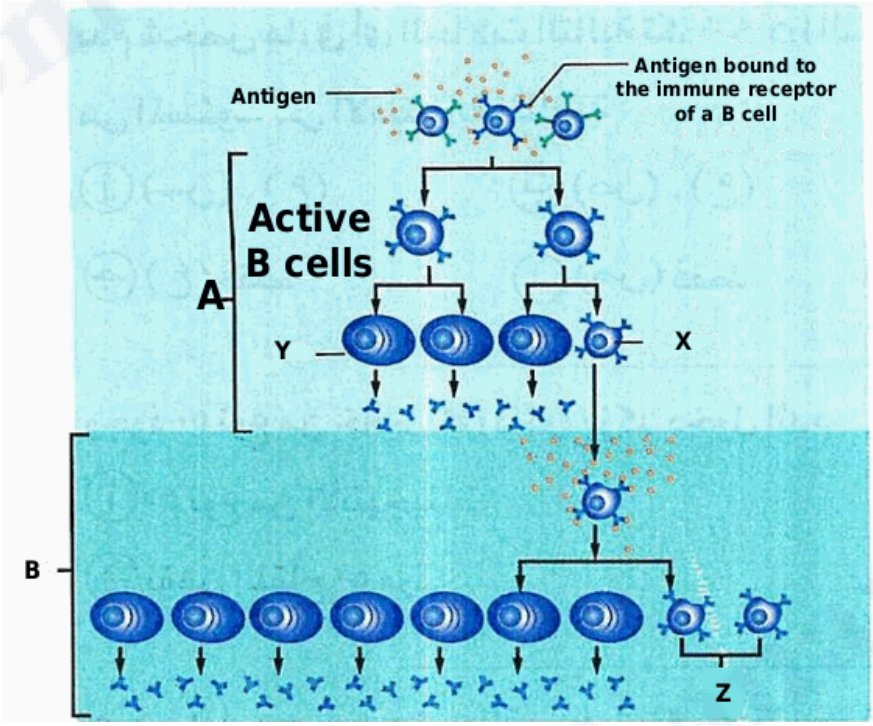
What do the cells marked with the letter (Z) represent?



(A) Helper T (B) Memory T (C) Plasma B (D) Memory B

118 The opposite figure represents the immune response of the human body when a pathogen enters. Study it, then answer:

Why does the number of antibodies increase in stage (B) more than in stage (A)?



(A) Because the number of antigens in (B) is greater than in (A)

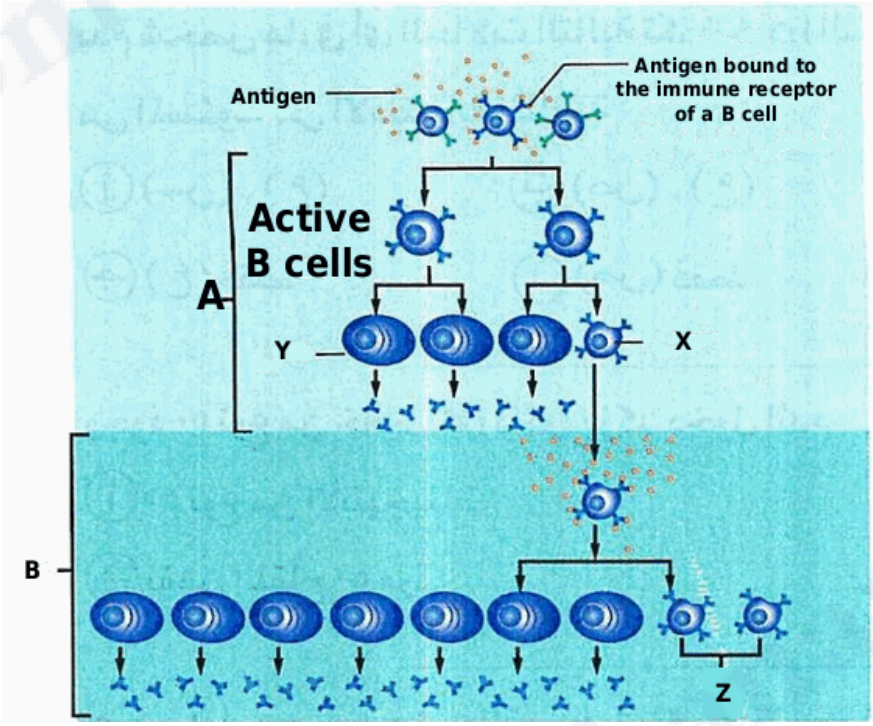
(B) Because the number of B cells increases in stage (B)

(C) Because the types of antigens in (B) are more than in (A)

(D) Because the same microbe enters the body for the second time in stage (B)

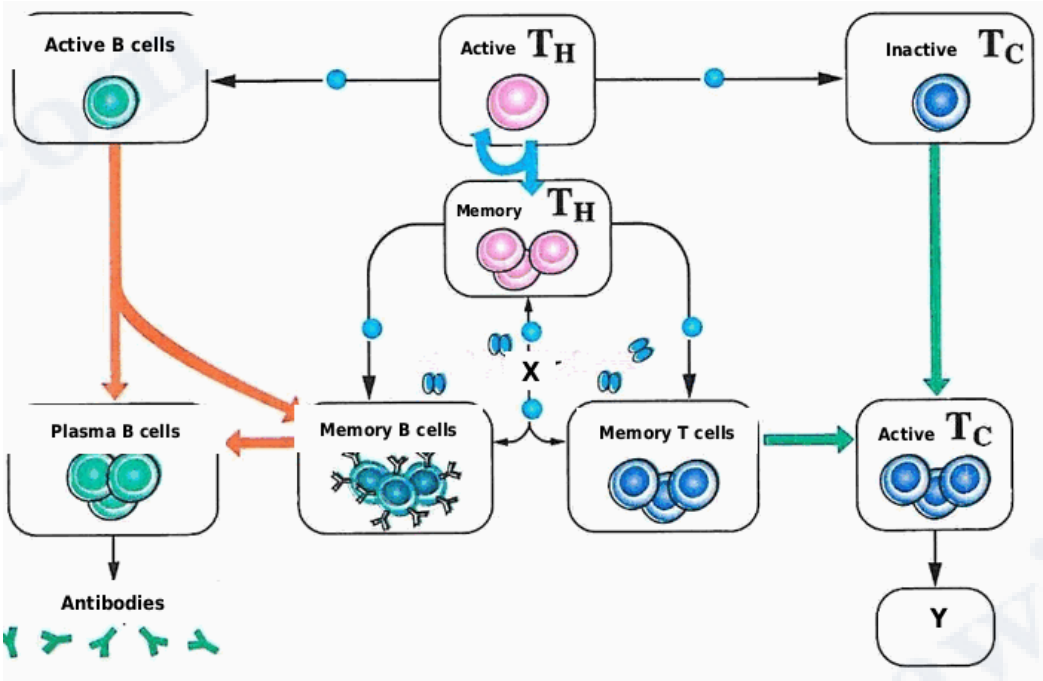
119 The opposite figure represents the immune response of the human body when a pathogen enters. Study it, then answer:

After the microbe is destroyed, which of the following do suppressor T cells inhibit?



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

120 The following diagram shows some stages of acquired immunity inside the body. What do the immune response (X) and the substance (Y) represent, respectively?



(A) Primary / cytokines
(B) Primary / perforin
(C) Secondary / cytokines
(D) Secondary / perforin

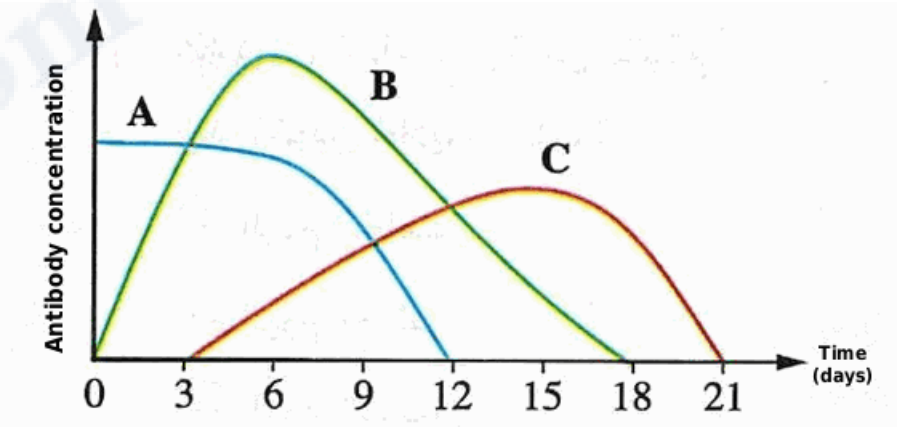
121 During the primary immune response, the following happens:

(1) B lymphocytes differentiate and form plasma B cells.
(2) B lymphocytes divide by mitosis.
(3) Specific antibodies are produced.
(4) Activated helper T cells secrete interleukins.
(5) Helper T cells recognize the antigen bound to the MHC protein.

Which of the following choices represents the correct order of the previous steps?

(A) (2) → (1) → (4) → (3) → (5)
(B) (2) → (4) → (3) → (1) → (5)
(C) (5) → (4) → (2) → (1) → (3)
(D) (5) → (4) → (3) → (2) → (1)

122 The opposite graph shows the concentration of antibodies in the blood of three persons (A), (B) and (C) who were infected by the same type of bacteria. Which of the three persons was given the serum (ready-made antibodies) for this type of bacteria?



(A) (A) only (B) (B) only (C) (A), (C) (D) (B), (C)

123 Which of the following can be a cause of the slowness of the primary immune response?

(A) Spread of the microbe in the body tissues

(B) Delay in activating (B) cells

(C) Absence of helper T cells

(D) Absence of plasma B cells

124 From the opposite table, which shows the antibody concentration in the blood of a person during 50 days, from 1 March to 19 April, for the same pathogen:
When was the first exposure to infection?

Antibody concentration in the blood	Day
Zero	5
110	10
120	16
10	25
200	35
390	45
200	50

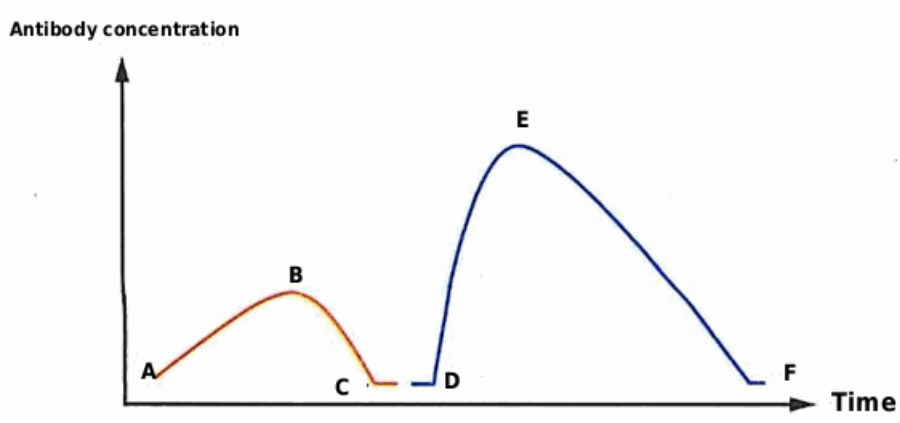
(A) 2 March (B) 8 March (C) 10 March (D) 16 March

125 From the opposite table, which shows the antibody concentration in the blood of a person during 50 days, from 1 March to 19 April, for the same pathogen:
When was the second exposure to infection?

Antibody concentration in the blood	Day
Zero	5
110	10
120	16
10	25
200	35
390	45
200	50

(A) 16 March (B) 2 April (C) 5 April (D) 14 April

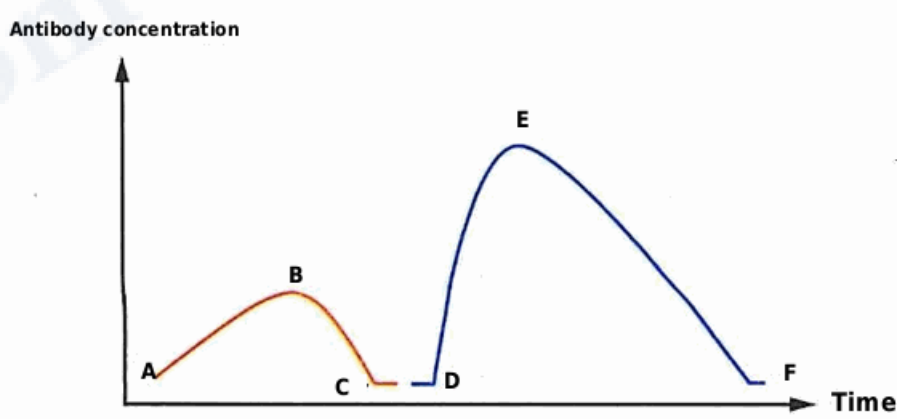
126 The opposite graph shows the immune response on the first infection and the second infection by a certain microbe:
In which periods does the work of memory B cells appear?



(A) A → B (B) B → C (C) D → E (D) E → F

127 The opposite graph shows the immune response on the first infection and the second infection by a certain microbe:

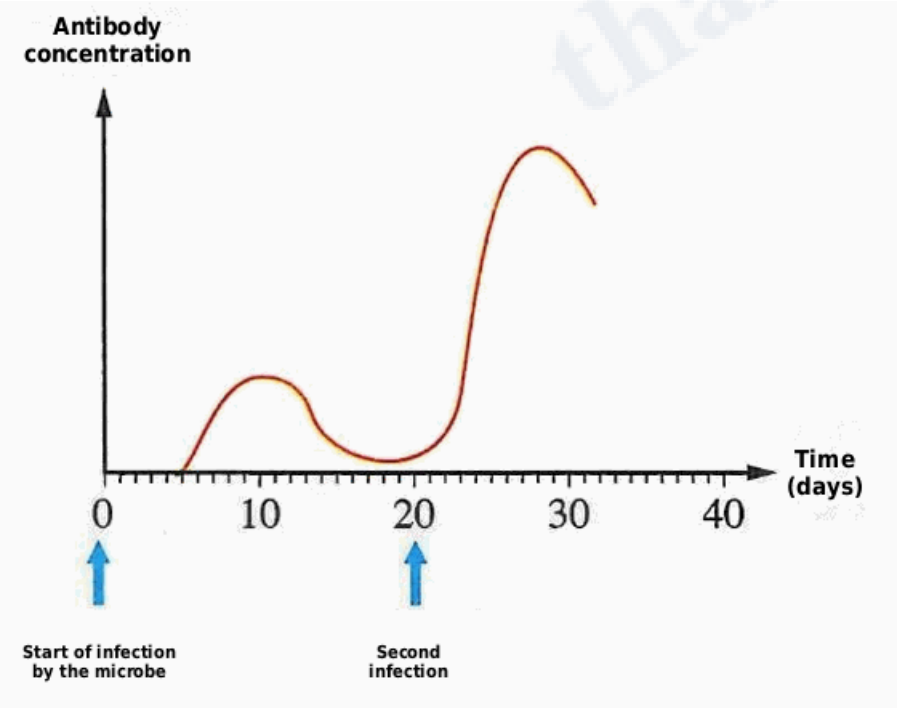
During which periods does the activity of lymphokine proteins increase?



(A) A → B , D → E (B) B → C , E → F (C) A → B , E → F (D) B → C , D → E

128 The opposite graph shows the concentration of antibodies produced as a response to a type of antigen:

On which of the following days is the formation of memory cells expected to start?

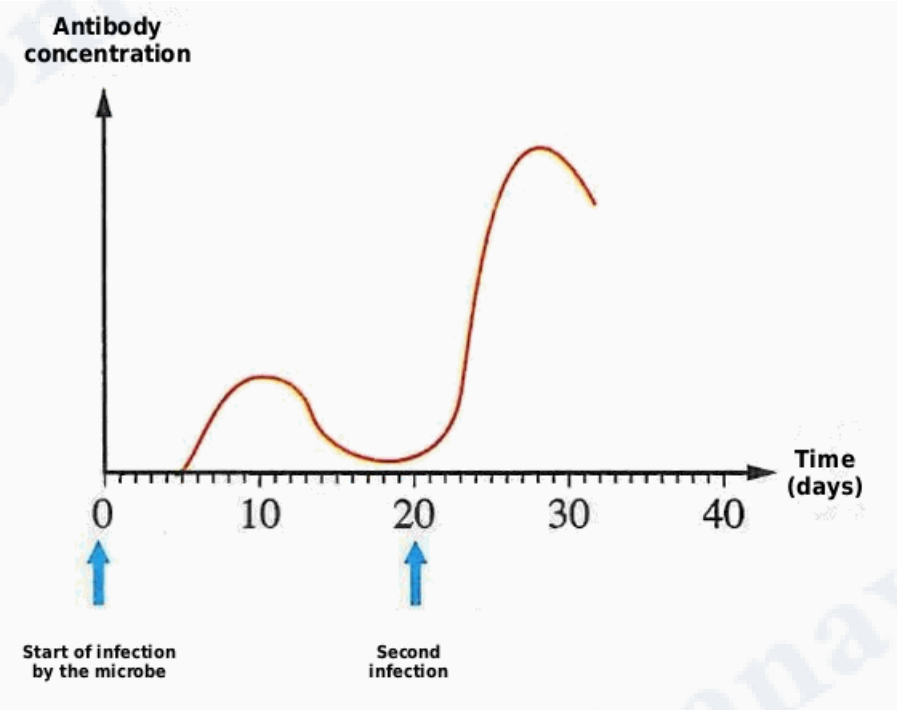


(A) The fifth day (B) The tenth day

(C) The twentieth day (D) The twenty-second day

129 The opposite graph shows the concentration of antibodies produced as a response to a type of antigen:

On which of the following days are plasma B cells expected to be produced?



(A) The fifth day and the fifteenth day

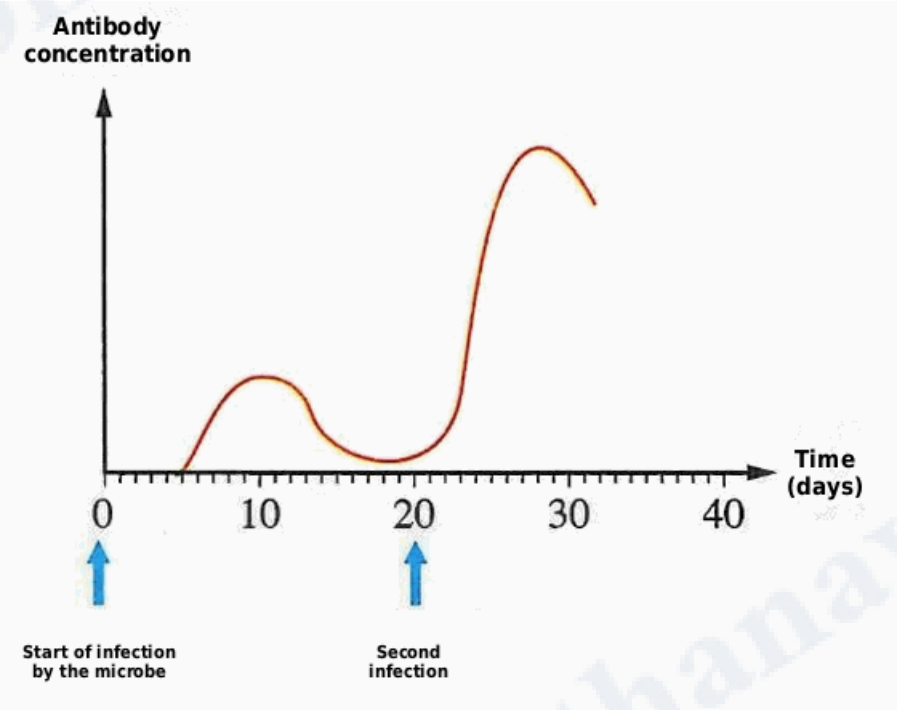
(B) The fifth day and the twentieth day

(C) The fifth day and the thirtieth day

(D) The fifteenth day and the thirtieth day

130 The opposite graph shows the concentration of antibodies produced as a response to a type of antigen:

In the secondary immune response, on which of the following days is the secretion of lymphokine proteins expected to start?



(A) The fifteenth day
(B) The twentieth day
(C) The twenty-fifth day
(D) The twenty-ninth day

---

131 Knowing that the serum is ready-made antibodies against the pathogenic microbe, while the vaccine is the pathogenic microbe in a dead or weakened form:

Which of the following can be concluded?

(A) The serum gives temporary protection, while the vaccine gives protection for long periods
(B) The serum gives protection for long periods, while the vaccine gives temporary protection
(C) Both the serum and the vaccine give protection for long periods
(D) Both the serum and the vaccine give temporary protection

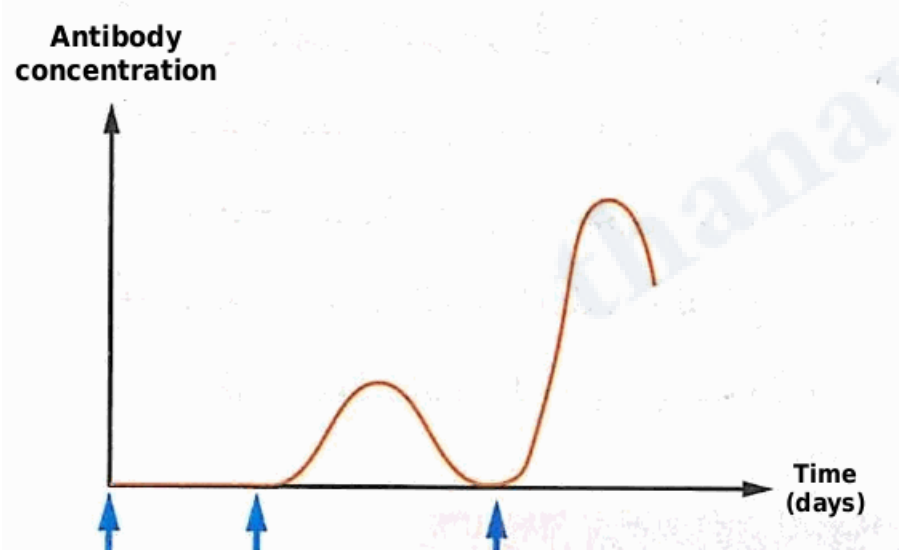
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132 Knowing that the serum is ready-made antibodies against the pathogenic microbe, while the vaccine is the pathogenic microbe in a dead or weakened form:
In the first attempts to limit the spread of coronavirus infection, an amount of blood was taken from the patient right after recovery. How is this explained?

(A) Isolating the virus and identifying its structure
(B) Separating the virus antigens and using them as a vaccine
(C) Separating the antibodies and using them as a serum
(D) Separating the active lymphocytes

---

133 Knowing that the serum is ready-made antibodies against the pathogenic microbe, while the vaccine is the pathogenic microbe in a dead or weakened form:
Which of the following can be concluded from the opposite graph?



(A) The pathogen stimulates the immune cells more strongly than the vaccine
(B) The vaccine used is active and works efficiently
(C) The vaccine used was not prepared properly
(D) The vaccine inhibits the activity of (B) cells

---

134 A person had measles, and several years later he got a tumor in the thymus gland, which led to removing this gland. What happens if this person is exposed to the same microbe that causes measles again, one year after the removal?

(A) He will be infected again because the lymphoid stem cells do not mature

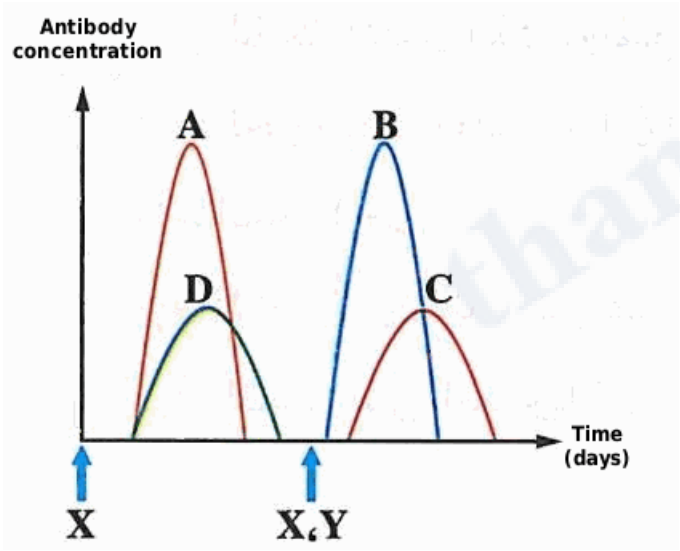
(B) He will be infected again because T lymphocytes do not differentiate

(C) He will not be infected again because memory cells were formed during the first exposure

(D) He will not be infected again because antibodies were formed during the first exposure

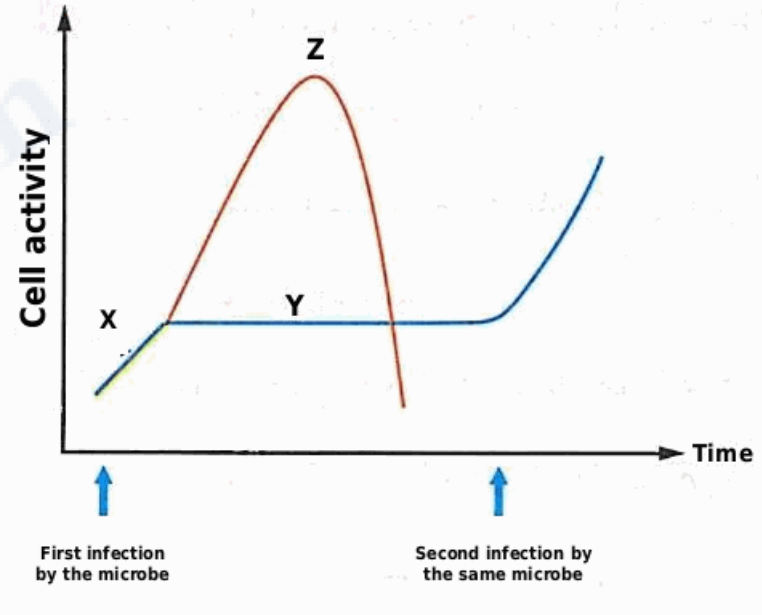
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135 The opposite graph shows the antibody response when a person is injected with antigen (X) first, then with the two antigens (X) and (Y) after a period. Which of the opposite curves represents the primary response to antigen (Y)?



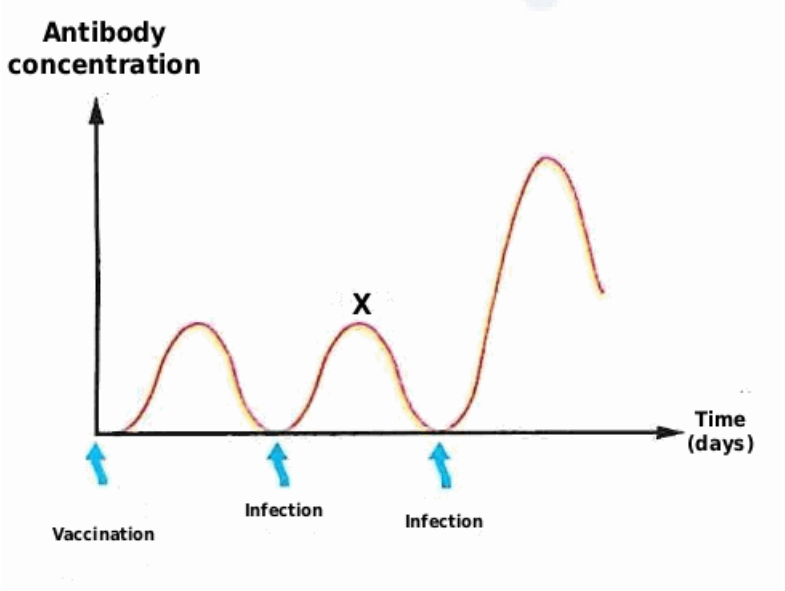
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136 In the opposite graph, what do cells (X), (Y) and (Z) represent?



(A) X: macrophage / Y: B / Z: plasma B
(B) X: T / Y: B / Z: killer T
(C) X: B / Y: plasma B / Z: memory B
(D) X: B / Y: memory B / Z: plasma B

137 The opposite graph shows the degree of the immune response in the body of a person vaccinated with a vaccine. What is the cause of the symptoms appearing in stage (X)?



(A) The vaccine used is for another pathogen
(B) The vaccine used was not prepared properly
(C) The immune cells did not respond to the vaccine
(D) The vaccine inhibits the activity of (B) cells

Essay questions — 14 questions

1 What lines and means of defense does the influenza virus meet until it reaches the lung cells?

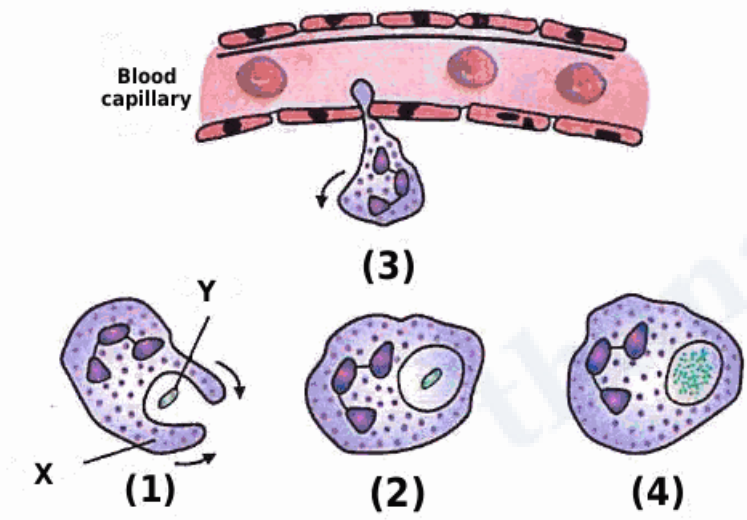
2 Study the opposite figure, which shows the role of one type of white blood cells in fighting infection:

(1) What is cell (X)?

(2) Is cell (X) specific or non-specific? Explain your answer.

(3) How is microbe (Y) destroyed?

(4) What is the correct order of the four stages?

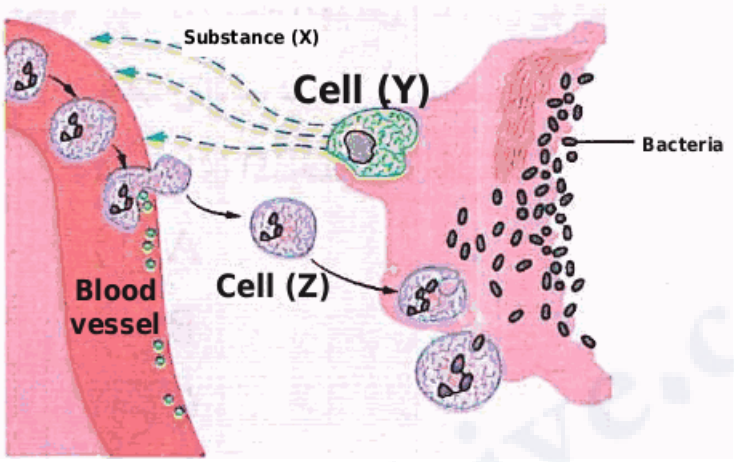


3 Study the opposite figure, which shows the inflammatory response, then deduce:

(1) What are cell (Y) and cell (Z)?

(2) What is substance (X)?

(3) What happens if this line of defense fails to destroy the bacteria?

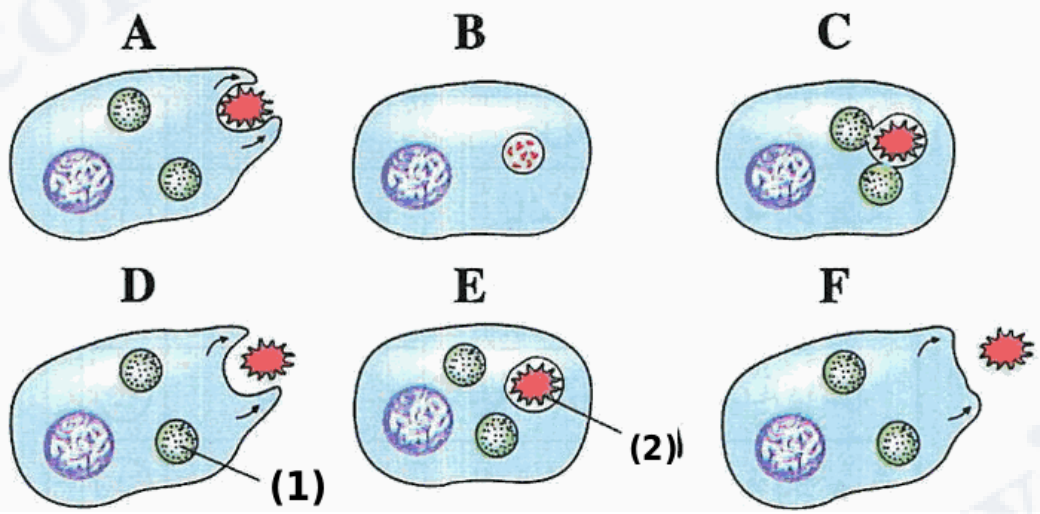


4 The opposite figure shows the stages of a white blood cell swallowing pathogenic bacteria:

(1) What is the correct order of the stages in front of you according to when they happen?

(2) What is organelle number (1)? What is its importance?

(3) Name three types of cells that carry out the same process shown in the figure.



5 Study the opposite diagram, then answer:

(1) What substances does cell (Y) produce?

(2) Where does cell (X) mature?

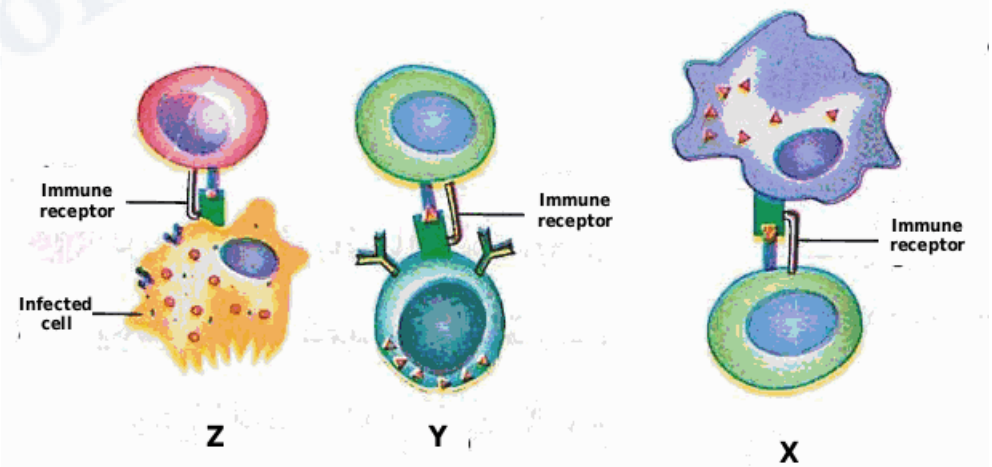


6 The opposite figure shows the work of some cells of the immune system. Answer:

(1) What substance is secreted in case (X)?

(2) What type of immune cell is in case (Z)? What substance does it secrete?

(3) Where are the immune cells in case (Y) formed and activated?



7 The following table shows the result of a blood test of a person after a pathogen attacked his body:

TH: result 25 (normal level from 20 to 30).

TC: result 30 (normal level from 30 to 40).

B: result 7 (normal level from 5 to 10).

NK: result 2 (normal level from 1 to 3).

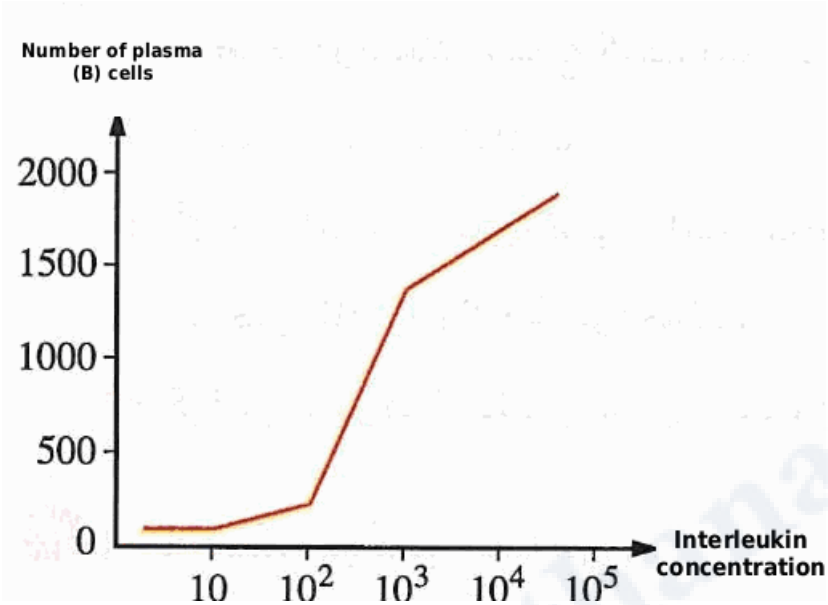
What type of immunity is active in this person? Explain your answer.

8 The opposite graph shows the relationship between the number of plasma B cells and the concentration of interleukins in the blood:

(1) What is the cause of the increase in the concentration of interleukins in the blood?

(2) Which cells decrease in number as the number of plasma B cells increases? Explain your answer.

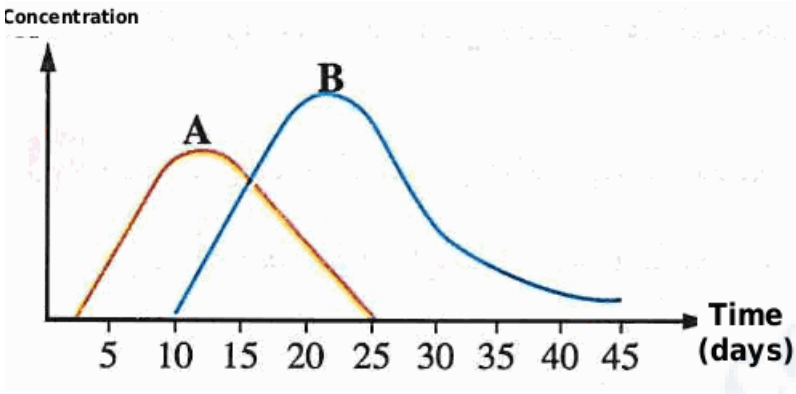
(3) What proteins accompany the increase of plasma B cells? What is their importance?



9 The opposite graph shows the concentration of antigens and the concentration of antibodies in the blood of a person infected by a virus for the first time:

(1) Which of the two curves represents the antigens, and which represents the antibodies? What is your scientific explanation for that?

(2) Which cells are responsible for the decrease in antibody production? When are they activated?



10 The following table shows the extent of the immune response of three organisms of different classification (numbers in thousands of antibodies):

Organism (1): before the first infection zero, during the infection zero, after the infection zero.

Organism (2): before the first infection zero, during the infection 50, after the infection 20

Organism (3): before the first infection zero, during the infection 70, after the infection 64

What can be concluded about these organisms?

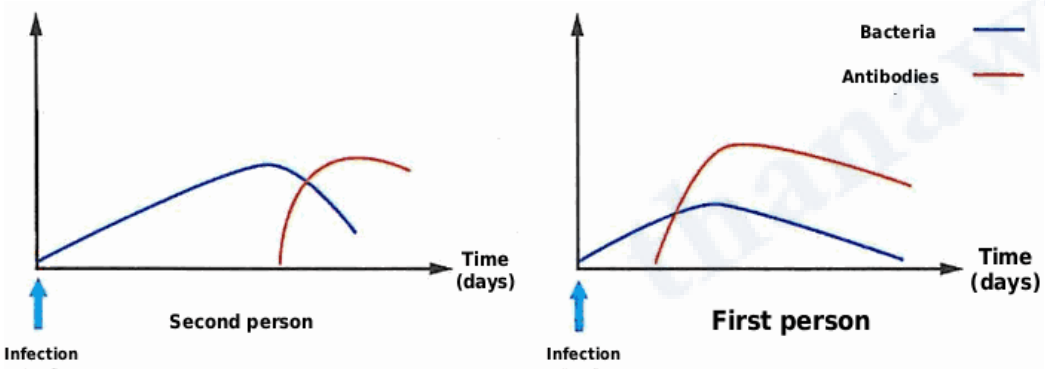
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11 The two opposite graphs show the amount of bacteria and the concentration of antibodies in the blood of two persons infected by the same type of bacteria. Answer the following:

(1) Which of the two persons was infected by this type of bacteria before?

(2) Name the type of lymphocytes responsible for the immune response of the first person.

(3) Which of the two persons shows the symptoms of the disease?



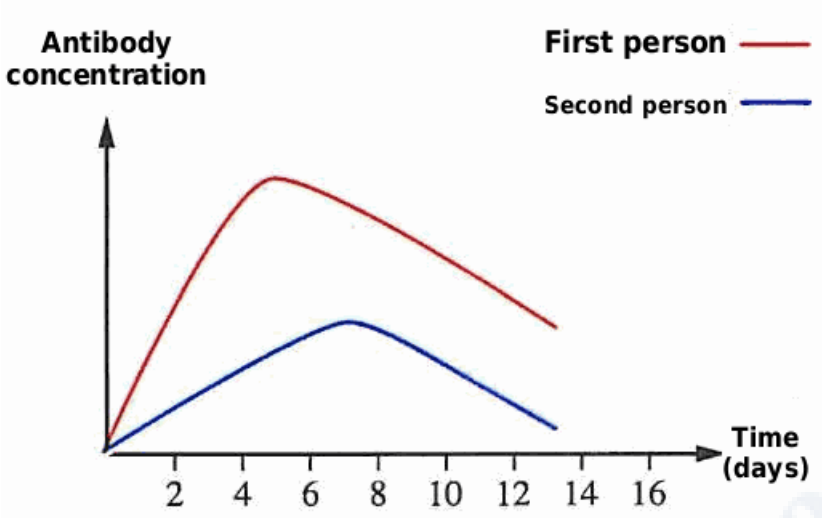
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12 The opposite graph shows a study done by two researchers on the immune state of two persons exposed to malaria. Study it, then answer:

(1) In the light of your study, explain how we can recognize malaria infection.

(2) Which of the two persons shows the symptoms of malaria first? Explain your answer.

(3) How does this parasite reproduce inside the human body?



13 In the middle of last November, scientists succeeded in isolating an antibody from a patient with AIDS, called (N6), which succeeded in resisting 98% of the strains of the AIDS virus in laboratory tests. Scientists hope to inject patients with it to use it for temporary protection from the virus. What is the type of immunity after the injection?

14 Elderly people catch influenza because of their weak immunity, so they are injected with a vaccine (the microbe in a dead or weakened form) to increase their immunity. What is the explanation for that?

Past exam questions — 61 questions

1 Which of the following takes place during the inflammatory response? (Trial exam / June 2021)

(A) Secretion of substances that reduce the blood supply in the infected area

(B) Increase in the activity of phagocytes

(C) Increase in the production of white blood cells in the bone marrow

(D) Secretion of interferons from mast cells

---

2 When a person eats food contaminated with Salmonella bacteria, which defensive means respond, in order? (1st session 2021)

(A) Mucus / stomach secretions

(B) Saliva / Peyer's patches

(C) Saliva / stomach secretions

(D) Peyer's patches / mucus

---

3 During the direct penetration of a microbe, the wall of a plant cell swelled. What immune means in humans is similar to this change? (1st session 2022)

(A) The skin (B) Tears (C) Inflammation (D) Earwax

---

4 Study the following table, which shows the percentages of some white blood cells in a blood test of a person, then deduce: what chemical substance increases in the body of this person? (2nd session 2022)

Neutrophils: result 70 (normal range from 40 to 60).

Monocytes: result 10 (normal range from 2 to 8).

Lymphocytes: result 25 (normal range from 20 to 30).

(A) Perforin

(B) Lymphokines

(C) Complement proteins

(D) Histamine

---

5 Which of the following is not one of the functions of the antibody? (2nd session 2022)

(A) Activating the inflammatory response

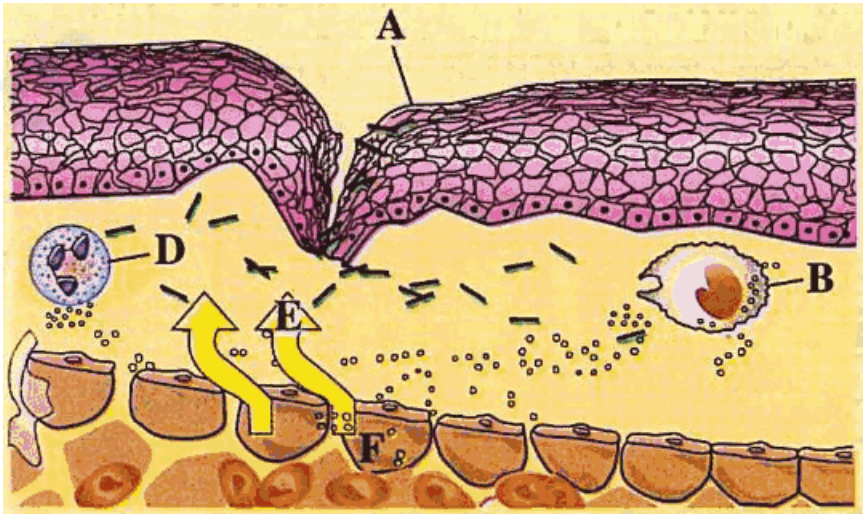
(B) Converting soluble antigens into insoluble ones

(C) Preventing toxins from binding to cells

(D) Preventing virus coats from sticking to cell membranes

---

6 Study the opposite figure, then deduce: which letter points to the cell / organ targeted by the secretions of cell (B)? (2nd session 2023)



7 Which immune cells can cause inflammation and engulf bacteria at the site of infection? (1st session 2023)

(A) Neutrophils (B) Monocytes (C) Macrophages (D) Basophils

8 Which of the following immune means is a physical barrier and not a chemical one? (1st session 2024)

(A) Mucus and saliva
(B) The horny layer and cilia
(C) Tears and sweat
(D) HCl and earwax

9 What is the cause of the redness, pain and swelling of tissues at the site of inflammation? (2nd session 2024)

(A) Accumulation of the fluid leaking from the blood
(B) Accumulation of interferons at the site of inflammation
(C) Phagocytes swallowing the microbe
(D) Tissue damage from a cut wound

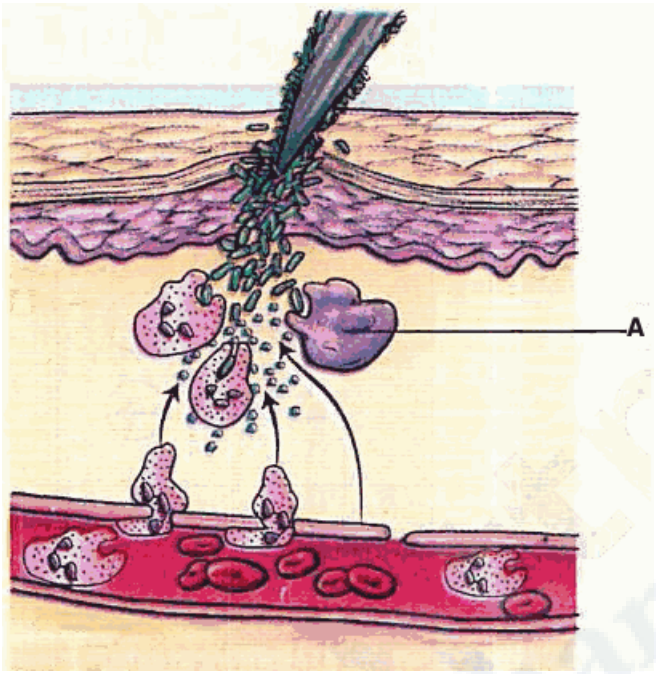
10 Which of the following is correct about the cell and its function? (Sample exam 2025)

(A) Eosinophils - produce antibodies
(B) B lymphocytes - attack foreign cells directly
(C) Basophils - secrete histamine
(D) T lymphocytes - engulf bacteria

11 Which cells are directly affected by histamine? (Sample exam 2025)

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

12 What process does cell (A) show? (Sample exam 2025)



(A) Release of histamine (B) Phagocytosis

(C) Swelling of tissues (D) Passage of interferons

13 Study the following table, which shows the result of a blood test of a person, then determine: what type of immunity is active in this person? (Trial exam / June 2021)

TH: result 50 (normal level from 20 to 30).

TC: result 30 (normal level from 30 to 40).

B: result 20 (normal level from 5 to 10).

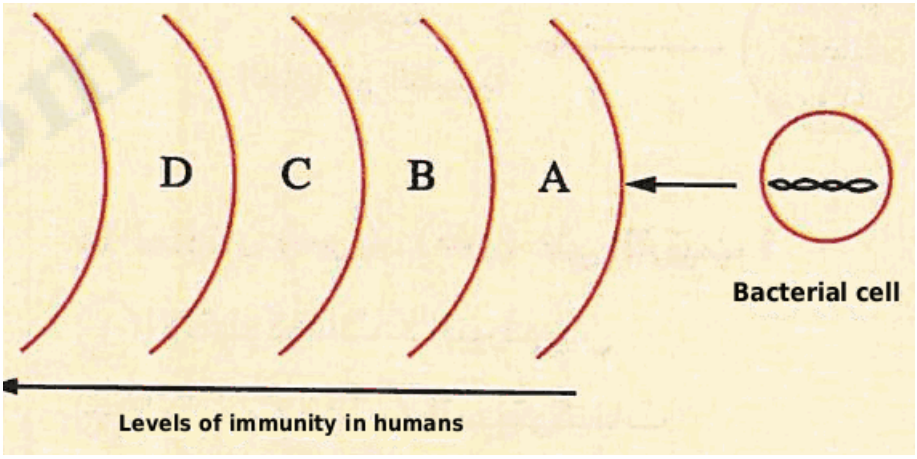
NK: result 2 (normal level from 1 to 3).

(A) Humoral (B) Cell-mediated (C) Non-specific (D) Inherited

14 What substance's secretion is evidence of the integration between humoral and cell-mediated immunity together? (Trial exam / June 2021)

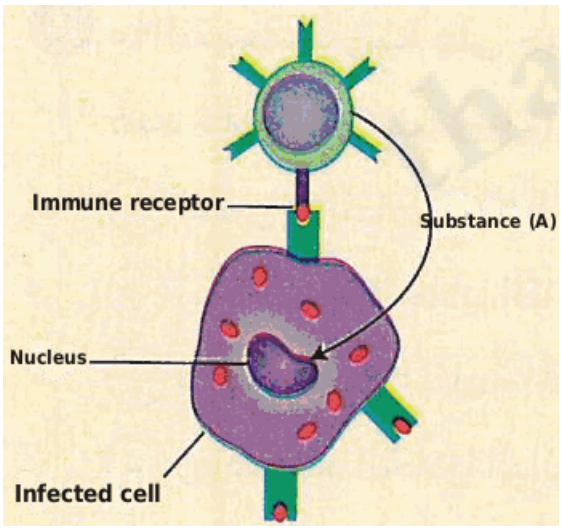
(A) Cytokines (B) Lymphokines (C) Interferons (D) Histamine

15 From the opposite figure, which of the following is found at immunity level (C) only? (1st session 2021)



(A) Interferons (B) Antibodies (C) Histamine (D) Lymphokines

16 The opposite figure shows one of the stages of acquired immunity. What is substance (A)? (1st session 2021)



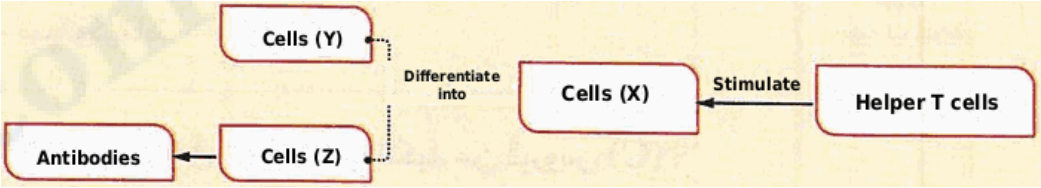
(A) Cytokines (B) Perforin (C) Lymphokines (D) Lymphotoxins

17 A person was infected by a microbe, and medical tests showed a rise in the level of antibodies and activating proteins such as cytokines. Which immune cells have a shared role in increasing both cytokines and antibodies? (2nd session 2021)

(A) B cells (B) Killer T cells
(C) Natural killer cells (D) Phagocytes

18 Study the following diagram, which shows the relationship between some cells of the immune system in humans:

What are the names of cells (X), (Y) and (Z), respectively? (2nd session 2021)



(A) B / plasma B / memory B
(B) B / memory B / plasma B
(C) Plasma B / B / memory B
(D) Plasma B / memory B / B

19 Which of the following is not affected when there is a defect in the gene that forms the hormone thymosin? (1st session 2022)

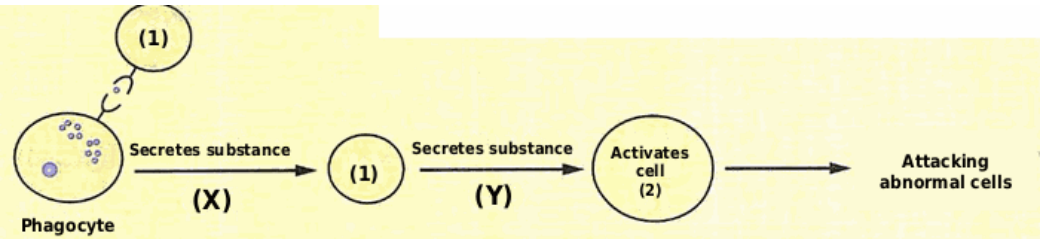
(A) Perforin (B) Antibodies (C) Interferons (D) Lymphokines

20 Which of the following indicates an increase in the immune response of a person who had a kidney transplant? (1st session 2022)

(A) Cytokines (B) Interleukins (C) Interferons (D) Perforin

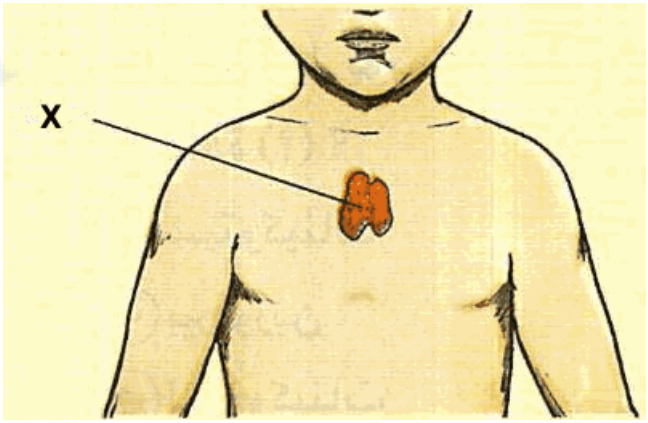
21 Study the drawing in front of you, then determine:

What are the two substances (X) and (Y), respectively? (1st session 2022)



(A) Interleukins / perforin
(B) Cytokines / lymphokines
(C) Interleukins / cytokines
(D) Perforin / lymphotoxins

22 What is the result of a gene mutation that led to a decrease in the number of cells of structure (X) in a child? (2nd session 2022)



(A) A decrease in the production of lymphoid stem cells

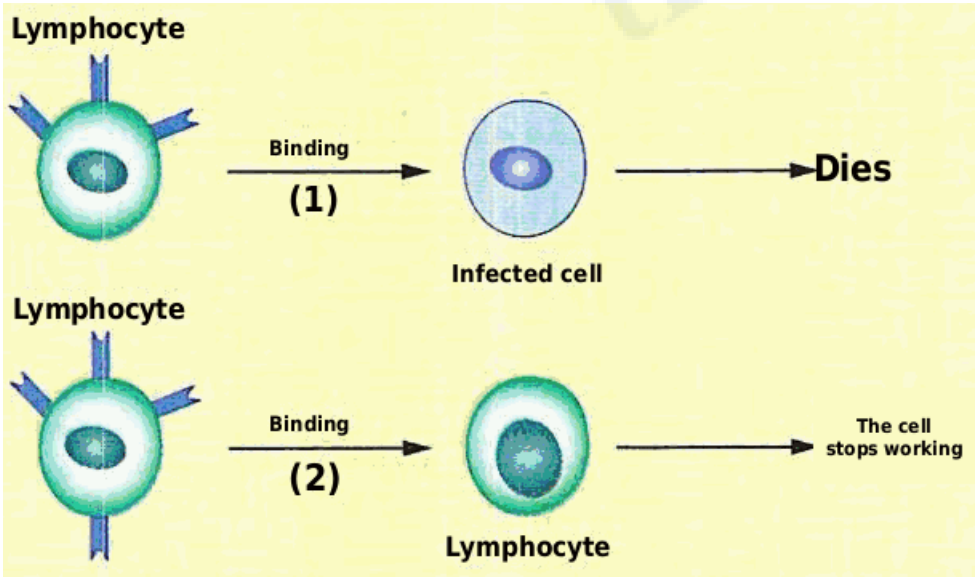
(B) An increase in the differentiation of T cells into their different types

(C) A severe deficiency in acquired immunity

(D) An increase in the number of plasma B cells

---

23 Study the opposite figure, which shows the role of two types of lymphocytes. What substances were produced in (1) and (2), respectively? (Trial exam 2023, Sample exam 2025)



(A) Complement proteins / interleukins

(B) Lymphotoxins / lymphokines

(C) Interleukins / complement proteins

(D) Perforin / cytokines

---

24 Which of the following substances plays no role in healing liver cells from virus (C)? (Trial exam 2023)

(A) Interferons (B) Histamine (C) Lymphotoxins (D) Antibodies

25 A blood test of a person showed a type of bacteria in the blood sample. Which immune cells are responsible for protecting this person? (Trial exam 2023, Sample exam 2025)

(A) Natural killer cells
(B) Plasma B cells
(C) Memory T cells
(D) Cytotoxic T cells

26 Which of the following substances is not a component of the third line of defense in the human body? (Trial exam 2023)

(A) Cytokines (B) Interleukins (C) Interferons (D) Lymphokines

27 What substance do natural killer cells secrete? (1st session 2023)

(A) Perforin (B) Histamine (C) Lymphokines (D) Cytokines

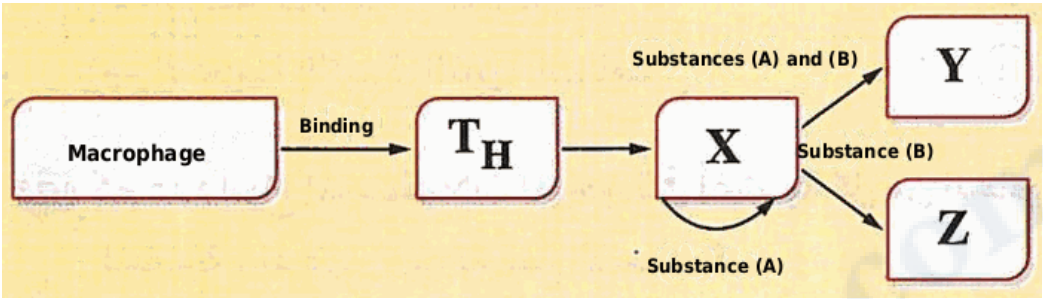
28 What is the correct order of the work of humoral immunity and cell-mediated immunity? (1st session 2023, Sample exam 2025)

(A) Simultaneous
(B) Successive
(C) Separate
(D) One stops the other

29 What distinguishes B cells from plasma B cells? (1st session 2023)

(A) Their ability to produce antibodies
(B) The line of defense they take part in
(C) The presence of receptors on their surface
(D) Their ability to secrete cytokines

30 Study the opposite schematic figure of one of the immune mechanisms in humans, then deduce: what are the cells marked with the letters (X) and (Y), respectively? (2nd session 2023)



(A) Activated helper T / natural killer
(B) Activated helper T / cytotoxic T
(C) Activated helper T / suppressor T
(D) Activated helper T / B

31 What substance acts as a mediator between immune cells and body cells? (2nd session 2023)

(A) Interferons (B) Cytokines (C) Lymphokines (D) Lymphotoxins

32 Why are both B cells and helper T cells specific cells? (2nd session 2023)

(A) Because both belong to cell-mediated immunity
(B) Because both belong to humoral immunity
(C) Because they can recognize more than one type of virus
(D) Because of the presence of one type of receptor on their membranes

33 What immune response in humans is equivalent to hypersensitivity in plants? (2nd session 2023)

(A) Saliva and tears (B) The inflammatory response
(C) Humoral immunity (D) Cell-mediated immunity

34 Suppose a new disease that inhibits the immune system was discovered. Which of the following indicates that the disease affects B cells specifically and not helper T cells or cytotoxic T cells? (Sample exam 2025)

(A) A decrease in the production of interleukin
(B) A decrease in the production of interferon
(C) A decrease in the number of plasma cells
(D) A decrease in the production of chemokines

35 Which of the following is not a shared feature between macrophages and B lymphocytes? (Sample exam 2025)

(A) Both present the antigen to helper T cells
(B) Both contain the MHC protein in their cytoplasm
(C) Both break down the pathogen into antigens
(D) Both contain receptors specific to one type of antigen

36 Which lymphocytes are similar in their mechanism of destroying the pathogen? (Sample exam 2025)

(A) Natural killer and cytotoxic T (B) Phagocytes and helper T
(C) B and phagocytes (D) Natural killer and B

37 Which cells do Ts cells bind to after the microbe is removed? (Sample exam 2025)

(A) Plasma B, cancer cells
(B) Helper T, B, natural killer
(C) Macrophages, cytotoxic T
(D) Helper T, plasma B, cytotoxic T

38 How many types of receptors are found in the membranes of each of the B cells and the helper T cells that attack the measles virus when it attacks the human body? (Sample exam 2025)

(A) One type
(B) Two different types
(C) One type and an MHC protein
(D) Two types and two MHC proteins

39 What is the shared feature between lymphotoxins and interferons? (1st session 2025)

(A) Both destroy virus-infected body cells
(B) Both prevent the virus from entering body cells
(C) Both are secreted by immune cells
(D) Both activate certain genes in body cells

40 What types of immune cells contain the MHC protein? (2nd session 2025)

(A) B cells and macrophages
(B) Macrophages only
(C) B cells only
(D) B cells and plasma B cells

41 In which of the following lines of defense are the cells activated by interleukins? (2nd session 2025)

(A) The second line of defense
(B) The third line of defense
(C) The second and third lines of defense
(D) All lines of defense

42 Each of the following substances acts as a means of communication between different types of immune cells except ..... (2nd session 2025)

(A) cytokines (B) lymphokines (C) lymphotoxins (D) interleukins

43 Which of the following lymphoid organs plays a main role in the maturation of acquired immunity cells? (Sample exam 2026)

(A) The tonsils
(B) Peyer's patches
(C) The thymus gland
(D) The spleen

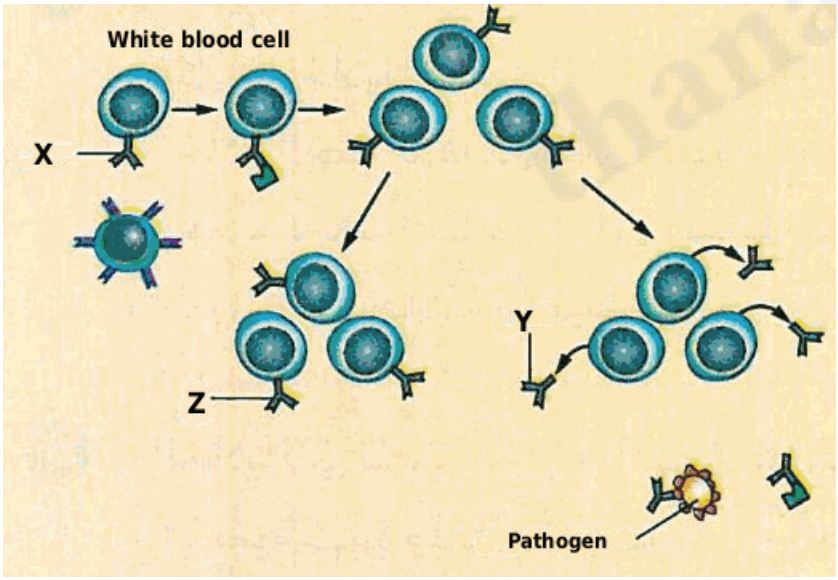
44 What is the first type of white blood cells to attack pathogens when they invade the body? (Sample exam 2026)

(A) Macrophages only
(B) B lymphocytes only
(C) Macrophages and B lymphocytes
(D) Macrophages and helper T cells

45 The complex formed by the binding of the antigen with the MHC protein is formed ..... (Sample exam 2026)

(A) on the membrane of the macrophage only
(B) inside the cytoplasm of B cells only
(C) on the membrane of the macrophage and the membrane of B cells
(D) in the cytoplasm of B cells and the cytoplasm of the macrophage

46 The opposite figure shows some steps of humoral immunity. Which of the following is correct for (X), (Y) and (Z)? (Sample exam 2026)



(A) They have the same chemical structure
(B) They are specific to different antigens
(C) They are produced at the same time
(D) They have different antigen-binding sites

47 Which of the following immune systems in humans will be activated when bacteria enter with inhaled air? (Sample exam 2026)

(A) Innate immunity

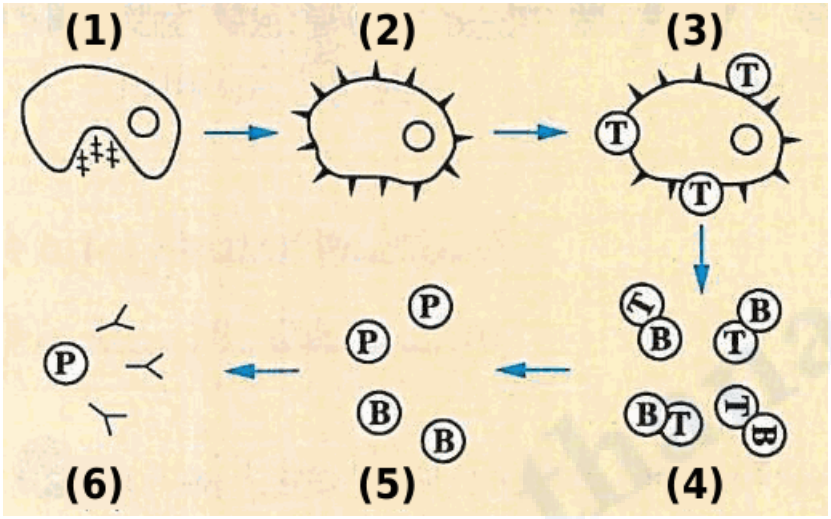
(B) Acquired immunity

(C) Acquired immunity after innate immunity succeeds

(D) Innate and acquired at the same time

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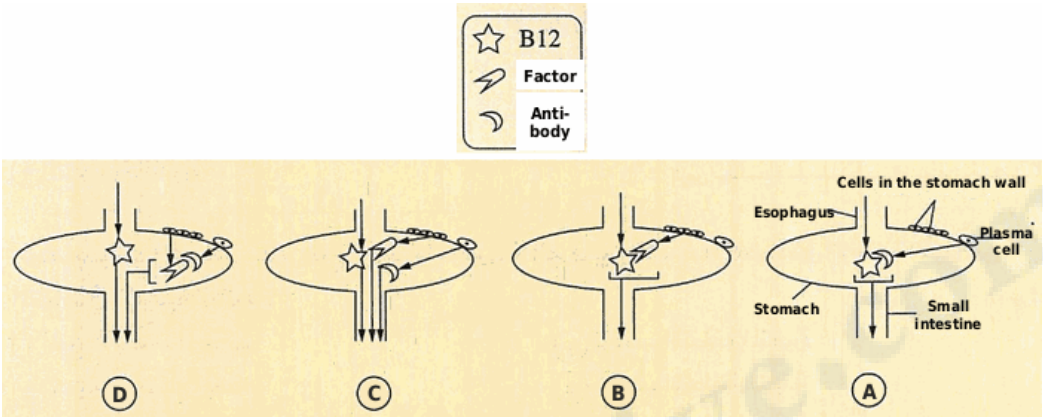
48 In the opposite figure, cell number (1) may be ..... (Sample exam 2026)



(A) a mature B cell (B) a helper T cell (C) a plasma B cell (D) a macrophage

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49 Usually, vitamin B12 enters the stomach and binds to a factor produced by cells in the stomach wall, then the complex (vitamin + factor) moves to the small intestine to be absorbed into the blood. In pernicious anemia, plasma cells produce antibodies against this factor, so the vitamin is not absorbed. Which of the following expresses the pathway followed in the case of this disease? (Sample exam 2026)



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50 What distinguishes natural killer cells from cytotoxic T cells? (1st session 2024)

- (A) Their immune response belongs to the third line of defense only
- (B) Their immune response is slower when attacking infected cells
- (C) Their immune response is specific to a certain microbe
- (D) Their immune response is faster when attacking infected cells

51 The cells of which of the following lines of defense activate the other? (1st session 2024)

- (A) The cells of each of the second and third lines of defense activate the other
- (B) The cells of the second line of defense activate the cells of the third line of defense only
- (C) The cells of the third line of defense activate the cells of the second line of defense only
- (D) There is no mutual activation relationship between the cells of the second and third lines of defense

52 Which cells play immune roles in both the second and third lines of defense? (2nd session 2024)

- (A) Macrophages and natural killer cells
- (B) B and T cells
- (C) Basophils and mast cells
- (D) Phagocytes and B cells

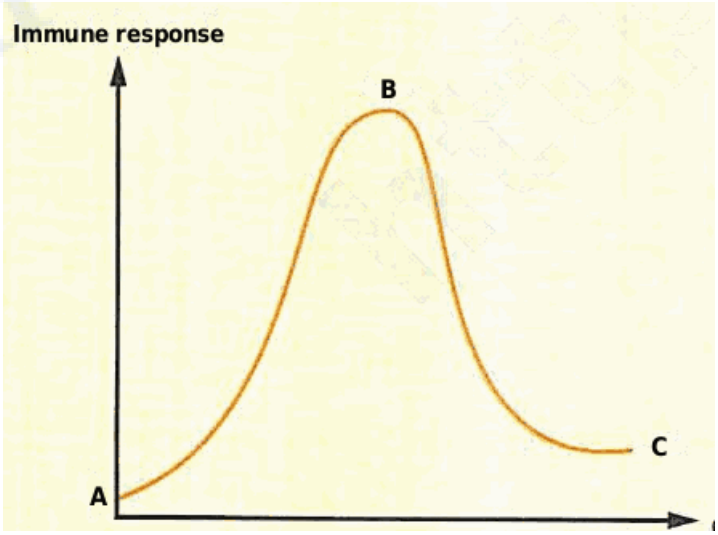
53 What feature distinguishes B cells from macrophages? (2nd session 2024)

- (A) They contain the MHC protein
- (B) They recognize the pathogen
- (C) They can display the antigen on their surface
- (D) They bind to TH cells through their receptors

54 Which cells are not affected by lymphokines? (1st session 2025)

- (A) Plasma B
- (B) Helper T
- (C) Memory B
- (D) Cytotoxic T

55 The opposite graph expresses the rate of the immune response of a person infected by the measles virus. Which cells increase in number in the period from (A) to (B)? (2nd session 2021)



(A) Suppressor T (B) Memory B (C) Cytotoxic T (D) Macrophages

---

56 When a person is infected by the same type of bacteria twice, what is the difference between the antibodies in the first infection and the antibodies in the second infection? (1st session 2022)

(A) The type of antibodies
(B) The structure of the variable region
(C) The amount of antibodies
(D) The structure of the constant region

---

57 A person was infected by a type of bacteria, then was infected again by bacteria of another strain. Which of the following is responsible for the immune response to resist these bacteria when they reach the blood? (1st session 2022)

(A) Monocytes
(B) Antibodies produced by memory (B) cells
(C) Antibodies produced by plasma cells
(D) Eosinophil white blood cells

---

58 What distinguishes the mechanism of work of memory B cells from B cells against the same microbe? (2nd session 2024)

(A) They do not need to divide and differentiate into plasma cells

(B) They do not need activation by TH cells

(C) They do not need to recognize the antigen again

(D) There is no difference between their mechanisms of work

---

59 A person was infected by microbe (A) at the age of 5 and recovered, then was infected by microbe (B) at the age of 7 and recovered, then was infected by microbe (A) at the age of 30 and showed no symptoms of the disease. How many times did the immune system of this person give primary and secondary immunity, respectively? (Sample exam 2025)

(A) Primary 2, secondary 1

(B) Primary 1, secondary 1

(C) Primary 1, secondary 2

(D) Primary 2, secondary 2

---

60 The following table shows three immune mechanisms: (Sample exam 2025)

Mechanism (A): monocytes, phagocytes, basophils, mast cells.

Mechanism (B): helper T, B, natural killer, killer T.

Mechanism (C): memory T, memory B, phagocytes, killer T.

Which letter / letters point to the mechanism that is not accompanied by the appearance of disease symptoms?

(A) (A) and (B)

(B) (A) and (C)

(C) (A) only

(D) (C) only

---

61 Which of the following cells can recognize the type of antigen directly? (Sample exam 2026)

(1) Plasma B. (2) Helper T. (3) Macrophage. (4) B. (5) Memory B.

(A) (1) and (3)

(B) (2) and (4)

(C) (4) and (5)

(D) (3) and (5)

Answer key and solutions

Multiple choice questions

1	2	3	4	5	6	7	8	9	10
B	A	A	C	C	D	B	A	C	B
11	12	13	14	15	16	17	18	19	20
A	A	C	A	D	A	A	D	B	B
21	22	23	24	25	26	27	28	29	30
D	B	B	C	C	A	B	D	B	C
31	32	33	34	35	36	37	38	39	40
C	A	D	A	B	A	B	C	A	D
41	42	43	44	45	46	47	48	49	50
A	A	C	A	D	D	C	C	B	A
51	52	53	54	55	56	57	58	59	60
C	B	A	C	D	D	D	A	C	A
61	62	63	64	65	66	67	68	69	70
D	A	B	D	D	A	A	A	B	A
71	72	73	74	75	76	77	78	79	80
A	A	C	B	A	B	A	D	D	D
81	82	83	84	85	86	87	88	89	90
A	D	B	C	B	A	D	D	A	C
91	92	93	94	95	96	97	98	99	100
C	C	A	A	B	A	B	C	D	C
101	102	103	104	105	106	107	108	109	110
D	C	C	B	A	B	A	C	D	A
111	112	113	114	115	116	117	118	119	120
B	C	A	B	A	D	D	D	B	D
121	122	123	124	125	126	127	128	129	130
C	A	B	A	B	C	B	A	B	D
131	132	133	134	135	136	137			
A	C	C	C	C	D	A			

1 **Answer (B)**

The virus entered through the respiratory system, so the mucus and cilia failed to stop it.

2 **Answer (A)**

The salivary glands secrete saliva into the mouth, that is, inside the body.

3 **Answer (A)**

Tears are secreted outside the body through ducts.

4 **Answer (C)**

Skin, tears, mucous membranes and HCl acid belong to the first line of defense.

5 **Answer (C)**

Lysozyme is an enzyme that breaks down bacterial cell walls.

6 **Answer (D)**

Mucus is a sticky substance that traps microbes.

7 **Answer (B)**

Histamine increases the permeability of blood vessels, so the cells move to the infected tissue.

8 **Answer (A)**

The acidic medium of urine is a means of natural immunity.

9 **Answer (C)**

The cilia expel dust and microbes, so they do not reach the lungs.

10 **Answer (B)**

An antigen is a foreign substance that triggers the immune response.

11 **Answer (A)**

Phagocytosis is a mechanism of innate immunity; the others are acquired immunity.

12 **Answer (A)**

Some means of natural immunity, such as the skin, work from the moment the microbe arrives.

13 **Answer (C)**

The cell is a neutrophil engulfing bacteria.

14 **Answer (A)**

T cells are specific and do not take part in non-specific immunity.

15 **Answer (D)**

Non-specific immunity does not need an antigen.

16 **Answer (A)**

The cell swallows the bacteria and digests them, so it is a macrophage.

17 **Answer (A)**

All white blood cells are produced in the bone marrow.

18 **Answer (D)**

Histamine increases the permeability of small blood vessels at the wound.

19 **Answer (B)**

Histamine increases the permeability of blood vessels to plasma, and antibodies do not enter cells.

20 **Answer (B)**

Histamine dilates blood vessels, so more blood reaches the infected part and its temperature rises.

21 **Answer (D)**

Injury by the wound (2), then migration of cells (3), then engulfing the bacteria (1).

22 **Answer (B)**

Histamine does not direct B cells towards the site of infection.

23 **Answer (B)**

Inflammation is fast and is not specific to a certain microbe.

24 **Answer (C)**

B cells are specific, while the second line of defense is non-specific.

25 **Answer (C)**

26 **Answer (A)**

27 **Answer (B)**

28 **Answer (D)**

Inflammation does not identify the type of the microbe; that is the work of specific immunity.

29 **Answer (B)**

The antibody and RNA belong to specific immunity, while the lysosome digests the bacteria non-specifically.

30 **Answer (C)**

The blood vessels dilate under the effect of histamine secreted by basophils and mast cells.

31 **Answer (C)**

Basophils secrete histamine at the beginning of inflammation.

32 **Answer (A)**

Histamine dilates blood vessels, so blood flow increases during the infection and returns to normal on healing.

33 **Answer (D)**

Histamine is the trigger for the rest of the inflammation steps.

34 **Answer (A)**

Chemokines attract phagocytes to the wound site in the first stage.

35 **Answer (B)**

The inflammation is caused by histamine, so an antihistamine is prescribed.

36 **Answer (A)**

Specific lymphocytes are activated in the blood when the microbe is present.

37 **Answer (B)**

Antibodies are produced by B cells in specific immunity.

38 **Answer (C)**

The receptor is what binds to the complex of the antigen and the MHC protein.

39 **Answer (A)**

The helper T cell divides and multiplies after recognizing the antigen.

40 **Answer (D)**

The MHC protein displays the antigen on the cell surface, and it depends on the presence of a receptor on TH cells.

41 **Answer (A)**

Cell (A) has a receptor on its surface, which is a feature of specific cells.

42 **Answer (A)**

(Y) is the mucus on the surface, the first line; (X) is the phagocytic blood cells, the second line; and (Z) is the antibodies, the third line.

43 **Answer (C)**

Cytokines are secreted by specific cells during adaptive immunity.

44 **Answer (A)**

Humoral immunity protects against pathogens found in the body fluids.

45 **Answer (D)**

(Y) is a phagocyte in the second and third lines of defense, and (Z) is T cells in the third line only.

46 **Answer (D)**

Binding of the antigen to the receptor, then formation of memory cells, then antibodies, then destruction.

47 **Answer (C)**

TC cells secrete lymphotoxins in the third line of defense.

48 **Answer (C)**

After being broken into pieces, the antigen binds to the MHC protein inside the cell.

49 **Answer (B)**

Cytokines and interferons are substances that stimulate certain cells.

50 **Answer (A)**

Mast cells belong to the second line of defense.

51 **Answer (C)**

Interferons protect neighboring cells from the virus.

52 **Answer (B)**

Response (Y) is fast and short, so it is innate, and (X) is slower and longer, so it is acquired.

53 **Answer (A)**

Lymphotoxins activate the programmed cell death genes in the infected cell.

54 **Answer (C)**

Killer T cells secrete perforin, which makes holes in the membrane.

55 **Answer (D)**

Cytotoxic T cells and natural killer cells attack cancer cells.

56 **Answer (D)**

Interleukins and cytokines activate B cells.

57 **Answer (D)**

58 **Answer (A)**

The antigen is what antibodies bind to.

59 **Answer (C)**

TH activate B cells to produce antibodies, which activate complement proteins.

60 **Answer (A)**

The neutrophil engulfs the bacteria.

61 **Answer (D)**

(X) is a receptor on the cell surface that binds to the pathogen.

62 **Answer (A)**

TS cells suppress the response, so their number does not increase during the infection.

63 **Answer (B)**

Innate immunity is ready, while acquired immunity needs time to be activated.

64 **Answer (D)**

The receptor on the TH cell binds to the antigen bound to the MHC protein.

65 **Answer (D)**

Complement proteins are activated by antibodies produced by plasma cells.

66 **Answer (A)**

TS cells become active at the end of the response to suppress it, not during the infection.

67 **Answer (A)**

Mucus is a fast innate response, and antibodies appear later.

68 **Answer (A)**

69 **Answer (B)**

(X) is a TH cell that secretes a substance that activates the B cell (Y), so it divides into plasma and memory cells.

70 **Answer (A)**

(M) is a substance secreted by TH (interleukins), and (K) is a plasma cell that secretes antibodies.

71 **Answer (A)**

The neutrophil has the shortest life and works in acute inflammation.

72 **Answer (A)**

73 **Answer (C)**

Rejection of transplanted organs is the work of cell-mediated immunity.

74 **Answer (B)**

Toxins are neutralized by antibodies, and this is a humoral response.

75 **Answer (A)**

TC cells attack foreign cells, so they must be stopped for the transplant to succeed.

76 **Answer (B)**

77 **Answer (A)**

Histamine belongs to the second line of defense.

78 **Answer (D)**

TH secrete cytokines, and plasma cells produce antibodies.

79 **Answer (D)**

All T cells have immune receptors on their surface.

80 **Answer (D)**

The antigen (Z) rises then falls, and the antibodies (Y) appear later.

81 **Answer (A)**

Chemokines and cytokines attract phagocytes.

82 **Answer (D)**

(5) produces antibodies, so it is a B cell, and (7) secretes lymphotoxins, so it is TC.

83 **Answer (B)**

Cell (2) reacts with the antigen, is activated by TH, then divides, so it is a B cell.

84 **Answer (C)**

Cell (4) activates cells (3) and (2), so it is a helper T cell.

85 **Answer (B)**

Cell (6) produces antibodies, so it is a plasma B cell.

86 **Answer (A)**

Mast cells are not cells of specific immunity, so they are not affected by TS.

87 **Answer (D)**

88 **Answer (D)**

Histamine is related to inflammation, not to cell-mediated immunity.

89 **Answer (A)**

TH are activated by the interleukins they secrete.

90 **Answer (C)**

TC work in cell-mediated immunity only.

91 **Answer (C)**

TH first, then TC, then TS at the end to suppress the response.

92 **Answer (C)**

The antigen binds to the MHC protein, then it is displayed on the cell surface.

93 **Answer (A)**

TC is a mature cell that is active in cell-mediated immunity.

94 **Answer (A)**

The proteins (X) on the virus surface are antigens recognized by B cells.

95 **Answer (B)**

The TC cell secretes perforin, and the infected cell secretes interferons.

96 **Answer (A)**

NK cells attack any infected cell without specificity.

97 **Answer (B)**

(X) is a TC cell that secretes perforin, with which it makes holes in the virus-infected cell (Y).

98 **Answer (C)**

The virus-infected cell secretes interferons.

99 **Answer (D)**

TH recognize the antigen only together with the MHC protein.

100 **Answer (C)**

TH mature in the thymus and activate both humoral and cell-mediated immunity, so all acquired immunity becomes weak.

101 **Answer (D)**

The antigen binds to the receptors of B cells and to the antibody.

102 **Answer (C)**

103 **Answer (C)**

The memory cell divides on the second exposure and produces plasma B cells.

104 **Answer (B)**

Memory cells are a feature of specific immunity.

105 **Answer (A)**

The immune response produces antibodies, which are immunoglobulins.

106 **Answer (B)**

The change in the virus makes secondary immunity ineffective, because memory cells do not recognize it.

107 **Answer (A)**

A memory B cell produces only one type of antibody, the one specific to its antigen.

108 **Answer (C)**

Plasma B cells have not formed yet, so the antibodies are delayed.

109 **Answer (D)**

The secondary response is faster and larger than the primary one because of memory cells.

110 **Answer (A)**

(Y) is a primary response that may result from vaccination, and (Z) is a fast secondary response.

111 **Answer (B)**

The second exposure gives a faster and higher response than the first.

112 **Answer (C)**

Memory cells control the secondary response (Z) only.

113 **Answer (A)**

Each type of memory cell is specific to one antigen.

114 **Answer (B)**

Memory cells recognize the similar protein and produce antibodies against it.

115 **Answer (A)**

The younger brother was not exposed to the microbe before, so plasma cells produce them.

116 **Answer (D)**

Curve (X) starts at a high concentration, so it is a secondary response, and (Y) starts from zero, so it is primary.

117 **Answer (D)**

Cells (Z) are formed in the second stage and remain, so they are memory B cells.

118 **Answer (D)**

The same microbe entering a second time gives a larger response thanks to memory cells.

119 **Answer (B)**

Suppressor T cells inhibit the plasma cells that produce antibodies (Y).

120 **Answer (D)**

121 **Answer (C)**

Recognizing the antigen, then interleukins, then division and differentiation of B, then antibodies.

122 **Answer (A)**

Person (A) has a high antibody concentration from the beginning, so the antibodies are ready-made from the serum.

123 **Answer (B)**

Activating B cells takes time, so the primary response is slow.

124 **Answer (A)**

Antibodies appeared after 5 days, so the first exposure was on 2 March.

125 **Answer (B)**

The second fast rise after day 25 shows a second exposure on 2 April.

126 **Answer (C)**

Memory cells work in the secondary response from (D) to (E).

127 **Answer (B)**

128 **Answer (A)**

The primary response starts on the fifth day, and memory cells are formed in it.

129 **Answer (B)**

Plasma cells are produced in the primary response, then in the secondary response after day twenty.

130 **Answer (D)**

131 **Answer (A)**

The serum is ready-made antibodies that disappear quickly, and the vaccine forms memory cells.

132 **Answer (C)**

The blood of a recovered person has antibodies that are used as a serum.

133 **Answer (C)**

There is no response after vaccination, so the vaccine was not prepared properly.

134 **Answer (C)**

Memory cells were formed during the first exposure, so they protect against the second infection.

135 **Answer (C)**

(C) is a low, slow response to antigen Y for the first time, and (B) is the secondary response to antigen X.

136 **Answer (D)**

(Y) is a memory cell that acts on the second infection, and (Z) is a plasma cell that produces antibodies.

137 **Answer (A)**

There is no response after vaccination, so the vaccine is for another pathogen.

Essay questions

1 **Model answer**

First line of defense: the mucus in the respiratory passages, which sticks to the virus so that it is then expelled by the cilia in the respiratory passages.

Second line of defense: allowing interferons to pass to the site of infection to prevent the spread and reproduction of the virus, and allowing natural killer cells to pass, which attack the virus-infected cells by secreting the protein perforin that makes holes in the infected cells and destroys them.

Third line of defense: humoral immunity, by producing antibodies by plasma B cells to neutralize the virus and stop its activity, and cell-mediated immunity by T lymphocytes.

2 **Model answer**

(1) A neutrophil white blood cell.

(2) Non-specific / because it can swallow pathogens and is not specific against a certain type of them.

(3) By swallowing it, digesting it and breaking it into pieces by the granules inside cell (X).

(4) (3) then (1) then (2) then (4).

3 **Model answer**

(1) Cell (Y): a mast cell; cell (Z): a neutrophil white blood cell.

(2) Substance (X): histamine.

(3) Acquired immunity in the body (the third line of defense) is activated, represented by lymphocytes, which respond with a series of specific defensive means to resist the pathogen through the two mechanisms of humoral and cell-mediated immunity.

4 **Model answer**

(1) F then D then A then E then C then B

(2) The lysosome / breaking down the pathogenic bacteria into antigens.

(3) Basophil, eosinophil and neutrophil white blood cells, and monocytes after they turn into phagocytes (mentioning three cells is enough).

5 **Model answer**

(1) Interleukins and cytokines.

(2) In the red bone marrow.

6 **Model answer**

(1) Interleukin proteins.

(2) The cytotoxic «killer» T cell (Tc) / the protein perforin, which makes holes in the membrane of the infected cell.

(3) B and T cells are formed in the red bone marrow and activated in the blood.

7 **Model answer**

Natural (innate) immunity / the results in the table show normal ratios within the normal level of lymphocytes, which indicates that the natural means of the body were effective in resisting, fighting and breaking down the pathogen that tried to enter the body.

8 **Model answer**

(1) Helper T cells binding, through their immune receptor, to the complex formed by the binding of the antigen and the MHC protein turns them into activated helper T cells that release interleukins.

(2) Activated B cells / because activated B cells divide and multiply into plasma B cells and memory B cells, so the number of activated B cells decreases and the number of plasma B cells increases.

(3) Antibodies / antibodies bind to pathogens to make them within reach of white blood cells so that they engulf and destroy them.

9 **Model answer**

(1) (A) represents the antigens, (B) represents the antibodies / because the concentration of antigens (A) decreases after the concentration of antibodies (B) increases.

(2) Suppressor T cells (Ts) / they are activated after the antigens are destroyed (on day 25 on the curve).

10 **Model answer**

Organism (1) is an invertebrate, because it cannot produce antibodies.

Organisms (2) and (3) are vertebrates, because they can produce antibodies during the infection.

11 **Model answer**

(1) The first person.

(2) Memory cells are responsible for the secondary immune response, and they are the same type of cells that recognized the same bacteria before.

(3) The second person.

12 **Model answer**

(1) When the symptoms of malaria fever appear (high temperature / shivering / heavy sweating).

(2) The second person / because his immune response is slow, as it takes time to reach the maximum production of B and T cells, which need time to multiply, so the antibody concentration is lower, the infection spreads widely in the body and the symptoms of the disease appear.

(3) It reproduces asexually by fragmentation.

13 **Model answer**

Short-term acquired immunity.

14 **Model answer**

The vaccine (the microbe in a dead or weakened form) stimulates their immune system to form memory cells (B and T) that stay in the blood for a long time to recognize the same microbe as soon as it enters the body during the second encounter. The memory cells then start dividing quickly, and their fast activity produces plasma B cells that produce antibodies, as well as many active T cells within a short time, because their numbers are much larger than those of B and T cells, so they take less time to recognize the pathogen and respond to it. That is why the vaccine gives protection for long periods.

Past exam questions

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

1 **Answer (B)**

In the inflammatory response, the blood supply to the infected area increases and the activity of phagocytes increases to swallow the microbes.

2 **Answer (C)**

Saliva in the mouth is the first to meet the bacteria, then the acidic stomach secretions.

3 **Answer (C)**

Swelling of the plant cell wall is a local response after penetration, and its equivalent in humans is the inflammatory response.

4 **Answer (D)**

The high percentage of neutrophils and monocytes indicates inflammation, so histamine increases.

5 **Answer (A)**

Antibodies convert soluble antigens into insoluble ones and prevent toxins and viruses from binding to cells.

They do not activate the inflammatory response, which is activated by histamine.

6 **Answer (B)**

Cell (B) is a mast cell that secretes histamine, which targets the blood vessels (F), dilating them and increasing their permeability.

7 **Answer (D)**

According to the textbook: basophils cause inflammation and take part in engulfing bacteria.

8 **Answer (B)**

The horny layer of the skin and the cilia are physical barriers.
Mucus, saliva, tears, sweat, HCl and earwax are chemical barriers.

9 **Answer (A)**

Leakage of fluid from the blood into the tissues causes swelling, redness and pain.

10 **Answer (C)**

Basophils secrete histamine.

11 **Answer (D)**

Histamine affects the body cells of the walls of blood vessels, dilating them and increasing their permeability.

12 **Answer (B)**

Cell (A), outside the blood vessel, swallows the bacteria entering through the wound: phagocytosis.

13 **Answer (A)**

The number of B cells (20) is higher than the normal level, and helper T cells are high to activate them, so the active immunity is humoral.

14 **Answer (A)**

Cytokines are secreted by cells of both humoral and cell-mediated immunity, so they are evidence of the integration between them.

15 **Answer (B)**

(A) is the first line, (B) is the second line and (C) is the third line.
Antibodies are found in the third line of defense only.

16 **Answer (D)**

The cytotoxic T cell binds to the infected cell and secretes lymphotoxins, which activate genes in its nucleus that lead to its destruction.

17 **Answer (D)**

Phagocytes display the antigen to helper T cells and activate them to secrete cytokines and activate B cells to produce antibodies.

18 **Answer (B)**

(X) B cells are activated by helper T cells and differentiate into memory B (Y) and plasma B (Z) cells that produce antibodies.

19 **Answer (C)**

Thymosin is needed for the maturation of T cells, so perforin, lymphokines and antibodies (activation of B cells) are affected.
Interferons are secreted by virus-infected cells, so they are not affected.

20 **Answer (A)**

An increased immune response against the transplanted kidney is accompanied by increased secretion of cytokines.

21 **Answer (C)**

The phagocyte secretes interleukins (X), which activate the helper T cell (1).
The helper T cell secretes cytokines (Y), which activate cell (2) to attack abnormal cells.

22 **Answer (C)**

(X) is the thymus gland, and a decrease in its cells reduces the maturation of T cells, causing a severe deficiency in acquired immunity.

23 **Answer (B)**

(1) The cytotoxic T cell secretes lymphotoxins, so the infected cell dies.
(2) The suppressor T cell secretes lymphokines, so the work of lymphocytes stops.

24 **Answer (B)**

Histamine causes inflammation and plays no role in destroying the virus.
Interferons, lymphotoxins and antibodies resist the virus.

25 **Answer (B)**

Bacteria in the blood are destroyed by antibodies produced by plasma B cells.

26 **Answer (C)**

Interferons are secreted by virus-infected cells and belong to the second line of defense.

27 **Answer (A)**

Natural killer cells secrete perforin, which makes holes in the membrane of the infected cell.

28 **Answer (A)**

Humoral and cell-mediated immunity work at the same time (simultaneous).

29 **Answer (C)**

B cells have receptors on their surface with which they recognize the antigen, while plasma cells produce antibodies.

30 **Answer (D)**

The phagocyte activates TH, which becomes an activated helper T cell (X) that secretes the substances that activate B cells (Y) and cytotoxic T cells (Z).

31 **Answer (D)**

According to the textbook: lymphotoxins are secreted by cytotoxic T cells and affect infected body cells.

32 **Answer (D)**

Each B cell or helper T cell has one type of receptor that recognizes a certain antigen, so they are specific.

33 **Answer (D)**

Hypersensitivity in plants gets rid of infected cells, and its equivalent in humans is cell-mediated immunity, which destroys infected cells.

34 **Answer (C)**

B cells differentiate into plasma cells, so a decrease in the number of plasma cells shows that B cells specifically are affected.

35 **Answer (D)**

Macrophages are non-specific, so they have no receptors specific to one type of antigen.

36 **Answer (A)**

Natural killer cells and cytotoxic T cells both destroy infected cells by secreting substances that make holes in them or destroy them.

37 **Answer (D)**

Suppressor T cells bind to helper T cells, plasma B cells and cytotoxic T cells and stop their activity after the microbe is destroyed.

38 **Answer (A)**

Each B cell or helper T cell carries one type of receptor specific to the antigen of the measles virus.

39 **Answer (D)**

Lymphotoxins activate genes that destroy the infected cell, and interferons activate genes that produce enzymes that prevent the reproduction of the virus.

40 **Answer (A)**

B cells and macrophages contain the MHC protein to display the antigen to helper T cells.

41 **Answer (B)**

Interleukins activate helper T cells, which belong to the third line of defense.

42 **Answer (C)**

Lymphotoxins affect infected cells and do not act as a means of communication between immune cells.

43 **Answer (C)**

T cells, which are acquired immunity cells, mature in the thymus gland.

44 **Answer (A)**

Macrophages are the first to attack pathogens (second line of defense).

45 **Answer (D)**

The antigen binds to the MHC protein inside the cytoplasm of the B cell and the macrophage, then the complex is displayed on their surface.

46 **Answer (A)**

(X) is the receptors of the B cell, and (Y) and (Z) are antibodies, and all are proteins with the same chemical structure.

47 **Answer (A)**

Bacteria entering with inhaled air activate innate immunity (mucus and cilia) first.

48 **Answer (D)**

Cell (1) swallows the microbe and displays the antigen on its surface to activate T cells: it is a macrophage.

49 **Answer (D)**

The antibodies bind to the factor, so it does not bind to the vitamin, and the vitamin passes without being absorbed, as in figure (D).

50 **Answer (D)**

Natural killer cells attack infected cells faster because they do not need activation.

51 **Answer (A)**

Phagocytes (second line) activate helper T cells, and helper T cells activate phagocytes.

52 **Answer (A)**

Macrophages and natural killer cells work in the second line of defense and take part in the third line of defense.

53 **Answer (B)**

B cells recognize the pathogen specifically through their receptors.

54 **Answer (C)**

Lymphokines are secreted by suppressor T cells to stop the activity of immune cells, and memory B cells are not affected by them.

55 **Answer (C)**

In the period from (A) to (B), the immune response against the virus increases, so the number of cytotoxic T cells increases.

56 **Answer (C)**

In the second infection, memory cells produce a larger amount of the same antibodies.

57 **Answer (D)**

Memory cells do not recognize the new strain, so the cells of natural immunity (eosinophils) resist it when it reaches the blood.

58 **Answer (B)**

Memory B cells do not need activation by TH cells.

59 **Answer (A)**

Infection by (A) then (B) for the first time: two primary responses; infection by (A) a second time: one secondary response.

60 **Answer (D)**

Mechanism (C) depends on memory cells, so it destroys the microbe quickly without disease symptoms appearing.

61 **Answer (D)**