

Model Answers: Medium

1

The correct answer is **B** because:

- Endocytosis is the process of **engulfing** a pathogen that is either attached to the surface of the cell or marked by an antibody
- A vacuole is formed around the bacteria
- Digestive enzymes are released from **lysosomes** into the vacuole
- The products of digestion are excreted from the cell by **exocytosis**

The whole process described above is 'phagocytosis'.

2

The correct answer is **B** because:

- Antigens are often **cell-surface proteins**
- **Proteins** are macromolecules made from the elements carbon, hydrogen, nitrogen (as well as oxygen), and cysteine and methionine also contain sulfur in their R-groups.

A is incorrect as	The common 20 amino acids found in living organisms that are used to synthesise proteins do not contain phosphorus. Phosphorus is found in nucleotides.
C is incorrect as	carbon is the central element to all biomolecules.
D is incorrect as	all amino acids contain nitrogen in the amine group, so nitrogen must be included.

3

The correct answer is **C** – this statement is not correct as **phagocytes** do not participate in the specific immune response, they will engulf and digest all types of pathogen and foreign material when activated.

A is incorrect as	phagocytes need ATP for endocytosis.
B is incorrect as	phagocytes will digest foreign material using hydrolytic enzymes; enzymes that breakdown complex biomolecules.
D is incorrect as	phagocytes are white blood cells with lobed nuclei.

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The correct answer is **A** because memory cells form from some of the cells produced when activated **B-** and **T-lymphocytes** divide by mitosis; these memory cells enhance the immune response if a **secondary infection** with a pathogen with the same antigen invades the body again.

B is incorrect as	antibody receptors bind with complementary antigens.
C is incorrect as	only B-lymphocytes form plasma cells when they are stimulated by cytokines from a helper T cell .
D is incorrect as	only helper T cells release cytokines which stimulate B cells to divide into plasma cells and secrete antibodies.

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The correct answer is **A** because:

- The first step is that a helper T cell encounters an antigen-presenting cell (APC) to which it has a complementary receptor
- The activated T cell then divides by mitosis, some of the cells produced then release **cytokines**; these activate the **B-lymphocytes**
- The B-lymphocytes that are specific to the antigen divide by **mitosis**
- Some of the B-lymphocytes will form **plasma cells**
- The plasma cells formed will make **specific antibodies**

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The correct answer is **B** because:

- B-lymphocytes form **plasma cells** and secrete **antibodies** into the blood
- T-lymphocytes do not form plasma cells; they are activated when they come across a specific antigen to which they have a complementary receptor, in so doing they **divide** forming active cells that **secrete cytokines** and **memory cells**
- There are two main types of T-lymphocytes, **helper T cells** and **killer T cells**; **helper T cells** produce cytokines to stimulate the B cells, **killer T cells** are cytotoxic and destroy cells that are displaying foreign antigens.

A is incorrect as	macrophages are not stimulated by B cells
C is incorrect as	T-lymphocytes are formed in the bone marrow and mature in the thymus.
D is incorrect as	B-lymphocytes divide to produce memory cells.

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The correct answer is **D** because:

- T lymphocytes can produce **memory cells** to give long term immunity
- They can also destroy infected cells (**cytotoxic**)
- There are two main types of T-lymphocytes, **helper T cells** and **killer T cells**; **helper T cells** produce cytokines to stimulate the B cells, **killer T cells** are cytotoxic

A & B are incorrect as	T cells have a wider function that just destroying infected cells or producing memory cells.
C is incorrect as	T cells do not produce antibodies.

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The correct answer is **C** because:

- **B-lymphocytes** can act as **antigen-presenting** cells and present the antigens to the helper T cells
- They do not act in the **cell-mediated response**; this a role of **T-lymphocytes**
- They do not produce **antibodies** immediately after formation; relatively short-lived plasma cells formed when an activated B I
- **T-lymphocytes** are processed in the **thymus**, not B lymphocytes

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The correct answer is **D** because:

- Lysosomes are membrane-bound organelles containing **hydrolytic enzymes**
- If the bacteria prevent the lysosome from working then the **macrophages** will not be able to engulf and digest the bacteria

A is incorrect as	vesicles do not contain hydrolytic enzymes .
B is incorrect as	ribosomes are the site of protein synthesis .
C is incorrect as	the Golgi body modifies and packages proteins in the cell; it is not specifically involved in an immune response.

10

The correct answer is **D**. This statement is **incorrect** because:

- The production of **antibodies** by the body describes **active** (and not passive) **immunity**
- **Active immunity** is immunity gained when an antigen enters the body, an immune response occurs and antibodies are produced by plasma cells. This activation also results in the production of memory cells which enable a more rapid immune response if a secondary infection with the same pathogen occurs again in the future.

A is incorrect as	a specific immune response does involve the activation of B-lymphocytes and T-lymphocytes
B is incorrect as	natural active immunity is produced when the immune response is activated.
C is incorrect as	lysosomes fuse with vacuoles and secrete hydrolytic enzymes to digest invading microorganisms.

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The correct answer is **D** because:

- **Myasthenia gravis** is an example of an **autoimmune** disease; this is where the immune system attacks one or more antigens in the body, this makes statement 3 correct.
- One of the main symptoms of myasthenia gravis is muscle weakness as the antibodies are targeting the **neuromuscular junctions** between motor neurones and skeletal muscle cells, this makes statement 4 correct.

A & B are incorrect as	the antibodies are not attacking the central nervous system
C is incorrect as	this is not a symptom of myasthenia gravis