Phagocytes and specific antibodies

Student activity • observation and reasoning

YEAR 10 / LESSON 61 / BIOLOGY + SCIENCE (DOUBLE AWARD)

The question

How do different white blood cells contribute to defence?

Use the supplied examples, record your reasoning and correct it using evidence.

Equipment

- Student booklet, pencil and ruler
- Paper antigen and antibody shape sets with several complementary and non-matching shapes

Paper, modelling and written reasoning only. No chemicals or biological samples are handled.

Course coverage: Shared Biology / Double Award: 2.62. White-cell responses.

Plan, model or apparatus sketch

Draw and label the apparatus or biological model; identify one limitation.

Method and reasoning

Read the whole sequence before starting

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1. Draw a sequence showing a phagocyte surrounding, engulfing and digesting a pathogen.

2. Use differently shaped paper antigens and antibody binding sites to model specificity.

3. Explain that lymphocytes can give rise to cells secreting antibodies that bind particular antigens.

4. Distinguish an antigen from an antibody and from the whole pathogen.

5. Explain how antibody binding can help neutralise a target or make it easier for immune mechanisms to remove it.

6. Evaluate the shape model: it illustrates matching but not the full molecular interactions or diversity of immune responses.

Cleanup

- Return models and keep the corrected work.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Phagocytosis involves ingestion and digestion. Antibodies are proteins with binding sites specific to particular antigen features; they are not living cells or antibiotics. The two processes cooperate but are not interchangeable. This is a paper model with no pathogen culture or body-fluid handling.

Example / trial	Observation / evidence	Explanation / limit
Evidence / comparison		
Explanation		
Limit / correction		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. What does a phagocyte do?

2. Which white-cell group is associated with specific antibody responses?

3. What is an antibody?

4. What is an antigen?

5. Does one antibody bind every pathogen?

6. Give a paper-model limitation.