Health & Disease: Vaccinations & Immune Response

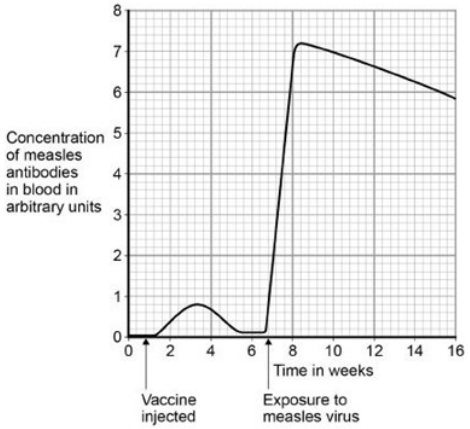
Exam Question

Measles is a serious disease. A person can die from measles. The table below shows the number of medically confirmed cases of measles in England and Wales between 2012 and 2015

Year	Number of medically confirmed cases of measles
2012	2030
2013	1843
2014	121
2015	91

One reason for the decrease in the number of cases of measles is that more children were vaccinated against the disease. Vaccinating a large proportion of the population reduces the spread of the measles virus.

The graph below shows the concentration of measles antibodies in the blood of a boy



Explain the differences between antibody production after the vaccine injection and after exposure to the measles virus.

You should include data from the graph above [6 marks]

Now, what do we need to know?

- Measles is caused by a virus, that means we can not treat it with antibiotics.
- Vaccines allow a dead or altered form of the disease causing pathogen to be introduced into the body, which contain a specific antigen . This causes the immune system, specifically the white blood cells , to produce complementary antibodies , which target and attach to the antigen.

Model Answer

differences (after exposure to measles virus):

- greater number / higher concentration of antibodies produced
- quantitative statement, e.g. 9 times higher **or** 0.8 to 7.2
- antibodies produced sooner − idea of immediate response
- antibodies produced quicker
- antibodies stay (in higher concentration) for longer

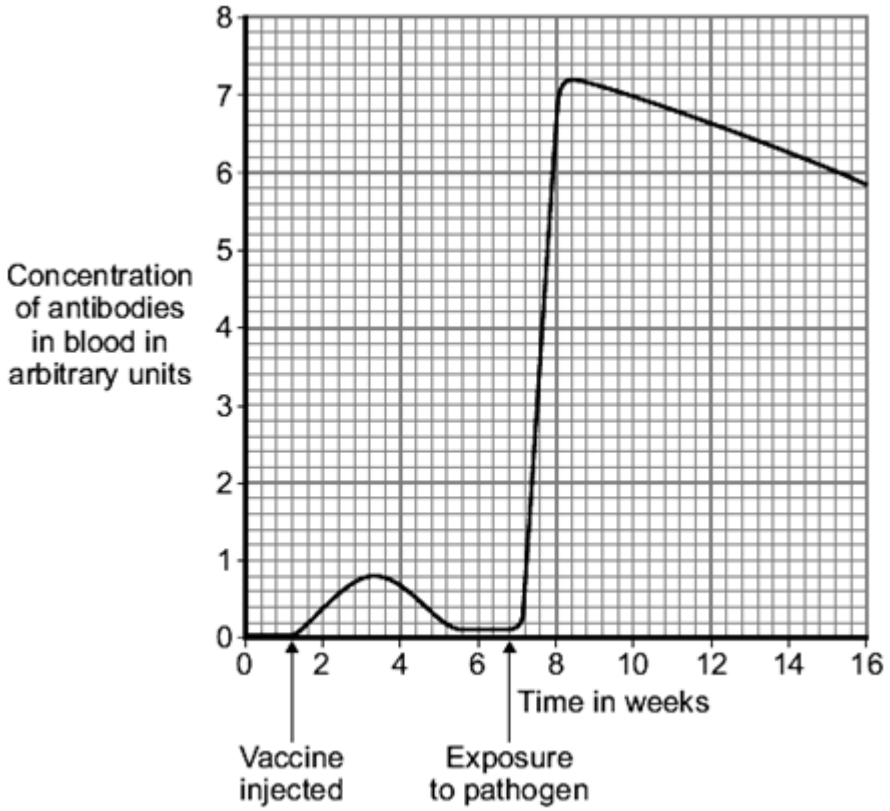
explanation

- white blood cells / leucocytes / lymphocytes / B cells
  ignore phagocytes / macrophages
- reference to previous exposure (of white blood cells) to pathogen / virus
- (white blood cells) recognise pathogen / virus / antigen
- memory cells
- production of specific / correct antibodies

Exam Question

A person was injected with a vaccine. A few weeks later the person was exposed to the pathogen they had been immunised against.

The graph shows how the concentration of antibodies in the blood changed after injection of the vaccine and after exposure to the pathogen.



(i) Describe in detail the differences between antibody production after the injection of the vaccine **and** after the person was exposed to the pathogen.

[3 marks]

(ii) Suggest an explanation for the differences you have described in part (i).

[3 marks]

Health & Disease: Vaccinations & Immune Response