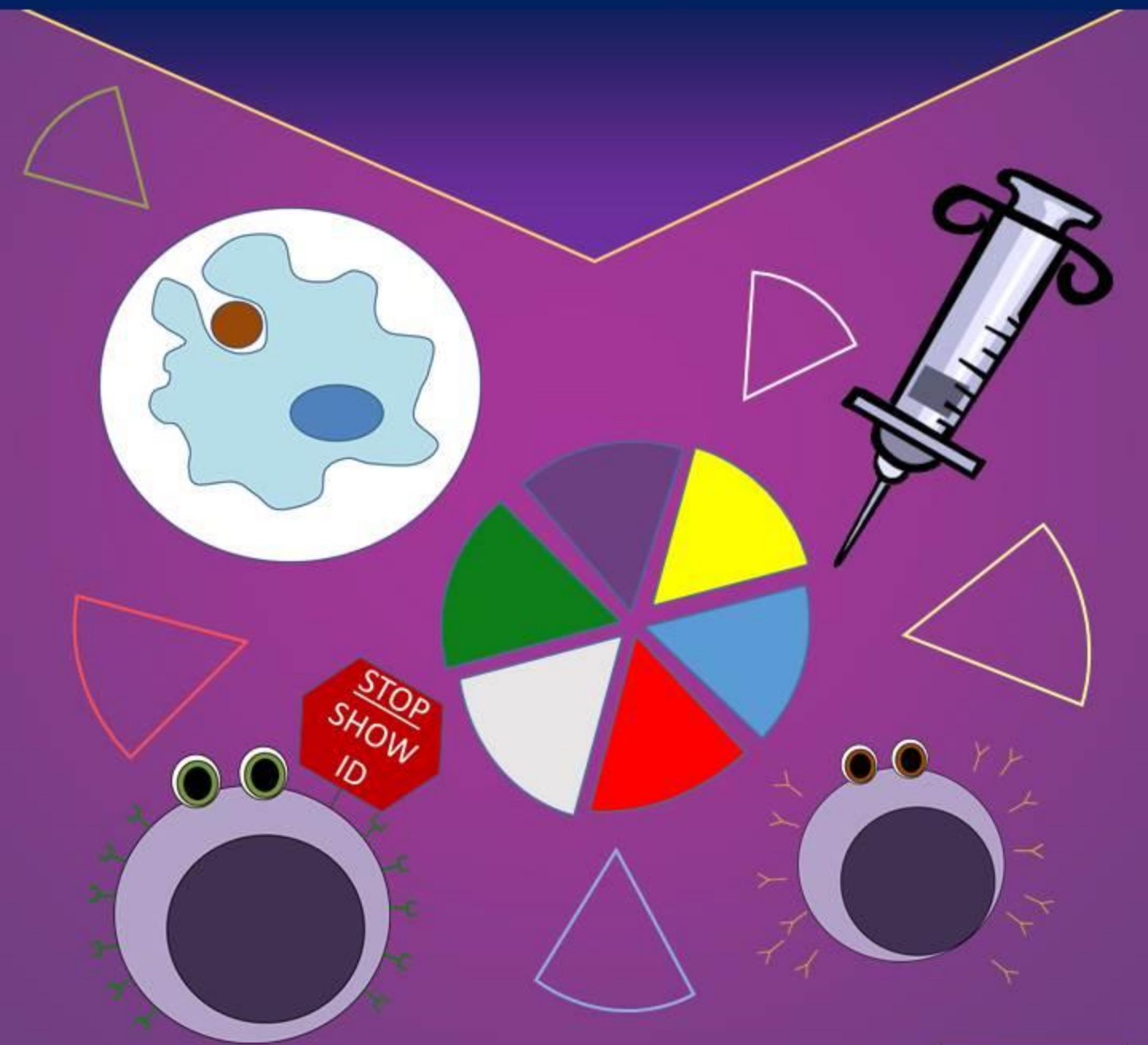
MANCHESTER 1824
The University of Manchester

ImmunoPursuit



Twitter: #parasiteselfie @MancImmunoGroup
WormWagon@facebook
www.mig.ls.manchester.ac.uk/impact/

The Worm Wagon
Wriggling...
Writhing...
Wow!

ImmunoPursuit

Welcome to the immunology battle ground! Your body has a fierce army of highly trained specialists to destroy any germs that dare try and infect you!

Hidden behind the fortress of your skin are frightening phagocytes waiting to swallow germs whole and brutal bacteria slaying B cells! Amazing antibodies fearlessly reveal invaders to the immune system authorities and **vigorous vaccines** train your body so the **germs don't stand a chance!**

Is your knowledge of this secret struggle enough to conquer your components, in the race for ImmunoPie?

Find out more:
Twitter: #parasiteselfie @MancImmunoGroup
WormWagon@facebook
www.mig.ls.manchester.ac.uk/impact/

This game was created at the WormWagon by Laura Lewis, Ruth Stoney, Sheena Cruickshank and Kathryn Else

Rules

- Role the dice
- Answer a question on one of the following topics

1	Antibodies
2	T cells and cell mediated immunity
3	Defence Mechanisms
4	Vaccination
5	Phagocytosis
6	B cells and humeral immunity

- If you answer correctly collect a piece of pie in the corresponding colour
- The first player to build a pie with slices in all 6 colours wins

Vaccination

Q. In 1988 which vaccine was combined to replace three separate vaccines in the UK?

Vaccination

A. MMR

Vaccination

Q. Why are oral treatments (e.g. antibiotics) of cholera rarely effective?

Vaccination

A. Rapidly flushed from the intestines by diarrhoea that is symptomatic of the disease

Vaccination

Q. Why is it important to have few side effects to a vaccination?

Vaccination

A. Unpleasant side effects discourage people from being vaccinated

Vaccination

Q. Why is passive immunity not as long lasting as active immunity?

Vaccination

A. The individual is not producing the antibodies themselves; therefore they are not replaced when they are broken down in the body

Vaccination

Q. What is active immunity?

Vaccination

A. The stimulation and production of antibodies by the individuals own immune system

Vaccination

Q. What is the term that describes the protective effect of vaccinating the majority of the population?

Vaccination

A. Herd immunity

Vaccination

Q. What is immunity?

Vaccination

A. The ability of an organism to resist infection

Vaccination

Q. Which type of immunity is longer lasting, passive or active?

Vaccination

A. Active

Vaccination

Q. True or False?

Individuals may develop a disease immediately after vaccination but before there immunity levels are high enough to prevent it?

Vaccination

A. True

Vaccination

Q. What is an attenuated vaccine?

Vaccination

A. A vaccine created by reducing the virulence of a pathogen, but still keeping it viable or alive

Vaccination

Q. What is passive immunity?

Vaccination

A. The introduction of antibodies, from an external source into an individual

Vaccination

Q. What does MMR stand for?

Vaccination

A. Measles, mumps and rubella.

Vaccination

Q. MMR vaccine was wrongly suggested to increase the incidence of which disorder?

Vaccination

A. Autism

Vaccination

Q. Why is it difficult to develop a vaccine against certain diseases such as cholera?

Vaccination

A. The antigens of the pathogen change rapidly (antigenic variability).

Vaccination

Q. True or false?

The increase in HIV infection has lead to more people with impaired immune systems. This makes them more likely to contract tuberculosis.

Vaccination

A. True

Vaccination

Q. What type of immunity does vaccination develop towards a pathogen?

Vaccination

A. Adaptive

Vaccination

Q. What is called when pathogens frequently mutate and change their antigens

Vaccination

A. Antigenic variability

Vaccination

Q. Give an example of a common pathogen that has a high rate of antigenic variability

Vaccination

A. Influenza virus, common cold virus

Vaccination

Q. Give an example of a pathogen that is able to "hide" from the body's immune system to avoid detection.

Vaccination

A. Cholera, salmonella, malaria parsite

Vaccination

Q. Which disease was the first vaccine developed for?

Vaccination

A. Smallpox

Vaccination

Q. Why is it difficult to develop a vaccine against certain diseases such as cholera?

Vaccination

A. High levels of antigenic variability

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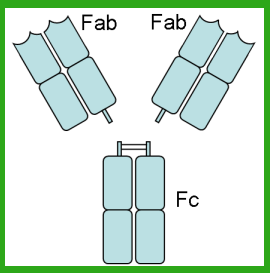
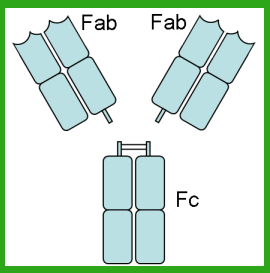
V22



Antibodies

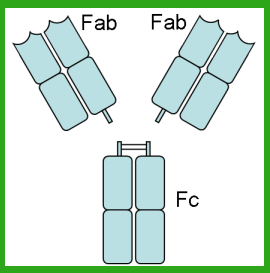
Q. True or False?

Monoclonal antibodies can be used to "knock out" specific T cells that cause rejection of transplanted organ.



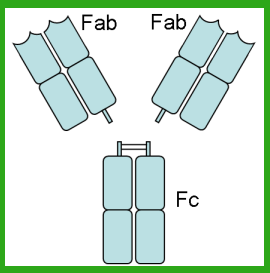
Antibodies

A. True



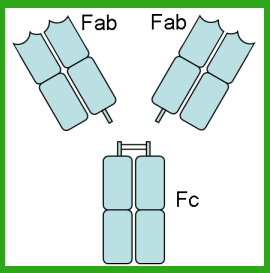
Antibodies

Q. Which cells synthesise antibodies?



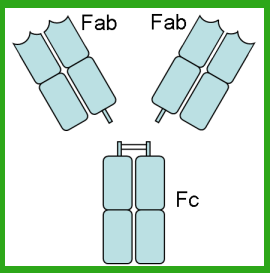
Antibodies

A. B cells



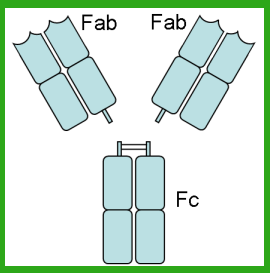
Antibodies

Q. How many polypeptide chains make up an antibody?



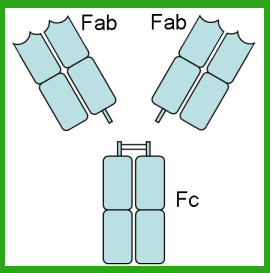
Antibodies

A. 4



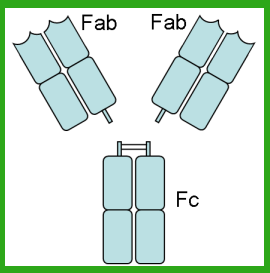
Antibodies

Q. What are antibodies made of?



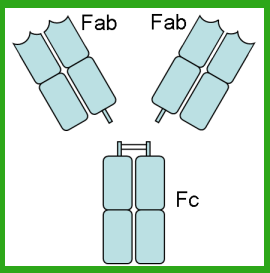
Antibodies

A. Protein



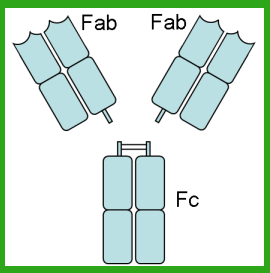
Antibodies

Q. Name one of the scientists involved in developing the method for the production of monoclonal antibodies?



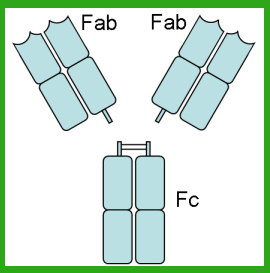
Antibodies

A. Cesar Milstein or Georges Kohler



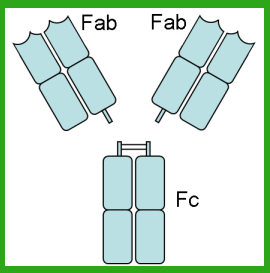
Antibodies

Q. In which region is the binding site on the antibody located?



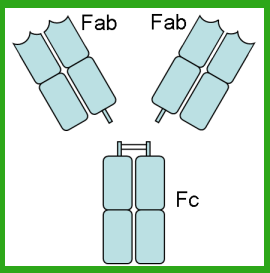
Antibodies

A. The variable region



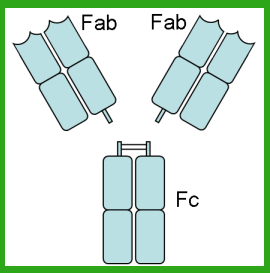
Antibodies

Q. What is the complex formed by an antibody binding to antigen called?



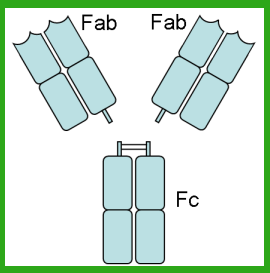
Antibodies

A. Antigen – antibody complex



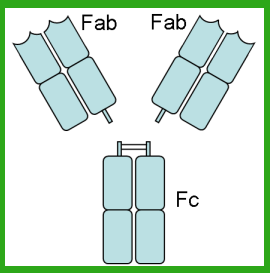
Antibodies

Q. In which year was a method for the production of monoclonal antibodies developed?



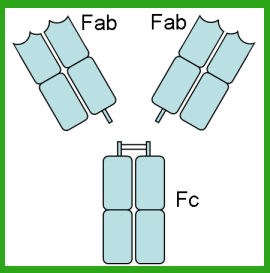
Antibodies

A. 1975



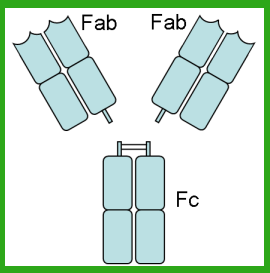
Antibodies

Q. Name one of the pairs of chains that make up antibodies.



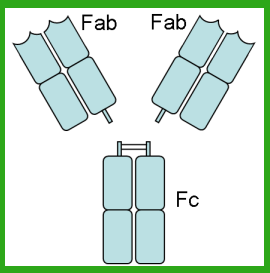
Antibodies

A. Heavy or light chains



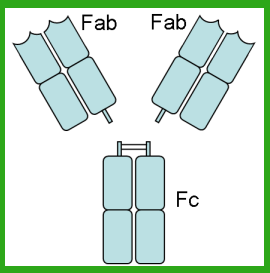
Antibodies

Q. What is the name of the region on an antibody that binds to receptors on cells?



Antibodies

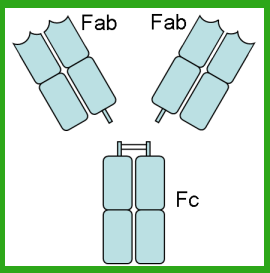
A. Constant region



Antibodies

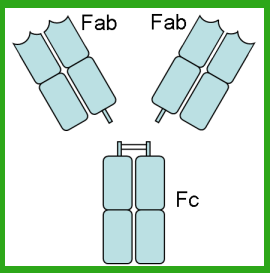
Q. True or False?

Antibodies are very specific; each antigen has its own individual antibody



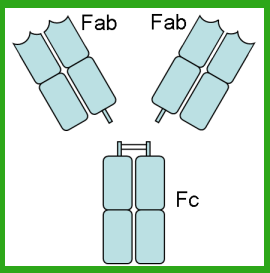
Antibodies

A. True



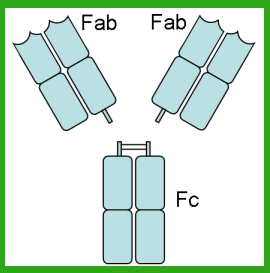
Antibodies

Q. What is the name of the method that uses antibodies to calculate the amount of a substance in a mixture?



Antibodies

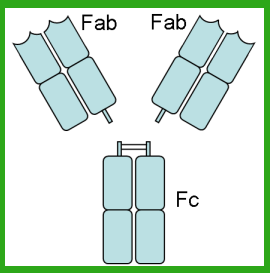
A. Immunoassay



Antibodies

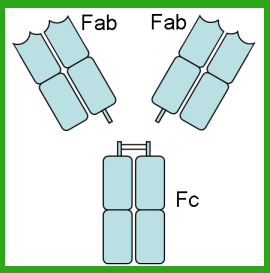
Q. True or False?

Transgenic mice can be used to eliminate the need for humanisation of antibodies.



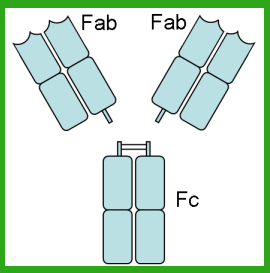
Antibodies

A. True



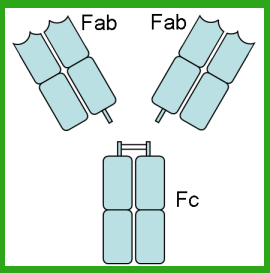
Antibodies

Q. What is a group of antibodies with specificity for a variety of different antigens known as?



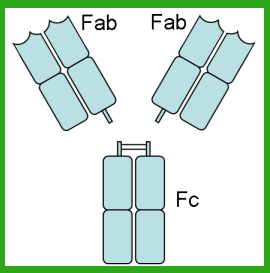
Antibodies

A. Polyclonal antibodies



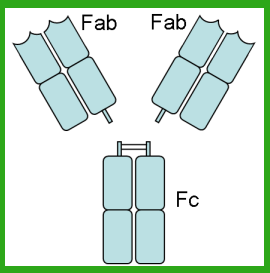
Antibodies

Q. Which type of cells are used to produce monoclonal antibodies?



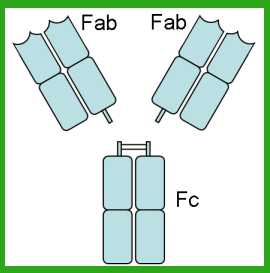
Antibodies

A. Cells that divide readily / cancer cells



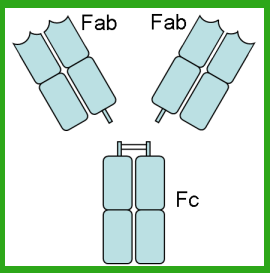
Antibodies

Q. Name one reason why it is so difficult to produce monoclonal antibodies from B cells?



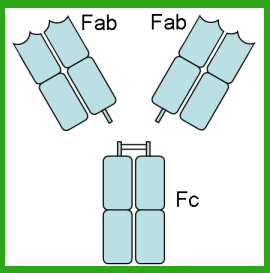
Antibodies

A. B cells are short lived and will only divide inside a living organism



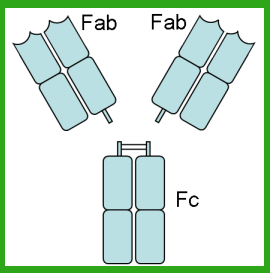
Antibodies

Q. What is a group of antibodies with specificity for only one antigen knows as?



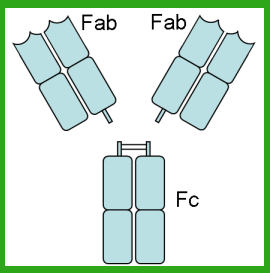
Antibodies

A. Monoclonal antibodies



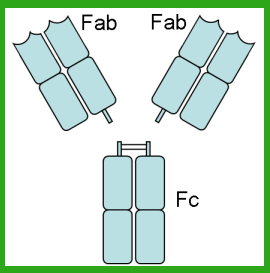
Antibodies

Q. From which organ in the mice are the polyclonal antibodies extracted during the monoclonal production process?



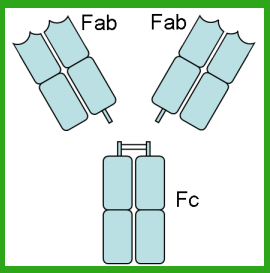
Antibodies

A. Spleen



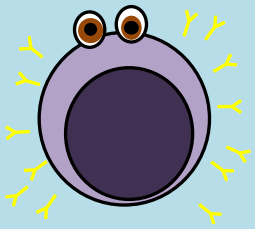
Antibodies

Q. Which letter of the alphabet best describes an antibody's shape?



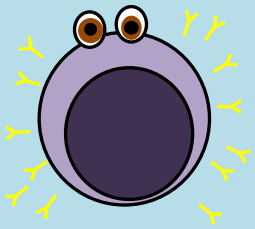
Antibodies

A. Y



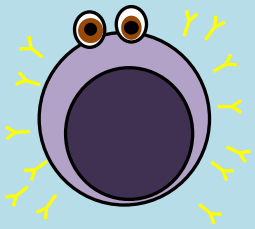
B cells and Humoral immunity

Q. Which part of the pathogen do B cells take up?



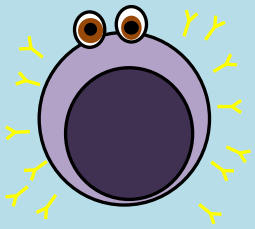
B cells and Humoral immunity

A. Surface antigens



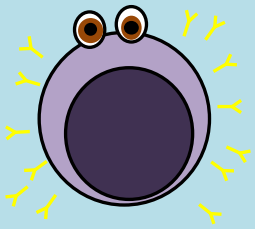
B cells and Humoral immunity

Q. How do the secreted antibodies destroy the pathogen?



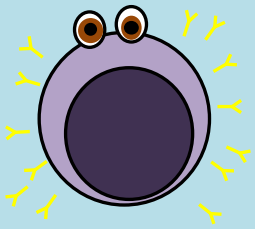
B cells and Humoral immunity

A. They attach to the antigens present on the pathogens surface



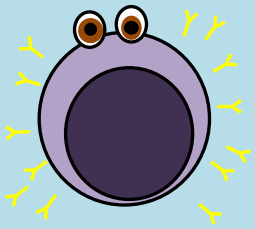
B cells and Humoral immunity

Q. Approximately how long do memory cells live for?



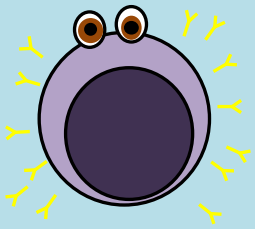
B cells and Humoral immunity

A. Decades



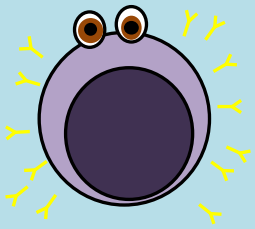
B cells and Humoral immunity

Q. When memory cells encounter the same antigen for a second time, they divide and develop into which kind of cells?



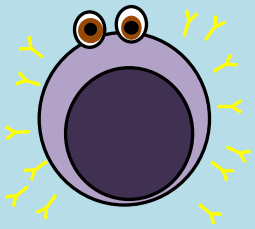
B cells and Humoral immunity

A. Plasma cells and more memory cells



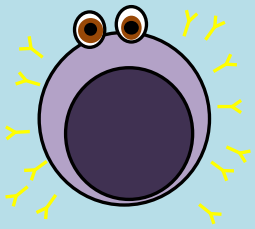
B cells and Humoral immunity

Q. Where in the B cells are the antibodies synthesised?



B cells and Humoral immunity

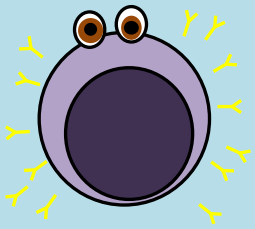
A. Endoplasmic reticulum



B cells and Humoral immunity

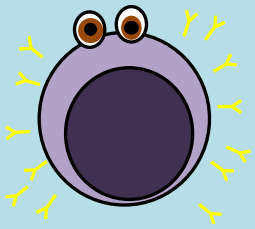
Q. True or False?

When a B cell divides by mitosis it creates a clone of itself.



B cells and Humoral immunity

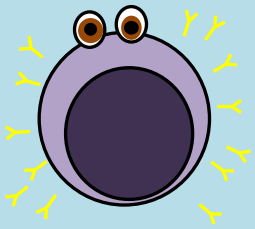
A. True



B cells and Humoral immunity

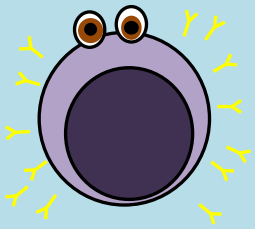
Q. True or False?

Another word for bodily fluids is 'humour'.



B cells and Humoral immunity

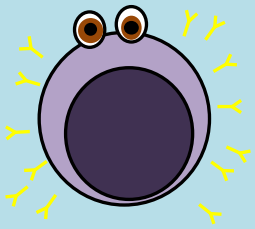
A. True



B cells and Humoral immunity

Q. Fill the gap.

Antigen which has been taken up and expressed on the B cell surface is know as ..... antigen.



B cells and Humoral immunity

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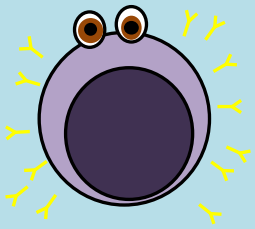
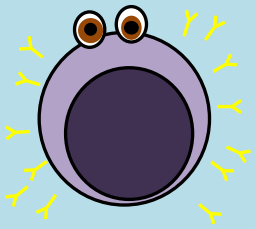


B cells and Humoral immunity

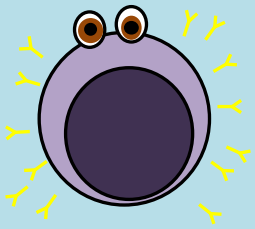
Q. Fill the gap.

Antigen which has been taken up and expressed on the B cell surface is know as ..... antigen.



B cells and Humoral immunity

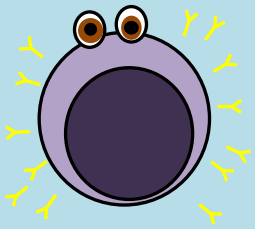
A. Processed



B cells and Humoral immunity

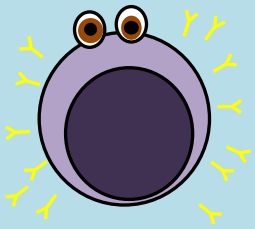
Q. True or False?

B cells with the appropriate antibody to bind to antigens of pathogens are not produced in response to the pathogen. They are present from birth.



B cells and Humoral immunity

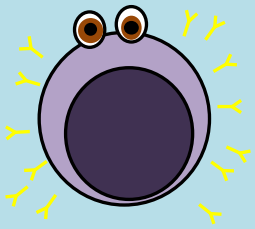
A. True, they are present, they simply multiply in response to the pathogen



B cells and Humoral immunity

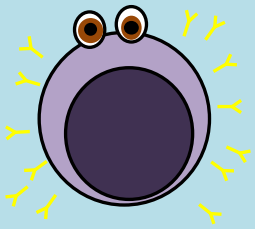
Q. True or False?

Antibodies are NOT soluble in blood and tissue fluid.



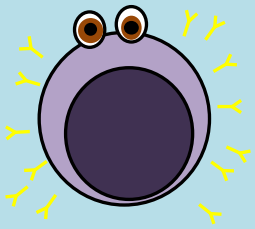
B cells and Humoral immunity

A. False



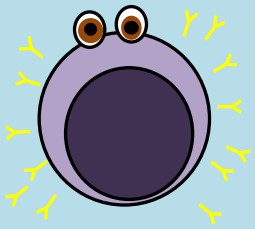
B cells and Humoral immunity

Q. How are T helper cells activated?



B cells and Humoral immunity

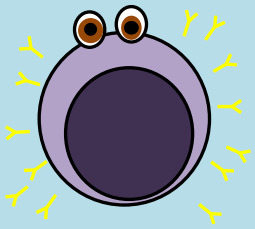
A. By binding to the processed antigens on the B cells.



B cells and Humoral immunity

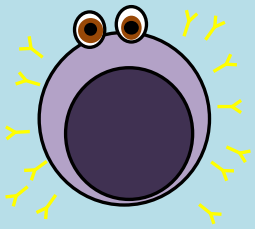
Q. Fill the gap.

Memory cells provide long-term immunity against the original infection, this is known as .....



B cells and Humoral immunity

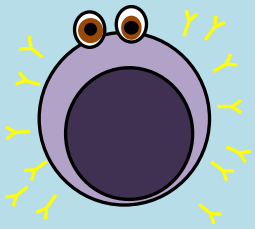
A. Secondary immune response



B cells and Humoral immunity

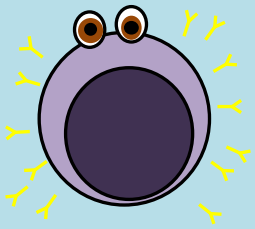
Q. True or False?

Memory cells can secrete antibody directly.



B cells and Humoral immunity

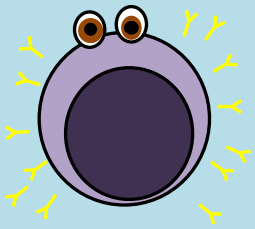
A. False



B cells and Humoral immunity

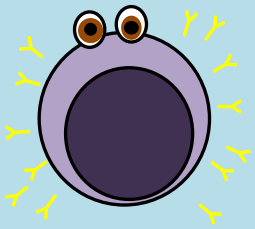
Q. True or False?

Pathogens only express one antigen specific to them?



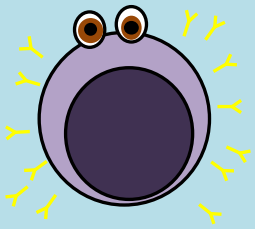
B cells and Humoral immunity

A. False



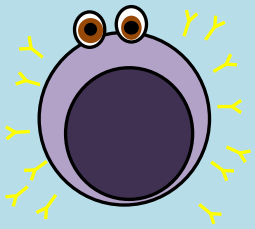
B cells and Humoral immunity

Q. Each different type of B cell is able to produce antibody that is specific for how many antigens.



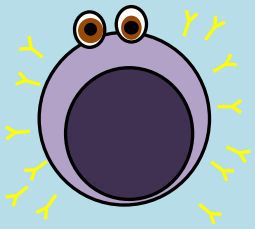
B cells and Humoral immunity

A. One



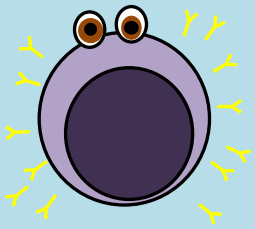
B cells and Humoral immunity

Q. Roughly how many different types of B cells are there?



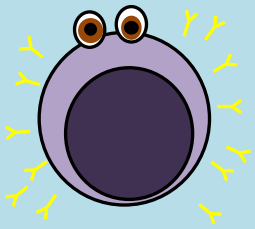
B cells and Humoral immunity

A. 10 million



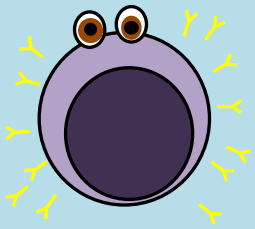
B cells and Humoral immunity

Q. Approximately how many antibody molecules can one plasma B cell make in one second?



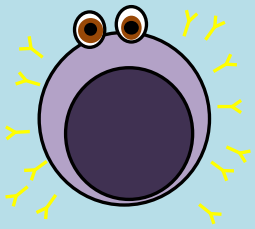
B cells and Humoral immunity

A. 2000



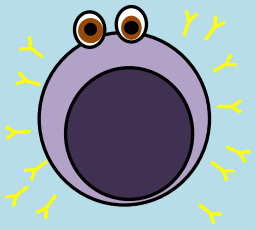
B cells and Humoral immunity

Q. Approximately how long do plasma B cells live for?



B cells and Humoral immunity

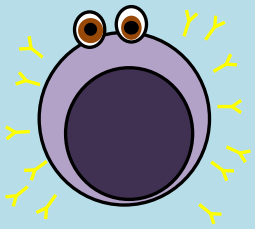
A. A few days



B cells and Humoral immunity

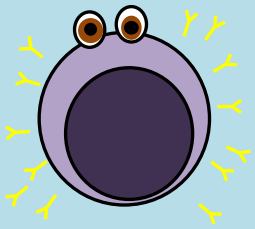
Q. True or False?

Plasma B cells secrete antibody directly.



B cells and Humoral immunity

A. True

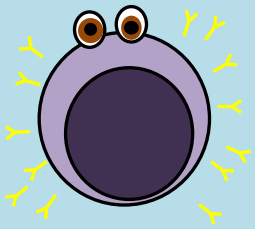


B cells and Humoral immunity

Q. Fill the gap.

Plasma cells are responsible for the specific defence of the body against infection. This is known as the

. . . . . .



B cells and Humoral immunity

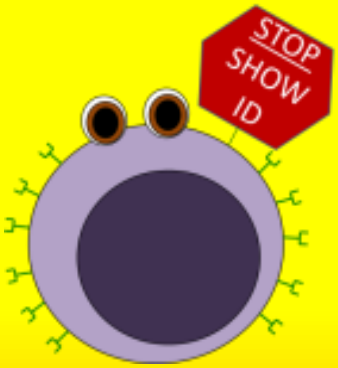
A. Memory immune response

T cells and cell mediated immunity

Q. Where are T cells formed?

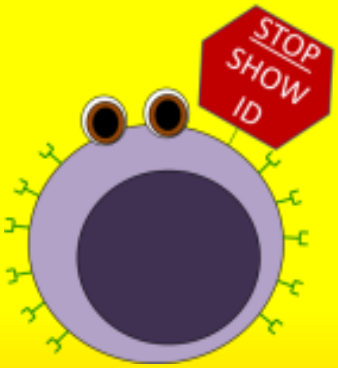
T cells and cell mediated immunity

A. Bone marrow



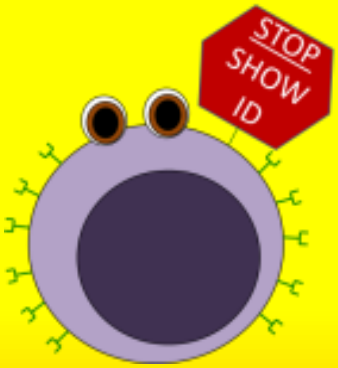
T cells and cell mediated immunity

Q. Where do B cells form and mature?



T cells and cell mediated immunity

A. In the bone marrow

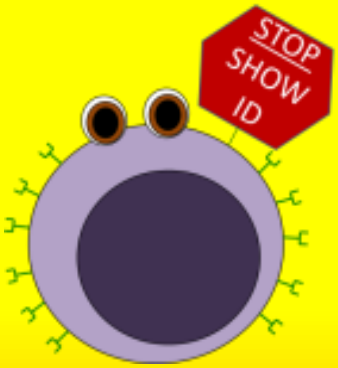


T cells and cell mediated immunity

Q. What type of immunity is the body's initial response to infection?

T cells and cell mediated immunity

A. Non-specific

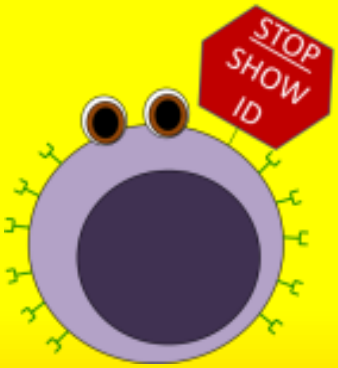


T cells and cell mediated immunity

Q. What are antigens usually made from?

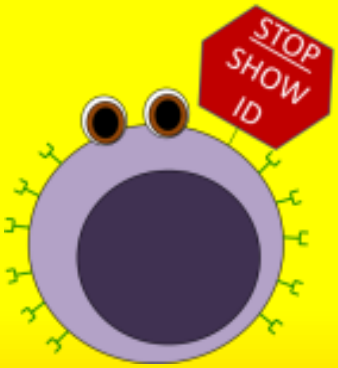
T cells and cell mediated immunity

A. Protein



T cells and cell mediated immunity

Q. What are the two types of lymphocytes involved in specific immune responses?



T cells and cell mediated immunity

A. B and T cells

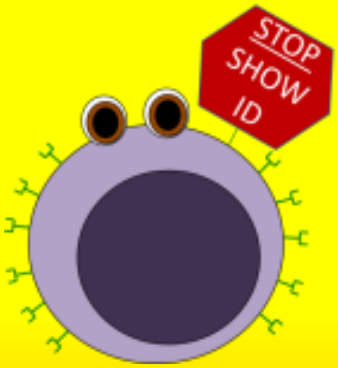
T cells and cell mediated immunity

Q. True or False?

Cancer cells cannot present antigen on their cell-surface membranes.

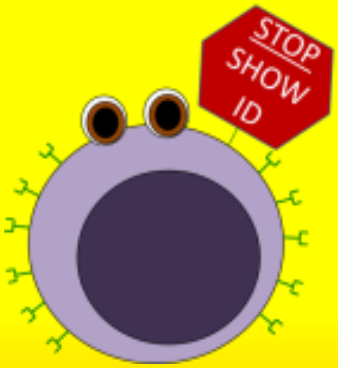
T cells and cell mediated immunity

Q. False



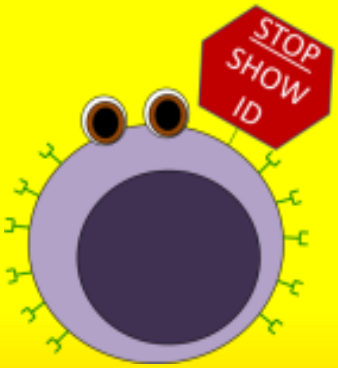
T cells and cell mediated immunity

Q. What name is given to molecules that trigger the production of an antibody?



T cells and cell mediated immunity

A. Antigen

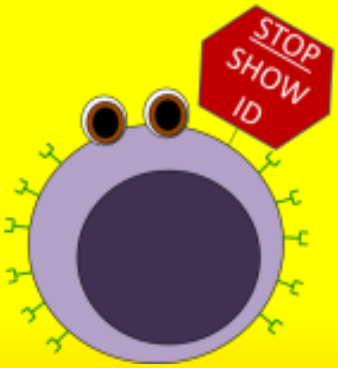


T cells and cell mediated immunity

Q. What are both B and T cells formed from?

T cells and cell mediated immunity

A. Stem cells



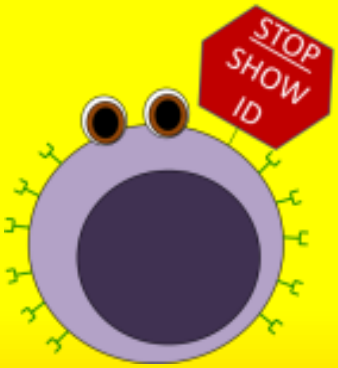
T cells and cell mediated immunity

Q. True or False?

T cell receptors can recognise multiple different antigens.

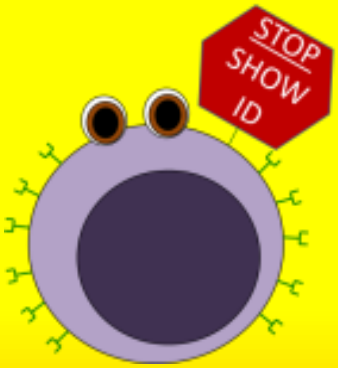
T cells and cell mediated immunity

A. False



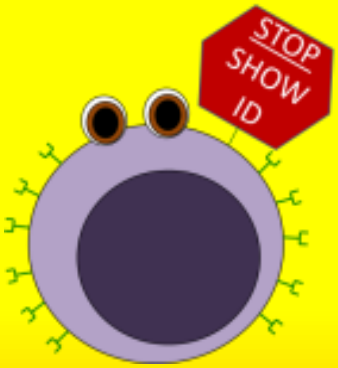
T cells and cell mediated immunity

Q. Why do T cells respond to transplanted material?



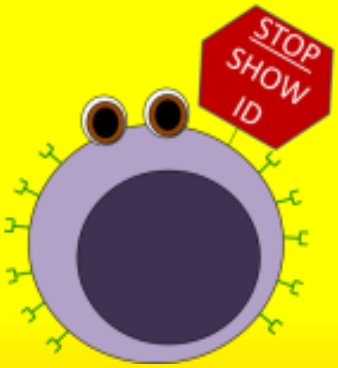
T cells and cell mediated immunity

Q. Because these cells are genetically different from the body's own cells



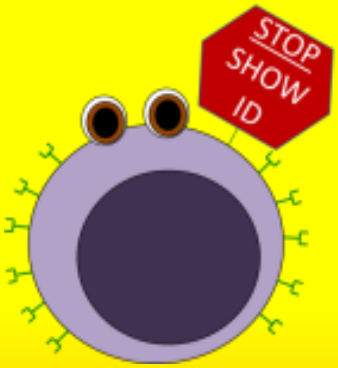
T cells and cell mediated immunity

Q. Against which type of pathogen are most T cells most effective?



T cells and cell mediated immunity

A. Viruses



T cells and cell mediated immunity

Q. True or False?

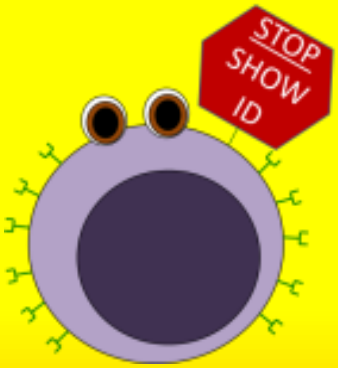
Viruses need living cells in which to reproduce.

T cells and cell mediated immunity

A. True

T cells and cell mediated immunity

Q. T cells kill infected cells by making holes in their cell membrane, why is this bad for the cell?



T cells and cell mediated immunity

A. The cell becomes permeable to all substances and dies as a result.

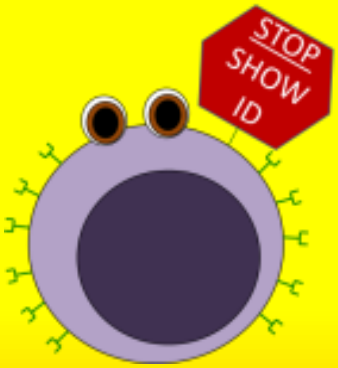
T cells and cell mediated immunity

Q. True or False?

T cells can produce memory cells that circulate in the blood and tissue fluid in readiness to respond to a future infection

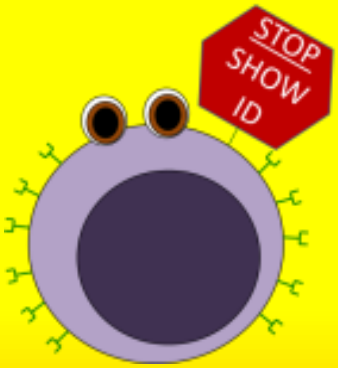
T cells and cell mediated immunity

A. True



T cells and cell mediated immunity

Q. How do T cells kill cells that are infected by pathogens?

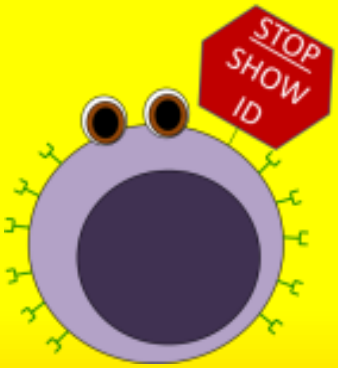


T cells and cell mediated immunity

A. They produce a protein that makes holes in the surface membrane.

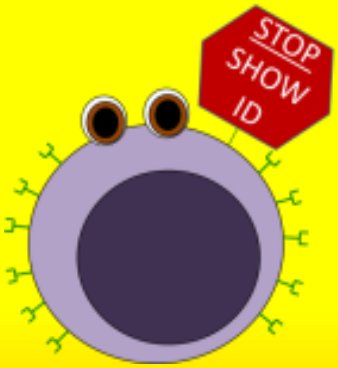
T cells and cell mediated immunity

Q. T cells can stimulate increased cell division in which other cell type?



T cells and cell mediated immunity

A. B cells

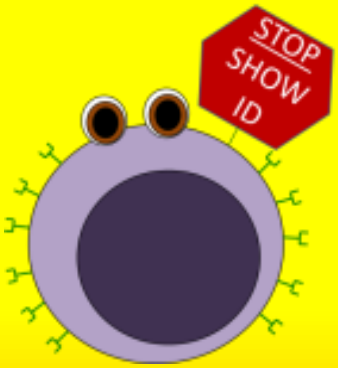


T cells and cell mediated immunity

Q. When T cells divide, what type of division do they use?

T cells and cell mediated immunity

A. Mitosis

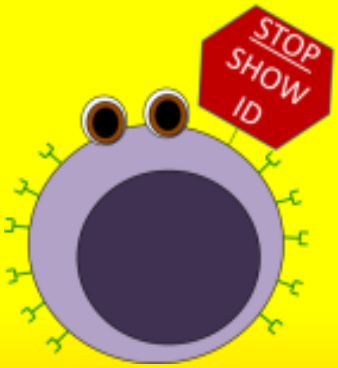


T cells and cell mediated immunity

Q. What is present on the T cell's surface that recognises antigens?

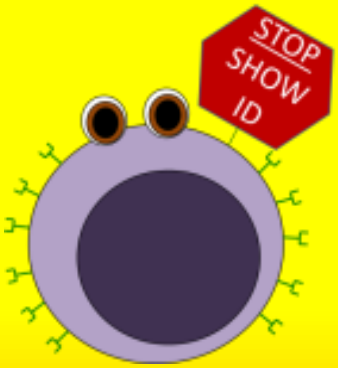
T cells and cell mediated immunity

A. T cell receptors



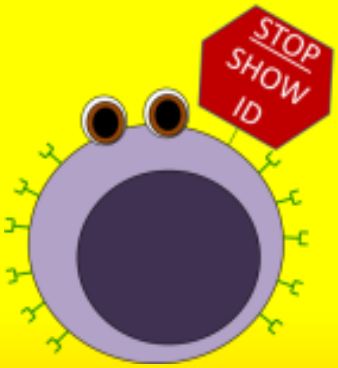
T cells and cell mediated immunity

Q. What is the name of cells that present antigens on their cell surface?



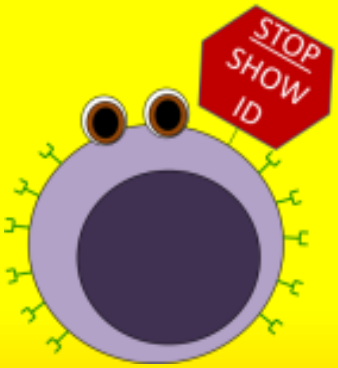
T cells and cell mediated immunity

A. Antigen-presenting cells



T cells and cell mediated immunity

Q. Where do T cells mature?



T cells and cell mediated immunity

A. In the thymus gland

Defence Mechanisms

Q. Cell mediated responses involve which type of lymphocyte?

Defence Mechanisms

A. T lymphocytes

Defence Mechanisms

Q. Humoral responses involve which type of lymphocyte?

Defence Mechanisms

A. B lymphocytes

Defence Mechanisms

Q. Choose the correct word. Measles is a highly infectious bacterial/viral/fungal disease.

Defence Mechanisms

A. Viral

Defence Mechanisms

Q. True or False?

Specific immune responses are fast but don't provide long lasting immunity.

Defence Mechanisms

A. False

Defence Mechanisms

Q. True or False?

Non-specific mechanisms respond to all the pathogens in the same way.

Defence Mechanisms

A. True

Defence Mechanisms

Q. The body uses physical barriers to help prevent infection. Are these parts of the specific or non-specific type of immune system?

Defence Mechanisms

A. Non-specific

Defence Mechanisms

Q. Phagocytosis forms part of which type of immune response?

Defence Mechanisms

A. Non-specific

Defence Mechanisms

Q. Fill the gap. There are probably around ..... million different lymphocytes, each capable of recognising a different chemical shape.

Defence Mechanisms

A. 10

Defence Mechanisms

Q. What happens when a pathogen overwhelms the individuals defence mechanisms?

Defence Mechanisms

A. They die

Defence Mechanisms

Q. Fill the gap.

A disease, in effect, is a interaction between a ..... and the body's various defence mechanisms.

Defence Mechanisms

A. Pathogen

Defence Mechanisms

Q. True or False?

Specific lymphocytes are not produced by an infection, but already exist.

Defence Mechanisms

A. True

Defence Mechanisms

Q. Name a group of people who are more vulnerable to infection.

Defence Mechanisms

A. Young, elderly or those in ill health.

Defence Mechanisms

Q. True or False?

Non-specific responses are immediate and the same for all pathogens.

Defence Mechanisms

A. True

Defence Mechanisms

Q. Fill the gap.

Lymphocytes recognise pathogens because a protein on their surface is ..... to one of the proteins on the pathogen.

Defence Mechanisms

A. Complementary

Defence Mechanisms

Q. Why is infection in a foetus rare?

Defence Mechanisms

A. It is protected by the mother/placenta

Defence Mechanisms

Q. What happens to lymphocytes that express receptors which fit exactly with those of the body's own cells?

Defence Mechanisms

A. They die or are suppressed

Defence Mechanisms

Q. What is the name given to the time that it takes the immune system to build up a response against an infection?

Defence Mechanisms

A. Lag time

Defence Mechanisms

Q. Is mucus a chemical or physical barrier to infection, or both?

Defence Mechanisms

A. Both

Defence Mechanisms

Q. Despite various barriers, pathogens still frequently gain entry to the body. What is the next line of defence?

Defence Mechanisms

A. Non-specific immune response

Defence Mechanisms

Q. What would happen if lymphocytes could not recognise "self" from "non-self"?

Defence Mechanisms

A. The lymphocytes would destroy the organism's own tissues.

Phagocytosis

Q. What is the name of the enzyme that can break down the cell wall of bacteria?

Phagocytosis

A. Lysozyme

Phagocytosis

Q. What does the phagocyte do with the breakdown products of the pathogen?

Phagocytosis

A. It absorbs them

Phagocytosis

Q. When a phagocyte engulfs the pathogen, it forms a vesicle, what is this vesicle called?

Phagocytosis

A. Phagosome

Phagocytosis

Q. What is it called when cells engulf and break down pathogens?

Phagocytosis

A. Phagocytosis

Phagocytosis

Q. What effect does histamine have on the blood vessels?

Phagocytosis

A. Causes them to dilate

Phagocytosis

Q. Name one thing that is found in pus.

Phagocytosis

A. Pathogen or phagocytes

Phagocytosis

Q. How does mucus protect against invading pathogen?

Phagocytosis

A. They get trapped inside/stuck to the mucus

Phagocytosis

Q. Fill in the gap.

A phagocyte moves towards a pathogen along a ..... gradient.

Phagocytosis

A. Concentration

Phagocytosis

Q. Which compound aids in the dilation of blood vessels?

Phagocytosis

A. Histamine

Phagocytosis

Q. During inflammation blood vessels dilate, why is this beneficial?

Phagocytosis

A. Speeds up delivery of phagocytes to site of infection.

Phagocytosis

Q. What from the pathogen acts as an attractant, causing the phagocytes to move towards them?

Phagocytosis

A. Chemical products or chemoattractants

Phagocytosis

Q. What is the name of the acid in your stomach?

Phagocytosis

A. Hydrochloric acid

Phagocytosis

Q. What is the name of the cells that ingest and destroy pathogens?

Phagocytosis

A. Phagocytes

Phagocytosis

Q. Fill in the gap.

The acid in your stomach has a ..... pH.

Phagocytosis

A. low

Phagocytosis

Q. What is the role of lysosomes?

Phagocytosis

A. To break down the pathogen.

Phagocytosis

Q. What do lysosomes contain?

Phagocytosis

A. Lytic enzymes

Phagocytosis

Q. Fill in the gap.

Phagocytosis causes ..... at the site of infection.

Phagocytosis

A. Inflammation

Phagocytosis

Q. What is the body's main physical barrier?

Phagocytosis

A. Skin

Phagocytosis

Q. What can epithelia be covered with to help prevent pathogens gaining entry to the body?

Phagocytosis

A. Mucus