

# Edexcel Biology GCSE

## Topics 5.9B to 5.15B - Preventing and identifying disease

### Flashcards

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Describe the physical defence system  
within plants (biology only)



# Describe the physical defence system within plants (biology only)

- **Waterproof waxy cuticle** - surface barrier preventing the entry of pathogens
- **Cellulose cell wall** - further barrier against pathogens



Give some examples of chemical barriers in plants (biology only)



## Give some examples of chemical barriers in plants (biology only)

- Secretion of **toxins** to reduce damage by pests e.g. stinging nettles
- Production of **antibacterial** chemicals that kill bacterial pathogens



# Why are chemicals produced by plants useful? (biology only)



Why are chemicals produced by plants useful?  
(biology only)

They produce physiological effects on the body so can be used in medicines to treat disease.



Give an example of a medicine derived  
from plants (biology only)





Give an example of a medicine derived from plants  
(biology only)

- Quinine - antimalarial, bark of *Cinchona* sp.
- Aspirin - painkiller, bark/leaves of *Salix alba*



# Why are plant defence systems important? (biology only)



# Why are plant defence systems important?

(biology only)

- Plants are producers so all organisms higher up in food chains rely upon their survival and ability to fight disease
- Important in maintaining human food security



How can plant diseases be detected  
and identified in the field?  
(biology only/higher)



# How can plant diseases be detected and identified in the field? (biology only/higher)

- Observation of **symptoms** e.g. Chalara ash dieback disease causes bark lesions. Books and online resources aid identification
- Analysis of the **distribution** of infected plants can indicate the type of pathogen involved and its mode of transmission e.g. airborne
- Changing **environmental conditions** to eliminate other causes such as nutrient deficiencies or water-logged soils



Why is it difficult to identify a disease  
using symptoms alone?  
(biology only/higher)



Why is it difficult to identify a disease using symptoms alone? (biology only/higher)

Many diseases may have similar symptoms



# How can plant diseases be detected and identified in the lab? (biology only/higher)





## How can plant diseases be detected and identified in the lab? (biology only/higher)

- Detection of **foreign antigens** in a sample of plant tissue using monoclonal antibodies
- Analysis of DNA to identify any **pathogen DNA** in a tissue sample



# What is a non-specific defence?



# What is a non-specific defence?

- Always present
- Same for all organisms
- Prevents pathogens from entering the body



Give some examples of the body's  
physical defence system (3)



## Give some examples of the body's physical defence system (3)

- **Skin** - protective surface barrier
- **Blood clotting** - platelets seal wounds preventing entry of pathogens into the blood
- **Respiratory tract** - mucus traps pathogens, cilia waft mucus to the back of the throat where it is swallowed



Give some examples of the body's  
chemical defence system (2)



## Give some examples of the body's chemical defence system (2)

- **Tears** - contain lysozyme which digests bacterial cell walls, killing bacteria and protecting the eye
- **Hydrochloric acid** in stomach - acidic pH kills pathogens that are swallowed



# What is the immune system?





# What is the immune system?

- The body's defence against pathogens once they have entered the body
- Aims to prevent or minimise disease caused by pathogens



# How do white blood cells detect pathogens in the body?



How do white blood cells detect pathogens in the body?

Pathogens have unique antigens on their surface which are detected by specialised receptors on white blood cells.



# How does the immune system destroy pathogens?



# How does the immune system destroy pathogens?

- B-lymphocytes (type of WBC) produce **antibodies** in response to a particular antigen
- Each antibody is specific to an antigen and binds to it
- Antibodies 'tag' pathogens or clump them together, disabling them so that they can be killed by other WBCs.



# What are memory lymphocytes?



# What are memory lymphocytes?

- WBCs produced in response to a foreign antigen that remain in the body after a pathogen has been destroyed
- Provide **immunity** - if the body is re-infected, antibodies are produced more rapidly and the pathogen is destroyed before it can produce disease symptoms



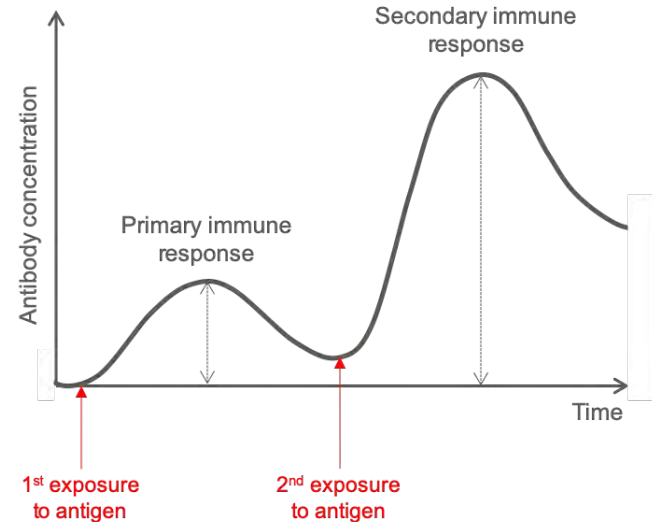
# Compare the primary and secondary immune responses





# Compare the primary and secondary immune responses

The secondary response produces antibodies more rapidly and in higher concentrations than in the primary response. The pathogen is destroyed before it can cause symptoms.



# What is a vaccination?



# What is a vaccination?

- Deliberate exposure of an individual to foreign antigens
- Triggers an immune response (produces antibodies) and provides immunity (due to memory cells)
- The individual does not contract the disease that they are being immunised against



# Describe the components of a vaccine



Describe the components of a vaccine

Dead, weakened or inactivated  
pathogens with their surface antigens  
still present



# What are the benefits of vaccinations? (biology only)



## What are the benefits of vaccinations? (biology only)

- **Herd immunity** - vaccination of a significant proportion of the population gives some protection to individuals who are not immune
- Helps to prevent epidemics and pandemics



# What are the drawbacks of vaccinations? (biology only)





# What are the drawbacks of vaccinations?

## (biology only)

- **High mutation rate** of viruses changes the structure of viral antigens, making vaccines that are already available ineffective
- Not guaranteed to work
- Inactivated pathogens may mutate and become **pathogenic**
- May cause an **adverse reaction**
- Vaccination programmes are **costly**

