C3.2 Defence against disease

What the Cell · DP Biology · note-taking sheet · SL and HL

Name _____ **Date** _____

How to use this sheet: go through the slides and videos with it, then close them and write from memory. Use your own words and add page numbers from the book where you want more detail.

Guiding questions. How does the body detect pathogens and fight infection? What affects how common a disease is in a population?

C3.2.1 Pathogens are what cause infectious disease

Textbook pp. 517–518

Define **pathogen**, and explain what makes a disease **infectious**.

Complete the table. You may choose your own examples.

Group	Key features	Example disease
Bacteria		
Viruses		
Fungi		
Protists		

List ways pathogens can travel between hosts, with a disease for each.

C3.2.2 How skin and mucous membranes act as the first defence

Textbook pp. 519–520

Barrier	Physical defence	Chemical defence
Skin		
Mucous membranes		

Describe what cilia do in the airways.

C3.2.3 How blood clotting closes cuts in the skin

Textbook pp. 520–521

Fill in the gaps in the cascade.

Platelets and damaged tissue release _____	→	Prothrombin becomes _____	→	Soluble _____ becomes insoluble _____	→	Mesh traps _____

Give two reasons why a clot is useful.

C3.2.4 How innate and adaptive immunity differ

Textbook p. 522

	Innate	Adaptive
What it responds to		
Change during life?		
Second exposure		
Cell type to know		

C3.2.5 How phagocytes help to control infection

Textbook pp. 522–523

Draw a phagocyte taking in a bacterium. Annotate **amoeboid movement**, **endocytosis**, **vesicle** and **lysosome**.

C3.2.6 How lymphocytes work together in adaptive immunity to make antibodies

Textbook pp. 523–524

Where are lymphocytes found? Why is it important that there are so many different types of B-cell?

C3.2.7 Antigens: molecules that are recognised and set off antibody production

Textbook pp. 524–525

	Antigen	Antibody
What it is		
Where it is found		
Its role		

Explain why a person with group B blood should not receive group A red blood cells.

C3.2.8 How helper T-cells activate B-cells

Textbook pp. 526–527

Number these events in the correct order, from 1 to 5.

Order	Event
	Activated helper T-cell contacts the matching B-cell
	Pathogen enters the body
	Helper T-cell binds to the displayed antigen and is activated
	B-cell is activated
	Phagocyte engulfs the pathogen and displays its antigen

What are the two conditions a B-cell needs before it can be activated?

C3.2.9 How activated B-cells multiply into clones of plasma cells that secrete antibody

Textbook pp. 527–528

Why must activated B-cells divide first? How is a plasma cell adapted to its job?

C3.2.10 How keeping memory cells gives immunity

Textbook p. 529

Sketch antibody level against time for a first and second exposure. Annotate two differences.

Define **immunity**.

C3.2.11 How HIV passes between people in body fluids

Textbook p. 530

HIV can be transmitted by	HIV is not transmitted by

Give one implication of how HIV is transmitted.

C3.2.12 How HIV infects lymphocytes and leads to AIDS

Textbook pp. 529–531

Watch the HIV life cycle video and write the main stages.

Explain the link between a falling helper T-cell count and opportunistic infections.

C3.2.13 Antibiotics: chemicals that block processes in bacteria but leave eukaryotic cells unharmed

Textbook pp. 532–534

Process targeted	Effect on bacteria	Why human cells are unaffected
Cell wall synthesis		
Protein synthesis		

Explain why antibiotics do not control viral infections. (Hint: "viruses hide in cells" is not the reason.)

C3.2.14 How pathogenic bacteria evolve resistance to several antibiotics

Textbook pp. 534–537

Explain how resistance evolves, in four steps.

1	2	3	4

Suggest actions that doctors, patients, hospitals and farmers can take to slow resistance.

C3.2.15 Zoonoses: infectious diseases that can pass from other species to humans

Textbook pp. 537–540

Research and complete the table.

Zoonosis	Pathogen	Animal source	Mode of human infection
Tuberculosis			
Rabies			
Japanese encephalitis			
COVID-19			

C3.2.16 How vaccines and immunization work

Textbook pp. 540–542

What can a vaccine contain? How does it give immunity without causing the disease?

C3.2.17 How herd immunity helps to prevent epidemics

Textbook pp. 544–545

Explain how herd immunity protects someone who cannot be vaccinated.

C3.2.18 Evaluating data from the COVID-19 pandemic

Textbook pp. 546–547

Use the WHO dashboard: **data.who.int/dashboards/covid19**

	Country 1	Country 2
Cases at start of chosen month		not needed
Cases at end of chosen month		
Calculation	Percentage change:	Percentage difference between countries:

Suggest why the two countries differ. How confident are you that the figures can be compared?

Before you finish

Tick the ones you can explain without notes. Circle anything to ask about.

- ☐ Physical and chemical defences of skin and mucus
- ☐ The clotting cascade
- ☐ Innate compared with adaptive immunity
- ☐ How phagocytes destroy a pathogen
- ☐ Antigen compared with antibody
- ☐ Why B-cells need two signals
- ☐ Clones, plasma cells and memory cells
- ☐ How HIV leads to AIDS
- ☐ Why antibiotics do not act on viruses
- ☐ How resistance evolves
- ☐ Examples of zoonoses
- ☐ How vaccines and herd immunity work
- ☐ Percentage change and percentage difference