Topic 5: Health, Disease and the Immune System

Edexcel · GCSE Biology · Revision Notes

Specification reference: 5.1–5.9

Note: Sections marked ★ HIGHER TIER ONLY are for Higher tier students only. Foundation tier students should focus on the unmarked sections.

5.1–5.3 Health and Communicable Disease

Health is a state of physical and mental wellbeing. Diseases can be communicable (spread between organisms) or non-communicable (cannot be passed on).

- **Bacteria** — produce toxins; treated with antibiotics.
- **Viruses** — invade host cells; no antibiotic treatment; vaccines can prevent.
- **Fungi** — e.g. athlete's foot, rose black spot.
- **Protists** — e.g. malaria (spread by mosquito vector).
- **Malaria**: protist Plasmodium; spread by Anopheles mosquito; symptoms: fever, chills; prevent with mosquito nets, antimalarials.
- **HIV**: retrovirus; spread via body fluids; attacks white blood cells; treated with antiretroviral drugs; leads to AIDS.
- **Measles**: virus; spread by droplets; prevented by MMR vaccine.
- **Tuberculosis (TB)**: bacteria; spread by droplets; treated with antibiotics; BCG vaccine available.

Key Terms

Communicable disease: Disease that can be passed from one organism to another

Pathogen: Microorganism causing disease

Antibiotic resistance: Bacteria that survive antibiotic treatment due to natural selection

5.4–5.5 The Immune System

The immune system defends the body against pathogens.

- Non-specific defences: skin, mucus, cilia, stomach acid.
- **Phagocytes** — engulf and digest pathogens.
- **Lymphocytes** — produce antibodies specific to antigens on pathogens. Memory cells remain for future infections.
- Vaccines: introduce dead/harmless pathogen → immune system produces antibodies and memory cells → rapid response if real pathogen encountered.

★ HIGHER TIER ONLY — Monoclonal Antibodies

- Made from a single clone of B-lymphocytes fused with a tumour cell (hybridoma).
- Used in: pregnancy tests (detect hCG), cancer diagnosis and treatment (direct drugs to tumour cells), autoimmune disease treatment.

Exam Tip: Monoclonal antibodies are SPECIFIC — they only bind to ONE antigen. This is why they can be used to target cancer cells specifically.

5.6–5.9 Non-communicable Disease

- **Cardiovascular disease**: plaques in arteries (atherosclerosis) → heart attack or stroke. Risk factors: smoking, obesity, high cholesterol, inactivity.
- **Cancer**: mutations cause uncontrolled cell division. Risk factors: UV radiation, smoking, viruses, obesity.
- **Type 2 diabetes**: cells resistant to insulin. Linked to obesity and poor diet.
- **Drug development**: preclinical testing (cells/animals) → clinical trials (phase 1: safety, phase 2: effectiveness, phase 3: large-scale comparison with placebo/existing drug).