CHURCH STRETTON SCHOOL

Combined Science - Biology

CB5 Knowledge organiser

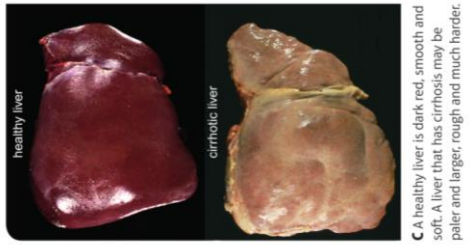
B5: Health and disease

Lesson sequence

1. Health and disease
2. Non-communicable disease
3. Cardiovascular disease
4. Pathogens
5. Spreading disease
6. Preventing infection
7. The immune system
8. Antibiotics

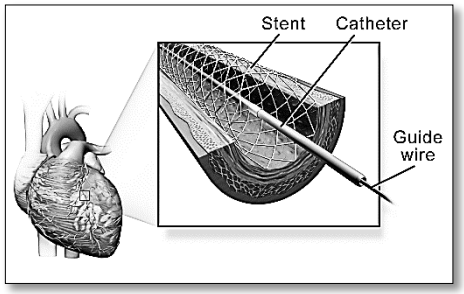
1. Health and disease	
Physical health	Being free from disease, active, fit, sleeping well and no substance abuse.
Mental health	Feeling good about yourself and being free of conditions such as depression and anxiety.
Social health	Having healthy relationships, loving and being loved.
WHO	World Health Organization – part of the UN responsible for monitoring global health.
Disease	Any problem with the body not caused by injury.
Communicable diseases	Diseases caused by pathogens, can be passed on.
Non-communicable diseases	Diseases caused by genes or, lifestyle. Cannot be passed on.
Correlated diseases	Getting one disease increases your chance of another due to diseases weakening organ systems, damaged immune system, weaker defences.

2. Non-communicable disease	
Genetic disorders	Diseases caused by inheriting faulty genes from your parents.
Malnutrition	Diseases caused by poor diet.
Anaemia	Lack of iron. Causes fewer and smaller red blood cells and low energy.
Kwashiorkor	Lack of protein. Swollen belly, small muscles, stunted growth.
Rickets	Lack of calcium or vitamin D. Causes weak bones leading to bowed legs.
Scurvy	Lack of vitamin C. Swollen bleeding gums, muscle and joint pain, lack of energy.
Ethanol	The drug found in all alcoholic drinks.
Drugs	Chemicals that change the way your mind and body works.
Cirrhosis	A fatal liver disease caused by drinking too much alcohol over a long period of time.
Social problems of alcohol	Missed work days, increased risk of other diseases, risky sexual behaviour, increased violence.

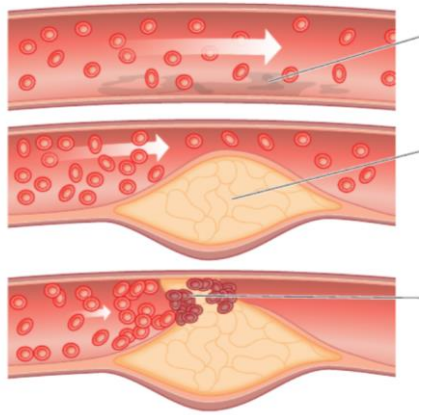


C A healthy liver is dark red, smooth and soft. A liver that has cirrhosis may be paler and larger, rough and much harder.

3. Cardiovascular disease	
Obesity	Being overweight to the extent that your health is at risk.
BMI	Body mass index, over 30 = obese.
BMI calculation	$BMI = \frac{mass\ (kg)}{height^2\ (m^2)}$
Problems with BMI	Someone with a lot of muscle could have high BMI without being obese.



Waist:hip ratio	The ratio of waist width to hip width. Over 0.9 (women) or 1.0 (men) = obese.
Calculating waist:hip ratio	$Waist:hip\ ratio = \frac{waist\ width}{hip\ width}$
Cardiovascular disease	Harmful substances in blood build up in the arteries around the heart. Blockages can form leading to heart attacks.
Stents	Used to treat cardiovascular disease. A tube of metal mesh is fed into the narrowed artery and opened up, holding the artery open.
Treating heart disease with lifestyle	More exercise and a better diet can treat cardiovascular disease, but this takes time.



4. Pathogens	
Pathogen	Microorganism that causes disease.
Types of pathogen	Bacteria, virus, protist, fungi.
Tuberculosis	Bacteria. Serious lung damage, bloody cough, fever.
Cholera	Bacteria. Sever life-threatening diarrhoea.
Chalara ash dieback	Fungi. Kills the leaves of ash trees, killing the tree.
Malaria	Protist. Sickness, fever and weakness.
Haemorrhagic fever	Virus, eg Ebola. Liver and kidney damage, internal bleeding.
HIV	Human immunodeficiency virus attacks white blood cells, causing AIDS.
AIDS	Acquired Immunodeficiency Syndrome. Weakened immune system making simple infections deadly. Caused by HIV.
Opportunistic pathogens	Pathogens that live in us causing no harm, but become dangerous when given the opportunity, such as *Helicobacter pylori* which cause stomach ulcers.

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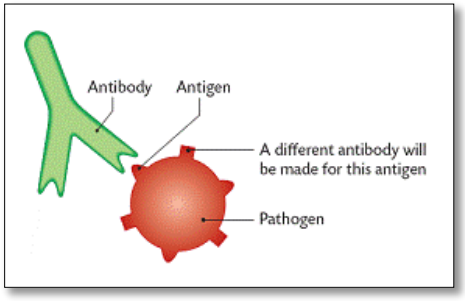
5. Spreading disease	
Airborne	Spreading through the air, such as colds and flu in infected droplets of saliva, and chalara ash dieback by fungal spores.
Waterborne	Spreading through contaminated water such as cholera.
Oral route	Eating food contaminated with a pathogen.
Vectors	Animals that spread pathogens in their bites, such as malaria that is spread by mosquitoes.
Bodily fluids	Spreading through contact with infected body fluids such as blood or semen, for example, HIV.

D Female *Anopheles* mosquitoes feed on human blood by piercing the skin with their mouthparts. The blood may also carry malaria protists.

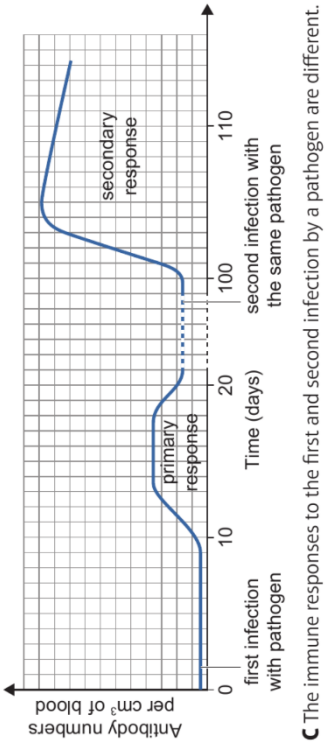
6. Preventing infection	
Chemical defences	Kill pathogens before they can infect us.
Lysozyme	Enzyme found in mucus, tears and sweat that kills *some* bacteria.
Hydrochloric acid	Found in the stomach, kills most bacteria on food.
Physical barriers	Block or trap pathogens so they can't enter the body.
Mucus	Sticky substance in most body openings that traps pathogens.
Ciliated cells	Have hairs that sweep mucus up and out of the body.
Skin as a physical barrier	Blocks pathogens from entering.
STIs	Sexually transmitted infections. Pathogens spread through sexual activity.

Preventing STIs	Use barrier contraception (such as condoms) to prevent mixing of fluids (semen, vaginal lubrication, blood).
Screening for STIs	Large scale testing of people to check if they have an STI so they can be treated. This helps to reduce the spread of STIs.

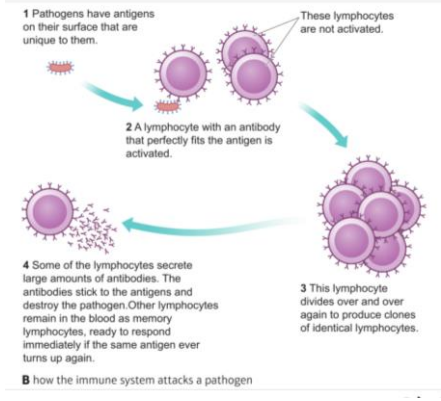


7. The immune system	
Immune system	Destroys pathogens that manage to infect us.
Primary immune response	How the body responds the first time it meets a new pathogen.
Antigens	Chemical markers on the surface of pathogens (and other cells) that identify them as a pathogen. Antigens are unique to each pathogen.
Lymphocyte	White blood cells that produce antibodies. Each lymphocyte makes a different antibody.
Antibodies	Chemicals with a specific shape that can stick to the antigens on a pathogen and kill it.
Activated lymphocyte	When an antigen sticks to an antibody, it activates the lymphocyte causing it to make many copies of itself that make the same antibodies.
Memory lymphocyte	Lymphocytes left over after an infection that retain the ability to fight the pathogen.

Immunity	When the body has the memory lymphocytes to fight a pathogen, so it can't be harmed by it.
Vaccine	A weakened version of a pathogen that trains the body to fight it, without causing disease.
How vaccines work	Vaccines are harmless versions of pathogen that still have the antibodies on them, so the immune response is triggered without any risk of disease.
Vaccine safety	Vaccines are safe, preventing about 6 million deaths per year.



C The immune responses to the first and second infection by a pathogen are different.



B how the immune system attacks a pathogen

8. Antibiotics	
Antibiotics	Substances that kill bacteria without harming human cells.
How antibiotics work	They inhibit (stop) an enzyme that maintains bacterial cell walls. This kills the bacteria.
Resistance	Widespread use of antibiotics has led to resistance, meaning many antibiotics don't work as well as they once did.
Drug development	Developing new medicines involves many stages that take a of time and money.
Discovery phase	Developing new chemicals that might work as medicines.
Pre-clinical testing	Testing on cells grown in the lab, or on animals, to see if the chemical has any useful effect.
Small clinical trial	Testing on a few healthy people to check for safety.
Large clinical trial	Testing on many patients to discover how effective the drug is and determine the dose.
Side effects	Unwanted effects of the medication, that can be quite harmful.