

Science Revision Notes

Human Biology

Bodies responding to changes

Hormones are produced by **glands** and are transported to the organs by the bloodstream.

Skin contains temperature, pressure and pain receptors. The **nose** contains receptors to detect chemicals in the air and **ears** contain receptors to sense vibrations in the air and ones that help us balance. The **eye** contains light receptors, and the optic nerve is a bundle of neurones connecting them to the **brain**. The brain **coordinates** our response to a range of different stimuli.

The brain is not involved in the rapid **reflex** actions which keep us safe. In a reflex action the correct path taken by the impulse is:

receptor-> sensory neurone-> relay neurone-> motor neurone-> effector

Information **quickly** crosses the synapses between neurones by movement of a chemical. The relay neurones are found in the spine and the effector can be a muscle that contracts, or a gland that secretes a hormone.



Controlling conditions

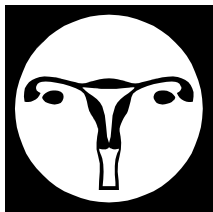
The body gets most of its **water** by absorbing it from food in the large intestine and some is produced by respiration. Water is lost from the body in exhaled air, faeces and sweat produced by glands in the skin. **Kidneys** are organs that keep the correct amount of water in the blood. Most water is lost from the body in urine.

The core body **temperature** is kept at 37°C because enzymes work best at this temperature. When the core body temperature increases, the person is likely to sweat and skin capillaries dilate.

Blood sugar levels are kept steady by hormones secreted by the pancreas. If sugar levels get very high after meals the person could have diabetes.

Controlling Fertility

The pituitary gland produces both hormones FSH which makes eggs **mature**, and LH which **releases** mature eggs. FSH makes the ovaries produce **oestrogen**, which is used in the oral contraceptive pill because it stimulates LH production and inhibits FSH production.



In a woman's monthly **cycle** the first day is the day menstruation starts, an **egg** should be travelling to the womb on the 21st day and the womb lining is thickest on the 24th day

In **IVF** a lot of eggs are made to mature using FSH, then collected and mixed with sperm in a Petri-dish. When they have developed into a ball of cells one or two can be placed into the womb.

Healthy eating

In digestion, carbohydrates are broken down into glucose, proteins into amino acids, and fats into fatty acids and glycerol, to be absorbed in the small intestine. The body's activity level affects how quickly these are used up, known as the **metabolic rate**.

Starvation is a severe shortage of food in the diet. **Anorexia** is a psychological condition leading to a dangerously low body mass index and eating too little food can cause irregular periods. **Malnutrition** is an imbalance of nutrients in the diet and **obesity** is caused by eating a lot too much food over a long time.

Too much **salt** in the diet causes high blood pressure and a high proportion of **saturated fat** causes heart disease and blocked blood vessels. **Cholesterol** is made in the liver and the

concentration of cholesterol in the blood depends on the amount of fat in the diet. Cholesterol is carried around the body by two types of lipoproteins. The high density lipoproteins are considered "**good**" **cholesterol**, and low density lipoproteins are bad. Eating food containing a lot of saturated fats increases cholesterol in the blood. Eating mono-unsaturated and polyunsaturated fats improves the balance of LDLs and HDLs. **Statins** can also improve cardio-vascular health.

Drugs

Painkillers are drugs taken to relieve the symptoms of a disease. **Thalidomide** was used as a sleeping pill, but was found to be dangerous when used on pregnant women. Thalidomide is now being used to treat leprosy and to see if it can treat AIDS. A **placebo** is used in drug trials to ensure that the trial is carried out on a random basis.

Alcohol acts as a depressant increasing your reaction time and causing a lack of self control. Drinking large amounts of alcohol could lead to liver failure or brain damage.

Tobacco contains nicotine which is addictive. **Smoking** cigarettes can cause lung cancer, because of the carcinogens, and makes infections like **emphysema** more likely. It is dangerous when carbon monoxide in smoke is absorbed by red blood cells because it reduces the ability of blood to carry **oxygen**. Women who smoke during pregnancy have a higher risk of their baby being a low birth weight.

Cannabis may cause psychological problems. Taking cannabis could also lead to addiction to hard drugs like heroin or cocaine, which are **illegal** drugs. When deprived of certain drugs a person may suffer from withdrawal symptoms.

Pathogens

Ignaz **Semmelweiss** noticed the way that infections were spread in hospitals and prevented women dying of childbed fever by insisting that doctors wash their hands before examining patients. Our bodies have natural defences against **pathogens** e.g. blood clots seal wounds to prevent them entering the body, air passages are lined with mucus to trap them and stomach acid kills bacteria in food. **Antiseptics** kill bacteria and viruses outside the body.

White blood cells **ingest** pathogens, make **antibodies** and **antitoxins**.

● Antibodies are chemicals produced to counteract a specific pathogen.

Toxins are poisons produced by plants and bacteria that make us feel ill.

Antitoxins neutralise poisons produced by pathogens. Digitalis produced by foxgloves is a toxin, but it can be used to treat heart failure.

It takes time for white blood cells to produce antibodies. **Antibiotics** are drugs that kill bacteria inside the body. MRSA bacteria have **mutated** and become resistant to antibiotics. MRSA kills about 1000 hospital patients per year. This can be prevented by everyone **washing** their hands frequently.

Measles cannot be treated with antibiotics because it is a **virus**. Viruses get inside cells and destroy them as they reproduce. They have DNA but do not have any cytoplasm.

Vaccination

Scientists like Edward **Jenner** who worked on smallpox and Louis **Pasteur**, who vaccinated a boy against rabies brought us immunisation. To avoid measles, mumps and rubella children have to be **vaccinated** because these diseases are caused by viruses. The MMR vaccine contains dead or **weakened** viruses. Vaccines work in the body by getting **white blood cells** to produce the correct antibodies. After vaccination, it takes a few days for the level of antibodies to increase. Then some time after vaccination, the level of antibodies in a person's blood will begin to decrease.

Tests on vaccines take time because scientists need to check on **side effects**.

