

**Infertility**

Depending on the reason for infertility there are different methods of treatment. The hormones FSH and LH can be given in medicinal form to stimulate normal menstrual cycles. IVF (In Vitro Fertilisation) is where eggs are harvested from a woman and fertilised using sperm. The embryos are then replanted into the uterus and a successful pregnancy could occur.

Fertility treatments are often stressful and success rates are low. They also increase the change of multiple births.

**Menstrual Cycle**

The menstrual cycle occurs in females and is a 28-day cycle. It involves four different hormones:

**FSH (Follicle Stimulating Hormone)** – this is released in the pituitary gland and causes an egg to develop. It also stimulates the production of oestrogen.

**Oestrogen** – released in the ovaries and causes the lining of the uterus to build up and thicken and stimulates the production of LH.

**LH (Luteinising Hormone)** – produced in the pituitary gland and causes ovulation and indirectly stimulates the release of progesterone.

**Progesterone** – produced in the ovaries and causes the lining of the uterus to maintain and inhibits the production of LH.

**Diabetes**

There are two types of diabetes; Type 1 and Type 2.

Type 1 diabetes is a disorder affecting the pancreas. The pancreas does not produce enough insulin to control the blood sugar level so the levels become higher than normal. This is treated by injecting insulin.

Type 2 diabetes is a disorder of effector cells which no longer respond to the hormones released from the pancreas. It can be managed through lifestyle choices such as diet and exercise.

**Human Nervous System**

The nervous system allows a fast response to a stimulus. The information is received by a receptor and is passed along neurons as an electrical impulse and creates a response. Information is passed between neurons via a synapse (gap). The electrical signal cannot pass through the synapse so the message is passed by chemical neurotransmitters.

**Methods of Contraception**

**The pill** – hormonal, it inhibits FSH so an egg doesn’t mature. Easily self-administered but may have mild side effects.

**Condoms** – non-hormonal, creates a visible barrier to prevent sperm from reaching the egg. Easy to use but not always effective.

**IUD (Intrauterine Device)** – hormonal, a device that attaches to the lining of the uterus and releases hormones to prevent implantation of an embryo. Requires no maintenance but does not protect from STI’s.

**Abstinence** – non-hormonal, avoiding sexual intercourse, inexpensive but not reliable.

**Control of Blood Glucose**

The pancreas monitors and regulates the blood glucose concentration.

If the blood glucose level becomes too low the pancreas releases **glucagon** which acts on the liver and muscles to cause stored **glycogen** to be converted to glucose and emitted into the bloodstream.

If the blood glucose level becomes too high the pancreas releases **insulin** which causes glucose to be absorbed. This causes the liver and muscles to convert the glucose into **glycogen** to be stored in fat cells.

**Reproductive Hormones**

Oestrogen is released in females from the ovaries. It stimulates an egg being released during ovulation. Testosterone is released in males and stimulates the production of sperm.

**Endocrine system**

Glands that release hormones to create changes in the body.

**Pituitary Gland**

Known as the ‘master gland’. Is responsible for controlling all the other glands

**Thyroid Gland**

Responsible for the metabolic rate of the body.

**Adrenal Gland**

Releases adrenaline for the ‘fight or flight’ response.

**Pancreas**

Releases insulin and glucagon to regulate blood glucose levels.

**Ovary**

Female reproductive organ – releases oestrogen.

**Testes**

Male reproductive organ – releases testosterone.

**Nervous Pathway**

A stimulus is detected by a receptor, the information is passed through the sensory neuron to the central nervous system (CNS) via a relay neuron then through the motor neuron to an effector and a response is created.

**Homeostasis**

Homeostasis is the regulation of a constant internal environment. The conditions are maintained to ensure optimum conditions for metabolism and changes in response to external stimuli. Examples of internal regulations are; blood glucose levels, temperature, CO2 levels, and water levels.

**Ambitious Vocabulary**

Hormone Gland Effector Regulate

**B5 Homeostasis**

**Science**



**Regulating substances**

When proteins are broken down into amino acids the liver forms ammonia by the process of deamination of excess amino acids. Ammonia is converted into urea to be safely excreted.

Blood is filtered at high pressure in the kidneys and useful materials are selectively reabsorbed.

The control of water and mineral salts is known as osmoregulation. It can cause cells to become hypertonic (shrivelled), or hypotonic (turgid) if the concentration of water in the cell is too low or too high. Isotonic describes cells with water levels in equilibrium with the surroundings

**The Brain**

Made of a network of billions of neurons and controls complex behaviour. Cerebral cortex – controls conscious activities. Cerebellum – controls muscle co-ordination. Medulla – controls unconscious functions. Scientists study patients who have suffered brain damage, electrically stimulate healthy brains, and use MRI scanning (magnetic resonance imaging).

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**Required Practical: Seed Germination**

Germinate seeds in the same conditions (temperature/ light intensity etc.) then separate into separate dishes and place in various light intensity conditions. Measure the height of the seedling each day and record the results. Calculate the mean height of the seedlings each day. The higher the light intensity the higher the seedling will grow. **Independent variable:** light intensity. **Dependent variable**: the height of the seedlings in cm.

**Required Practical: Reaction Time**

Place your forearm over the edge of a desk with a ruler between your thumb and forefinger. Have a partner drop the ruler and catch as quickly as possible. Use a conversion table to find the reaction time. Repeat and calculate a mean. Choose a factor to change (glucose/ caffeine levels/ distractions etc.) Repeat the experiment with the same people and compare results to see impact of factor.

**Plant Hormones**

Auxins are hormones that control plant growth and are found in the tips, roots, and shoots and are sensitive to light.

Gibberellin are hormones that start seed germination and are used in the growth of stems and flowering.

Ethene is a gas produced when a plant ages responsible for controlling cell division and the ripening of fruit.

**Phototropism** – a plants response to light

**Gravitropism/ Geotropism** – a plants response to gravity, auxins are affected by gravity.

**Shoots** – these grow away from gravity.

**Roots** – these grow towards gravity.

**Organ Transplant**

Replaces an entire organ with one taken from a donor. The donor organ has protein antigens as markers in every cell and can cause rejection from the patient receiving the organ if there is a negative immune response to it. To reduce this risk patients and donors undergo tissue typing and patients must take immune-suppressant drugs,

**Kidney Dialysis**

Disease or damage to kidneys can affect the ability to remove toxic waste substances. Kidney dialysis can be used whilst waiting for a kidney transplant. A dialysis machine takes unfiltered blood and mixes it with anti-coagulants. A partially permeable membrane separates the unfiltered blood and dialysis fluid and the concentration gradient allows diffusion to filter out urea and filter in glucose and ions. This is expensive and time consuming (4-6 hours 2/3 times per week). It also creates restrictions on a patients diet.

**The Eye**

Detects light rays and transmits to the brain to produce images. The white part of the eye is the sclera is tough and protects the eye. The cornea is a transparent layer over the front of the eye. The iris contains muscles which contract and relax to dilate the pupil (the hole which light enters through). The lens focuses light on the retina which collects light and transmits this to the brain via the optic nerve. The lens can change shape controlled by the ciliary muscles and suspensory ligaments in order to focus on an object.

**Pupil Reflex**

The muscles in the iris relax and contract to change the size of the pupil depending on the light levels and this is a reflex action.

**Ambitious Vocabulary**

Regulate Rejection Hormone Auxins

**B5 Homeostasis**

**Science**