Biology GCSE

AQA Biology Homeostasis and response: Introduction and the Nervous System Journey of Knowledge

Context and introduction to the unit:
Cells in the body can only survive within narrow physical and chemical limits. They require a constant temperature and pH as well as a constant supply of dissolved food and water. These control systems include receptors which sense changes and effectors that bring about changes. In this section we will explore the structure and function of the nervous system and how it can bring about fast responses. We will also explore the hormonal system which usually brings about much slower changes. Hormonal coordination is particularly important in reproduction since it controls the menstrual cycle. An understanding of the role of hormones in reproduction has allowed scientists to develop not only contraceptive drugs but also drugs which can increase fertility.

KS3:
Cells – levels of organisation, Movement – organ systems, Digestion – enzymes, diabetes, coronary heart disease, Human reproduction.

CORE KNOWLEDGE

4.5.1 Homeostasis - Homeostasis maintains optimal conditions for enzyme action and all cell functions. In the human body, these include control of: • blood glucose concentration • body temperature • water levels.
These automatic control systems may involve ***nervous responses or chemical responses.*** There are two systems involved in communicating around the body for homeostasis, these are the Nervous System and the Endocrine System.
Nervous system – sends electrical impulses along neurones and is fast acting.
Endocrine system – secretes hormones through the blood stream to target organs/cells. Slower acting but longer lasting.
All control systems include: • cells called receptors, which detect stimuli (changes in the environment) • coordination centres (such as the brain, spinal cord and pancreas) that receive and process information from receptors • effectors, muscles or glands, which bring about responses which restore optimum levels.
4.5.3.6 Feedback systems (HT only) - Adrenaline is produced by the adrenal glands in times of fear or stress. It increases the heart rate and boosts the delivery of oxygen and glucose to the brain and muscles, preparing the body for 'flight or fight'. Thyroxine from the thyroid gland stimulates the basal metabolic rate. It plays an important role in growth and development. Thyroxine levels are controlled by negative feedback.

4.5.2 The human nervous system - The nervous system enables humans to react to their surroundings and to coordinate their behaviour. Information from receptors passes along cells (neurones) as electrical impulses to the central nervous system (CNS). The CNS is the brain and spinal cord. The CNS coordinates the response of effectors which may be muscles contracting or glands secreting hormones. Stimulus - receptor - coordinator – effector - response. Sensory neurones transmit impulses from receptors to the co-ordinator. Motor neurones transmit impulses to the effector.

Required Practical 6: plan and carry out an investigation into the effect of a factor on human reaction time. 1.1, 1.2, 1.3, 1.4
Human reaction time (e.g., how quickly a person responds to a stimulus) is the dependent variable. Use the **ruler drop test** to measure how quickly a person catches a falling ruler. Reaction time is measured by noting the distance the ruler falls before being caught and using a conversion table.
Independent variable: Factor you change (e.g., whether someone has caffeine, or has been distracted). **Dependent variable:** Reaction time (distance ruler falls). **Control variables:** Same ruler, same person (or test a fair group), same drop height, same conditions.
Alternative methods: Use a **computer-based test** (more precise, removes possibility of human error in ruler drop). Reaction times can be affected by factors like **age, gender, drugs, distractions**. Computer methods give **more reliable and precise** data.
Reflex actions are automatic and rapid; they do not involve the conscious part of the brain. Reflex actions can bypass the brain, if this is faster, by transmitting impulses along a relay neurone (in the spinal cord) from the sensory neurone to the motor neurone.

Disciplinary knowledge
Required practical activity 6: plan and carry out an investigation into the effect of a factor on human reaction time. 1.1, 1.2, 1.3, 1.4

Vocabulary
Homeostasis, optimal, enzyme, receptor, stimulus, effector, synapse, sensory, motor and relay neuron, endocrine, hormone, secrete, glycogen, glucagon, diabetes

Reading is Power
Anatomy of fear

Where next?
Homeostasis and response (part 2)

AQA Biology Homeostasis and response: Brain and Eye Journey of Knowledge

Context and introduction to the unit:
Cells in the body can only survive within narrow physical and chemical limits. They require a constant temperature and pH as well as a constant supply of dissolved food and water. These control systems include receptors which sense changes and effectors that bring about changes. In this section we will explore the structure and function of the nervous system and how it can bring about fast responses. We will also explore the hormonal system which usually brings about much slower changes. Hormonal coordination is particularly important in reproduction since it controls the menstrual cycle. An understanding of the role of hormones in reproduction has allowed scientists to develop not only contraceptive drugs but also drugs which can increase fertility.

KS3:
Cells – levels of organisation, Movement – organ systems, Digestion – enzymes, diabetes, coronary heart disease, Human reproduction.

CORE KNOWLEDGE

4.5.2.2 The brain (biology only) - The brain controls complex behaviour. It is made of billions of interconnected neurones and has different regions that carry out different functions.
Identify the cerebral cortex, cerebellum and medulla on a diagram of the brain as seen here:
Functions of key areas:
Cerebellum → Controls **balance** and **co-ordination of movement**.
Cerebral cortex → Responsible for **consciousness, intelligence, memory, and language**.
Medulla → Controls **unconscious activities** like **breathing** and **heartbeat**.
(HT only) Neuroscientists have been able to map the regions of the brain to particular functions by studying
Patients with brain damage
Electrically stimulating different parts of the brain
Using MRI scanning techniques.
The complexity and delicacy of the brain makes investigating and treating brain disorders very difficult.

4.5.2.3 The eye (biology only) (Approx 2-3 lessons)
The eye is a sense organ containing receptors sensitive to light intensity and colour.

Identify the following structures on a diagram of the eye and through an **eye dissection,** and explain how their structure is related to their function: • retina • optic nerve • sclera • cornea • iris • ciliary muscles • suspensory ligaments. *See diagram:*

A**ccommodation** is the process of changing the shape of the lens to focus on near or distant objects.
To focus on a near object: • the ciliary muscles contract • the suspensory ligaments loosen • the lens is then thicker and refracts light rays strongly.
To focus on a distant object: • the ciliary muscles relax • the suspensory ligaments are pulled tight • the lens is then pulled thin and only slightly refracts light rays.

Two common defects of the eyes are myopia (short sightedness) and hyperopia (long sightedness) in which rays of light do not focus on the retina. Generally, these defects are treated with spectacle lenses which refract the light rays so that they do focus on the retina. Myopia is treated using a concave lens, hyperopia is treated using a convex lens.

New technologies now include hard and soft contact lenses, laser surgery to change the shape of the cornea and a replacement lens in the eye.

Disciplinary knowledge
Required practical activity 6: plan and carry out an investigation into the effect of a factor on human reaction time.
1.1, 1.2, 1.3, 1.4

Vocabulary
Homeostasis, optimal, enzyme, receptor, stimulus, effector, synapse, sensory, motor and relay neuron, endocrine, hormone, secrete, glycogen, glucagon, diabetes

Reading is Power
Anatomy of fear

Where next?
Homeostasis and response (part 2)

AQA Biology Homeostasis and response: Control of glucose, temperature, water and nitrogen Journey of Knowledge

Context and introduction to the unit:
Cells in the body can only survive within narrow physical and chemical limits. They require a constant temperature and pH as well as a constant supply of dissolved food and water. These control systems include receptors which sense changes and effectors that bring about changes. In this section we will explore the structure and function of the nervous system and how it can bring about fast responses. We will also explore the hormonal system which usually brings about much slower changes. Hormonal coordination is particularly important in reproduction since it controls the menstrual cycle. An understanding of the role of hormones in reproduction has allowed scientists to develop not only contraceptive drugs but also drugs which can increase fertility.

KS3:
Cells – levels of organisation, Movement – organ systems, Digestion – enzymes, diabetes, coronary heart disease, Human reproduction.

CORE KNOWLEDGE

4.5.3.1 Human endocrine system
The endocrine system is composed of glands which secrete chemicals called hormones directly into the bloodstream. The blood carries the hormone to a target organ where it produces an effect. Compared to the nervous system the effects are slower but act for longer. The pituitary gland in the brain is a 'master gland' which secretes several hormones into the blood in response to body conditions. These hormones in turn act on other glands to stimulate other hormones to be released to bring about effects.
Identify the position of the following on a diagram of the human body: • pituitary gland • pancreas • thyroid • adrenal gland • ovary • testes.

4.5.3.2 Control of blood glucose concentration
Blood glucose concentration is monitored and controlled by the pancreas. If the blood glucose concentration is too high, the pancreas produces the hormone insulin that causes glucose to move from the blood into the cells. In liver and muscle cells excess glucose is converted to glycogen for storage.
Type 1 diabetes is a disorder in which the pancreas fails to produce sufficient insulin. It is characterised by uncontrolled high blood glucose levels and is normally treated with insulin injections. In Type 2 diabetes the body cells no longer respond to insulin produced by the pancreas. A carbohydrate controlled diet and an exercise regime are common treatments. Obesity is a risk factor for Type 2 diabetes.
(HT only) If the blood glucose concentration is too low, the pancreas produces the hormone glucagon that causes glycogen to be converted into glucose and released into the blood.
(HT only) Students should be able to explain how glucagon interacts with insulin in a negative feedback cycle to control blood glucose (sugar) levels in the body.

4.5.2.4 Control of body temperature (biology only)
Body temperature is monitored and controlled by the thermoregulatory centre in the brain. The thermoregulatory centre contains receptors sensitive to the temperature of the blood. The skin contains temperature receptors and sends nervous impulses to the thermoregulatory centre.
If the body temperature is too high, blood vessels dilate (vasodilation) and sweat is produced from the sweat glands. Both these mechanisms cause a transfer of energy from the skin to the environment. If the body temperature is too low, blood vessels constrict (vasoconstriction), sweating stops and skeletal muscles contract (shiver).

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)
Osmotic changes in body fluids occur. Water leaves the body via the lungs during exhalation. Water, ions and urea are lost from the skin in sweat. There is no control over water, ion or urea loss by the lungs or skin. Excess water, ions and urea are removed via the kidneys in the urine. If body cells lose or gain too much water by osmosis they do not function efficiently.
(HT only) The digestion of proteins from the diet results in excess amino acids which need to be excreted safely. In the liver these amino acids are deaminated to form ammonia. Ammonia is toxic and so it is immediately converted to urea for safe excretion.
The kidneys produce urine by filtration of the blood and selective reabsorption of useful substances such as glucose, some ions and water. Knowledge of other parts of the urinary system, the structure of the kidney and the structure of a nephron is not required. **However, a kidney dissection is recommended to view the overall size and structure.**
(HT only) The water level in the body is controlled by the hormone ADH which acts on the kidney tubules. ADH is released by the pituitary gland when the blood is too concentrated and it causes more water to be reabsorbed back into the blood from the kidney tubules. This is controlled by negative feedback.
People who suffer from kidney failure may be treated by organ transplant or by using kidney dialysis.

Disciplinary knowledge
Required practical activity 6: plan and carry out an investigation into the effect of a factor on human reaction time. 1.1, 1.2, 1.3, 1.4

Vocabulary
Homeostasis, optimal, enzyme, receptor, stimulus, effector, synapse, sensory, motor and relay neuron, endocrine, hormone, secrete, glycogen, glucagon, diabetes

Reading is Power
Anatomy of fear

Where next?
Homeostasis and response (part 2)

AQA Biology Homeostasis and response: Control of Reproduction Journey of Knowledge

Context and introduction to the unit:
Cells in the body can only survive within narrow physical and chemical limits. They require a constant temperature and pH as well as a constant supply of dissolved food and water. These control systems include receptors which sense changes and effectors that bring about changes. In this section we will explore the structure and function of the nervous system and how it can bring about fast responses. We will also explore the hormonal system which usually brings about much slower changes. Hormonal coordination is particularly important in reproduction since it controls the menstrual cycle. An understanding of the role of hormones in reproduction has allowed scientists to develop not only contraceptive drugs but also drugs which can increase fertility.

KS3:
Cells – levels of organisation, Movement – organ systems, Digestion – enzymes, diabetes, coronary heart disease, Human reproduction.

CORE KNOWLEDGE

4.5.3.3 Hormones in human reproduction
During puberty reproductive hormones cause secondary sex characteristics to develop. Oestrogen is the main female reproductive hormone produced in the ovary. At puberty eggs begin to mature and one is released approximately every 28 days. This is called ovulation. Testosterone is the main male reproductive hormone produced by the testes and it stimulates sperm production.
Several hormones are involved in the menstrual cycle of a woman. • Follicle stimulating hormone (FSH) causes maturation of an egg in the ovary. • Luteinising hormone (LH) stimulates the release of the egg. • Oestrogen and progesterone are involved in maintaining the uterus lining.

(HT only) The hormones interact with each other in a cycle of secretion. (HT only) Students should be able to extract and interpret data from graphs showing hormone levels during the menstrual cycle.

4.5.3.4 Contraception - Fertility can be controlled by a variety of hormonal and non-hormonal methods of contraception. These include: • oral contraceptives that contain hormones to inhibit FSH production so that no eggs mature • injection, implant or skin patch of slow release progesterone to inhibit the maturation and release of eggs for a number of months or years • barrier methods such as condoms and diaphragms which prevent the sperm reaching an egg • intrauterine devices which prevent the implantation of an embryo or release a hormone • spermicidal agents which kill or disable sperm • abstaining from intercourse when an egg may be in the oviduct • surgical methods of male and female sterilisation.

4.5.3.5 The use of hormones to treat infertility (HT only) - This includes giving FSH and LH in a 'fertility drug' to a woman. She may then become pregnant in the normal way. In Vitro Fertilisation (IVF) treatment. • IVF involves giving a mother FSH and LH to stimulate the maturation of several eggs. • The eggs are collected from the mother and fertilised by sperm from the father in the laboratory. • The fertilised eggs develop into embryos. • At the stage when they are tiny balls of cells, one or two embryos are inserted into the mother's uterus (womb). Although fertility treatment gives a woman the chance to have a baby of her own: • it is very emotionally and physically stressful • the success rates are not high • it can lead to multiple births which are a risk to both the babies and the mother.

Disciplinary knowledge
Required practical activity 6: plan and carry out an investigation into the effect of a factor on human reaction time. 1.1, 1.2, 1.3, 1.4

Vocabulary
Homeostasis, optimal, enzyme, receptor, stimulus, effector, synapse, sensory, motor and relay neuron, endocrine, hormone, secrete, glycogen, glucagon, diabetes

Reading is Power
Anatomy of fear

Where next?
Homeostasis and response (part 2)

AQA Biology Homeostasis and response: Feedback Systems & Control Reproduction Journey of Knowledge

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KS3:
Cells – levels of organisation, Movement – organ systems, Digestion – enzymes, diabetes, coronary heart disease, Human reproduction.

CORE KNOWLEDGE

4.5.3.7 Feedback systems
Adrenaline is produced by the adrenal glands in times of fear or stress. It increases the heart rate and boosts the delivery of oxygen and glucose to the brain and muscles, preparing the body for 'flight or fight'.
Thyroxine from the thyroid gland stimulates the basal metabolic rate. It plays an important role in growth and development. Thyroxine levels are controlled by negative feedback.

4.5.3.3 Hormones in human reproduction
During puberty reproductive hormones cause secondary sex characteristics to develop. Oestrogen is the main female reproductive hormone produced in the ovary. At puberty eggs begin to mature and one is released approximately every 28 days. This is called ovulation. Testosterone is the main male reproductive hormone produced by the testes and it stimulates sperm production.
Several hormones are involved in the menstrual cycle of a woman. • Follicle stimulating hormone (FSH) causes maturation of an egg in the ovary. • Luteinising hormone (LH) stimulates the release of the egg. • Oestrogen and progesterone are involved in maintaining the uterus lining.

(HT only) The hormones interact with each other in a cycle of secretion. (HT only) Students should be able to extract and interpret data from graphs showing hormone levels during the menstrual cycle.

4.5.3.4 Contraception - Fertility can be controlled by a variety of hormonal and non-hormonal methods of contraception. These include: • oral contraceptives that contain hormones to inhibit FSH production so that no eggs mature • injection, implant or skin patch of slow release progesterone to inhibit the maturation and release of eggs for a number of months or years • barrier methods such as condoms and diaphragms which prevent the sperm reaching an egg • intrauterine devices which prevent the implantation of an embryo or release a hormone • spermicidal agents which kill or disable sperm • abstaining from intercourse when an egg may be in the oviduct • surgical methods of male and female sterilisation.

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Disciplinary knowledge
Required practical activity 6: plan and carry out an investigation into the effect of a factor on human reaction time. 1.1, 1.2, 1.3, 1.4

Vocabulary
Homeostasis, optimal, enzyme, receptor, stimulus, effector, synapse, sensory, motor and relay neuron, endocrine, hormone, secrete, glycogen, glucagon, diabetes

Reading is Power
Anatomy of fear

Where next?
Homeostasis and response (part 2)

AQA Biology Homeostasis and response: Plant Hormones Journey of Knowledge

Context and introduction to the unit:
Cells in the body can only survive within narrow physical and chemical limits. They require a constant temperature and pH as well as a constant supply of dissolved food and water. These control systems include receptors which sense changes and effectors that bring about changes. In this section we will explore the structure and function of the nervous system and how it can bring about fast responses. We will also explore the hormonal system which usually brings about much slower changes. Hormonal coordination is particularly important in reproduction since it controls the menstrual cycle. An understanding of the role of hormones in reproduction has allowed scientists to develop not only contraceptive drugs but also drugs which can increase fertility.

KS3:
Cells – levels of organisation, Movement – organ systems, Digestion – enzymes, diabetes, coronary heart disease, Human reproduction.

CORE KNOWLEDGE

4.5.4 Plant hormones (biology only) - Plants produce hormones to coordinate and control growth and responses to light (phototropism) and gravity (gravitropism or geotropism). Unequal distributions of auxin cause unequal growth rates in plant roots and shoots. **(HT only) Gibberellins are important in initiating seed germination. (HT only) Ethene controls cell division and ripening of fruits. (HT only) The mechanisms of how gibberellins and ethene work are not required.**

4.5.4.2 Use of plant hormones (HT only) - Plant growth hormones are used in agriculture and horticulture. Auxins are used: • as weed killers • as rooting powders • for promoting growth in tissue culture. Ethene is used in the food industry to control ripening of fruit during storage and transport. Gibberellins can be used to: • end seed dormancy • promote flowering • increase fruit size.

Required practical activity 8: investigate the effect of light or gravity on the growth of newly germinated seedlings.
WS 1.2, 1.4
Investigate how light (phototropism) or gravity (gravitropism/geotropism) affects the **direction of growth** in newly germinated seedlings. Place seedlings in different conditions (e.g., light from above, light from one side, in darkness, or laid on their sides). Observe the **direction of shoot and root growth** over time.
Shoots grow **towards light** (positive phototropism) to maximise photosynthesis.
Roots grow **downwards (with gravity)** (positive gravitropism) for anchorage and to find water/minerals.
Shoots grow **against gravity** (negative gravitropism).

Variables:
Independent variable: Direction of light / orientation relative to gravity. **Dependent variable:** Direction of shoot and root growth. **Control variables:** Same type of seed, same number of seedlings, same environment (temperature, moisture).
How to make results reliable: Repeat with several seedlings. Use the same growth medium and conditions.
Understanding/Application: Plant growth responses are controlled by the plant hormone **auxin**. Auxin moves in response to light/gravity, causing **cells on one side of the shoot to elongate**, bending it towards the stimulus.

Disciplinary knowledge
Required practical activity 6: plan and carry out an investigation into the effect of a factor on human reaction time.
1.1, 1.2, 1.3, 1.4

Vocabulary
Homeostasis, optimal, enzyme, receptor, stimulus, effector, synapse, sensory, motor and relay neuron, endocrine, hormone, secrete, glycogen, glucagon, diabetes

Reading is Power
Anatomy of fear

Where next?
Homeostasis and response (part 2)

Trilogy GCSE

AQA Biology Homeostasis and response: Introduction and the Nervous System Journey of Knowledge

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KS3:
Cells – levels of organisation, Movement – organ systems, Digestion – enzymes, diabetes, coronary heart disease, Human reproduction.

CORE KNOWLEDGE

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Required Practical 6: plan and carry out an investigation into the effect of a factor on human reaction time. 1.1, 1.2, 1.3, 1.4
Human reaction time (e.g., how quickly a person responds to a stimulus) is the dependent variable. Use the **ruler drop test** to measure how quickly a person catches a falling ruler. Reaction time is measured by noting the distance the ruler falls before being caught and using a conversion table.
Independent variable: Factor you change (e.g., whether someone has caffeine, or has been distracted). **Dependent variable:** Reaction time (distance ruler falls). **Control variables:** Same ruler, same person (or test a fair group), same drop height, same conditions.
Alternative methods: Use a **computer-based test** (more precise, removes possibility of human error in ruler drop). Reaction times can be affected by factors like **age, gender, drugs, distractions**. Computer methods give **more reliable and precise** data.
Reflex actions are automatic and rapid; they do not involve the conscious part of the brain. Reflex actions can bypass the brain, if this is faster, by transmitting impulses along a relay neurone (in the spinal cord) from the sensory neurone to the motor neurone.

Disciplinary knowledge
Required practical activity 6: plan and carry out an investigation into the effect of a factor on human reaction time. 1.1, 1.2, 1.3, 1.4

Vocabulary
Homeostasis, optimal, enzyme, receptor, stimulus, effector, synapse, sensory, motor and relay neuron, endocrine, hormone, secrete, glycogen, glucagon, diabetes

Reading is Power
Anatomy of fear

Where next?
Homeostasis and response (part 2)

AQA Biology Homeostasis and response: Control of Glucose Journey of Knowledge

Context and introduction to the unit:
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KS3:
Cells – levels of organisation, Movement – organ systems, Digestion – enzymes, diabetes, coronary heart disease, Human reproduction.

CORE KNOWLEDGE

4.5.3.1 Human endocrine system
The endocrine system is composed of glands which secrete chemicals called hormones directly into the bloodstream. The blood carries the hormone to a target organ where it produces an effect. Compared to the nervous system the effects are slower but act for longer. The pituitary gland in the brain is a 'master gland' which secretes several hormones into the blood in response to body conditions. These hormones in turn act on other glands to stimulate other hormones to be released to bring about effects.
Identify the position of the following on a diagram of the human body: • pituitary gland • pancreas • thyroid • adrenal gland • ovary • testes.

4.5.3.2 Control of blood glucose concentration
Blood glucose concentration is monitored and controlled by the pancreas. If the blood glucose concentration is too high, the pancreas produces the hormone insulin that causes glucose to move from the blood into the cells. In liver and muscle cells excess glucose is converted to glycogen for storage.
Type 1 diabetes is a disorder in which the pancreas fails to produce sufficient insulin. It is characterised by uncontrolled high blood glucose levels and is normally treated with insulin injections. In Type 2 diabetes the body cells no longer respond to insulin produced by the pancreas. A carbohydrate controlled diet and an exercise regime are common treatments. Obesity is a risk factor for Type 2 diabetes.

(HT only) If the blood glucose concentration is too low, the pancreas produces the hormone glucagon that causes glycogen to be converted into glucose and released into the blood.
(HT only) Students should be able to explain how glucagon interacts with insulin in a negative feedback cycle to control blood glucose (sugar) levels in the body.

Disciplinary knowledge
Required practical activity 6: plan and carry out an investigation into the effect of a factor on human reaction time. 1.1, 1.2, 1.3, 1.4

Vocabulary
Homeostasis, optimal, enzyme, receptor, stimulus, effector, synapse, sensory, motor and relay neuron, endocrine, hormone, secrete, glycogen, glucagon, diabetes

Reading is Power
Anatomy of fear

Where next?
Homeostasis and response (part 2)

AQA Biology Homeostasis and response: Control of Reproduction Journey of Knowledge

Context and introduction to the unit:
Cells in the body can only survive within narrow physical and chemical limits. They require a constant temperature and pH as well as a constant supply of dissolved food and water. These control systems include receptors which sense changes and effectors that bring about changes. In this section we will explore the structure and function of the nervous system and how it can bring about fast responses. We will also explore the hormonal system which usually brings about much slower changes. Hormonal coordination is particularly important in reproduction since it controls the menstrual cycle. An understanding of the role of hormones in reproduction has allowed scientists to develop not only contraceptive drugs but also drugs which can increase fertility.

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Cells – levels of organisation, Movement – organ systems, Digestion – enzymes, diabetes, coronary heart disease, Human reproduction.

CORE KNOWLEDGE

4.5.3.3 Hormones in human reproduction
During puberty reproductive hormones cause secondary sex characteristics to develop. Oestrogen is the main female reproductive hormone produced in the ovary. At puberty eggs begin to mature and one is released approximately every 28 days. This is called ovulation. Testosterone is the main male reproductive hormone produced by the testes and it stimulates sperm production.
Several hormones are involved in the menstrual cycle of a woman. • Follicle stimulating hormone (FSH) causes maturation of an egg in the ovary. • Luteinising hormone (LH) stimulates the release of the egg. • Oestrogen and progesterone are involved in maintaining the uterus lining.

(HT only) The hormones interact with each other in a cycle of secretion. (HT only) Students should be able to extract and interpret data from graphs showing hormone levels during the menstrual cycle.

4.5.3.4 Contraception - Fertility can be controlled by a variety of hormonal and non-hormonal methods of contraception. These include: • oral contraceptives that contain hormones to inhibit FSH production so that no eggs mature • injection, implant or skin patch of slow release progesterone to inhibit the maturation and release of eggs for a number of months or years • barrier methods such as condoms and diaphragms which prevent the sperm reaching an egg • intrauterine devices which prevent the implantation of an embryo or release a hormone • spermicidal agents which kill or disable sperm • abstaining from intercourse when an egg may be in the oviduct • surgical methods of male and female sterilisation.

4.5.3.5 The use of hormones to treat infertility (HT only) - This includes giving FSH and LH in a 'fertility drug' to a woman. She may then become pregnant in the normal way. In Vitro Fertilisation (IVF) treatment. • IVF involves giving a mother FSH and LH to stimulate the maturation of several eggs. • The eggs are collected from the mother and fertilised by sperm from the father in the laboratory. • The fertilised eggs develop into embryos. • At the stage when they are tiny balls of cells, one or two embryos are inserted into the mother's uterus (womb). Although fertility treatment gives a woman the chance to have a baby of her own: • it is very emotionally and physically stressful • the success rates are not high • it can lead to multiple births which are a risk to both the babies and the mother.

Disciplinary knowledge
Required practical activity 6: plan and carry out an investigation into the effect of a factor on human reaction time. 1.1, 1.2, 1.3, 1.4

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Where next?
Homeostasis and response (part 2)