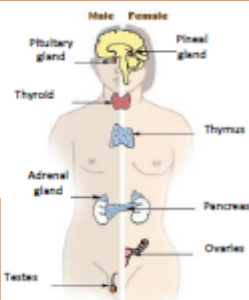


Human control systems include	Cells called receptors	Detect stimuli (changes in environment).
	Coordination centres	e.g. brain, spinal cord and pancreas that receive information from receptors.
	Effectors	Muscles or glands, which bring about responses to restore optimum levels.

Enables humans to react to their surroundings and to co-ordinate their behaviour

Human endocrine system



Endocrine system
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 effects are slower but act for longer.

Pituitary gland
'Master gland'; secretes several hormones into the blood
Stimulates other glands to produce hormones to bring about effects.

Control of blood glucose concentration

Negative feedback (HT only)	Adrenaline	Produced in adrenal glands, increases breathing/heart rate, blood flow to muscles, conversion glycogen to glucose. Prepares body for 'fight or flight'.
	Thyroxine	Produced in the thyroid gland, stimulates the basal metabolic rate. Important in growth and development.

Blood glucose concentration	
Monitored and controlled by the pancreas	
Too high	(HT only) Too low
Pancreas produces the hormone insulin, glucose moves from the blood into the cells. In liver and muscle cells excess glucose is converted to glycogen for storage.	Pancreas produces the hormone glucagon that causes glycogen to be converted into glucose and released into the blood.

(HT) Rising glucose levels inhibit the release of glucagon in a negative feedback system. Insulin is released to reduce glucose levels and which cause the pancreas to release glucagon

Increasing thyroxine levels prevent the release of thyroid stimulating hormone which stops the release of thyroxine.

Diabetes	
Type 1	Type 2
Pancreas fails to produce sufficient insulin leading to uncontrolled blood glucose levels. Normally treated by insulin injection.	Obesity is a risk factor. Body cells no longer respond to insulin. Common treatments include changing by diet and increasing exercise.

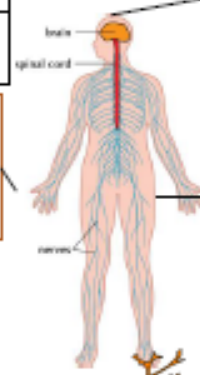
res in excellence

Response to internal and external change

Controls in the human body	Blood glucose concentration	These automatic control systems may involve nervous responses or chemical responses.
	Body temperature	
	Water levels	
The regulation of internal conditions of a cell or organism to maintain optimum conditions for function.		
Homeostasis maintains optimal conditions for enzyme action and all cell functions.		
Homeostasis		

AQA GCSE HOMEOSTASIS AND RESPONSE part 1

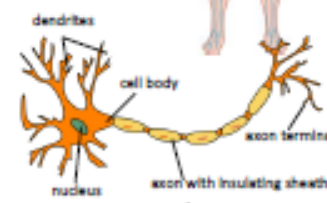
The human nervous system



Information from receptors passes along cells (neurones) as electrical impulses to the central nervous system (CNS)

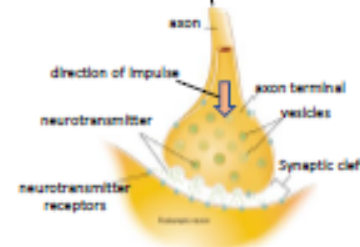
The CNS is the brain and the spinal cord.

Coordinates the response of effectors; muscles contracting or glands secreting hormones



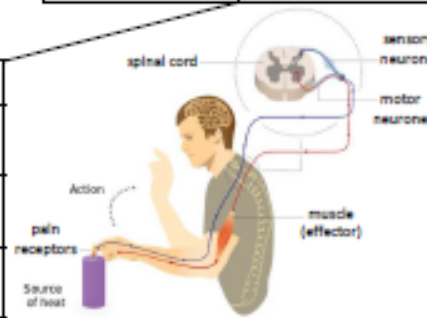
Typical motor neurone

Synapse (gap where two neurones meet).



Stimulus	Lights switch on
Receptor	Cells in retina
Coordinator	CNS
Effector	Muscles connected to iris
Response	Pupils get smaller

Reflex arc	Receptor	Detect stimuli.
	Sensory neurone	Long axon carries impulse from receptor to spinal cord.
	Synapse	Gap where neurones meet. Chemical message using neurotransmitter.
	Relay neurone	Allows impulses to travel between sensory and motor neurones in the spinal cord.
	Motor neurone	Long axon carries impulse from receptor to effector.
	Effector	Muscle or gland that carries out response.



Reflex actions are automatic and rapid; they do not involve the conscious part of the brain and can protect humans from harm.

FSH and LH are used as 'fertility drugs' to help someone become pregnant in the normal way

In Vitro Fertilisation (IVF) treatment.

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 a 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).

Potential disadvantages of IVF

- Emotional and physical stress.
- Success rates are not high.
- Multiple births risk to mother and babies.

Hormones are used in modern reproductive technologies to treat infertility

Plants produce hormones to coordinate and control growth

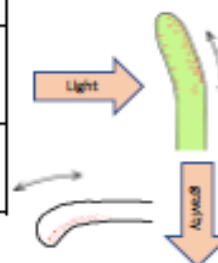
Plant responses using hormones (auxins)

Light
(phototropism)

Light breaks down auxins and they become unequally distributed in the shoot. The side with the highest concentration of auxins has the highest growth rate and the shoot grows toward the light.

Gravity
(geotropism or gravitropism)

Gravity causes an unequal distribution of auxins. In roots the side with the lowest concentration has the highest growth rate and the root grows in the direction of gravity. In new shoots from a seedling the unequal distribution of auxins causes the shoot to grow away from gravity.



(HT only) Gibberellins are important in initiating seed germination.

(HT only) Ethene controls cell division and ripening of fruits.

The use of hormone to treat infertility (HT only)

Plant hormones

Use of plant hormones (HT only)

Plant growth hormones are used in agriculture and horticulture

Auxins

Weed killers, rooting powders, promoting growth in tissue culture.

Ethene

Control ripening of fruit during storage and transport.

Gibberellins

End seed dormancy, promote flowering, increase fruit size.

AQA GCSE HOMEOSTASIS AND RESPONSE

Contraception

Hormones in human reproduction

During puberty reproductive hormones cause secondary sexual characteristics to develop

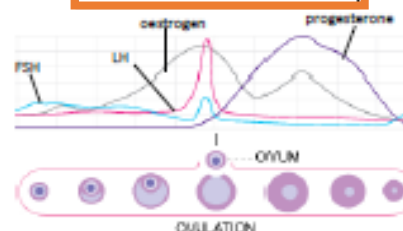
Oestrogen (main female reproductive hormone)

Produced in the ovaries. At puberty eggs begin to mature releasing one every 28 days – ovulation.

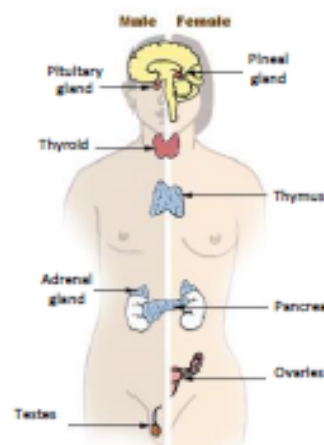
Testosterone (main male reproductive hormone)

Produced in the testes stimulation sperm production.

(HT only) a graph of hormone levels over time



Menstrual cycle	Follicle stimulating hormone (FSH)	Causes maturation of an egg in the ovary.	(HT) FSH stimulates ovaries to produce oestrogen.
	Luteinising hormone (LH)	Stimulates release of an egg.	(HT) Oestrogen stops FSH production and stimulates LH production in pituitary gland.
	Oestrogen and progesterone	Maintain uterus lining.	



Fertility can be controlled by hormonal and non hormonal methods

Oral contraceptives	Contain hormones to inhibit FSH production so that no eggs mature.
Injection, implant, skin patch	For slow release of progesterone to inhibit the maturation and release of eggs for months or years.
Barrier methods	Condoms or diaphragms which prevent sperm reaching the egg.
Intrauterine devices	Prevent implantation of an embryo or release a hormone.
Spermicidal agents	Kill or disable sperm.
Abstaining	Avoiding intercourse when an egg may be in the oviduct.
Surgery	Male or female sterilisation.