

Biology 5: Homeostasis and Response

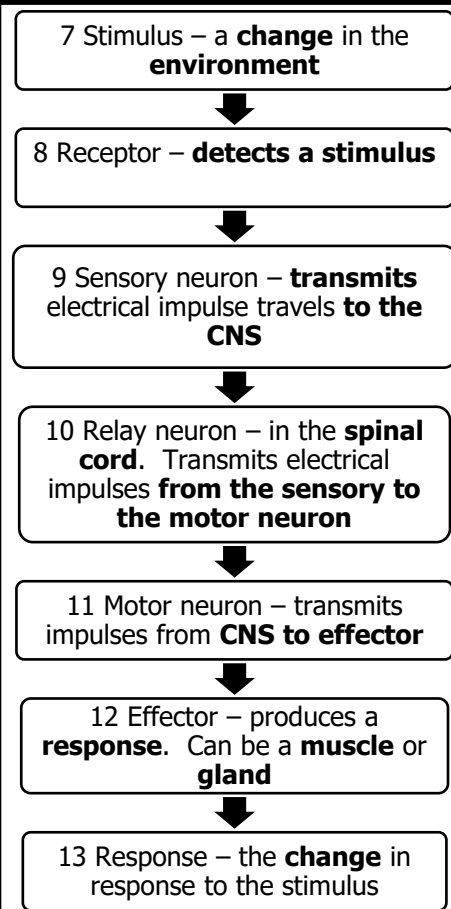
Section 1: Key Terms

1 Homeostasis	Regulating internal conditions to keep them at an optimum, despite internal and external changes . Maintains optimum conditions for enzymes .
2 Negative Feedback (HT)	Negative feedback ensures that changes are reversed and returned back to the optimum level .

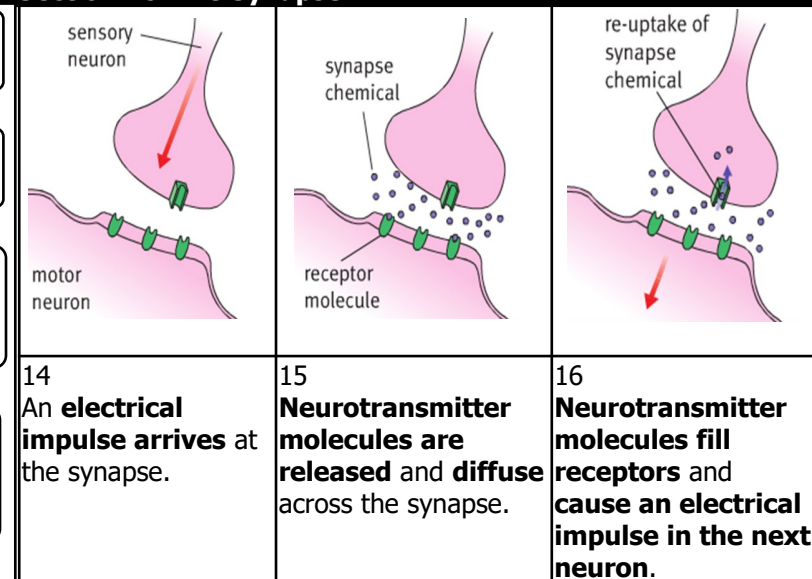
Section 2a: Nerve Reflexes Key Terms

2 Central nervous system (CNS)	The brain and spinal cord together. Co-ordinates the response of effectors .
3 Reflex action	A fast, automatic reaction. Does not involve thinking parts of the brain.
4 Coordination Centre	Receives and processes information from receptors e.g. CNS, pancreas.
5 Synapse	The gap between two neurons . Allows many different neurons to connect.
6 Myelin sheath	Some neurons are surrounded by myelin. Myelin insulates the neuron and speeds up the transmission of electrical impulses .

Section 2b: The Reflex Arc



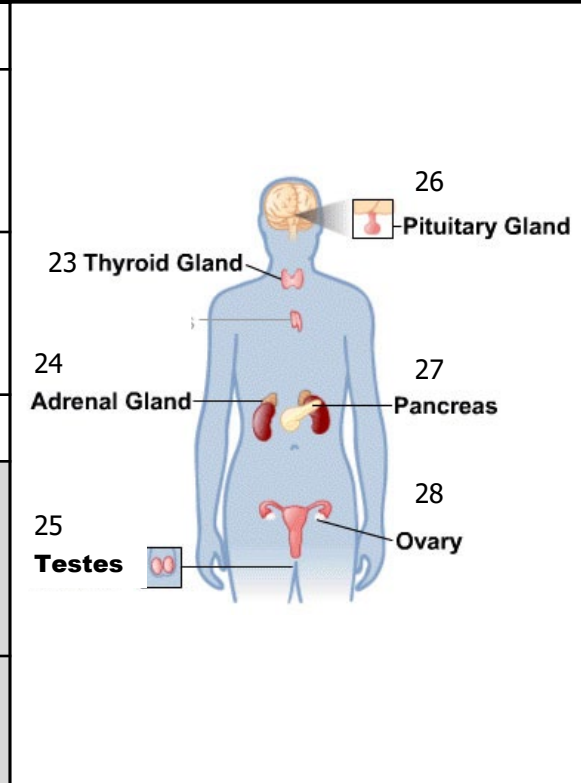
Section 2c: The Synapse



Section 3: Hormonal Control Key Terms

17 Endocrine System	The system of glands that secrete hormones .
18 Hormone	A chemical secreted by a gland that travels in the blood and has an effect on a target organ . The effects are slower and longer-lasting than responses from the nervous system.
19 Pituitary Gland	A gland that secretes several hormones into the blood. These hormones in turn act on other glands to stimulate other hormones to be released to bring about effects.
20 Testosterone	Male hormone produced by testes . Stimulates sperm production .
21 Adrenaline (HT)	Hormone produced by the adrenal glands in times of fear/ 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'.
22 Thyroxin (HT)	Hormone produced by the thyroid gland . Thyroxine stimulates the metabolic rate . Important in growth and development .

Section 4: Location of Endocrine Glands



Section 5: Blood Glucose Control Key Terms

29 Pancreas	The gland that monitors and controls blood glucose concentration .
30 Insulin	A hormone produced when blood glucose concentration is too high . Causes glucose to move from the blood into the cells . In liver and muscle cells excess glucose is converted to glycogen .
31 Glucagon (HT)	A hormone produced when blood glucose concentration is too low . Causes glycogen to be converted into glucose and released into the blood .
32 Glycogen	A storage molecule made from many glucose molecules bonded together . Found in liver and muscle cells.
33 Type I Diabetes	Disorder in which the pancreas fails to produce enough insulin . Causes uncontrolled high blood glucose levels. Treated with insulin injections .
34 Type II Diabetes	Body cells no longer respond to insulin produced by the pancreas . A carbohydrate controlled diet and exercise are common treatments. Obesity is a risk factor .

Biology 5: Homeostasis and Response

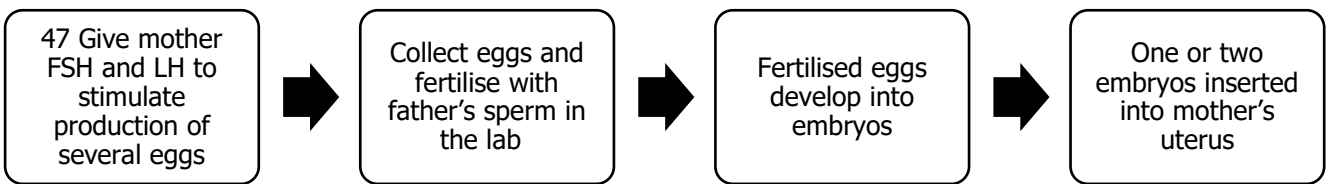
Section 6: Menstrual Cycle (Some HT)

35 Ovulation	The release of an egg cell . Occurs approximately every 28 days .
36 FSH	Produced by the pituitary gland . A hormone that causes an egg to mature in the ovary . Causes oestrogen to be produced .
37 Oestrogen	Produced by the ovaries . Causes blood lining of uterus to develop . Stops FSH being produced . Stimulates release of LH .
38 LH	Produced by the pituitary gland . A hormone that causes ovulation .
39 Progesterone	Produced by the ovary . Maintains blood lining in uterus. Stops production of LH and FSH .

Section 8: Methods of Contraception

Method	How it works	Pros (+) and Cons (-)
40 Oral contraceptives	The contraceptive pill. Contain hormones to inhibit FSH production so eggs do not mature .	+ 99% effective + Reduces risk of some cancers - Can cause side effects e.g. nausea
41 Progesterone	Injection, implant or skin patch of slow-release progesterone to stop eggs maturing and being released .	+ Fewer side effects than pill. + Doesn't need to be taken daily so less likely to be forgotten - Less effective than pill
42 Barrier methods	Condom or diaphragm . Prevents sperm reaching the egg .	+ 98% effective (when used correctly) + Prevent STIs - Can break or be used incorrectly
43 Spermicide	Kills or disables sperm . Used with diaphragms to make them more effective.	+ Increases effectiveness of some barriers - Can't be used on its own
44 Avoiding intercourse	Avoiding intercourse when an egg might be in an oviduct.	- High risk of becoming pregnant
45 Sterilisation	Undergoing surgery to stop sperm or eggs being able to fertilise.	+ Permanently stops pregnancy - Risks from surgery - Expensive to reverse and may not work
46 Intra-uterine device (IUD)	An implant into the uterus that prevent fertilised eggs implanting into the wall of the uterus or release hormones .	+ Long lasting but can be reversed - Small risk of infection or uterus damage when IUD is implanted

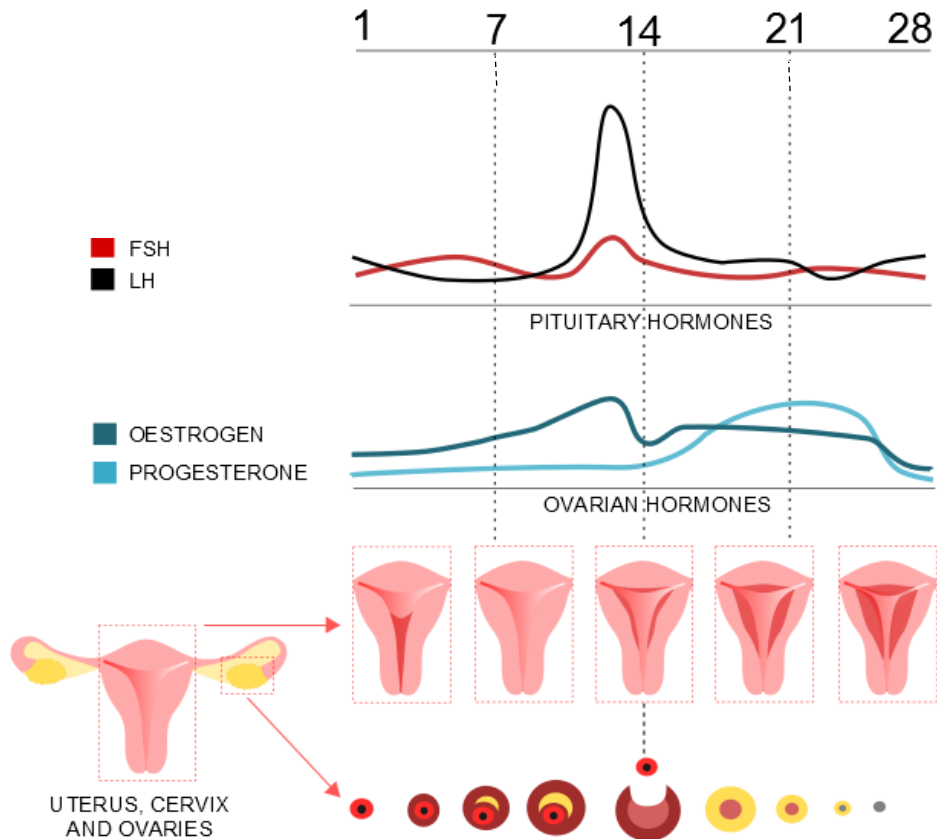
Section 9: IVF (HT)



Section 9a: IVF Disadvantages

- 48 Emotionally and physically stressful.
- 49 Success rates are low.
- 50 Can lead to multiple births which are risky for mother and babies

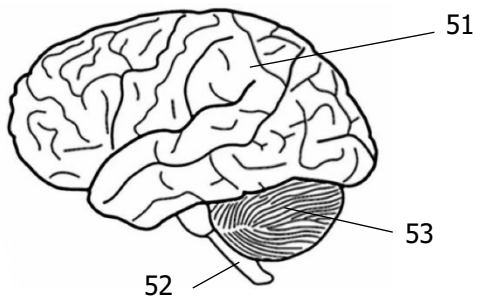
Section 7: Changes in the Menstrual Cycle (HT)



Biology 5: Homeostasis and Response

Section 10: The brain

51 Cerebral cortex	Outer wrinkly part, responsible for consciousness, intelligence, memory and language
52 Medulla oblongata	Controls unconscious activities e.g. breathing and heartbeat
53 Cerebellum	Responsible for muscle coordination



Section 11: Studying the brain

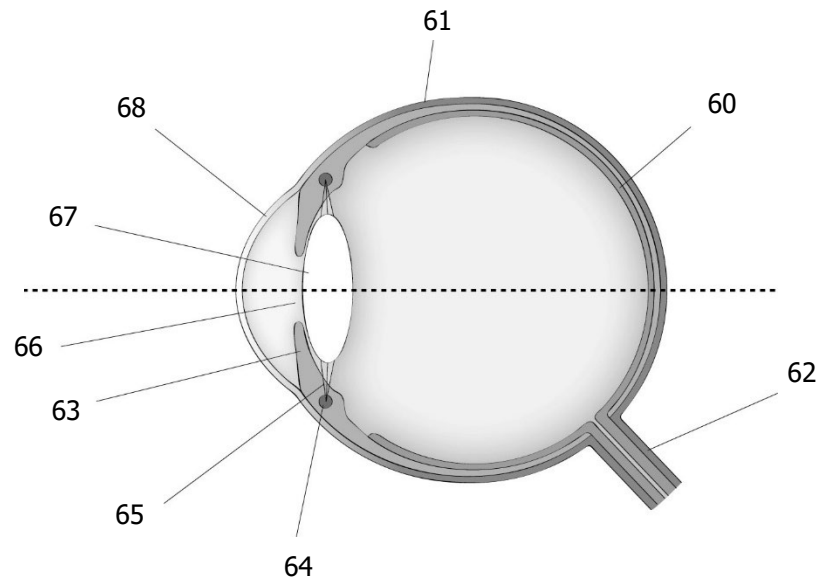
54 Study people with brain damage	If a part of the brain has been damaged the effect on the patient can tell you what this part does
55 Electrically stimulate the brain	By observing what stimulating different parts of the brain does its possible to get an idea of what those parts do
56 MRI scans	MRI scans produce detailed pictures of the brain. Scientists can see which parts are active when people are doing things
57 The brain is complex and delicate – investigating and treating it is difficult	

Section 12: The eye key terms and parts

58 Accommodation – changing the shape of the lenses to focus on near and distant objects

59 Refraction – the bending of light rays when they pass from one medium to another

Part	Function
60 Retina	Where an image forms at the back of the eye, contains rods and cones
61 Sclera	The white part, protects the eye
62 Optic nerve	Send electrical impulses from the retina to the brain
63 Iris	Coloured muscle controls the size of the pupil
64 Ciliary muscles	Contract and relax to change the shape of the lens
65 Suspensory ligaments	Controls the shape of the lens to focus light rays on the retina
66 Pupil	Hole located in the centre of the iris of the eye that allows light to strike the retina
67 Lens	Refracts light to be focused on the retina
68 Cornea	Refracts light through the pupil
69 Rods	Light sensitive receptor cells that let you see in low light conditions
70 Cones	Light sensitive receptor cells that let you see colour



Section 13: Focusing on near and distant objects

71	To look at near objects – ciliary muscles contract , suspensory ligaments slacken , lens becomes fat , increasing amount of refraction
72	To look at distant objects – ciliary muscles relax , suspensory ligaments tighten , lens becomes thin , decreasing amount of refraction

Section 14: Correcting vision problems

	Where the image focuses	How to correct it	Why it occurs
73 Long sighted (HYPEROPIA)	Behind the retina	Convex lens	The lens is too weak or the eyeball is too short
74 Short sighted (MYOPIA)	In front of the retina	Concave lens	The lens is too strong, or the eyeball is too long
75 Contact lenses	Good for sports/activities, almost invisible. Could cause infection if not sterilised properly		
76 Laser eye surgery	Permanent correction of vision problems, however, surgery carries risks		
77 Lens replacement	Permanent solution, risk of vision loss		

Biology 5: Homeostasis and Response

Section 15: Temperature control

78 Vasodilation	Arterioles (blood vessels) supplying skin capillaries dilate so more blood can flow close to the surface of the skin. Helps transfer heat energy from the skin to the environment to cool you down
79 Vasoconstriction	Arterioles supplying the skin capillaries constrict so less blood flows under the surface of the skin. Reducing heat loss when you are too cold
80 Sweating	Sweat glands release sweat when you are too hot. When sweat evaporates it transfers energy to the environment
81 Shivering	Shivering is when muscles contract rapidly, this need respiration which transfers energy to the body to warm you up
82 Thermoregulatory centre	Found in the hypothalamus in the brain, detects blood temperature changes and receives information about skin temperature too

Section 16: Water and nitrogen control

Urine contains.....

83 Urea	Excess proteins are broken down into amino acids in the liver. These amino acids are turned into ammonia which is toxic so it is quickly turned into urea and excreted from the body in urine
84 Ions	Excess ions are removed in the urine
85 Water	Excess water is removed in the urine

Section 17: Water and nitrogen control - ADH

86 ADH	Anti-diuretic hormone controls the concentration of the urine
87 Pituitary gland	Releases more or less ADH depending on how much water is in the body
88 Negative feedback	Controls water levels in the body

Section 18: The Kidney – removes waste substances

- 89 A kidney produces urine firstly by **filtering** the blood.
- 90 **Selective reabsorption** then occurs. This means that **all** of the **glucose** is reabsorbed back into the blood, along with **some** of the **ions** and **some** of the **water** depending on the concentration of these within the body.
- 91 The kidney **excretes urea** in the urine along with any **excess water and ions**.
- 92 **Protein** molecules are too **large** to pass through the kidney filters so remain in the blood and are not therefore excreted in the urine of a healthy person.

Section 19: Kidney failure

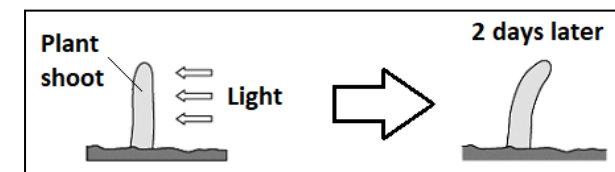
	Advantages	Disadvantages
93 Kidney transplants	<ul style="list-style-type: none"> • Patients can lead a more normal life without having to watch what they eat and drink • Cheaper for the NHS overall 	<ul style="list-style-type: none"> • Organ rejection by the patient's immune system • Must take immune-suppressant drugs which increase the risk of infection • Shortage of organ donors • Kidney only lasts 8-9 years on average • Any operation carries risks
94 Kidney dialysis	<ul style="list-style-type: none"> • Available to all kidney patients (no shortage) • Can buy valuable time until a donor is found • No need for immune-suppressant drugs 	<ul style="list-style-type: none"> • Patient must limit their salt and protein intake between dialysis sessions • Expensive for the NHS • Regular dialysis sessions – impacts on the patient's lifestyle • Can cause blood clots or infections

Section 20: Plant hormones

95 Auxin	A plant hormone responsible for cell elongation/plant growth	Uses – killing weeds, growing cuttings with rooting powder, growing cells in tissue culture
96 Ethene	A plant hormone responsible for ripening	Uses – speed up ripening of fruit
97 Gibberellin	A plant hormone responsible for seed germination	Uses – controlling seed dormancy and germination, inducing flowering, growing larger fruit
98 Tropism	A plant's response to a stimulus	
99 Phototropism	A plant's response to light	
100 Gravitropism	A plant's response to gravity	

101 A plant's response to light

- Auxin (a plant hormone) redistributes unequally in the shoot
- More auxin gathers on the dark side of the shoot
- Auxin promotes cell elongation in the shoot
- If the plant cells on the dark side have more auxin they will grow more/faster & longer
- This causes the plant to bend towards the light



102 A plant's response to gravity

- Gravity produces unequal distribution of auxin
- Auxin is pulled to the lower side of the roots (by gravity)
- In the root auxin inhibits cell growth
- The cells on top elongate faster
- This causes the root to bend downwards

