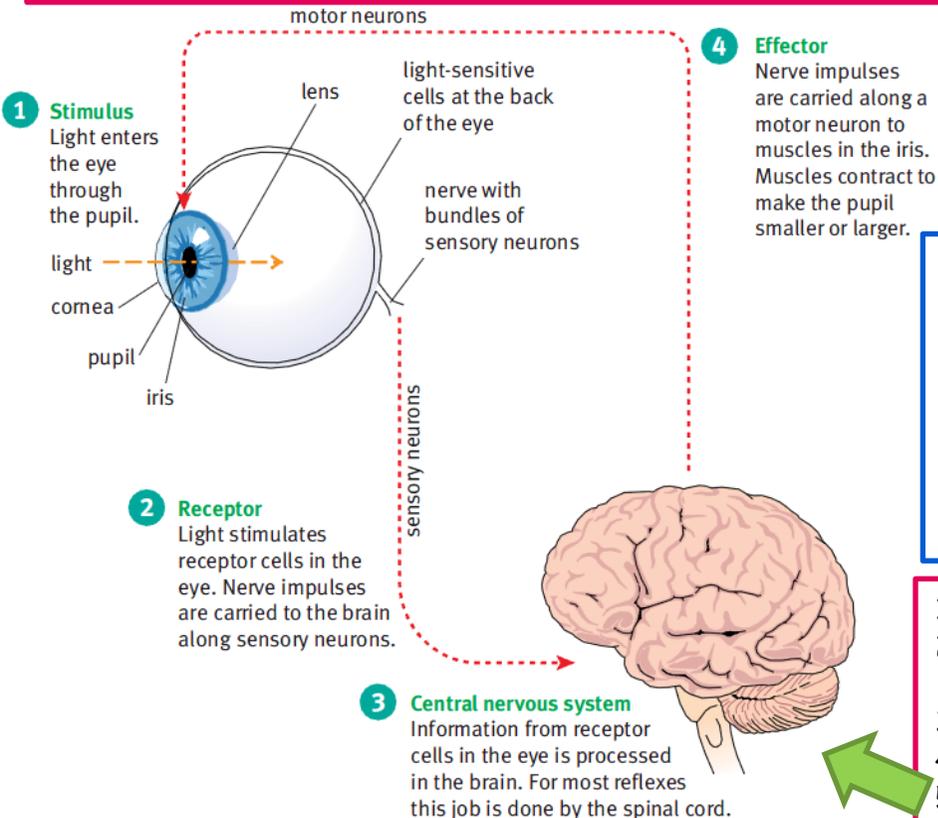


## Key words:

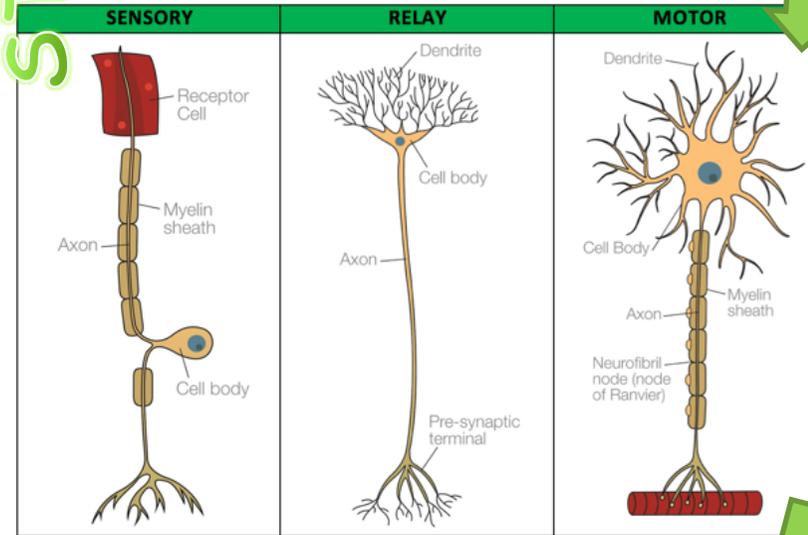
1. **Homeostasis:** Maintaining a constant internal environment
2. **Receptor:** Detect a change in the environment
3. **Effector:** Muscle or gland that carries out a response
4. **Stimulus:** A change in the environment
5. **Sensory neurone:** Carries an electrical impulse from the receptor to the CNS
6. **Relay neurone:** Carries the impulse from the sensory neurone to the motor neurone
7. **Motor neurone:** Carries the impulse from the CNS to the effector
8. **Synapse:** A tiny gap between 2 neurones
9. **Reflex:** An automatic response that does not require processing, helps an organism survive
10. **CNS:** Central Nervous System - the brain and spinal cord
11. **PNS:** Peripheral Nervous System - the neurones that connect the rest of the body to the CNS



START

## Y11 Homeostasis & Response

**Homeostasis:** Maintaining a constant internal environment e.g. temperature control and blood glucose control.  
**Through both nervous and hormonal control**



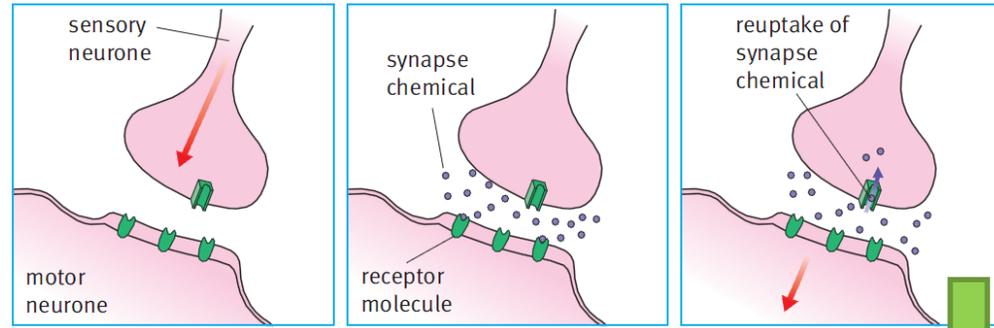
### Motor Neurone V Sensory Neurone

- A motor neurone goes from the CNS to the effector
- A sensory neurone goes from the sensory receptor to the CNS
- A motor neurone has longer axons, sensory neurone has a short axon
- A motor neurone has many short dendrites and a sensory neurone has long runs of (often 1) dendrite
- A motor neurone has its cell body inside the CNS and the sensory neurone has its cell body just outside the CNS

1. Receptor detects a stimulus
2. A nervous impulse is sent along the sensory neurone to the CNS from the PNS
3. A relay neurone then sends the message to a motor neurone
4. The motor neurone carries the nervous impulse to the effector
5. The effector carries out a response

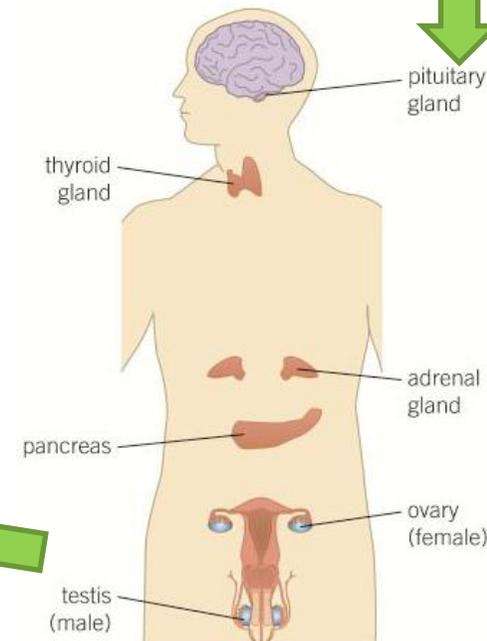
**Key words:**

1. **Hormones:** Chemical messenger that travels in the blood to target cells and causes a response
2. **Endocrine gland:** Release hormones
3. **Contraceptive:** A method to prevent fertilisation of an egg
4. **Ovulation:** When the egg is released from the ovary
5. **Menstruation:** The shedding of the cells that line the uterus 'period'



1. As the nervous impulse arrives at the **synapse** it causes a **chemical** to be released
2. The chemical **diffuses** into the synapse
3. The chemical binds to **receptors** on the second neurone, the nervous impulse is passed on
4. If a drug that has a **similar shape** the synapse chemical **blocks** the receptor the impulse is blocked and not passed on

Endocrine gland	Role of the hormones
Pituitary	<ul style="list-style-type: none"> <li>• Controls the growth of children</li> <li>• Stimulates the thyroid gland to produce thyroxine to control metabolism</li> <li>• In women stimulates ovaries, produce and release eggs and make oestrogen</li> <li>• In men stimulates the testes to make sperm and testosterone</li> </ul>
Thyroid	Controls the metabolic rate of the body
Pancreas	Controls the levels of glucose in the body
Adrenal	Prepares the body for stressful situations for 'fight of flight' and releases adrenaline
Ovaries	Controls the development of the female secondary sexual characteristics and is involved in the menstrual cycle
Testes	Controls the development of the male secondary sexual characteristics



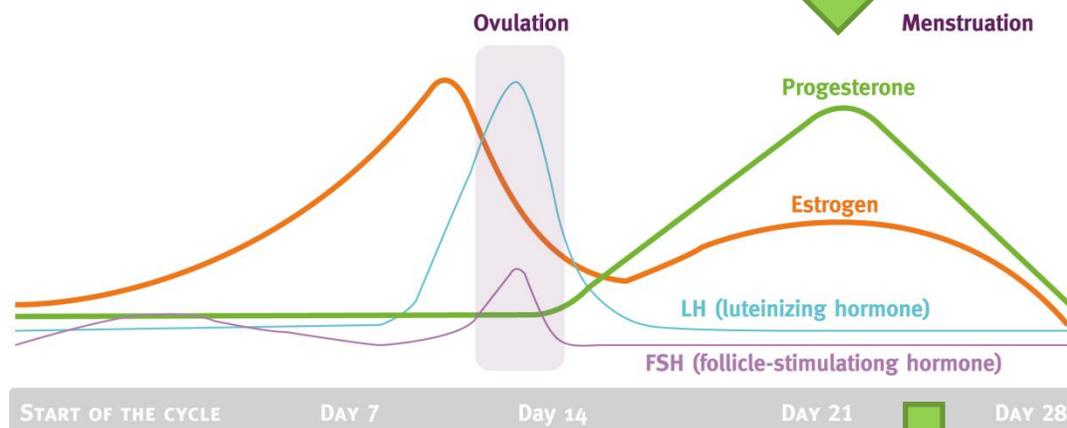
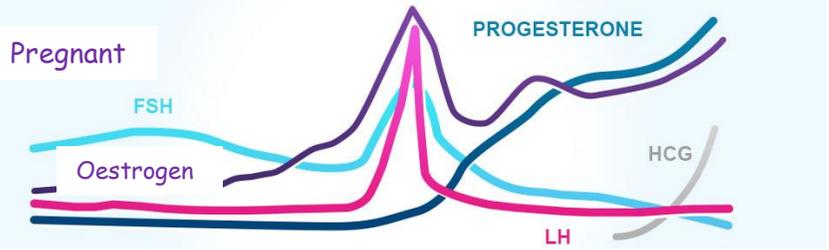
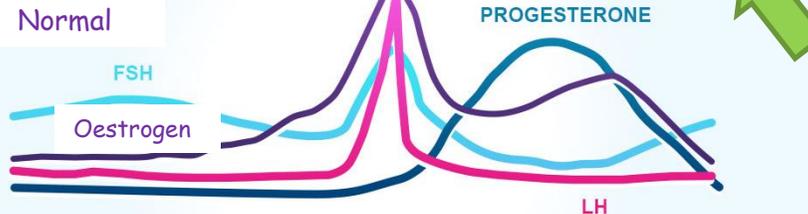
**'The pituitary is the master gland of the endocrine system'**

- The Pituitary controls the stimulation of the other glands
- It stimulates the thyroid gland to produce thyroxine to control metabolism
- In women it stimulates ovaries to produce and release eggs and make oestrogen
- In men it stimulates the testes to make sperm and testosterone
- Without the pituitary none of the other glands would be able to function

	Nerve	Hormone
What is it?	Carries an electrical impulse	A chemical messenger
How quick does it carry out a response?	Very quick	Slower than nerves
How long does it last?	Not very long	Longer than nerves
How is it activated?	Through a stimuli being detected by a receptor	Through the CNS sending an impulse along a motor neurone to a gland

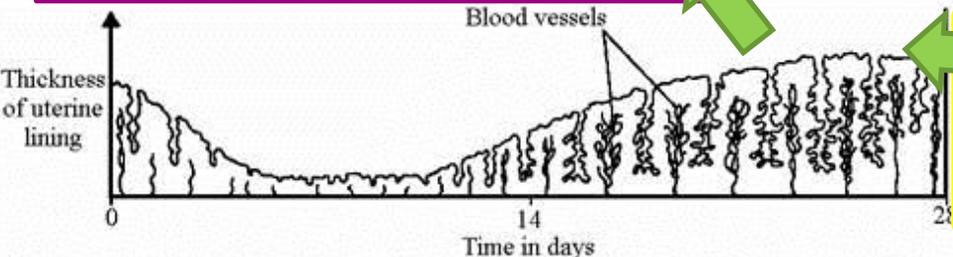
Progesterone and oestrogen continue to rise during pregnancy to maintain and thicken the lining of the womb. HCG is also produced

- Hormones have a specific shape
- They bind to specific receptors on the outside of the cell
- If the cell has a different shaped receptor the hormone will not be able to bind
- So no response will occur in this cell



Oestrogen & progesterone increase which cause the thickening of lining of the uterus

- 4 Hormones of the menstrual cycle**
1. FSH - Causes the egg to mature
  2. LH - Causes the release of the egg
  3. Oestrogen & Progesterone - Maintain the lining of the womb



### Lack of ovulation:

- Some women do not ovulate
- Artificial FSH can be used as a drug to treat this problem
- It stimulates the eggs in the ovaries to mature and also release oestrogen
- An artificial LH can then be used to trigger ovulation
- This can allow some women to get pregnant naturally without IVF

### IVF:

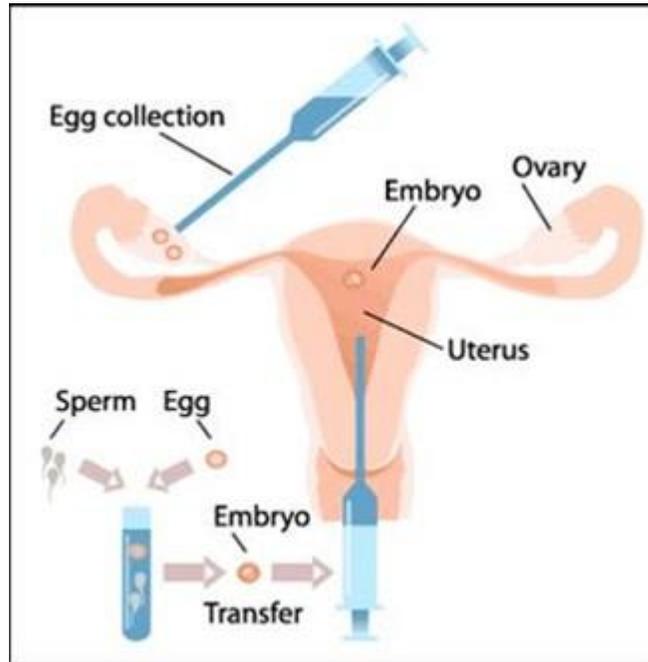
- Multiple embryos are implanted to increase the chance of a successful pregnancy
- It can lead to risky multiple births
- It is very emotionally and physically stressful

### IVF:

- Mother is given FSH to stimulate the maturation of a number of eggs followed by LH to cause ovulation
- The eggs and sperm are collected and fertilised outside of the body
- The fertilised eggs are kept in special solutions in a warm environment to develop the embryos
- The embryos are then inserted in back into the uterus of the mother

### Non-Hormonal methods of contraception

- Condoms - a physical barrier
- Diaphragm - prevents the sperm getting to the egg
- The coil - intrauterine device which prevents the implantation of an embryo
- Vaginal spermicide - kills sperm
- Abstaining from sexual intercourse
- Male and female sterilisation



### Hormonal methods of contraception

- The pill
- The implant
- The injection
- Intrauterine device that releases a hormone
- Vaginal spermicide

The pill works by inhibiting FSH production this prevents the egg from maturing, it contains **progesterone** and **oestrogen** when these hormones are high they inhibit the production of FSH and the maturation of eggs, by mimicking pregnancy

### Reasons contraception is used:

- when pregnancy might harm the mental or physical condition of the mother
- to limit the number of children people have to ensure they don't damage living standards or affect other children
- to prevent pregnancy in people who do not want a child at this stage in their lives

Some people object to contraception because of the following reasons:

- Contraception is unnatural
- Contraception is anti-life
- Contraception is a form of abortion
- Contraception separates sex from reproduction

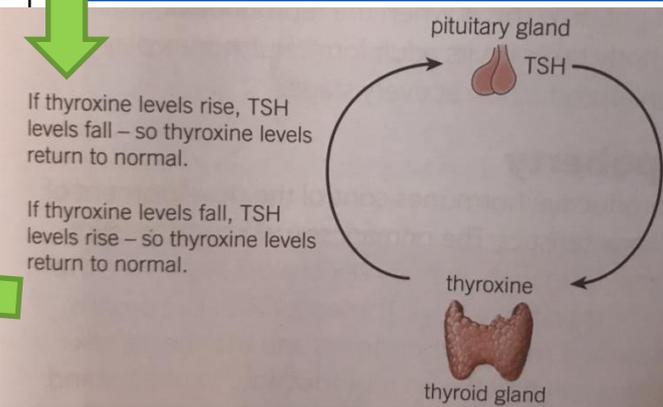
	Type 1 diabetes	Both types of diabetes	Type 2 diabetes
risk factors	causes not known for sure	people who have a relative with diabetes are more likely to develop the condition	people who are overweight women who have had diabetes during pregnancy people who are Asian or African-Caribbean
age of onset	mainly young people		mainly older people
symptoms	symptoms appear suddenly and are obvious	symptoms include: increased thirst; frequent urination; tiredness; feeling sick; weight loss; blurred vision	symptoms develop slowly and may not be noticed. Symptoms include: increased appetite; tingling in hands and feet; wounds that are slow to heal
cause	cells that make insulin in the pancreas are destroyed		the body no longer responds to its own insulin, or does not make enough insulin
treatment	insulin injections	regular testing of blood sugar levels; healthy diet; exercise	tablets either to increase insulin production or to help the body make better use of the insulin it does produce
prevention	prevention is not yet possible		a better diet, increased physical activity and modest weight loss can greatly cut the risk

**Insulin**  
 Glucose → Glycogen  
**Glucagon**  
 Glycogen → Glucose

- When glucose is higher insulin is released
- This caused glucose to be stored as glycogen
- When blood glucose levels drop too low glucagon is released
- Glucagon converts stored glycogen back into glucose

**Negative feedback:** When something moves away from the normal value the system brings it back to the normal value. This is how homeostasis is maintained.

Thyroxine controls your metabolic rate, how quickly substances are broken down and built up, how much oxygen your tissues use, and how the brain of a growing child develops. Negative feedback keeps thyroxine levels stable.



Adrenaline is released when you are stressed, angry, excited or frightened it causes the following changes:

- Increased heart and breathing rate, so more glucose and oxygen can get to the cells for respiration
- Causes stored glycogen in the liver to be converted to glucose for respiration
- Pupils of your eyes dilate
- Increased mental awareness
- Blood diverted away from the digestive system and towards the muscles in your limbs

1. What is homeostasis?
2. Explain the difference between a receptor and an effector
3. Explain the difference between a motor neurone and a sensory neurone
4. Describe a reflex arc
5. Explain what a reflex is and why it is important
6. Explain how an impulse crosses a synapse
7. Suggest how a drug could affect a synapse
8. What is an endocrine gland?
9. What is a hormone?
10. Explain how hormonal control is different to neuronal control
11. Suggest why the pituitary gland is known as the master gland
12. Suggest what would happen if the pituitary gland did not produce enough growth hormone in a child or too much
13. Name the 6 endocrine glands and describe what they do
14. Explain the roles of insulin and glucagon in the control of blood glucose
15. What is diabetes?
16. Compare and contrast type 1 and type 2 diabetes
17. Explain what negative feedback is
18. Explain why blood glucose control is an example of negative feedback and homeostasis
19. Explain how thyroxine is an example of negative feedback
20. Explain the role of adrenaline and how it affects the body
21. Describe the roles of the 4 hormones in the menstrual cycle
22. Describe how the 4 hormones change during the menstrual cycle
23. Compare the hormones of the normal menstrual cycle to that of pregnancy
24. Describe the different forms of contraception
25. Explain how the contraceptive pill works to prevent pregnancy
26. Explain how IVF can be used to treat fertility problems
27. Explain how doctors can treat women who are not ovulating