

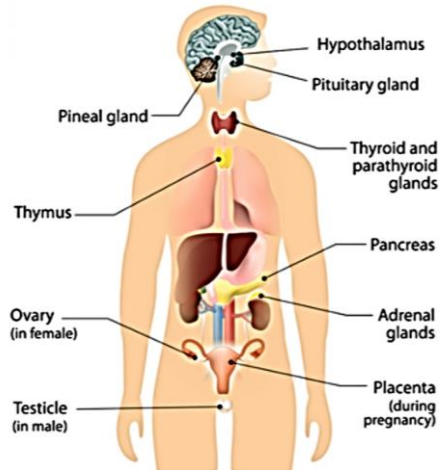
B7: Hormones

Lesson sequence

1. Hormones
2. Thyroxine and adrenalin
3. The menstrual cycle
4. Hormones and the menstrual cycle
5. Contraception and fertility treatment
6. Controlling blood glucose
7. Diabetes

1. Hormones

Hormone	A chemical messenger that changes the way a part of the body works.
Important hormones	Insulin, glucagon, adrenalin, oestrogen, progesterone, testosterone, thyroxine, LH, FSH, ACTH, growth hormone.
Endocrine gland	Parts of the body that produce hormones
Important endocrine glands	Pituitary gland, thyroid gland, pancreas, adrenal glands, ovaries and testes.
Target organ	The part of the body affected by a hormone.
Important hormones	Insulin, glucagon, adrenalin, oestrogen, progesterone, testosterone, thyroxine, LH, FSH, ACTH, growth hormone.
Sex hormones	Women: oestrogen and progesterone Men: testosterone



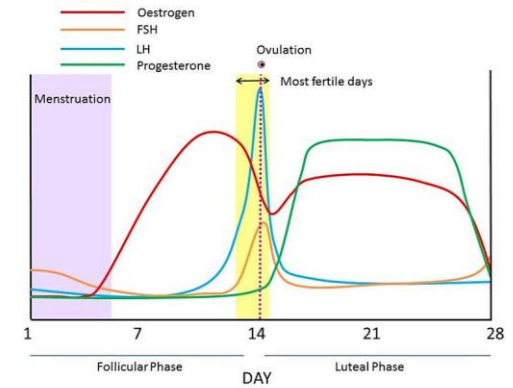
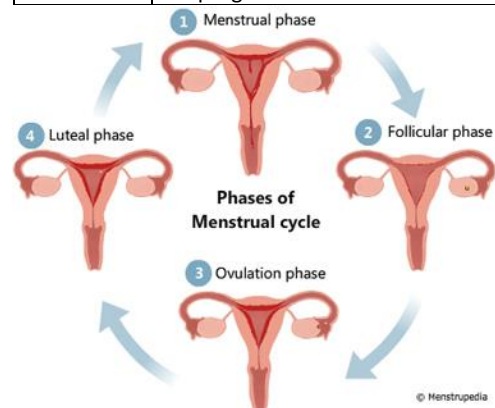
2. Thyroxine and adrenalin (HT)

Metabolic rate	The rate at which the bod uses the energy stored in food.
Thyroxine	Role: To control your metabolic rate. Endocrine gland: Thyroid gland Target organ: Most of the body
Negative feedback	The way the body responds to high levels of something by bringing them down, and low levels by bringing them up.
Negative feedback and the metabolic rate	1) Low levels of thyroxine stimulates production of TRH in hypothalamus 2) This causes the release of TSH from the pituitary gland 3) TSH causes the thyroid to produce thyroxine 4) Normal levels of thyroxine inhibits the release of TRH and the production of TSH

Adrenaline	Role: To prepare the body for fight or flight Endocrine gland: Adrenal glands Target organ: Heart (beats faster and stronger), blood vessels going to muscles (get wider), blood vessels going to organs (get narrower), liver (releases glucose)
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3. The menstrual cycle

Menstrual cycle	A (roughly) 28 day cycle that prepares a woman's body for pregnancy.
Ovulation	The release of an egg cell by an ovary
Fertilisation	When a sperm cell fuses with an egg cell to form a zygote.
Days 1-5	Menstruation (a period): the lining of the uterus breaks down and leaves the body through the vagina.
Days 6-12	The uterus lining begins to thicken again.
Days 13-15	Ovulation happens
Days 16-28	The uterus lining continues to thicken and would be able to accept an embryo if fertilisation happens.
Control of the cycle	The menstrual cycle is controlled by the sex hormones: oestrogen and progesterone.

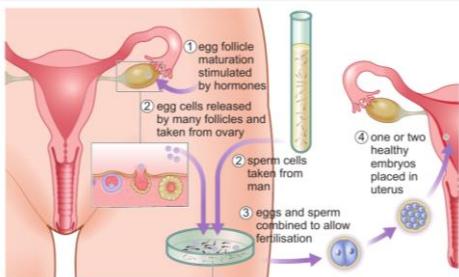


4. Hormones and the menstrual cycle (HT)

Egg follicle	A layer of tissue surrounding each of the immature eggs in the ovaries.
Oestrogen	Causes the release of FSH and the thickening of the uterus lining. High oestrogen levels cause LH release.
FSH	Causes one follicle to develop and mature the egg cell within it.
LH	Causes ovulation when the egg is released from the follicle.
Corpus luteum	The follicle becomes a corpus luteum after ovulation, and releases progesterone. It breaks down over two weeks.
Progesterone	Maintains the thickness of the uterus lining, inhibits FSH release. Falling progesterone levels trigger ovulation.

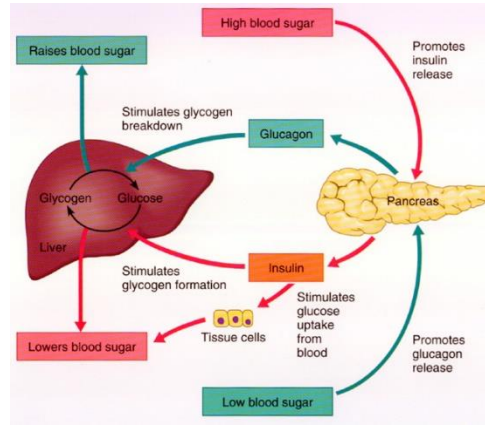
5. Contraception and fertility treatment

Contraception	Preventing sexual intercourse from leading to fertilisation and pregnancy.
Condom	Worn on the penis, they prevent sperm from entering the vagina. Also prevent STDs.
Diaphragm or cap	Placed over the cervix at the top of the vagina. Prevent sperm entering uterus, do not prevent STDs.
Contraceptive pill / implant	Uses hormones to prevent ovulation. Does not prevent STDs.
Assisted reproductive technology (ART)	Using hormones and other methods to increase the chance of pregnancy.
Clomifene therapy	Clomifene increases the levels of FSH and LH to make egg successful ovulation more likely.
In vitro fertilisation (IVF)	Sperm is extracted from a man, and eggs from a woman. The eggs are fertilised in a laboratory and one or more is placed into the uterus.



The technique is called 'in vitro' (which means 'in glass') because glass dishes were used originally.

C how IVF is carried out

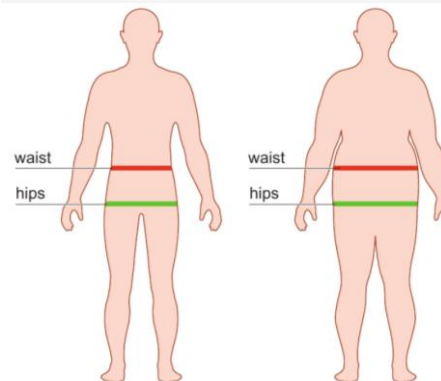


6. Controlling blood glucose

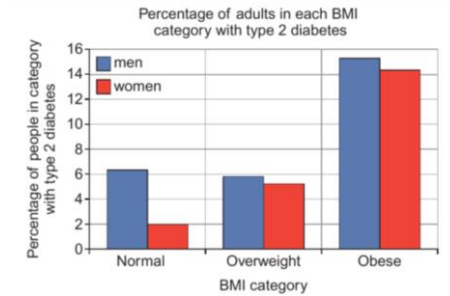
Homeostasis	Maintaining constant conditions in the body, such as temperature or blood glucose concentration.
Blood glucose concentration	The concentration (amount) of glucose in the blood. Both too high and too low are dangerous.
Glycogen	A stored form of glucose made by joining glucose molecules together in long chains.
Insulin	Role: To reduce blood glucose concentration Endocrine gland: Pancreas Target organ: Liver and muscles which convert glucose into glycogen.
Glucagon	Role: To increase blood glucose concentration Endocrine gland: Pancreas Target organ: Liver and muscles which convert glycogen back into glucose.

7. Diabetes

Diabetes	A disease in which the body cannot quickly reduce blood glucose concentrations after eating.
Type 1 diabetes	Diabetes caused when a person's pancreas can't produce insulin.
Treating type 1 diabetes	Insulin injections.
Type 2 diabetes	Diabetes caused when a person does not produce enough insulin (because of very high glucose levels) or stops responding to insulin.
Risk factors for type 2 diabetes	Obesity and inactivity (lack of exercise).
Treating type 2 diabetes	Low-sugar diet, increased exercise, medication to make the body more sensitive to insulin.
Measuring obesity	Body mass index above 30: $\text{BMI} = \frac{\text{mass in kg}}{\text{height in metres}^2}$ High waist:hip ratio $\text{Waist:hip ratio} = \frac{\text{waist}}{\text{hip}}$



D taking waist and hip measurements



C This study of UK adults shows that BMI category and type 2 diabetes are correlated.