

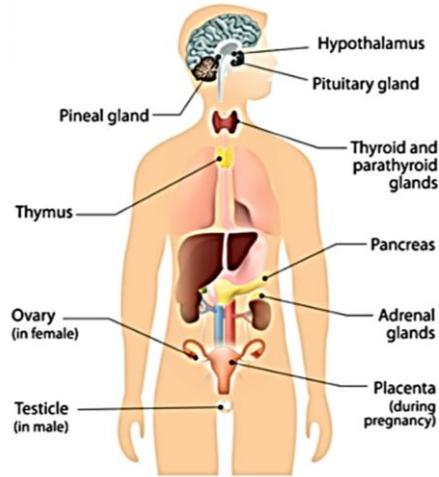
## B7: Hormones

### 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

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



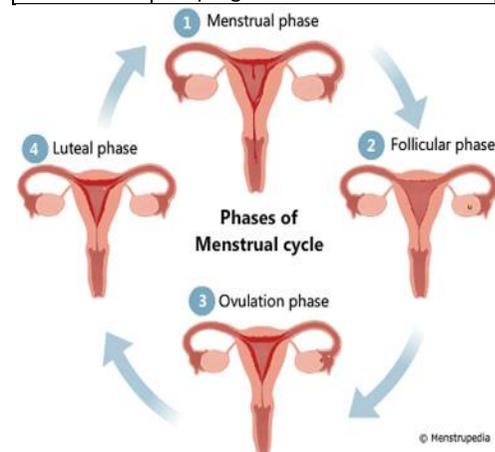
### 2. Thyroxine and adrenaline (HT)

<b>***Metabolic rate</b>	The rate at which the body uses the energy stored in food.
<b>***Thyroxine</b>	<b>Role:</b> To control your metabolic rate. <b>Endocrine gland:</b> Thyroid gland <b>Target organ:</b> Most of the body
<b>***Negative feedback</b>	The way the body responds to high levels of something by bringing them down, and low levels by bringing them up.
<b>***Negative feedback and the metabolic rate</b>	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

<b>***Adrenaline</b>	<b>Role:</b> To prepare the body for fight or flight <b>Endocrine gland:</b> Adrenal glands <b>Target organ:</b> 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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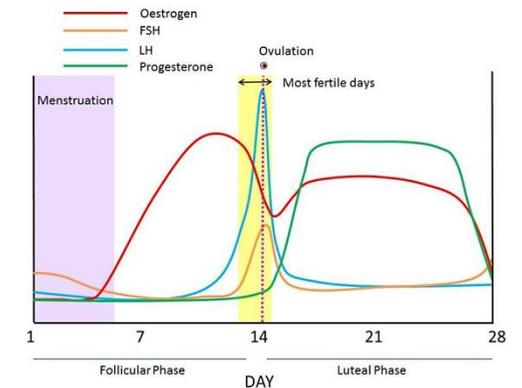
### 3. The menstrual cycle

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



### 4. Hormones and the menstrual cycle (HT)

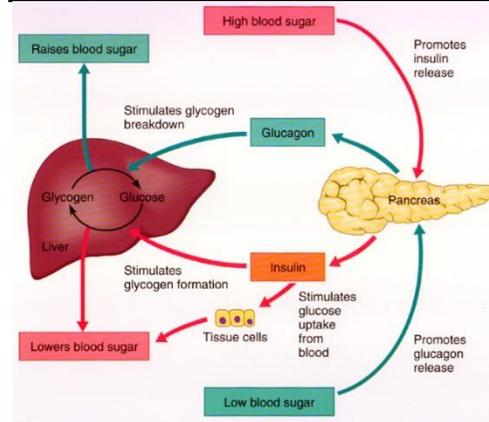
<b>***Egg follicle</b>	A layer of tissue surrounding each of the immature eggs in the ovaries.
<b>***Oestrogen</b>	Causes the release of FSH and the thickening of the uterus lining. High oestrogen levels cause LH release.
<b>***FSH</b>	Causes one follicle to develop and mature the egg cell within it.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



<b>***Progesterone</b>	Maintains the thickness of the uterus lining, inhibits FSH release. Falling progesterone levels trigger ovulation.
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5. Contraception and fertility treatment	
<b>*Contraception</b>	Preventing sexual intercourse from leading to fertilisation and pregnancy.
<b>*Condom</b>	Worn on the penis, they prevent sperm from entering the vagina. Also prevent STDs.
<b>*Diaphragm or cap</b>	Placed over the cervix at the top of the vagina. Prevent sperm entering uterus, do not prevent STDs.
<b>*Contraceptive pill / implant</b>	Uses hormones to prevent ovulation. Does not prevent STDs.
<b>***Assisted reproductive technology (ART)</b>	Using hormones and other methods to increase the chance of pregnancy.
<b>***Clomifene therapy</b>	Clomifene increases the levels of FSH and LH to make egg successful ovulation more likely.
<b>***In vitro fertilisation (IVF)</b>	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.

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



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