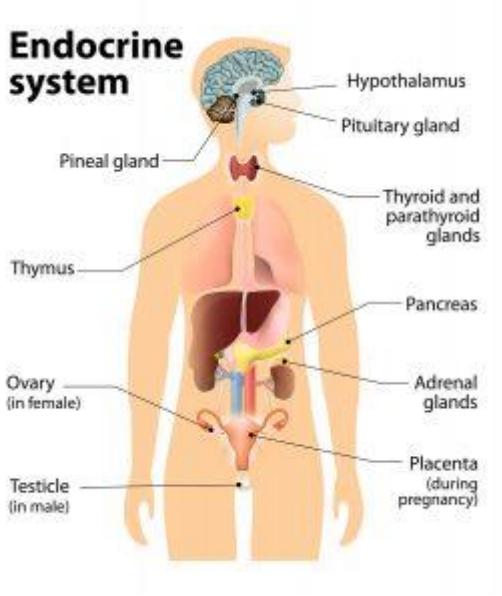
Hormones

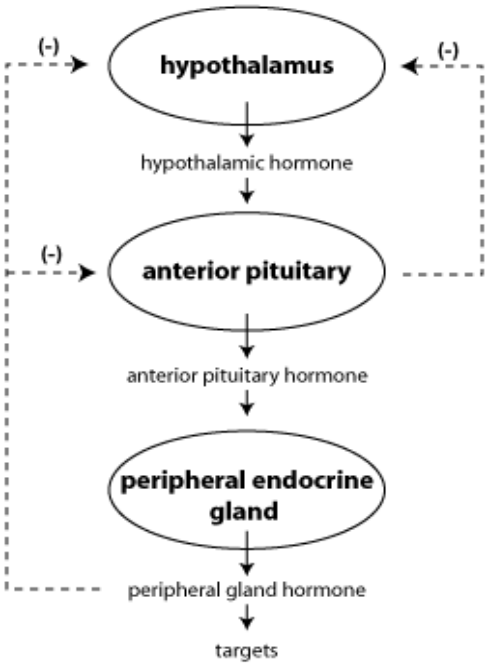
- Are chemical messengers which travel in the blood.
- Produced by endocrine glands. Act at target organs which are usually distant to the glands.
- Are secreted in response to external and internal stimuli.
- Have a long duration of activity, work slowly and have widespread effects.



Endocrine gland	Hormone	Functions
Hypothalamus	GnRH, TRH	Makes hormones that control the pituitary gland e.g. GnRH controls FSH/LH release and TRH controls TSH release. Important in negative and positive feedback loops.
Pituitary gland	Anterior pituitary secretes FSH, LH, TSH, ACTH, prolactin and growth hormone. Posterior pituitary secretes oxytocin and ADH.	FSH&LH – affects reproductive function and sexual characteristics. Stimulates oestrogen and progesterone to be produced by the ovaries and testosterone and sperm by the testes. TSH: stimulates release of thyroid hormones from the thyroid gland. ACTH: stimulates release of adrenaline and cortisol from the adrenal glands. Growth hormone – stimulates growth and repair. Prolactin- lactation. ADH – osmoregulation

		Oxytocin- stimulates uterine contractions in labour.
Pineal gland	Melatonin	Controls the biological 'clock' i.e. circadian rhythms.
Thyroid gland	Thyroid hormones: T4 (thyroxine) and T3 (triiodothyronine).	Controls metabolic rate.
Parathyroid gland	Parathyroid hormone	Regulates calcium levels.
Pancreas	Insulin and glucagon	Glucose homeostasis. Insulin lowers blood glucose levels and glucagon increases it.
Adrenal gland	Adrenaline	Prepares body for 'fight, flight and fright'.
Ovaries	Oestrogen and progesterone	Regulate the menstrual cycle, control development of female sexual characteristics, puberty and fertility.
Testes	Testosterone	Regulates fertility, muscle mass and controls development of male sexual characteristics.
Placenta	hCG, hPL (human placental lactogen), oestrogen and progesterone.	hCG – maintains corpus luteum. Used to test for pregnancy. hPL – increases glucose supply for the developing foetus. Oestrogen & progesterone: maintain uterine thickening to support the pregnancy.

- Negative feedback is often used to control a hormone's activity. This is to prevent the problems of over or under secretion of the hormone. An example is shown below:



- Positive feedback can sometime occur as well in order to amplify secretion of even more hormone when needed e.g. adrenaline secretion when frightened or in danger.

Comparison between hormones and nerves:

Endocrine system	**Nervous system**
Chemical messengers	Electrical signals
Long lasting	Short acting
Slow	Rapid
Widespread effects	Specific and narrow effects
Distant to target site	Released close to target site
Hormones are the messengers	Neurotransmitters are the messengers
No synapses needed.	Synapses used.