

Hormones as signals

The endocrine system

- Communication system between cells in the body using hormones – released as a result of a stimuli
- Hormones are signalling molecules which are transported in the blood stream
- Has a longer lasting effect than the nervous system however it is a slower response
- The endocrine system is anatomically discontinuous meaning that there does not have to be a link between the secretory organ and the receptive organ/ gland/ cell etc
- The endocrine system controls
 - Homeostasis
 - Growth
 - Metabolism
 - Sexual development and functions
 - Calcium levels
 - Circadian rhythm
 - Fight/flight responses
- There are primary and secondary endocrine glands
 - Primary glands have a main function of secreting hormones
 - Secondary glands/ organs do not have hormone secretion as the main function eg the kidney or liver

Negative feedback

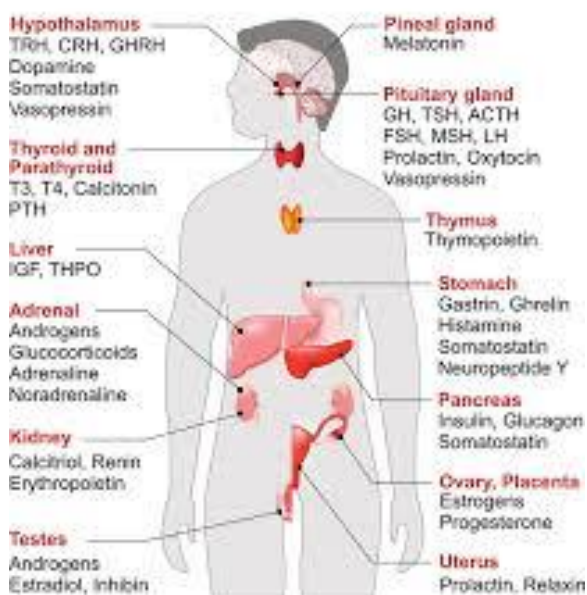
One endocrine gland may produce a trophic hormone which will activate the production of another hormone.

The negative feedback loop allows for one or more hormones along the way to inhibit the secretion of hormones which are its precursors

This prevents there being too high of a concentration of the final product

- Hormones can be made from amino acids or derived from lipids
- There are 3 types of hormones
 - Peptide – most common type of hormone. Often, they are produced as large molecular weight precursors which are proteolytically cleaved in order to form the active hormone. The cleaved section can sometimes also be active. These hormones are water soluble but cannot pass a cell surface membrane or cross membranes generally.
 - AA derived – these are formed from the modification of amino acids. They are small in size, often water soluble and can cross membranes. They bind to cell surface or intracellular receptors. Tyrosine is a precursor of thyroid hormone and tryptophan is a precursor of melatonin
 - Steroids – They are derived from cholesterol and are small and fat soluble. For this reason, they must circulate round the blood stream bound to plasma proteins as otherwise they would not be able to dissolve in water. They are able to pass through membranes

HORMONES



Transport of hormones

Hydrophilic hormones

- Peptides, catecholamines
- Dissolved in plasma

Hydrophobic hormones

- Steroids, thyroid hormones
- Bound to carrier proteins
- Only free hormone can bind to receptor
- Only free hormone can be metabolized
- Longer half-life
- can be stored in adipose tissue