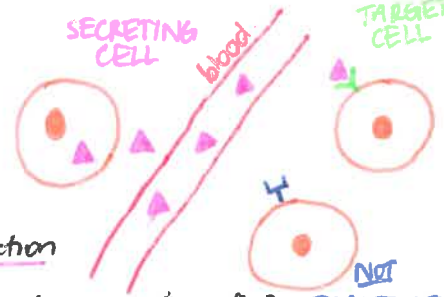
THE ENDOCRINE SYSTEM:

↳ maintains constant internal environment (homeostasis) by: releasing hormones to influence cellular activity responding to stimuli by releasing more/less hormone (feedback)

HORMONES:

↳ secreted by specialised cells + transported in blood
↳ only able to influence cells w specific receptor, may be: all cells in body, group of cells (target cells) or organ (target organ)
↳ change cell function by: changing type, activities or quantities of proteins/enzymes. Hormones can
- Activate genes to produce proteins
- Turn on/off enzymes (change shape)
- ↑/↓ transcription/translation to change rate of production of enzyme/protein.

↳ Enzyme amplification - one hormone activates thousands of enzymes (large effect)



THYROID:

- Thyroxine
- Target: all cells
- Controls metabolism by regulating anabolic/catabolic reactions to release energy + maintain body temp.

PARATHYROIDS:

- parathyroid hormone
- target: bones + kidneys
- control calcium + phosphate levels in the blood.

PINEAL GLAND:

- Melatonin
- Target: Hypothalamus
- Regulates sleep, release stimulated by darkness.

THYMUS:

- Thymosins
- Target: T-cells
- Influence maturation of T-cells

ADRENAL CORTEX:

- Influenced by ACTH

cortisol
Target: Liver
promotes normal metabolism, helps adapt to stress + repair.

Aldosterone
Target: Kidney
Na^+ reabsorption (also H_2O)
↑ K^+ in urine.

ADRENAL MEDULLA:

Adrenaline/noradrenaline
Target: many tissues.
Fight-or-flight responses.
noradrenaline also neurotransmitter for sympathetic NS.

PANCREAS:

- Glucagon
- Target: Liver
- Raises blood glucose by stimulating glycogen → glucose
- Insulin
- Target: liver, muscle cells + fat stores
- Lowers blood glucose by promoting glucose → glycogen, glucose to fat and increased uptake by cells.
- EXOCRINE FUNCTION ↳ secreting enzymes into small intestines.

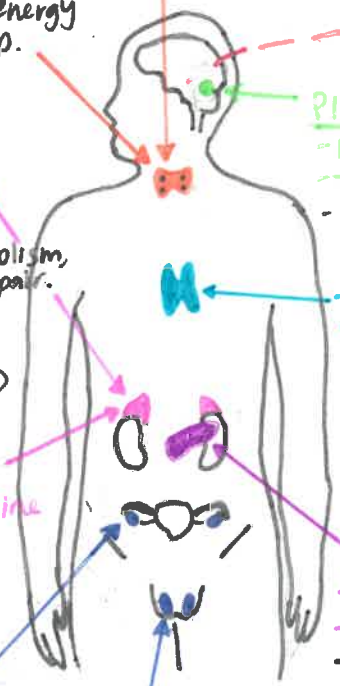
OVARIES

Oestrogens
Target: many tissues
stimulate development of female characteristics
regulate menstrual cycle

Progesterones
Target: uterus + mammary
Regulate menstrual cycle + pregnancy
Prep mammary for milk secretion

TESTES

- Androgens (eg. Testosterone)
- Target: many tissues
- stimulate sperm production
- skeletal muscle growth
- Development + maintenance of male characteristics.

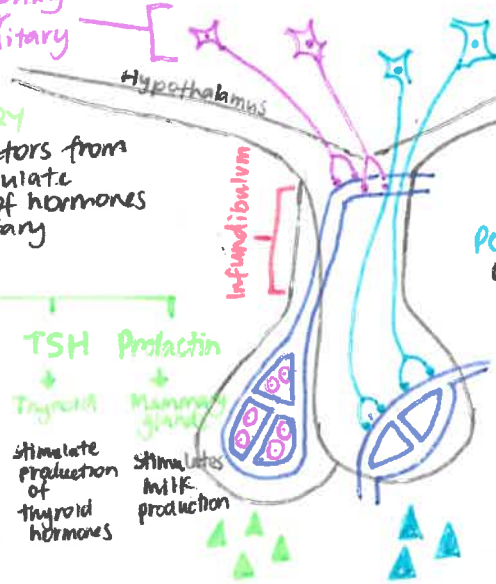


HYPOTHALAMIC CONTROL OF PITUITARY:

Produce + release releasing/inhibiting hormones for anterior pituitary

Hypothalamic neurosecretory cells

Produce oxytocin + ADH which travel down axons to be stored by posterior pituitary gland.



ANTERIOR PITUITARY

↳ releasing/inhibiting factors from the hypothalamus stimulate production + release of hormones from anterior pituitary

FSH	LH	ACTH	GH	TSH	Prolactin
Testes/ovaries		Adrenal cortex	Liver/bones	Thyroid	Mammary glands
gonad function + growth		stimulates cortisol production	↑ amino acid uptake + stimulate protein synthesis	stimulate production of thyroid hormones	stimulates milk production

"F.L.A.G. T.o.P"

POSTERIOR PITUITARY

↳ releases stored hormones after nervous stimulation by hypothalamus.

Oxytocin
↓
uterus/mammary glands
- contractions during labour
- release milk during breastfeeding

ADH
↓
Kidneys
- water reabsorption

LIPID-SOLUBLE

↳ steroid (lipids)

Can diffuse through membrane

CELL MEMBRANE (Target cell)

Binds w receptor inside cell (usually nucleus)

Hormone-receptor complex alters gene expression to activate genes controlling protein formation.

NUCLEUS

WATER-SOLUBLE

↳ protein + amine (amino acids)

Attaches to receptor in membrane of target cell

Cannot diffuse through membrane

E.g. cAMP

Cytoplasmic response

secondary messenger diffuses through cell activating enzymes (signal transduction)