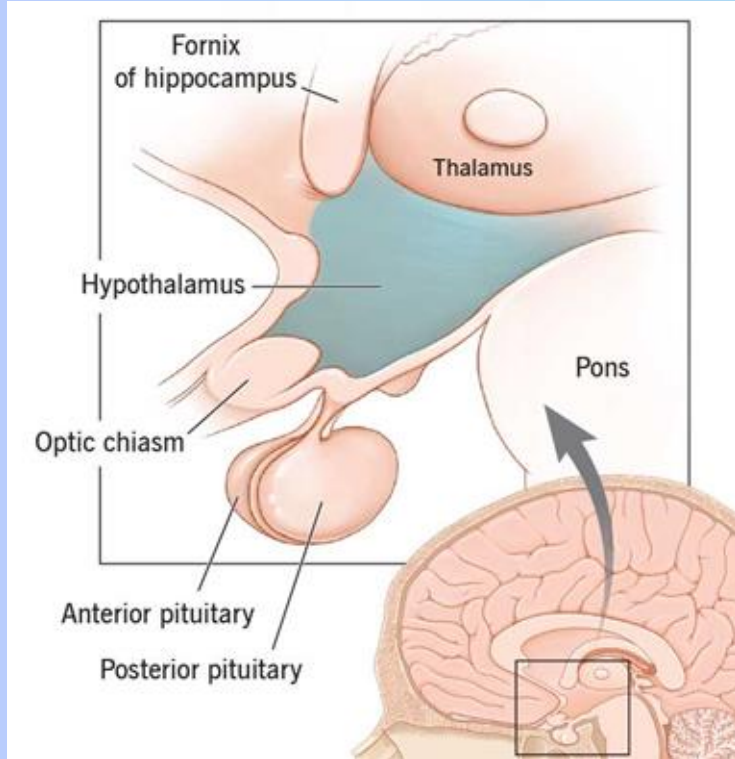


Endocrinology review

By Michelle Kaminski

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- Hypothalamus
- Pituitary glands
- Thyroid Review
- Growth Hormone Axis
- Adrenal Cortex
- Mammary glands
- Gonads
- Pancreas



Hypothalamus



Control Center:

does not store hormones long term- wants to use the hormones it produces quickly to signal to other organs

8 total

A.P Control Hormones:

- Thyrotropin-releasing hormone
- Corticotropin-releasing hormone
- Gonadotropin releasing hormone
- Dopamine (prolactin inhibiting hormone)
- Somatostatin (Growth Hormone inhibiting hormone)
- Growth Hormone Releasing Hormone

Direct Hormones:

- Vasopressin (adh)
- Oxytocin



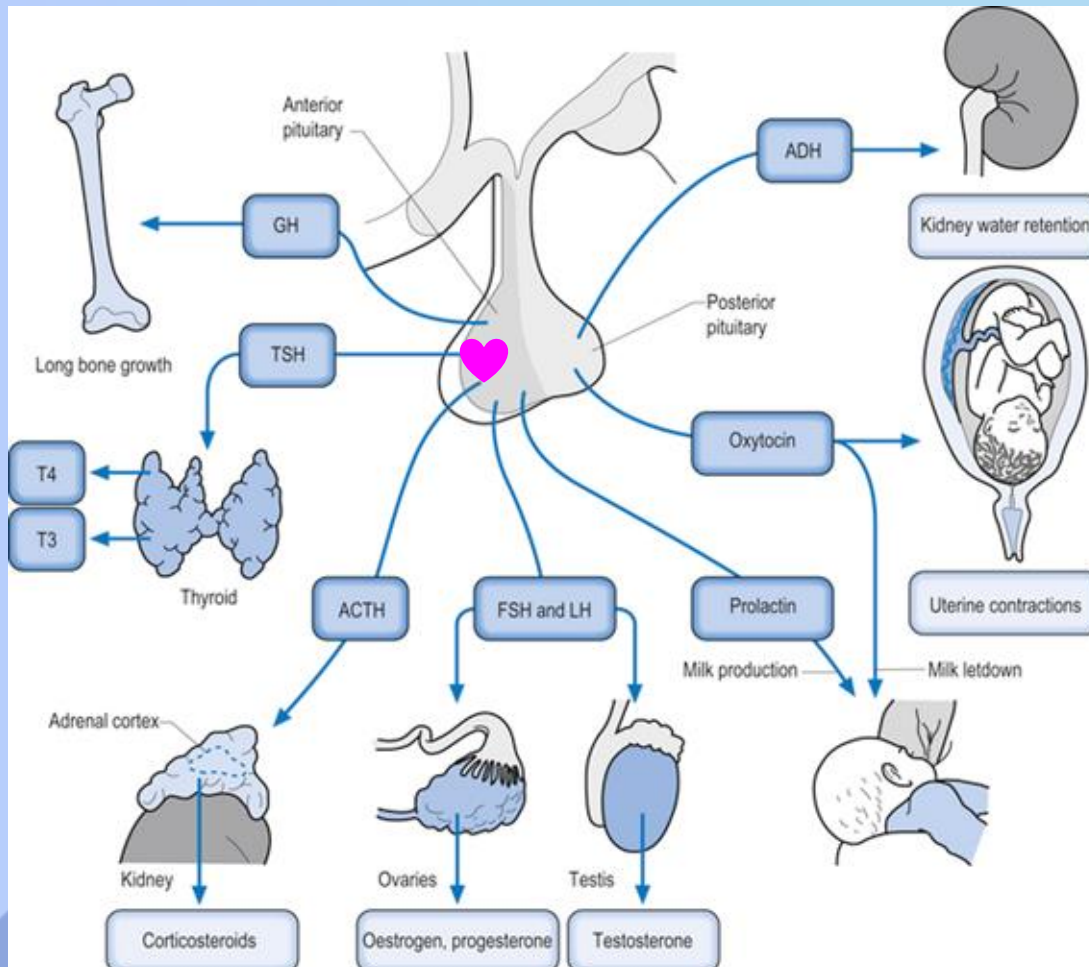
Stored **directly** in posterior pituitary



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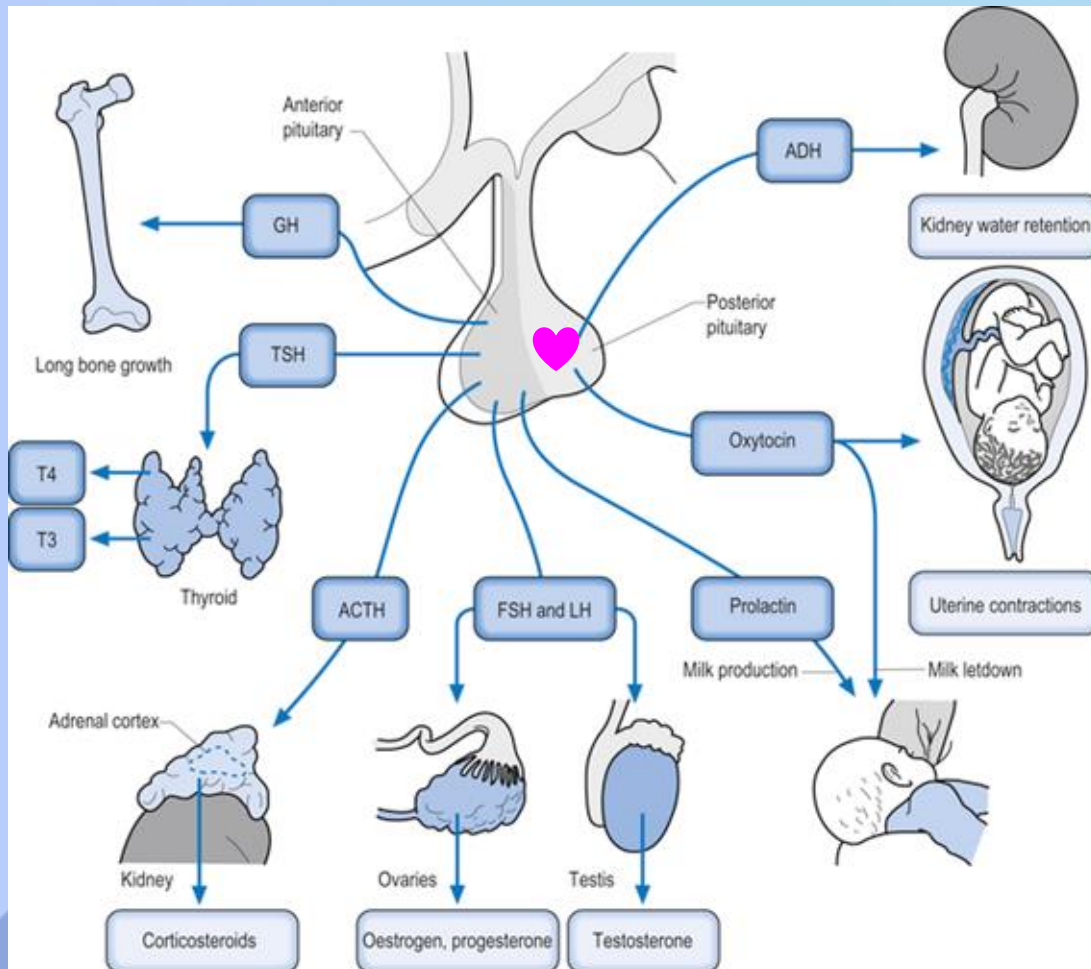
Pituitary Hormones and Target organs



Anterior pituitary Hormones:

1. GH = Growth Hormone
2. TSH = Thyroid Stimulating Hormone
3. ACTH = Adrenocorticotrophic Hormone
4. Prolactin
5. FSH = Follicle stimulating hormone
6. LH = Luteinizing Hormone

Pituitary Hormones and Target organs



Posterior pituitary hormones:

1. Oxytocin
2. Vasopressin (Antidiuretic Hormone)

Hypothalamic - Pituitary Axis

Not just 1 axis!! Its 5!!

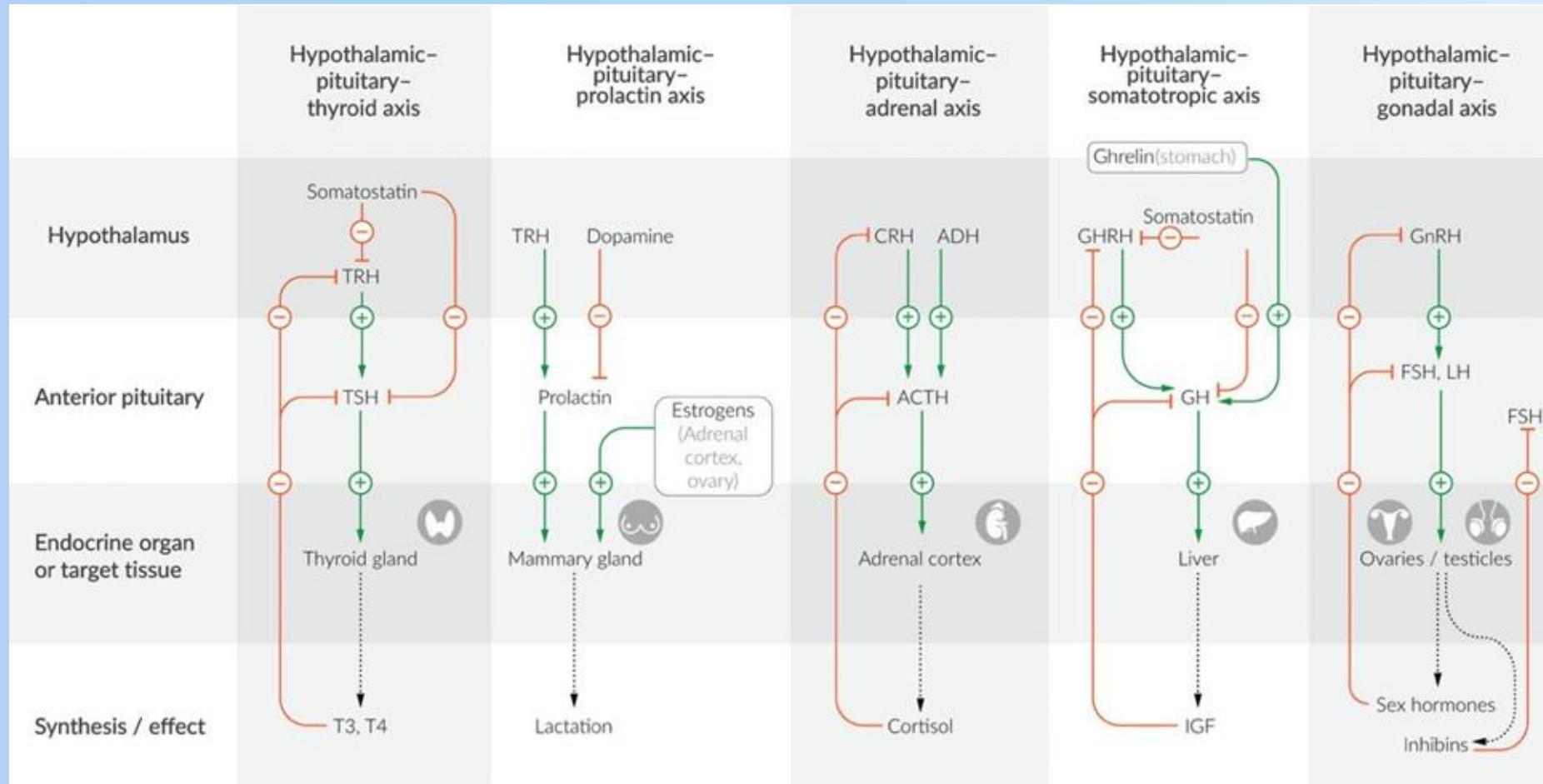
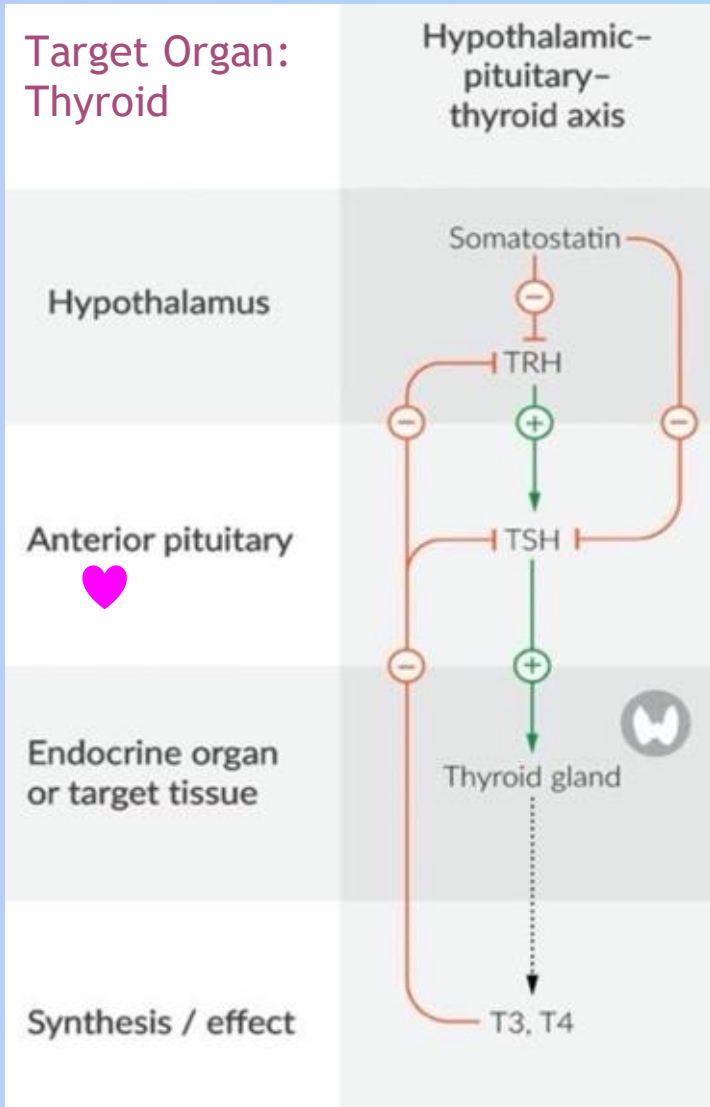


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Hypothalamic - Pituitary Axis



Hypothalamus

Thyrotropin Releasing Hormone: stimulates TSH release directly from anterior pituitary

Somatostatin: Will inhibit both GH and TSH release

Anterior Pituitary

Thyroid Stimulating Hormone: Stimulates thyroid gland directly to produce Thyroxine (T4) and Triiodothyronine (T3)

Negative feedback:

T3 and T4 inhibit TSH and TRH

Somatostatin inhibits TRH and TSH

Thyroid review

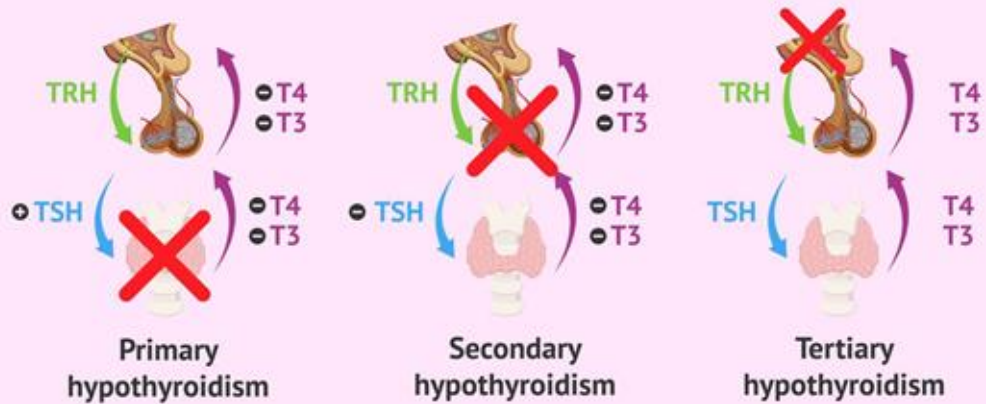
Why does thyroid gland need iodine?

T3 - 3 iodine molecules

T4 - 4 iodine molecules

80% of T4 is converted to T3 (more potent) in peripheral organs

Hypothyroidism Recap:



CLINICAL CORRELATION

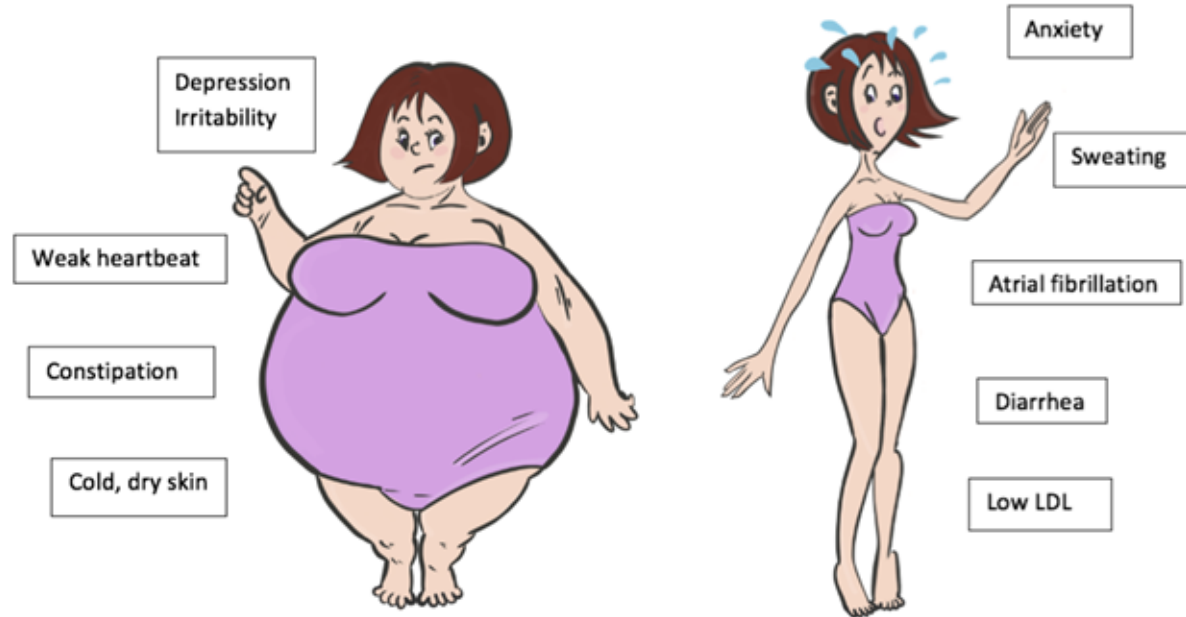
Hypothyroidism – deficiency of thyroid hormones in the blood

Hyperthyroidism - excess of thyroid hormones in the blood

Hypothyroidism

VS

Hyperthyroidism



Thyroid review

Why does thyroid gland need iodine?

T3 - 3 iodine molecules

T4 - 4 iodine molecules

80% of T4 is converted to T3 (more potent) in peripheral organs

Primary **HYPER**thyroidism:

EX: Graves Disease

- Autoimmune condition where **TSH antibodies** ↑↑ T4/T3 production.

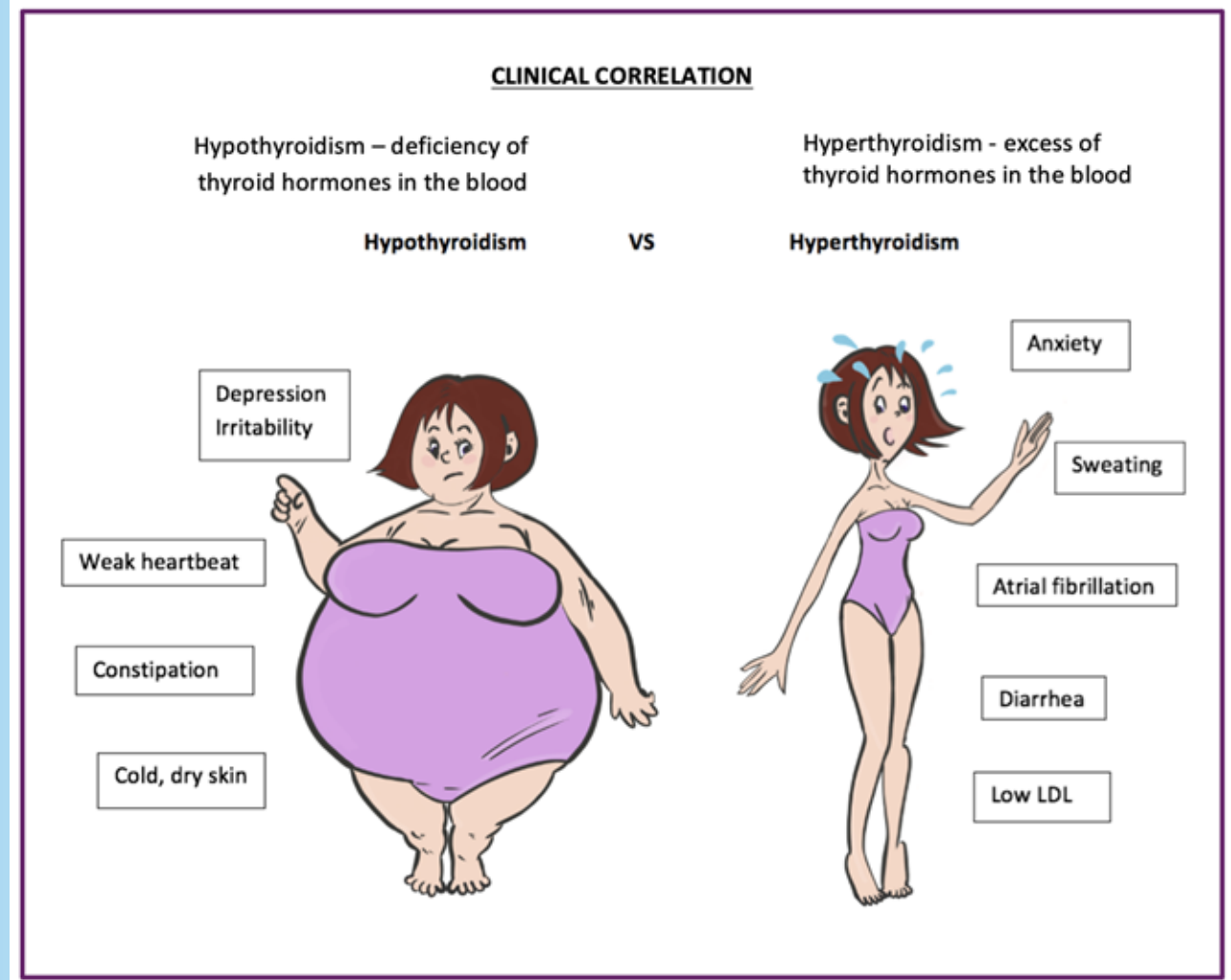
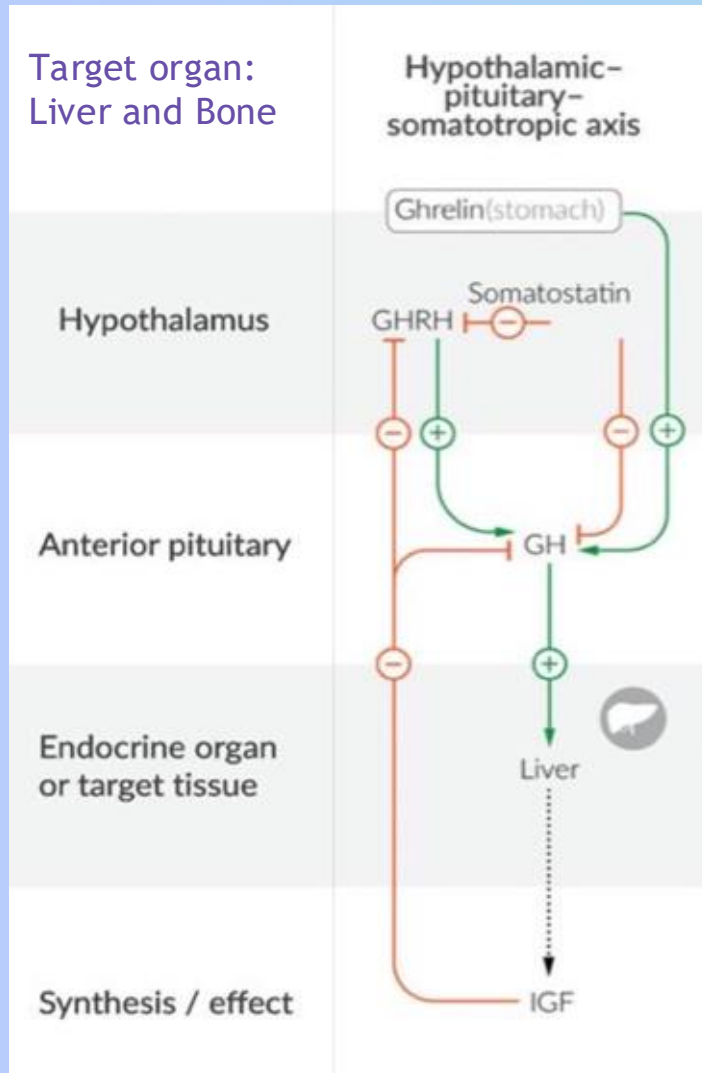


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Hypothalamic - Pituitary Axis



Hypothalamus

Growth Hormone releasing hormone: stimulates anterior pituitary to release GH

Anterior Pituitary

Growth Hormone: Targets Liver to increase production of Insulin Growth Factor-1(IGF-1). Has direct effects on increasing protein synthesis and uptake in tissues like muscle.

Liver

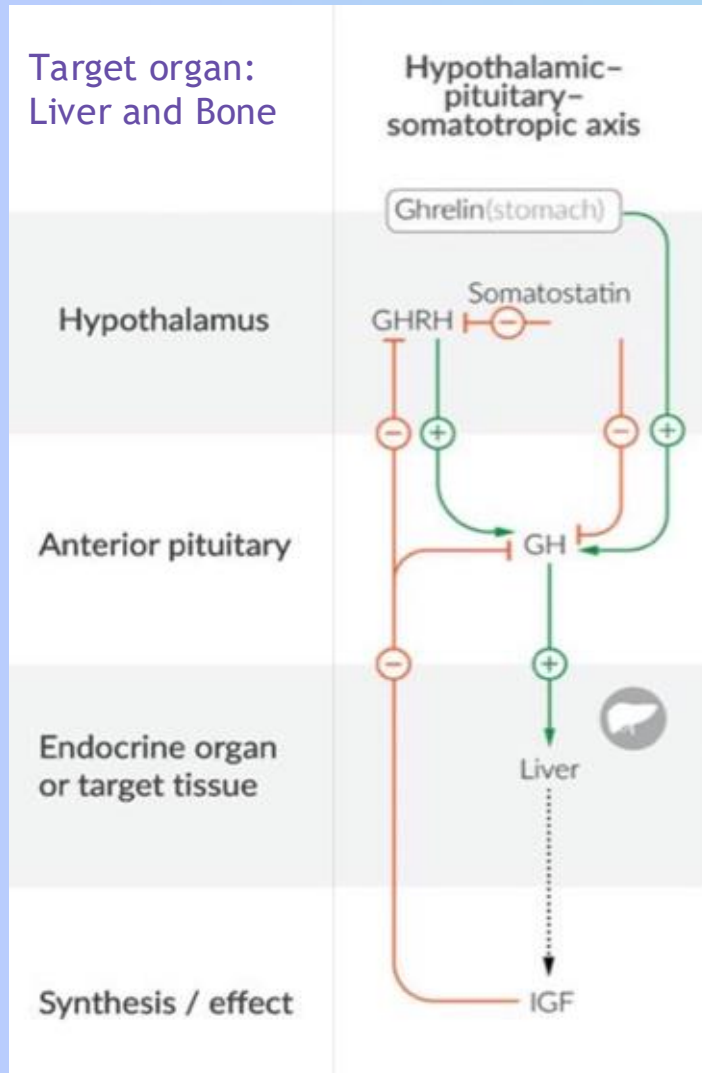
IGF-1: Increases DNA synthesis causing lengthening of long bones, widening of epiphyseal plates, and proliferation of chondrocytes.

Negative Feedback

IGF-1: inhibits GH and GHRH

Somatostatin: Inhibits GHRH production and GH release

Hypothalamic - Pituitary Axis



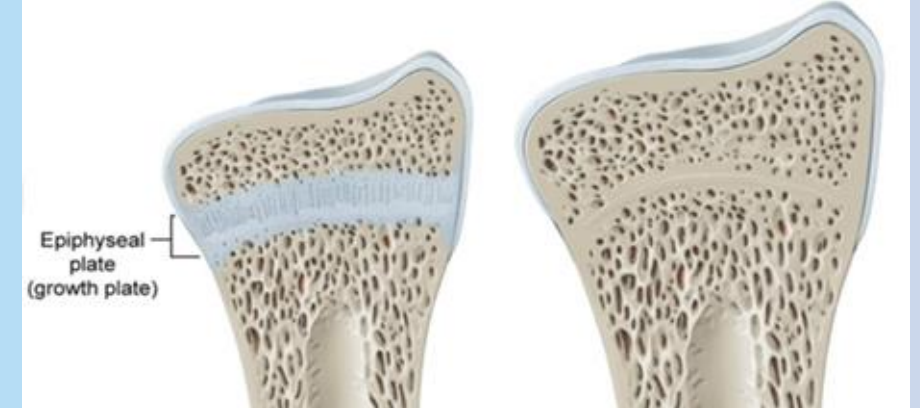
Clinical Correlations:

Gigantism:

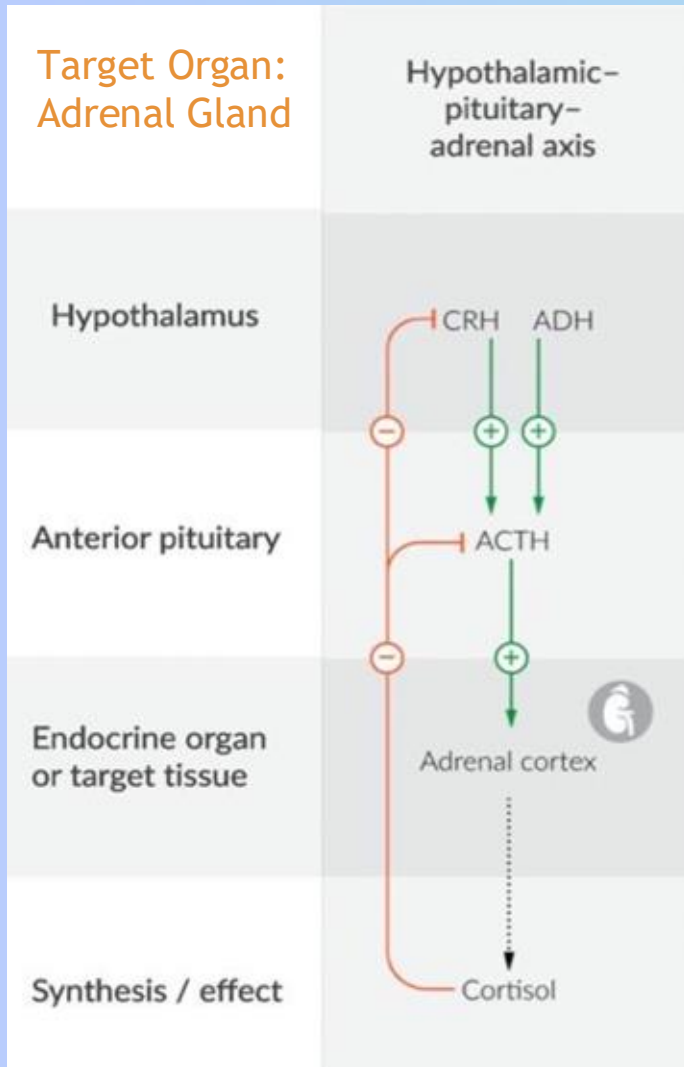
- Occurs in children
- Abnormal increased secretion of GH
- Present as excessive growth and height significantly above average

Acromegaly:

- Adult disorder
- Excess GH secretion AFTER epiphyseal plates have closed
- Presents as growth of facial bones, hands, feet. As well as Soft tissue swelling externally (nose, ears, lips, etc) and internal organs (liver, heart)
- Characteristic deepening of voice and slowing of speech



Hypothalamic - Pituitary Axis



Hypothalamus

Corticotropin releasing hormone: stimulates anterior pituitary to release ACTH

Antidiuretic Hormone: Stimulates release of ACTH by amplifying CRH effect

Anterior Pituitary

Adrenocorticotrophic Hormone: Targets Adrenal gland to increase cortisol production pathway.

Negative Feedback

Cortisol: Inhibits ACTH release and CRH release

Adrenal Cortex Review



} cortex
Epinephrine/norepinephrine

MNEMONIC

Go Find Rex – Make Good Sex

G – glomerulosa M – mineralocorticoids

F – fasciculata G – glucocorticoids

R – reticularis S – sex hormones

Mineralocorticoids- think **ALDOSTERONE**

Glucocorticoid- thinks **CORTISOL**

Adrenal Cortex Review



ADH (Vasopressin)

VS

Aldosterone

Released: From Posterior Pituitary

Stimulated by:

Increased Plasma Osmolality
Significant ↓↓ in BP or BV

Controls:

Water balance and Plasma osmolality

Mechanism Of Action:

Inserts aquaporin channels in collecting duct to increase water reabsorption without manipulating sodium. ADH increases water retention in kidney so more water is reabsorbed to blood.

Released: Adrenal cortex Zona Glomerulosa

Stimulated by:

Angiotensin II (Low sodium or Low BP)
↓↓Potassium levels

Controls: Sodium and Potassium balance
Water follows salt

Mechanism Of Action:

Increases expression of epithelial sodium channels (ENaC) and increases activity of Na⁺/K⁺ ATPase pump= increased sodium reabsorption and the pump pushes Na⁺ into blood while pushing K⁺ into urine

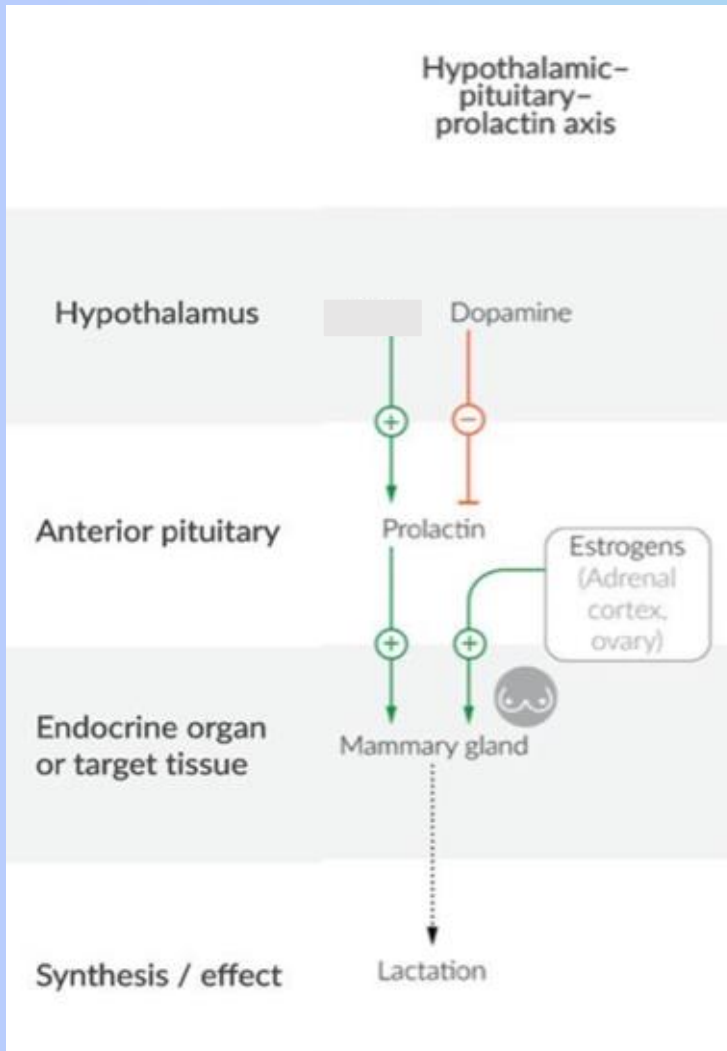


Main take away: ADH increases water retention in kidney so more water is reabsorbed into blood. Aldosterone increase sodium reabsorption in kidney to add into blood.

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Hypothalamic - Pituitary Axis



Prolactin:

Mainly **INHIBITED** rather than stimulated.

Nipple suckling = local decrease in Dopamine, causing increase in prolactin

Increased prolactin stimulates lactogenesis in mammary glands = Milk Production

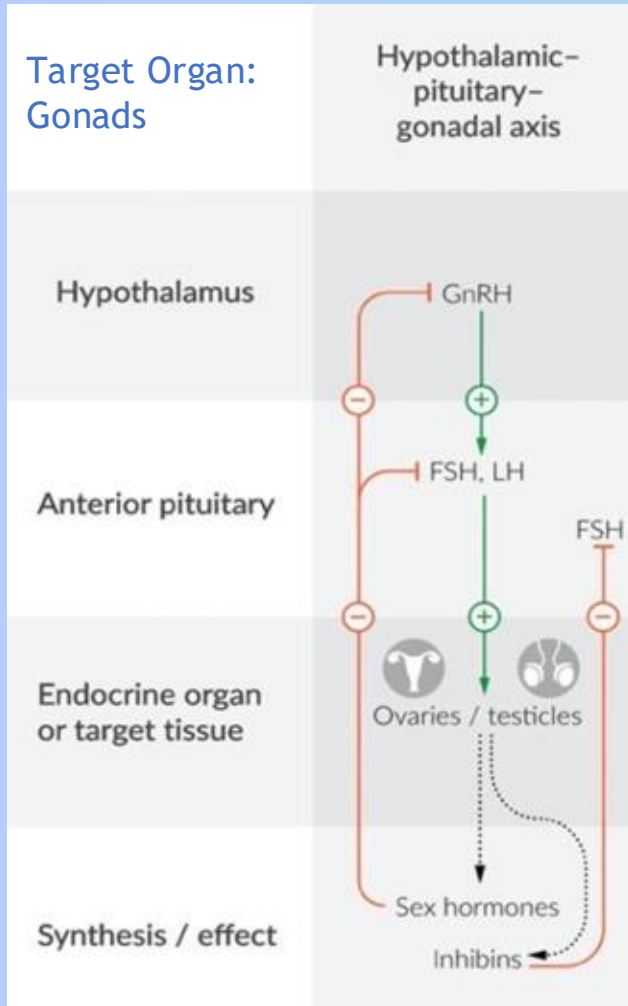
Oxytocin (from POSTERIOR pituitary) - stimulates 'let down' reflex = Milk ejection

Oxytocin Opens Duct
PROlactin **PRO**duces

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Hypothalamic - Pituitary Axis



Hypothalamus

Gonadotropin Releasing Hormone: secreted in a pulsatile fashion to stimulate Anterior Pituitary to release FSH/LH

Anterior Pituitary

Follicle stimulating hormone:

Stimulate ovaries to support follicle growth and estrogen production
Stimulate sertoli cells in testes to increase spermatogenesis

Luteinizing hormone:

Stimulate ovulation, corpus luteum formation, and progesterone secretion
Stimulate leydig cells in testes to produce testosterone

Negative Feedback:

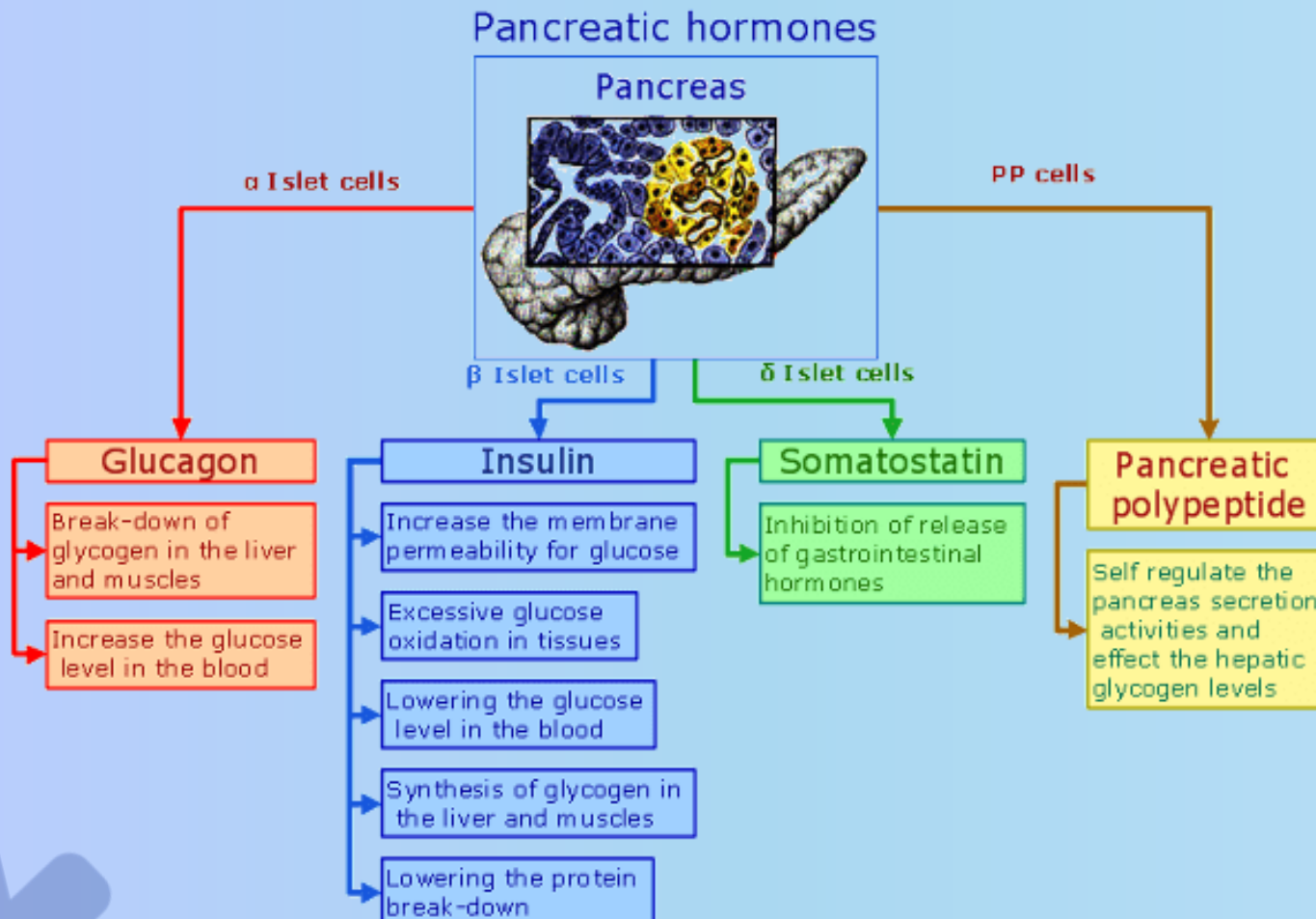
Inhibin- inhibits FSH

Testosterone, Estrogen, and Progesterone - inhibit GnRH and FSH/LH

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Pancreas Review



Main function of endocrine pancreas:
Maintain blood glucose levels

Beta Cell:

Produce Insulin = terminal effect is lowering glucose in blood

Main stimulation is increase in blood glucose!

Alpha Cell:

Produce Glucagon = terminal effect is raising glucose in blood

Main stimulation is decrease in blood glucose

You always send **Bets In**
Beta **Insulin**

WOOLAP TIMEEEE













