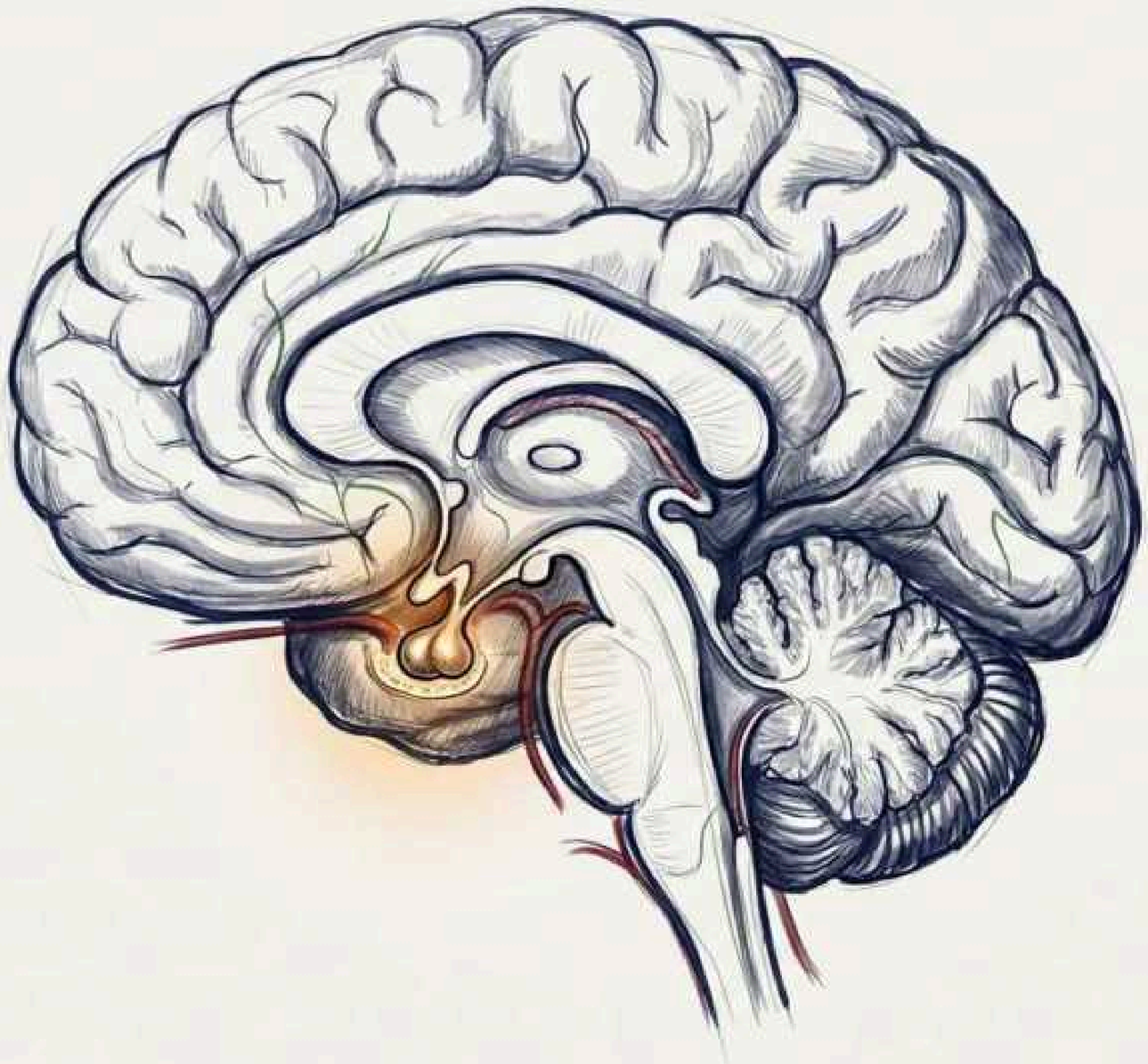


Lecture 1: Hormones and the Pituitary

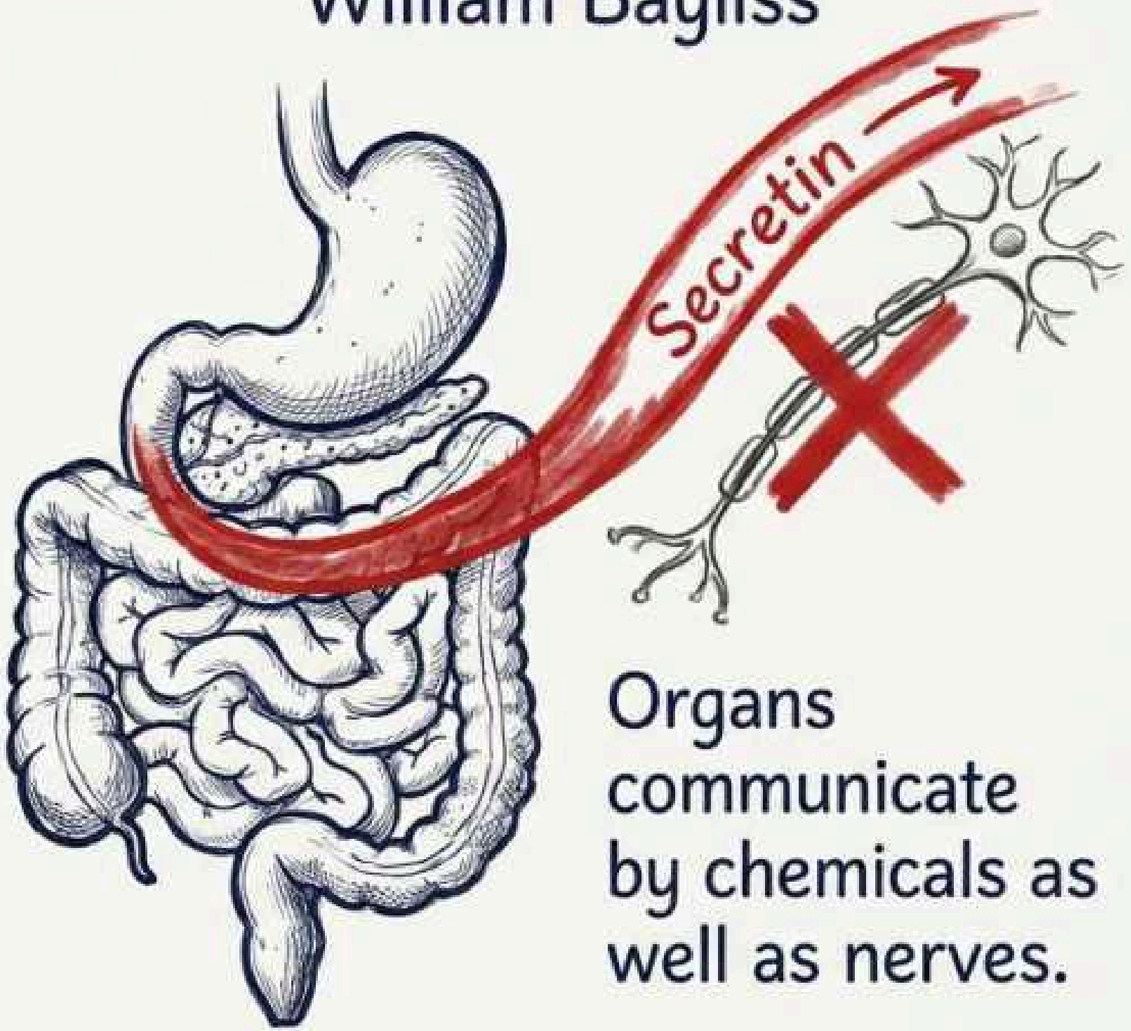
Mechanisms, Pathways, and Pathologies

MED 531 B

ὁρμῶν → to set in motion.

A chemical released by a gland into the blood that acts on target cells elsewhere.

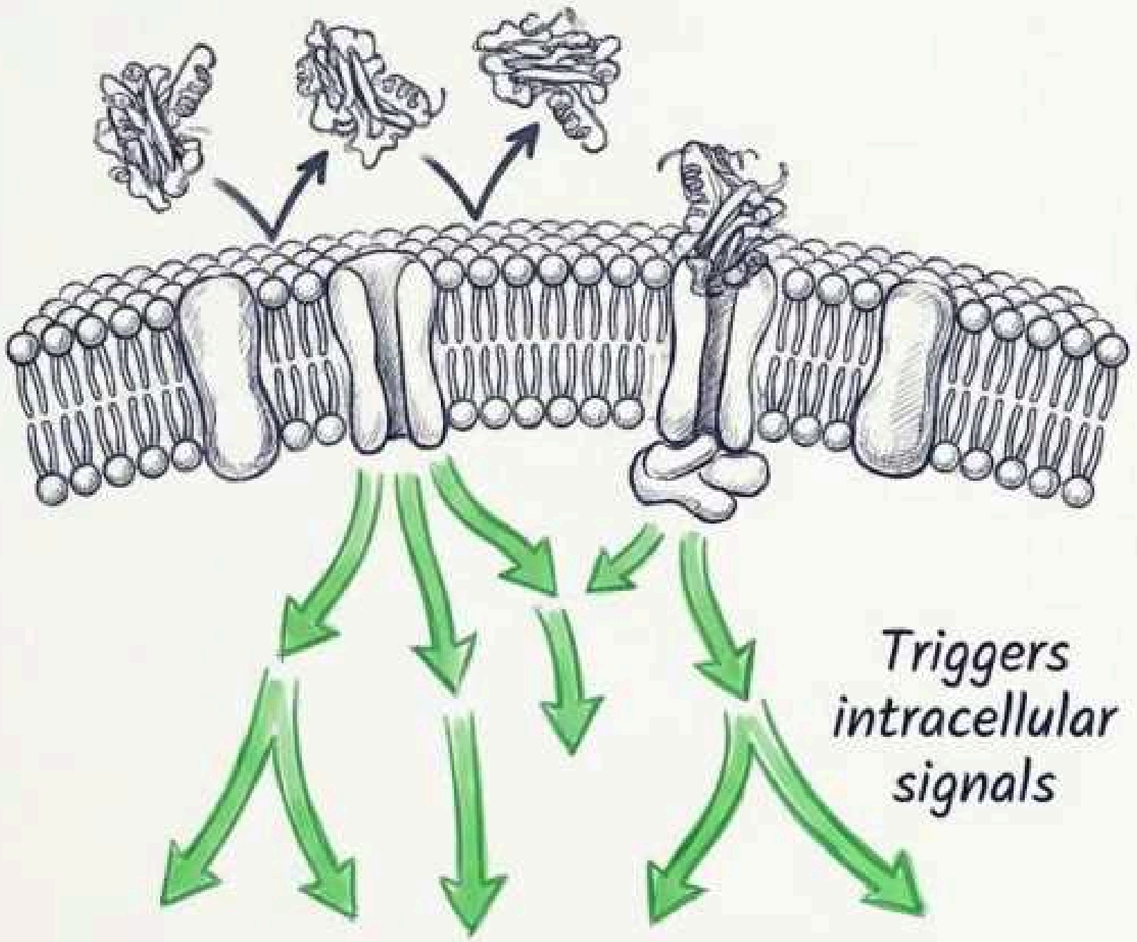
1905: Ernest Starling & William Bayliss



Organs communicate by chemicals as well as nerves.

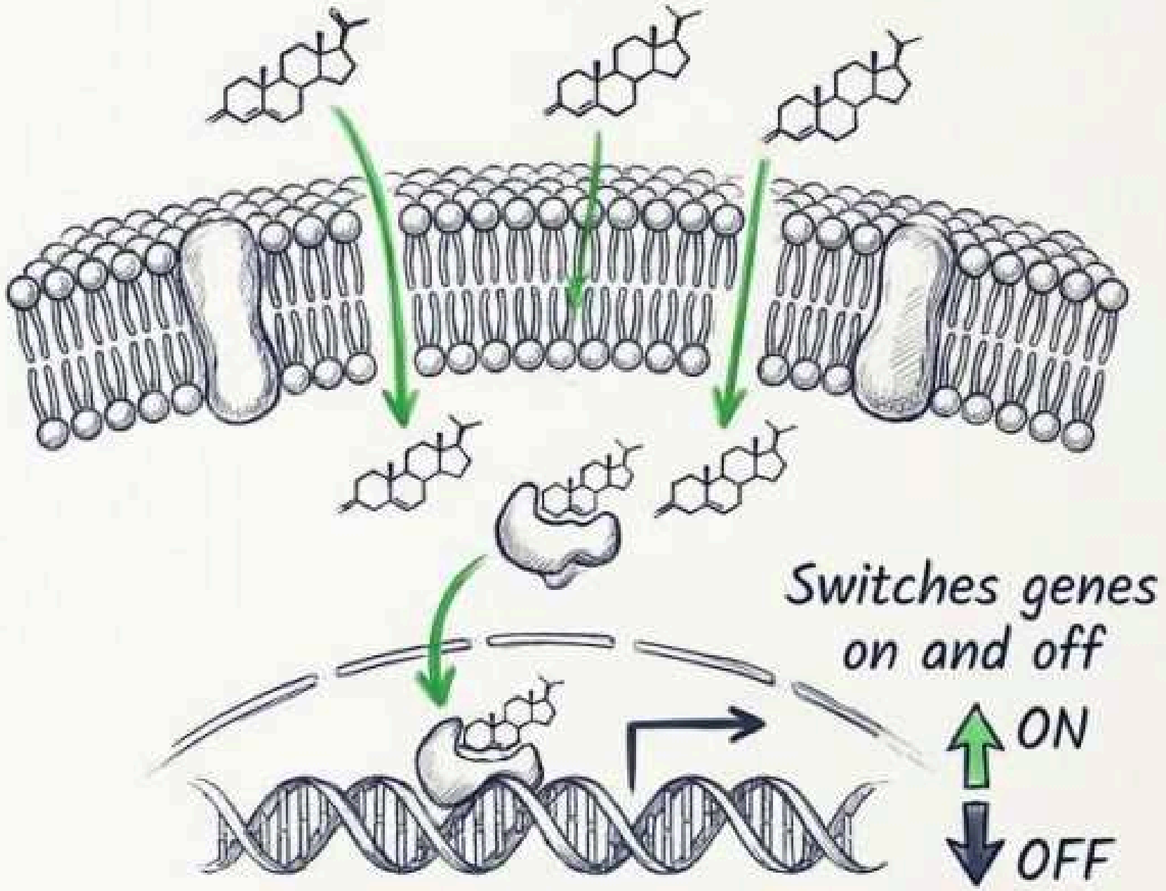
Peptide & Protein Hormones

Insulin, Growth Hormone



Steroid & Thyroid Hormones

Cortisol, Oestrogen (Cholesterol-derived)



Note: *Thyroid hormone is not a steroid, but also acts on intracellular receptors.*

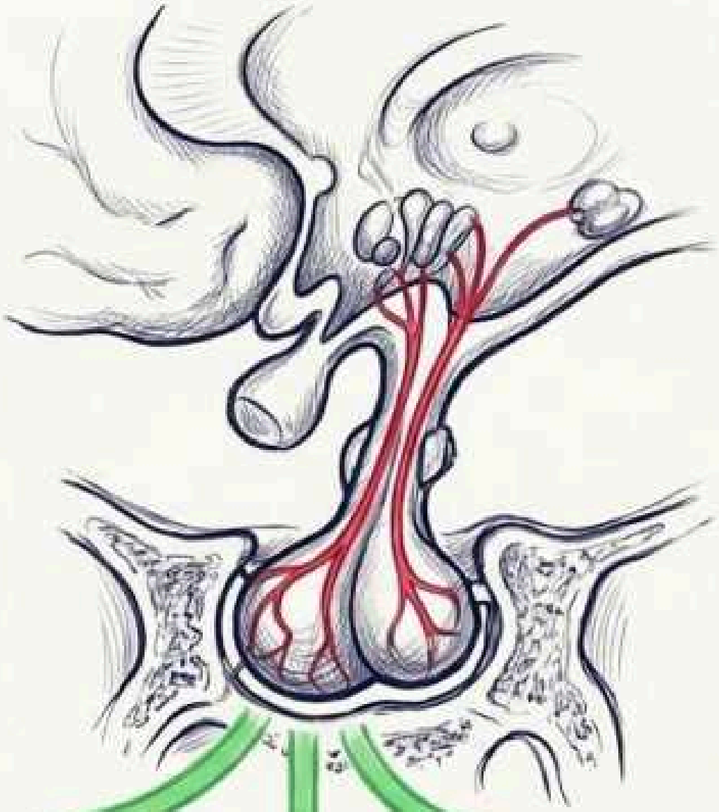


Keeps levels in narrow range.

[Gland Failure] → Target Hormone ↓ → Controlling Hormone ↑↑

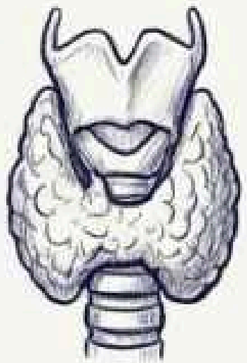
When a gland fails, the controlling hormone rises as the body attempts to drive it harder.

¶ 1.4

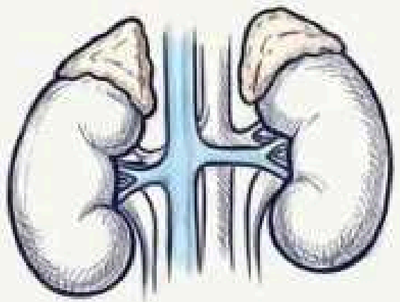


Hypothalamus: Links Nervous & Endocrine Systems.

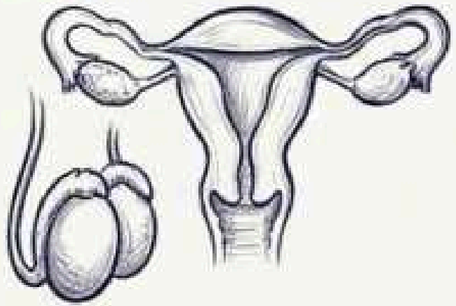
Pituitary Gland: Pea-sized, just below hypothalamus.



Thyroid Gland

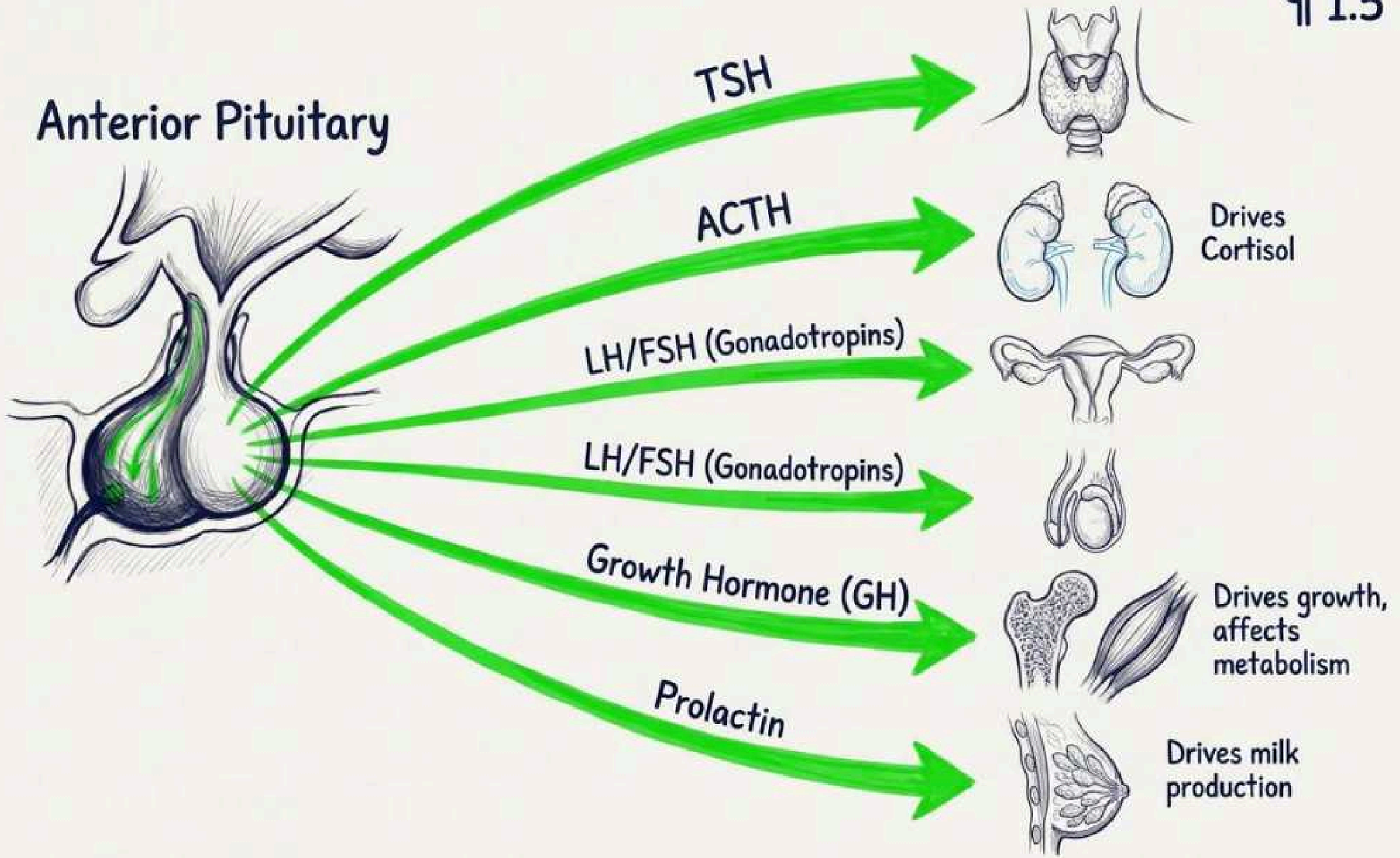


Adrenal Glands



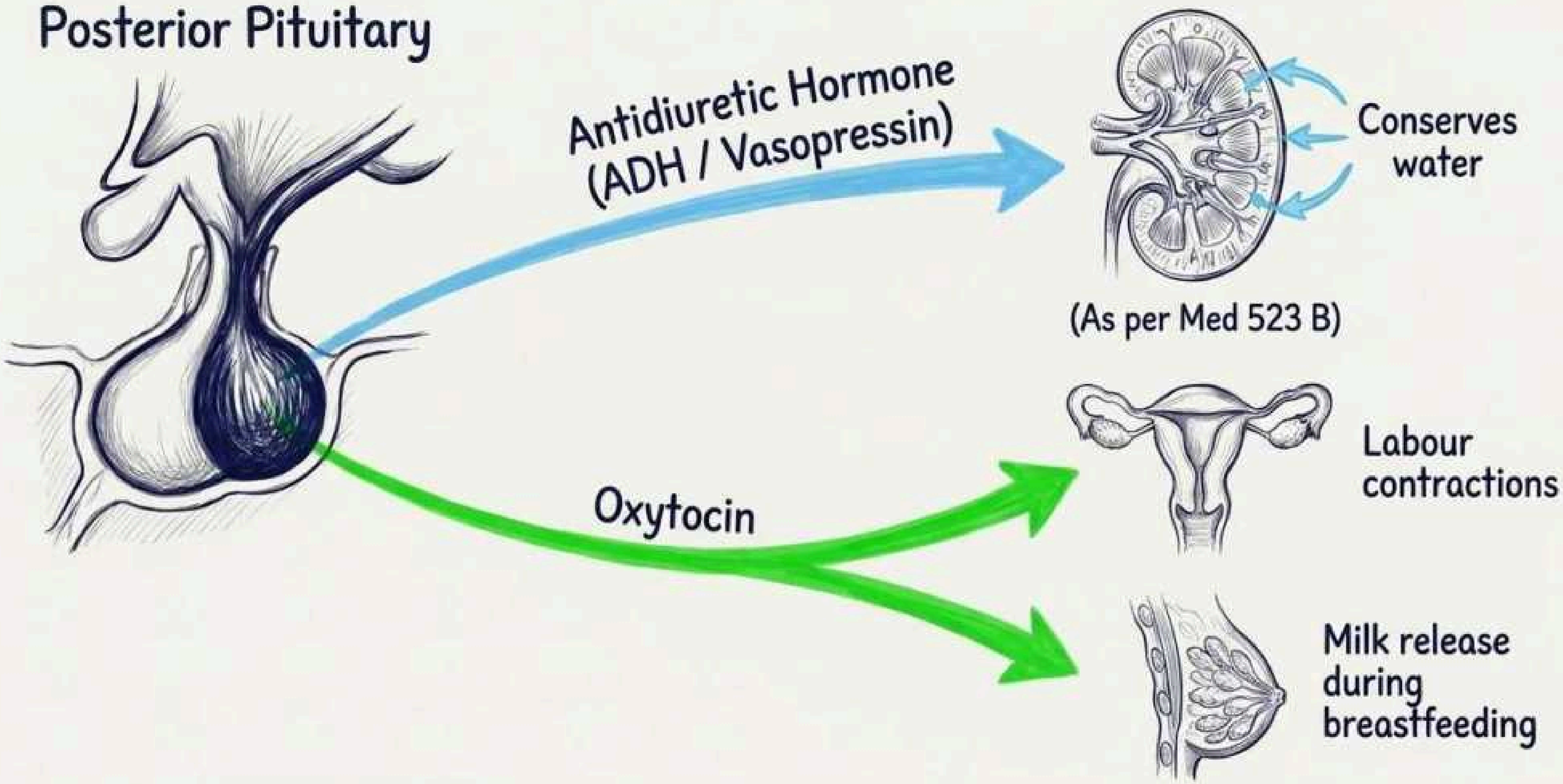
Gonads

The Master Gland Architecture


Anterior Pituitary
TSH
ACTH
LH/FSH (Gonadotropins)
LH/FSH (Gonadotropins)
Growth Hormone (GH)
Prolactin
Drives Cortisol
Drives growth, affects metabolism
Drives milk production

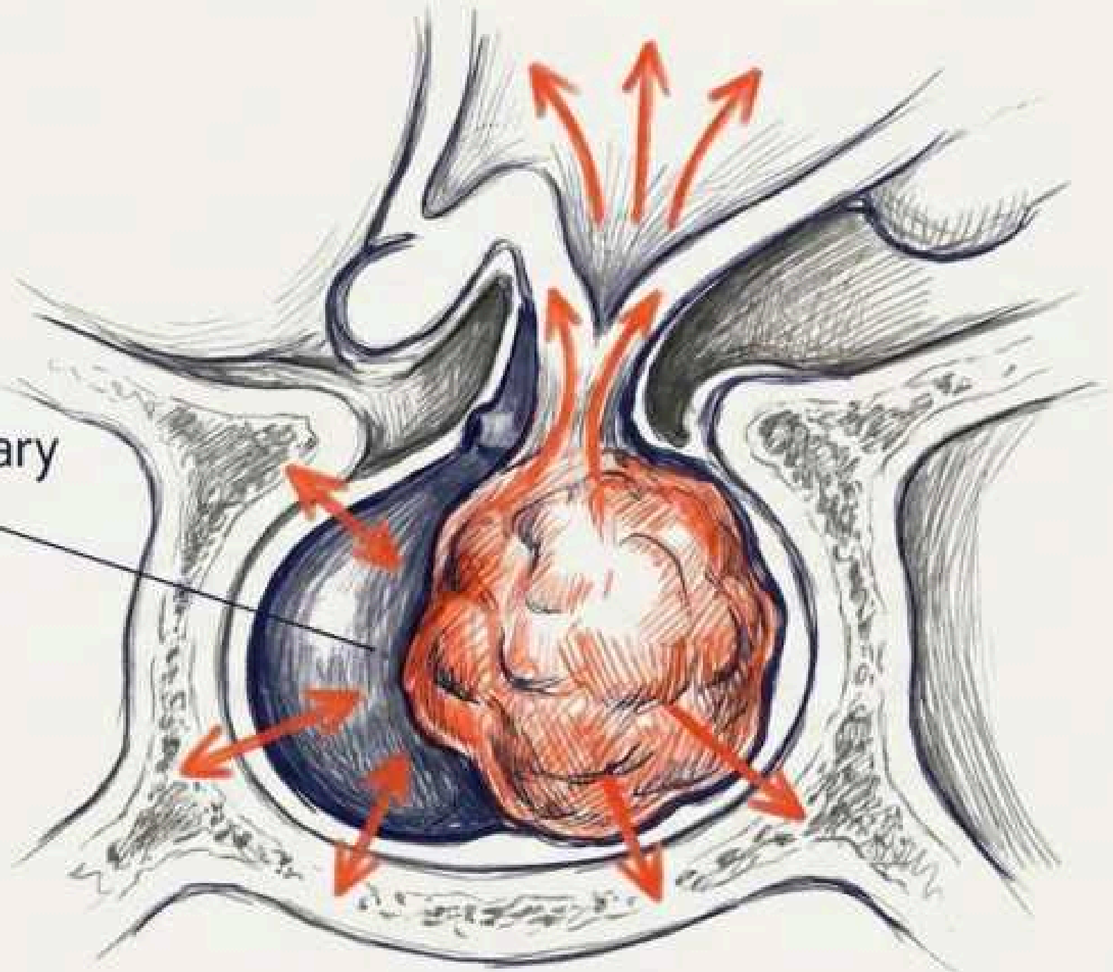
Hormones MADE in the hypothalamus, RELEASED by posterior pituitary.

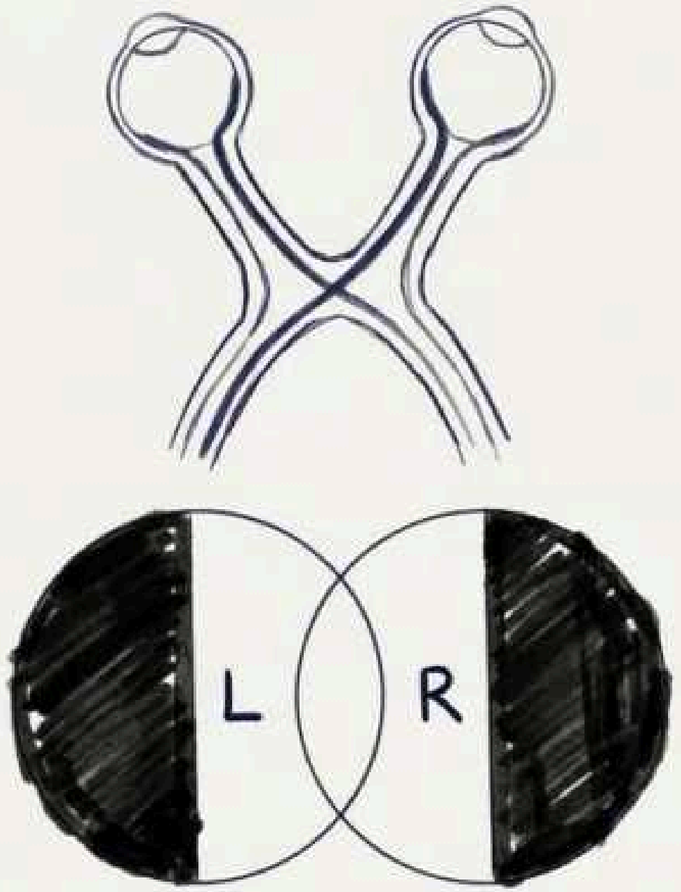
¶ 1.6



Adenomas: Common, almost always benign.

Presses on surrounding pituitary
→ Hormone Deficiencies.

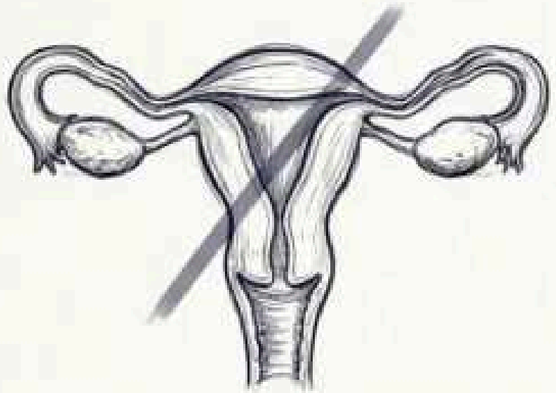




Classically causes loss of outer parts of vision in both eyes (Bitemporal Hemianopsia).

Prolactinoma

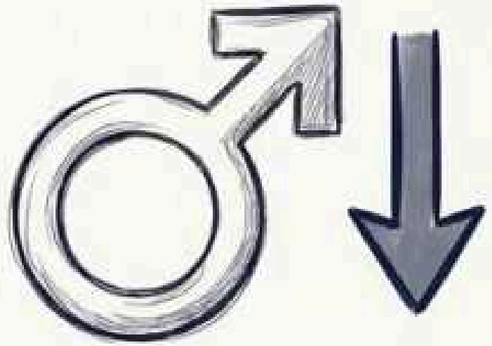
(Commonest hormone-producing tumour)



Absent periods
(women)



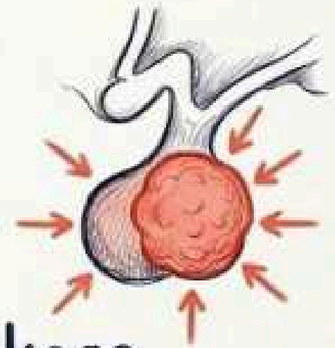
Milk production
(women)



Reduced sex drive
(men)

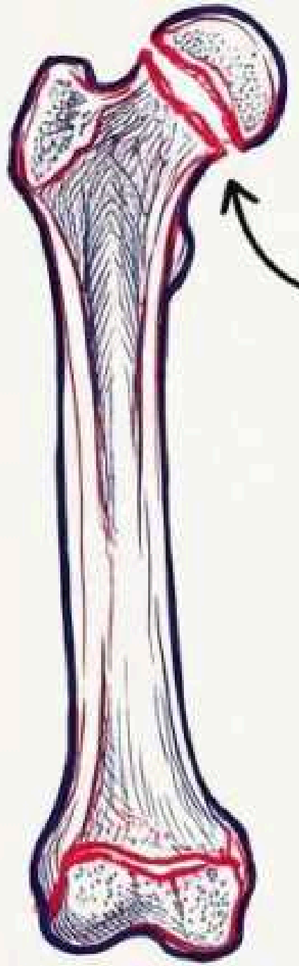
[Brain Dopamine] → (−) Holds Prolactin in check.

[Dopamine Mimicking Tablets] → ↓↓ Prolactin & Tumor Shrinkage.



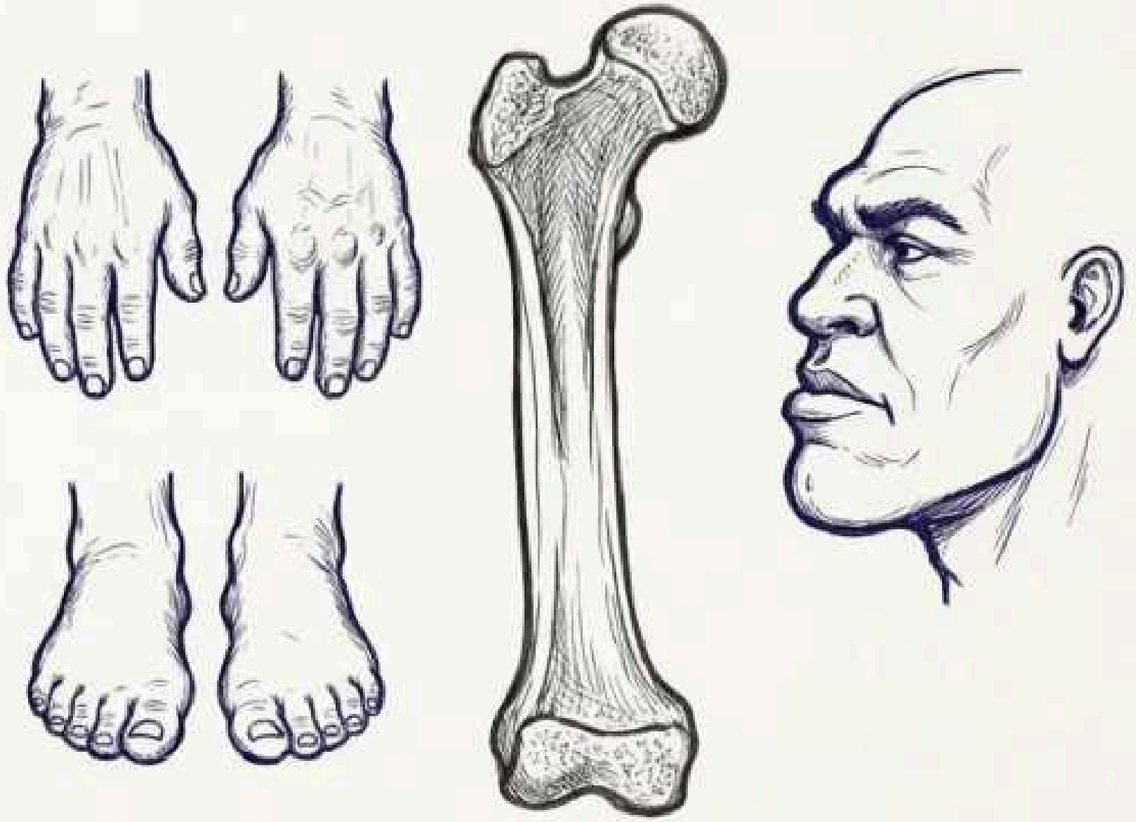
Excess Growth Hormone

Gigantism (Children)



Before growth plates have closed.

Acromegaly (Adults)



- Develops slowly—often recognized years late by comparing old photographs.
- Higher risk: Diabetes & Heart Disease.

Critical Path

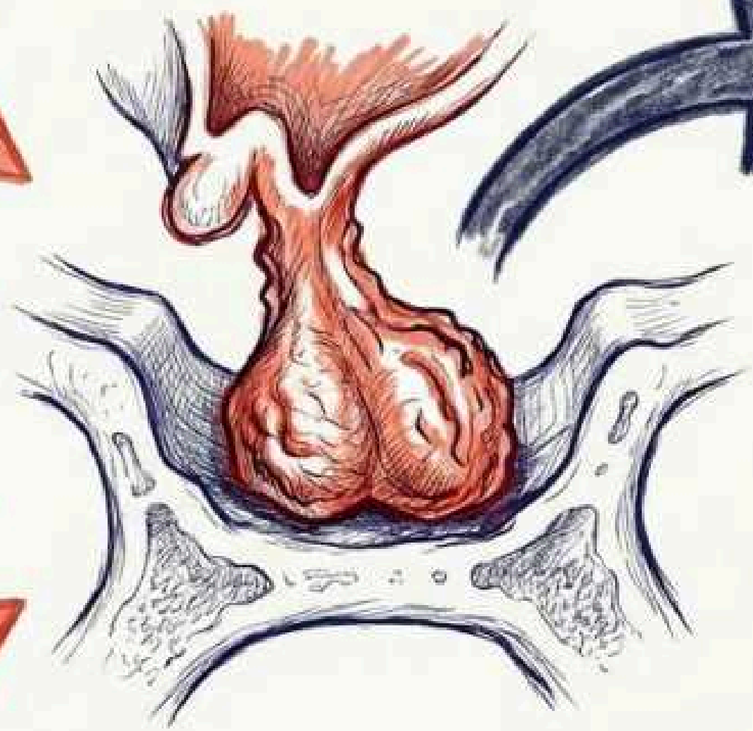
Tumours

Surgery

Radiotherapy

Head injury

Bleeding



Hypopituitarism
(Too little function)

Missing hormones must be replaced.

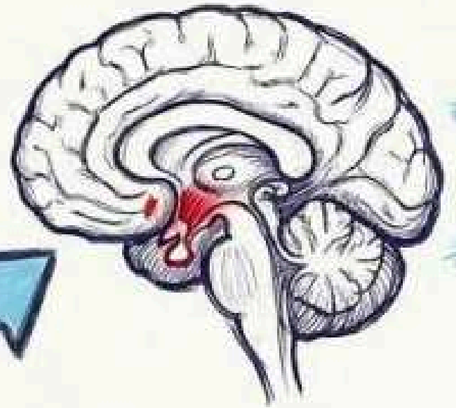
⚠ Cortisol Replacement = MOST URGENT

Lacking cortisol can be life-threatening during illness.

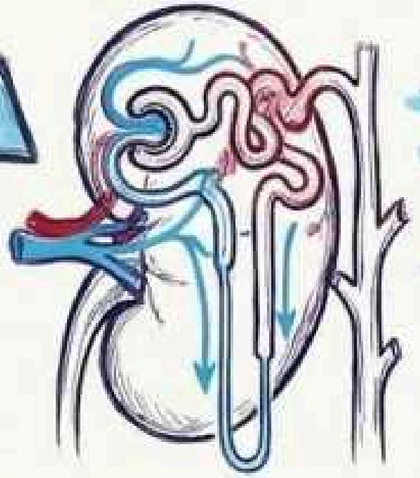
NOT related to blood sugar

Diabetes Insipidus

Downward Arrow
ADH production
(Brain)



Kidney fails
to respond



Large volumes
of dilute urine



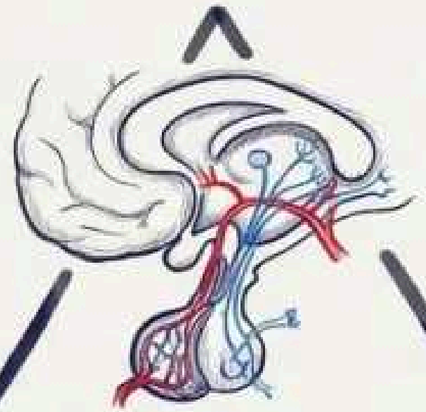


Great
thirst



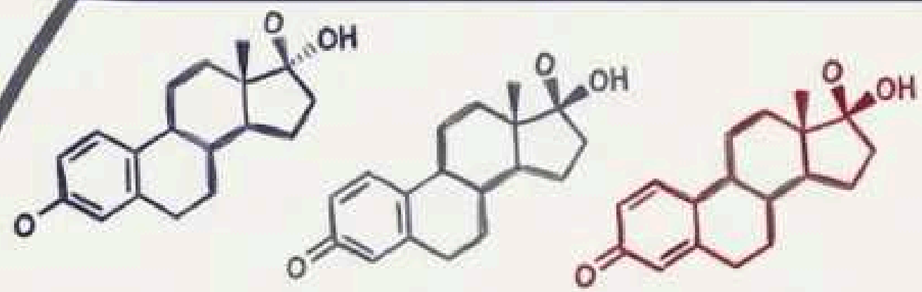
Desmopressin
(Synthetic ADH)

¶ 1.12



Hypothalamus & Pituitary:
Sit at the top of the system.

Feedback Control



Hormones
(Chemical Messengers)

Next Lecture:
The Thyroid