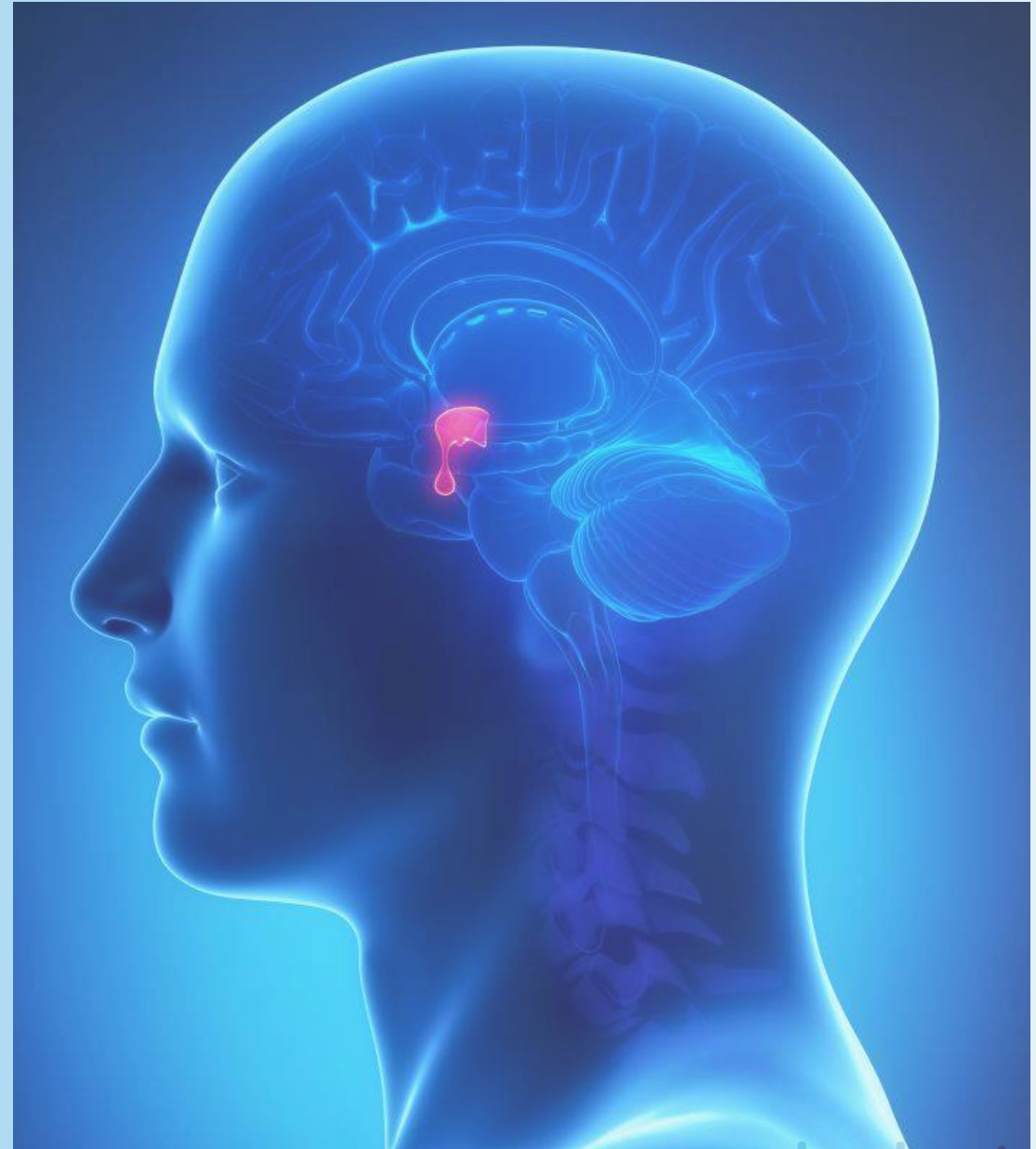


Endocrine Mix and Match

By Jakub Staniszewski

Table of Contents

- **Endocrine disorder overview**
- Hypothalamic-pituitary axis
- GH and acromegaly
- Hyperprolactinemia
- Pituitary adenoma
- ADH and Diabetes Insipidus
- SIADH
- Appetite regulation



Disorders of the Endocrine System

- **Primary disorders:** dysfunction of the endocrine gland itself.
- **Secondary disorders:** an outside disturbance that changes the activity of the endocrine gland.
- **Hypofunction** is evaluated by a stimulation test.
- **Hyperfunction** is evaluated by a suppression test.

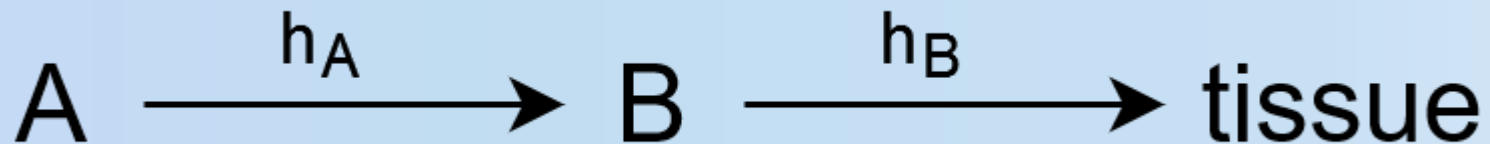
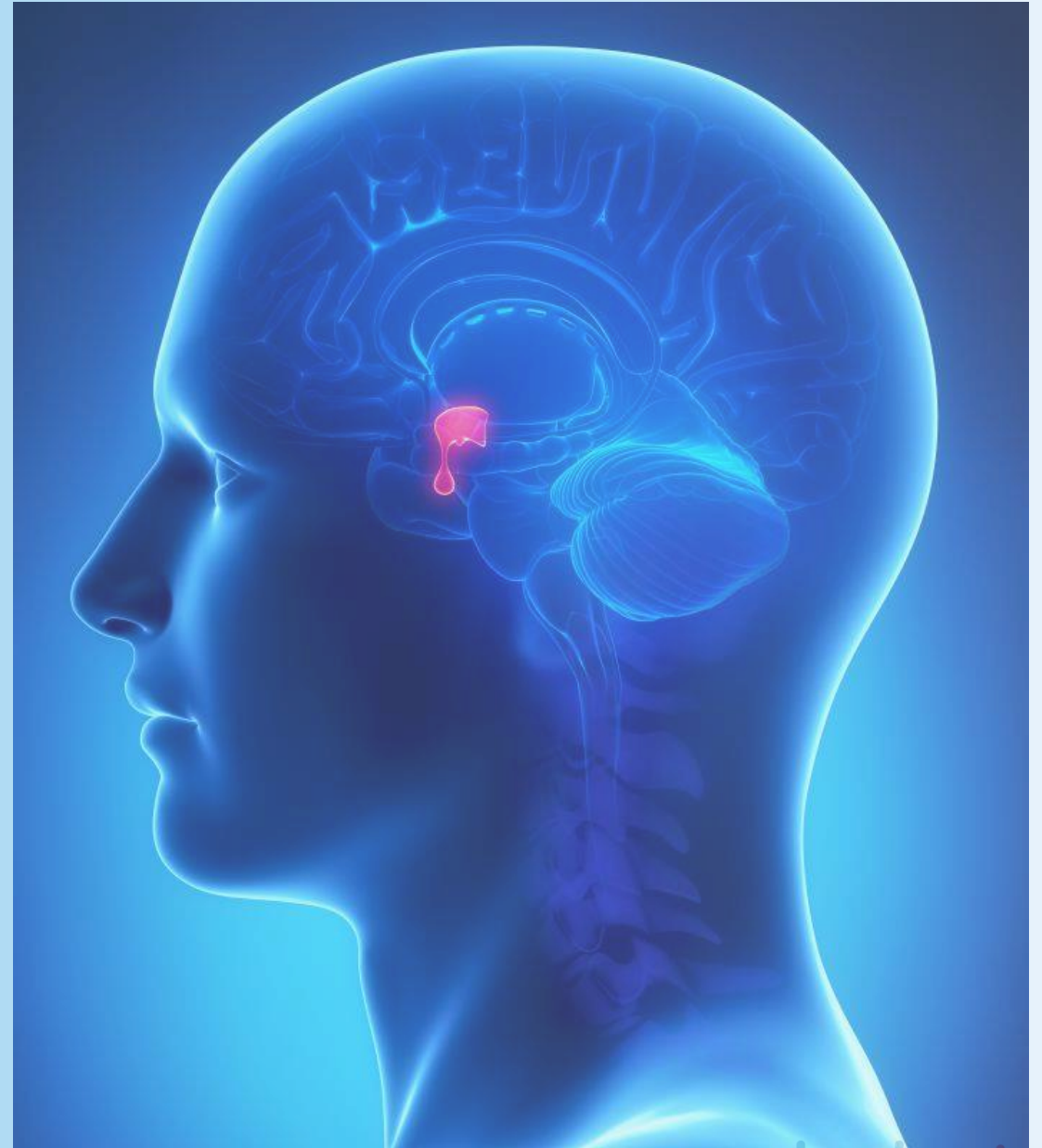


Table of Contents

- Endocrine disorder overview ✓
- **Hypothalamic-pituitary axis**
- GH and acromegaly
- Hyperprolactinemia
- Pituitary adenoma
- ADH and Diabetes Insipidus
- SIADH
- Appetite regulation



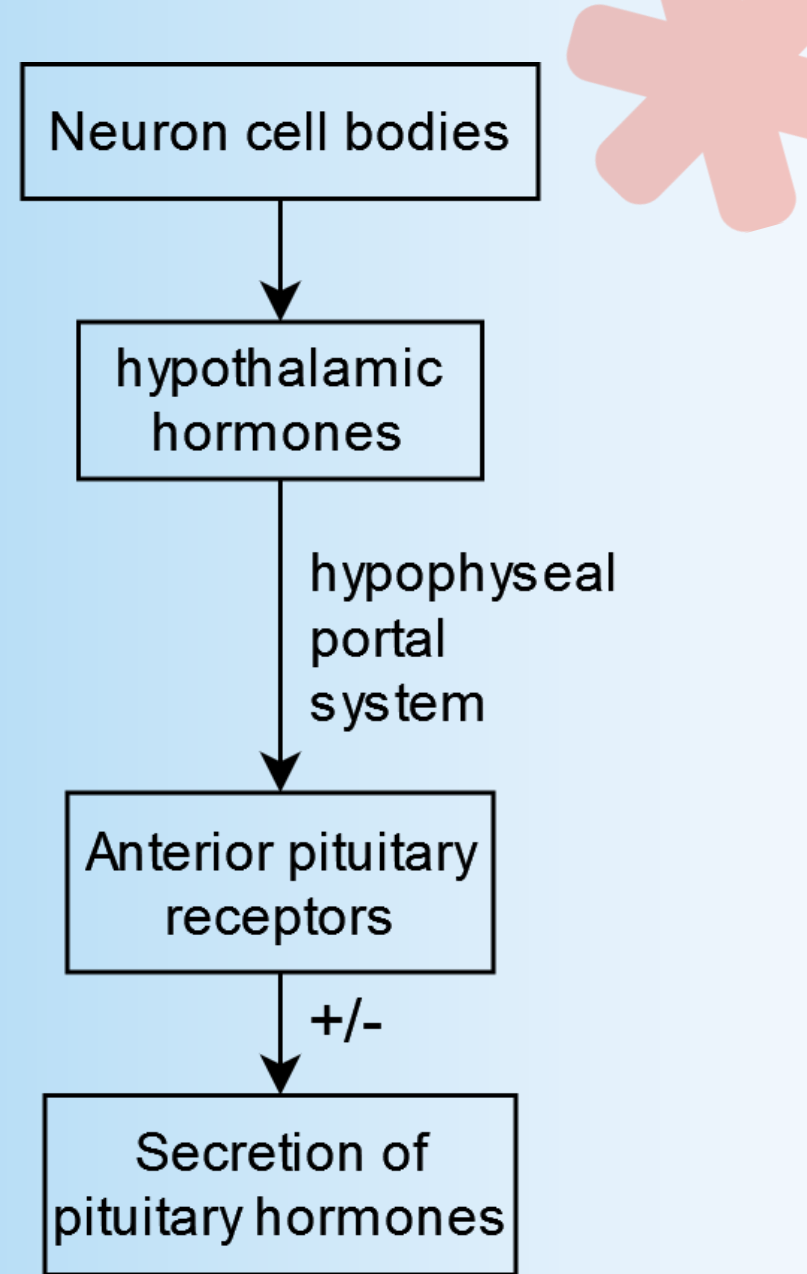
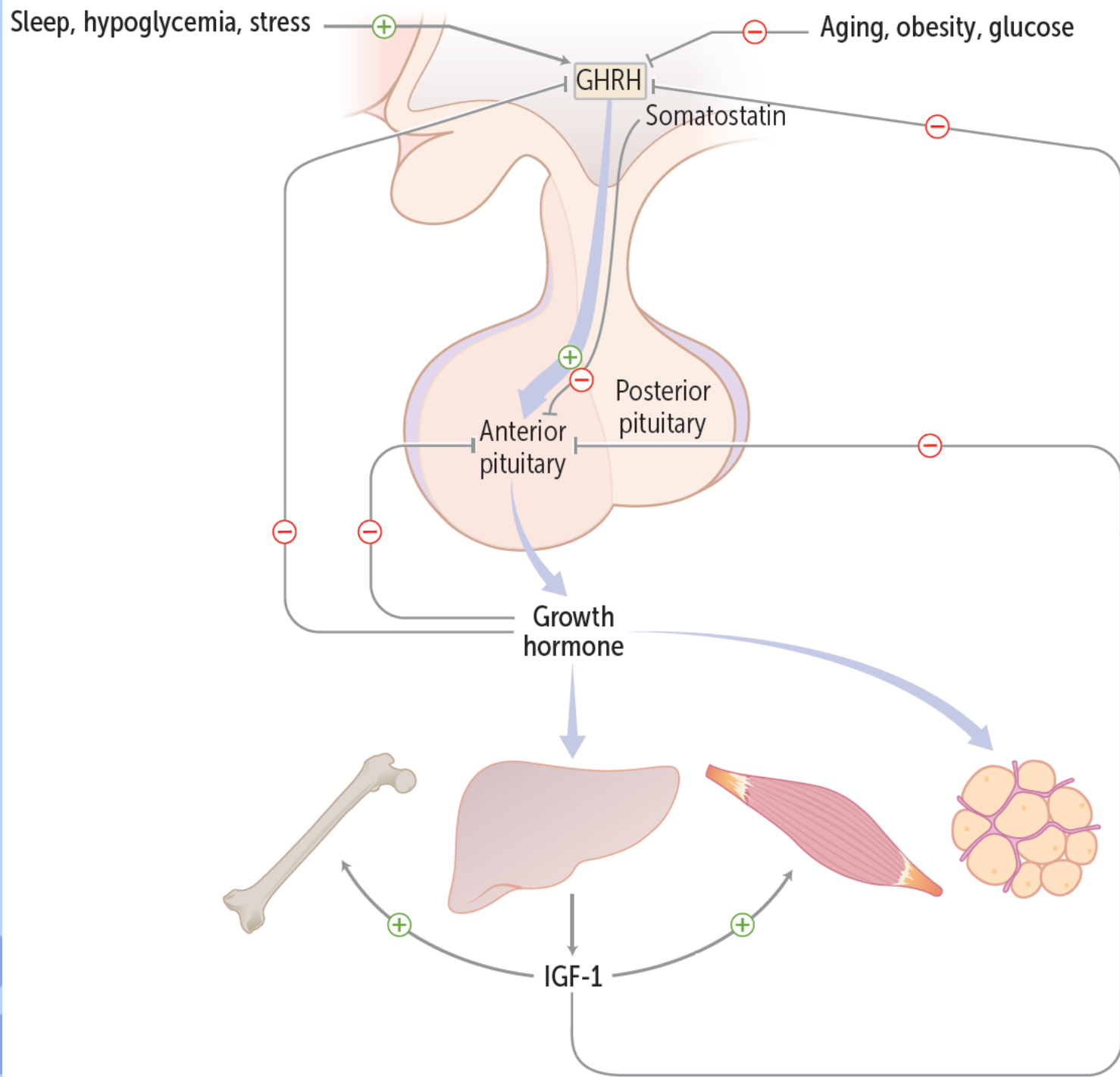
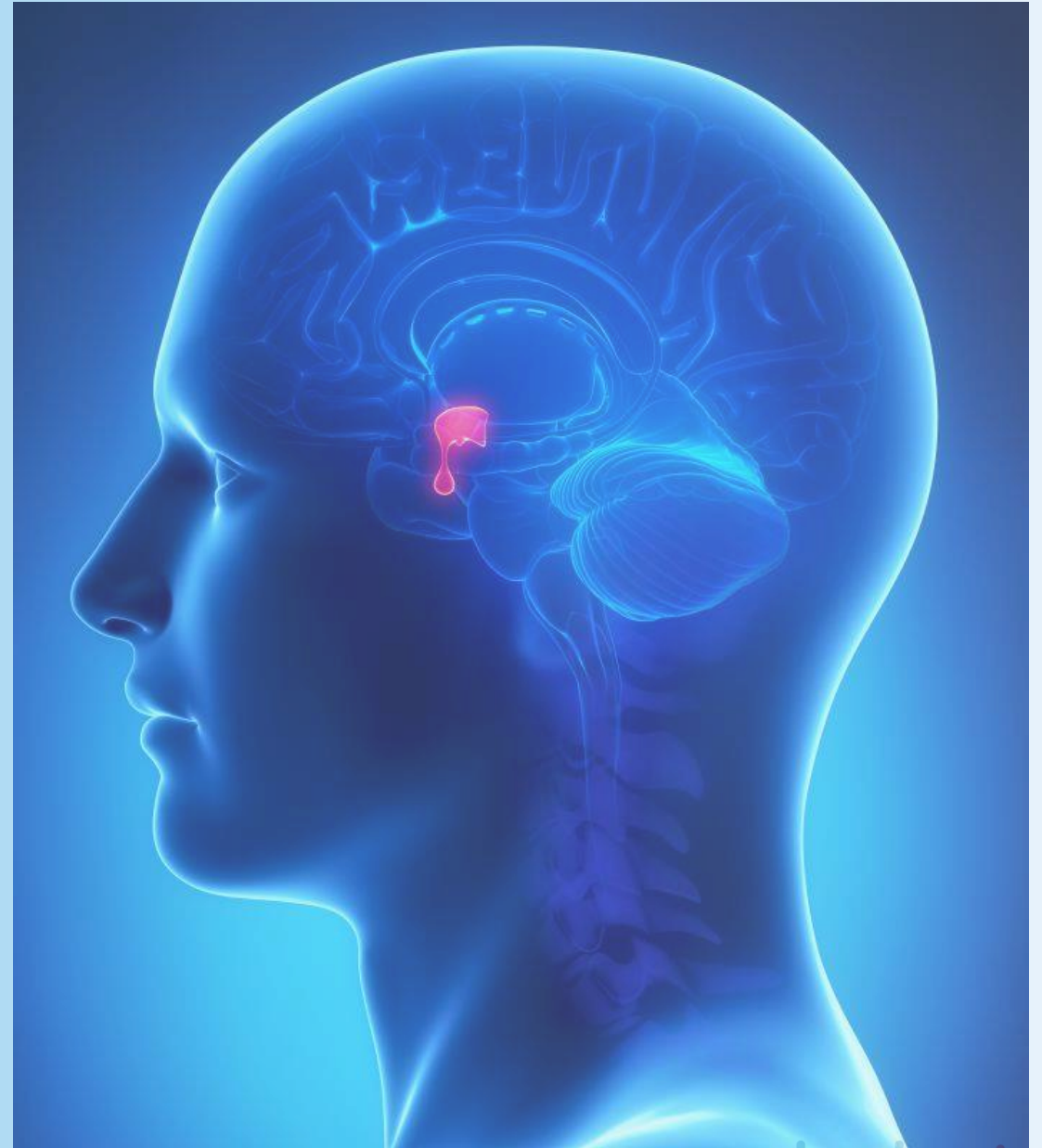
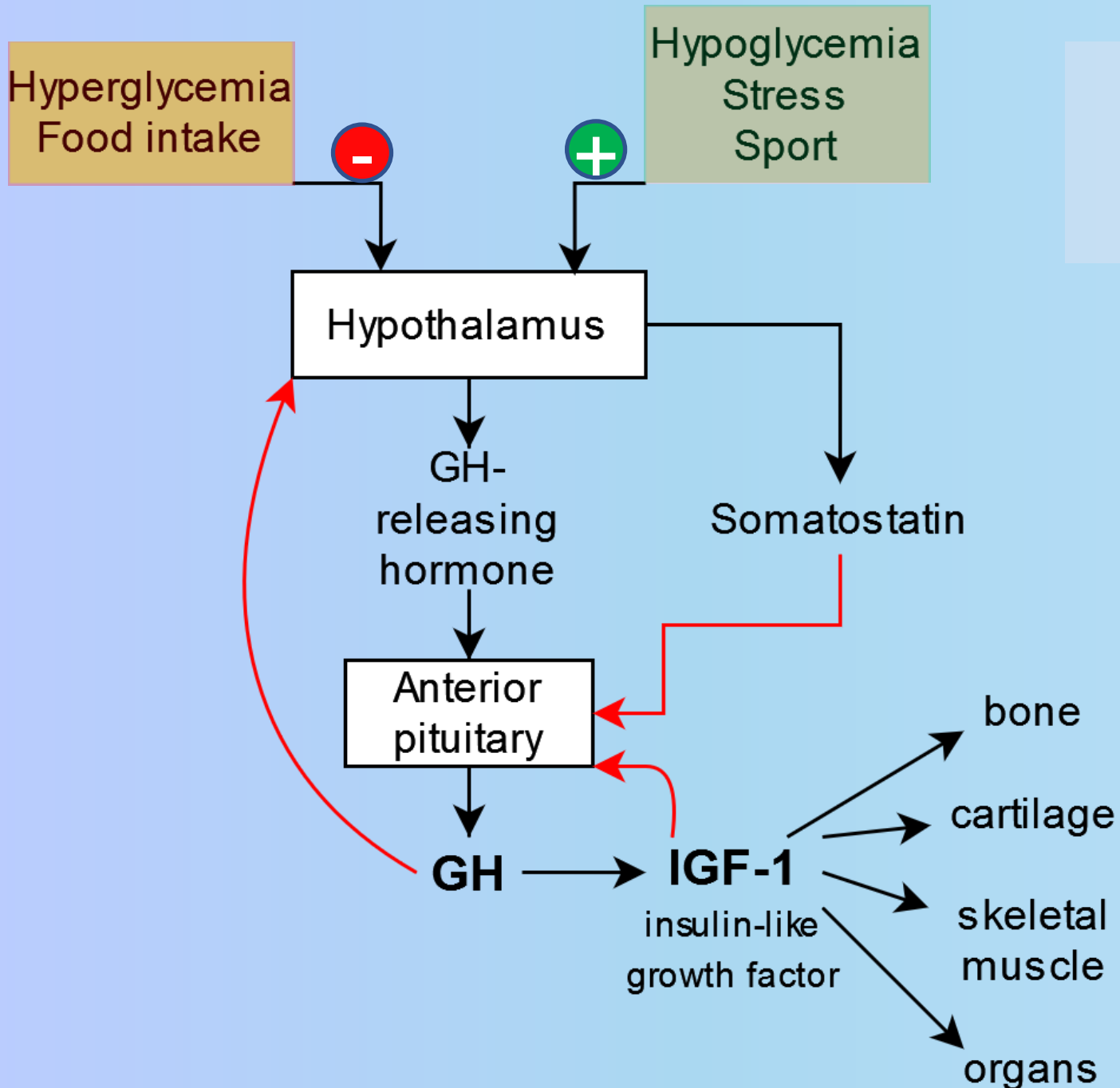


Table of Contents

- Endocrine disorder overview ✓
- Hypothalamic-pituitary axis ✓
- **GH and acromegaly**
- Hyperprolactinemia
- Pituitary adenoma
- ADH and Diabetes Insipidus
- SIADH
- Appetite regulation



Function and regulation of GH

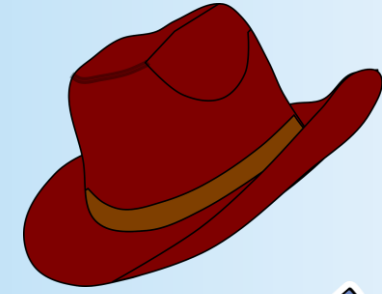


- Negative feedback mechanisms keep GH secretion in check.
- The most common disorder of GH is acromegaly.
- A tumor of the pituitary gland (pituitary adenoma) secretes excess GH.
- The tumor is not responsive to negative feedback.

Acromegaly

- Symptoms of acromegaly are the result of abnormally high IGF-1.
- The effects of IGF-1 depend on the bone age of the patient.
- Before epiphyseal plates close, GH will induce longitudinal growth (gigantism).

- Tumor mass effect*
- Soft tissue effects
 - Hyperhidrosis
 - Deepening of voice
 - Macroglossia
 - Obstructive sleep apnea
- Skeletal effects
 - Coarsening of facial features (nose, forehead, jaw)
 - Wide hands and feet



Acromegaly diagnosis

- IGF-1 levels are stable in the blood, so are a reliable measure of GH activity.
- Glucose is a suppressor of GHRH, so it is expected to decrease the secretion of GH.
- If acromegaly is confirmed, a pituitary MRI can be used to diagnose a pituitary adenoma.

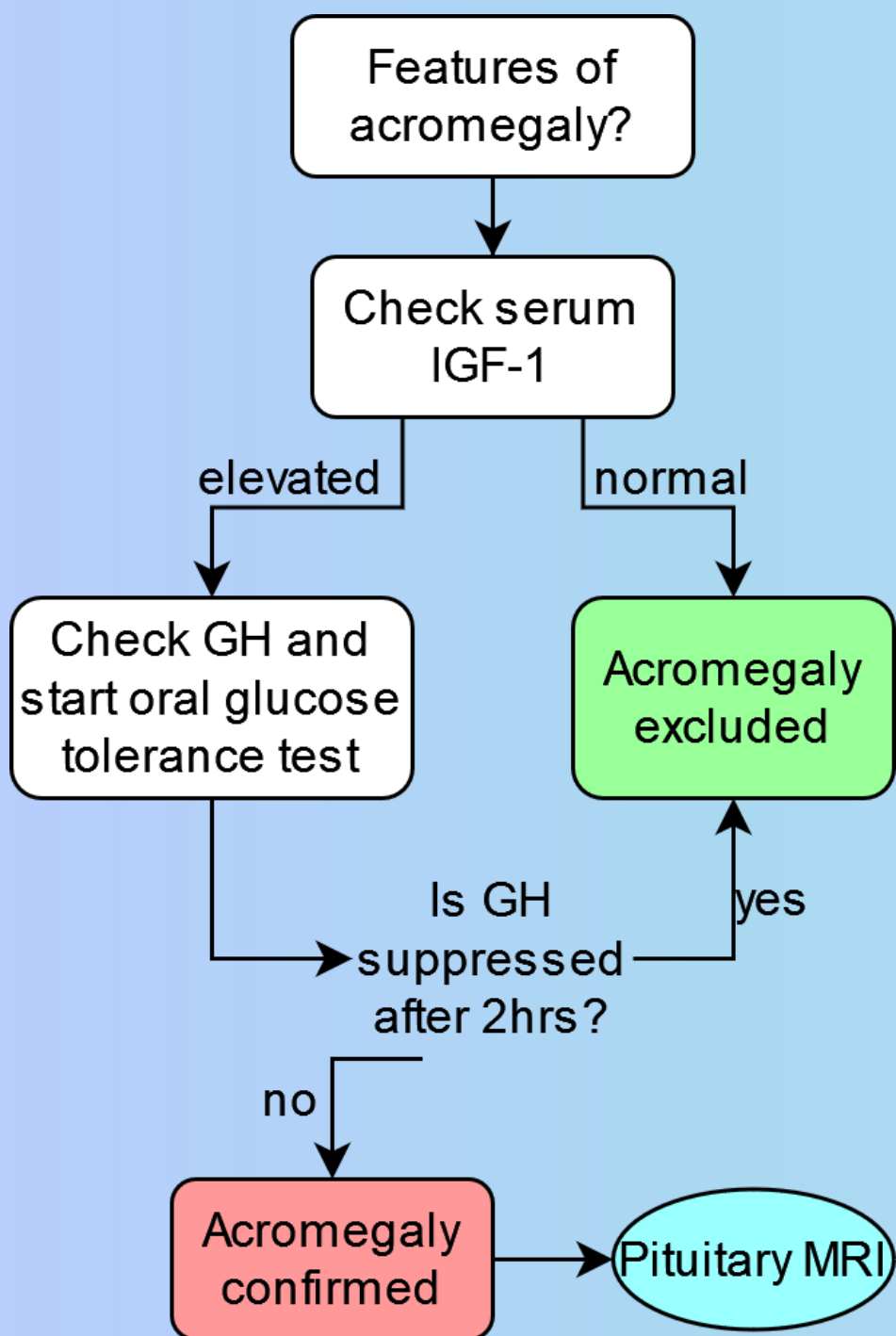
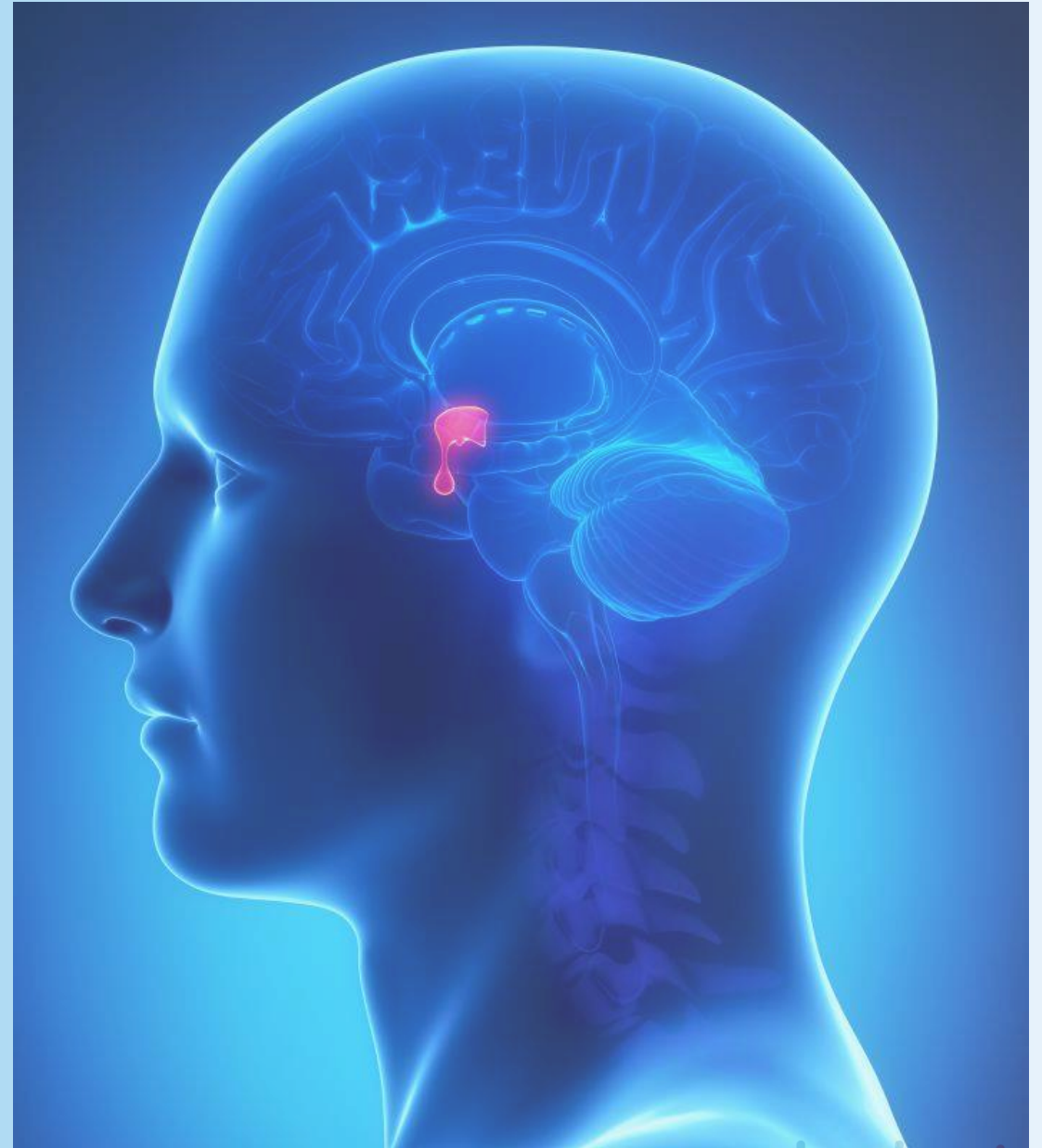


Table of Contents

- Endocrine disorder overview ✓
- Hypothalamic-pituitary axis ✓
- GH and acromegaly ✓
- **Hyperprolactinemia**
- Pituitary adenoma
- ADH and Diabetes Insipidus
- SIADH
- Appetite regulation



Hyperprolactinemia

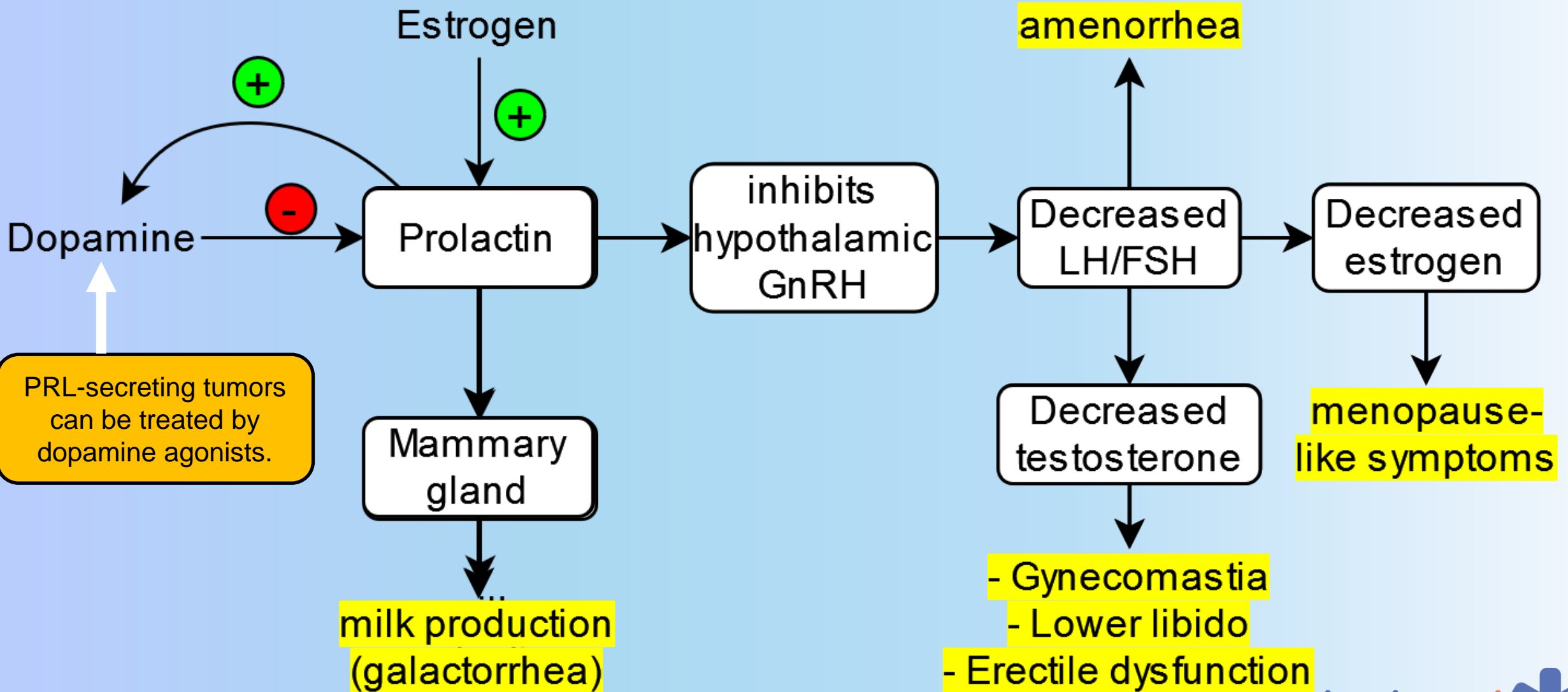
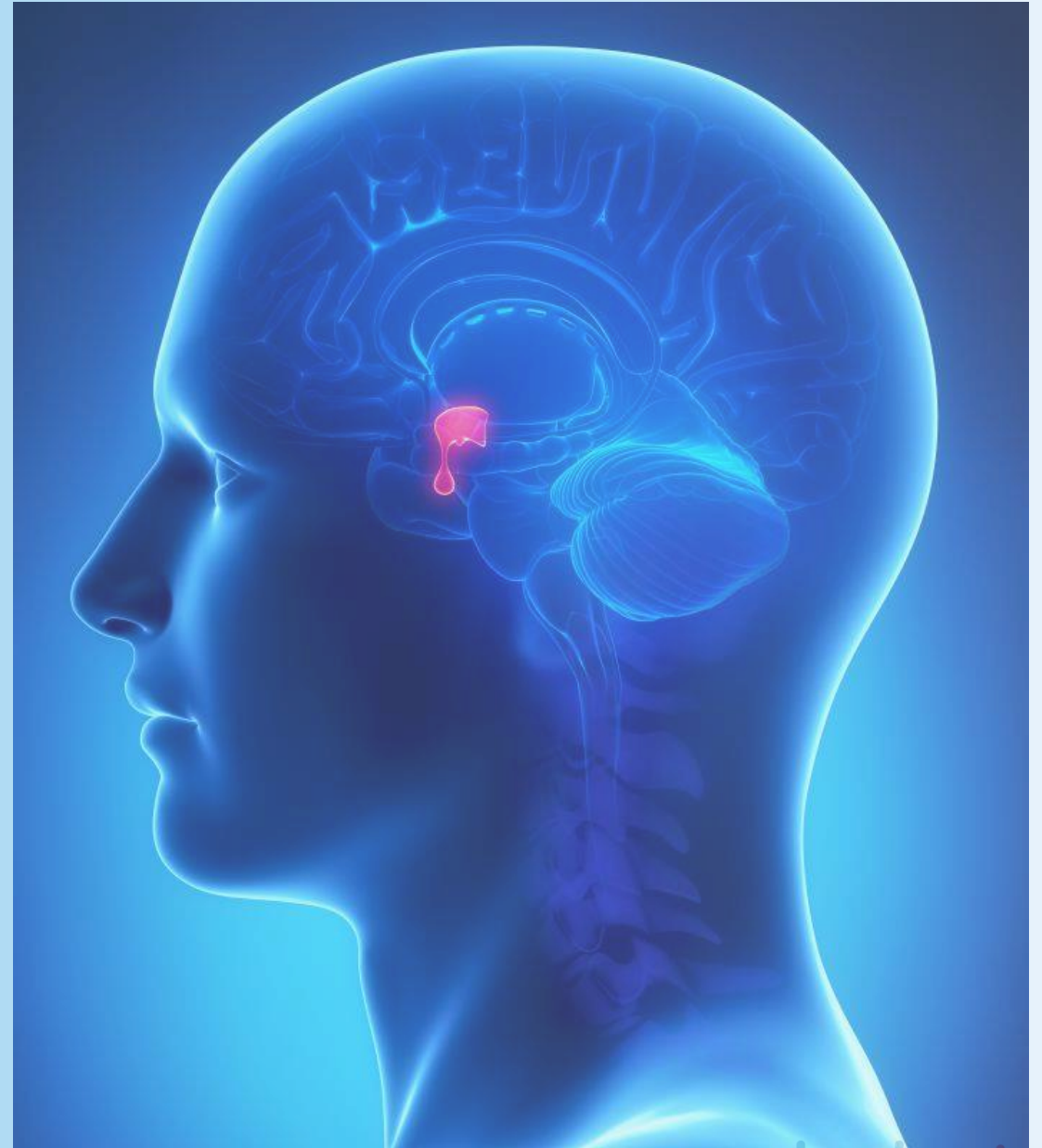


Table of Contents

- Endocrine disorder overview ✓
- Hypothalamic-pituitary axis ✓
- GH and acromegaly ✓
- Hyperprolactinemia ✓
- **Pituitary adenoma**
- ADH and Diabetes Insipidus
- SIADH
- Appetite regulation



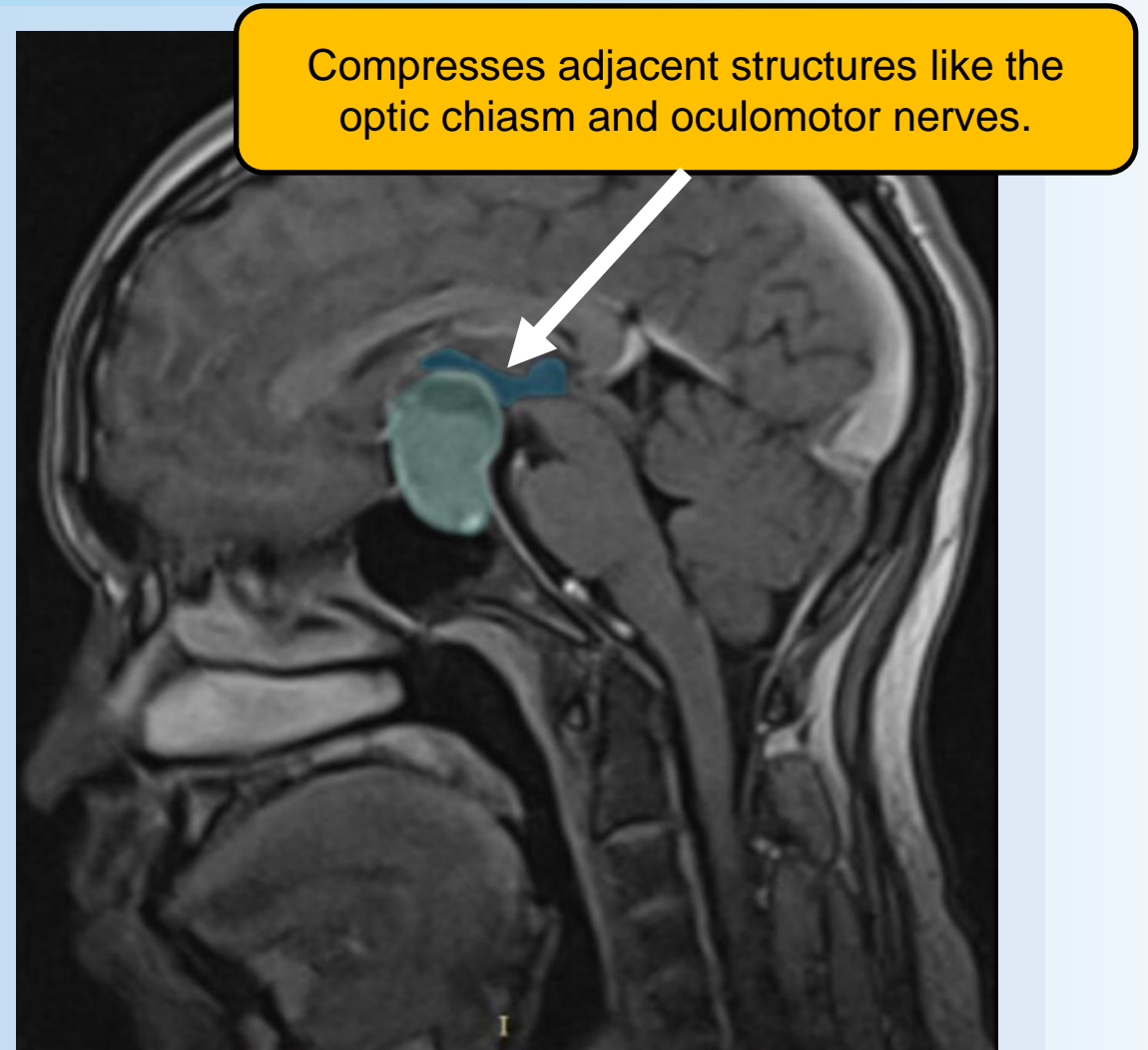
Pituitary adenoma

- Adenomas are divided into **secretory** and **non-secretory**.
- Adenomas also divided by size:
 - Microadenoma (<10mm)
 - Macroadenoma (>10mm)
- Non-secretory tumors are more likely to be detected later.
- Macroadenomas compress surrounding normal cells.

- Secretory adenomas usually secrete one hormone.
 - **The symptoms depend on the hormone secreted:**
 - Lactotroph/**PRL** (40%)
 - Somatotroph/**GH** (10-15%)
 - Corticotroph/**ACTH** (5%)
 - Thyrotroph/**TSH** (1%)
- *percent of all pituitary adenomas

Macroadenoma

- Mass effects
 - Headache
 - Bitemporal hemianopsia
 - Diplopia
- Hypopituitarism
 - **Adjacent pituitary cells are destroyed.**
 - Usually GH and GnRH are lost first.



Microadenoma

- Can be an incidental finding, or due to symptoms.
- Secretory adenomas are often found early (<10mm).
- Prolactinomas can be treated by the use of dopamine agonists.
- Gonadotroph adenomas typically do not secrete hormone.

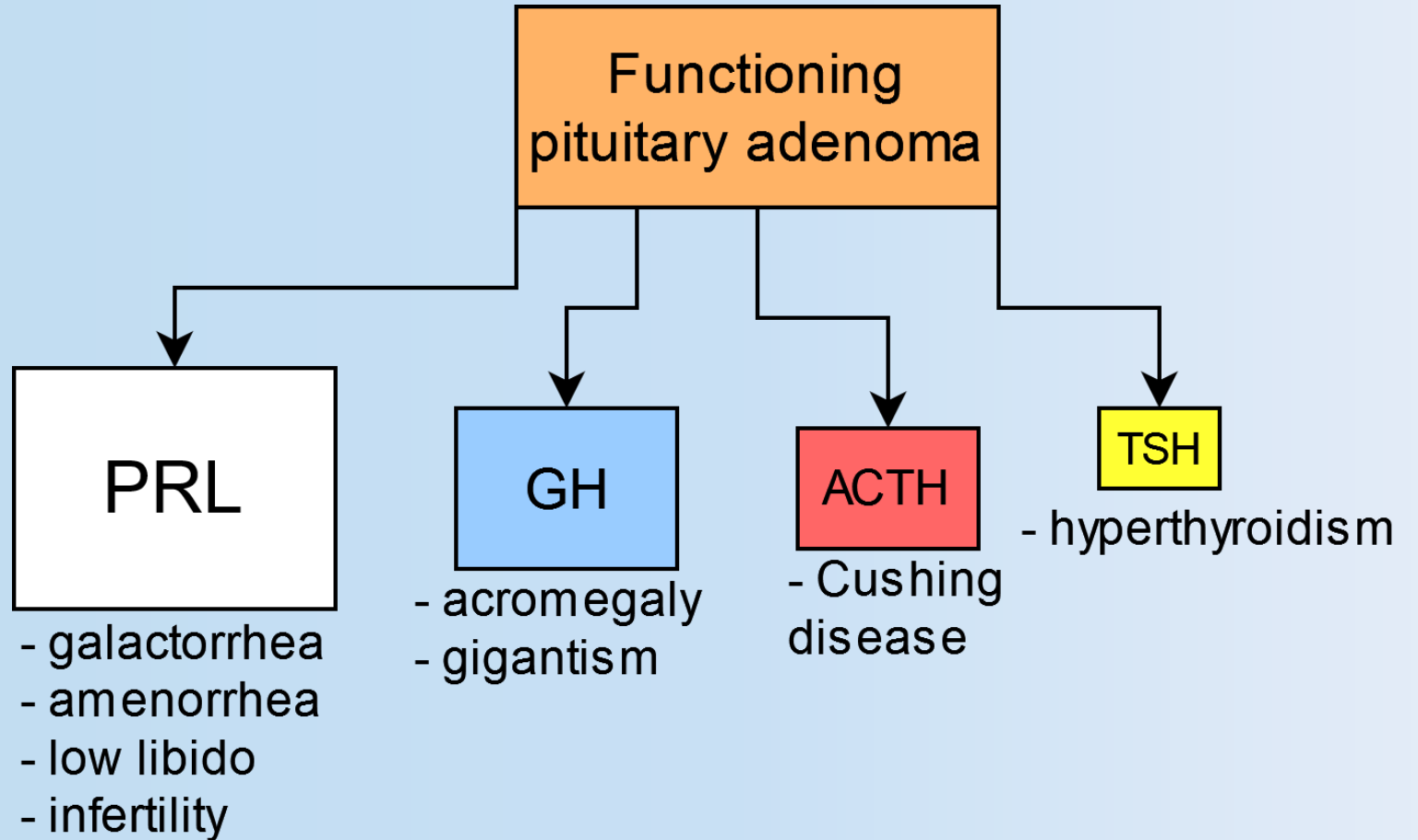
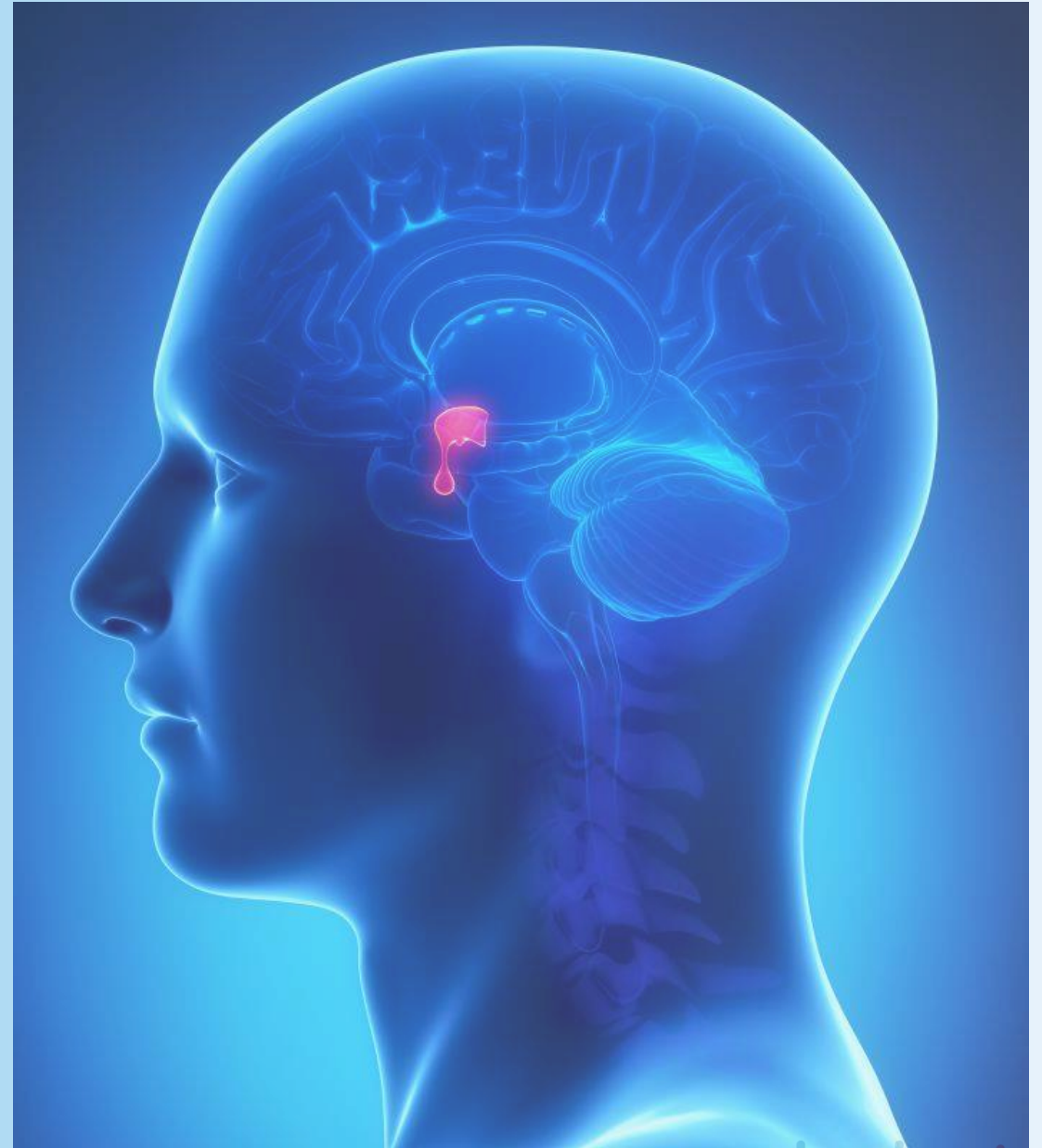


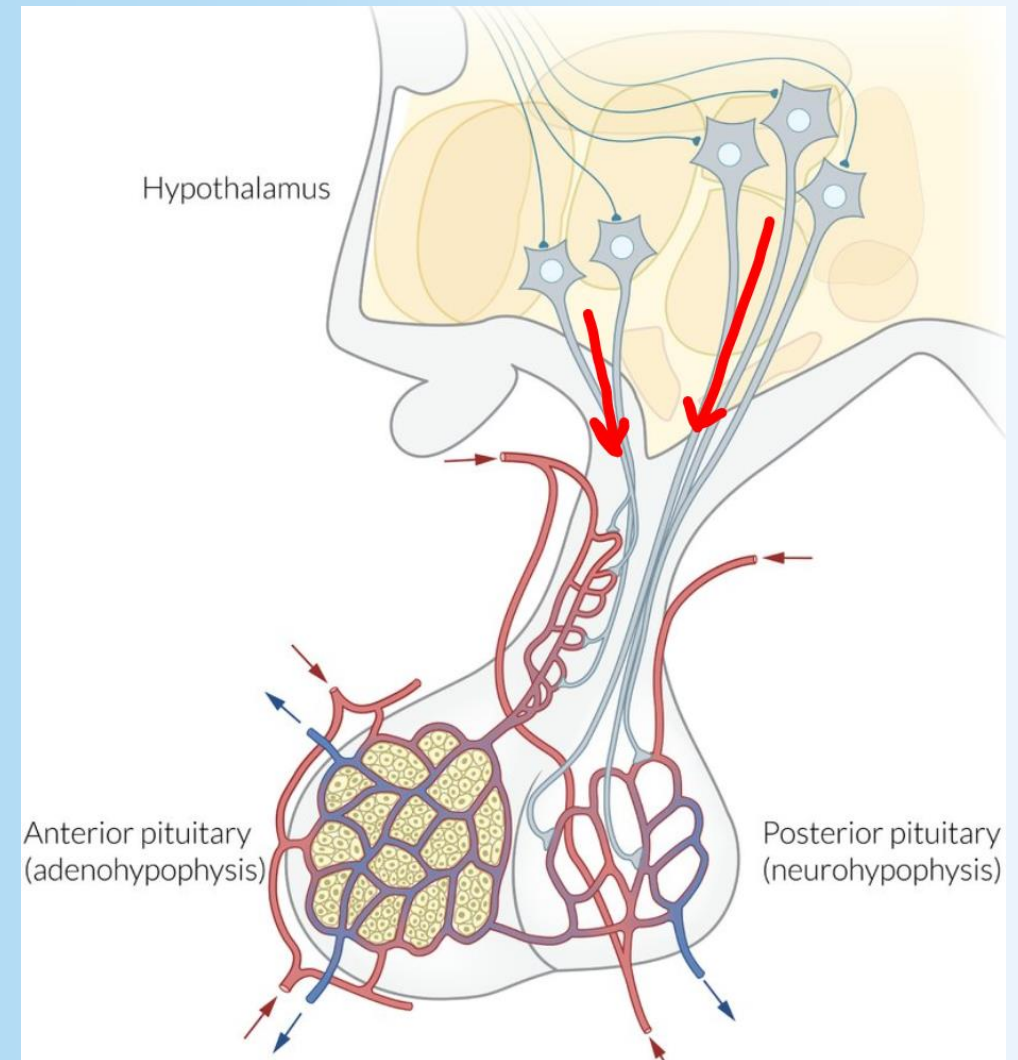
Table of Contents

- Endocrine disorder overview ✓
- Hypothalamic-pituitary axis ✓
- GH and acromegaly ✓
- Hyperprolactinemia ✓
- Pituitary adenoma ✓
- **ADH and Diabetes Insipidus**
- SIADH
- Appetite regulation

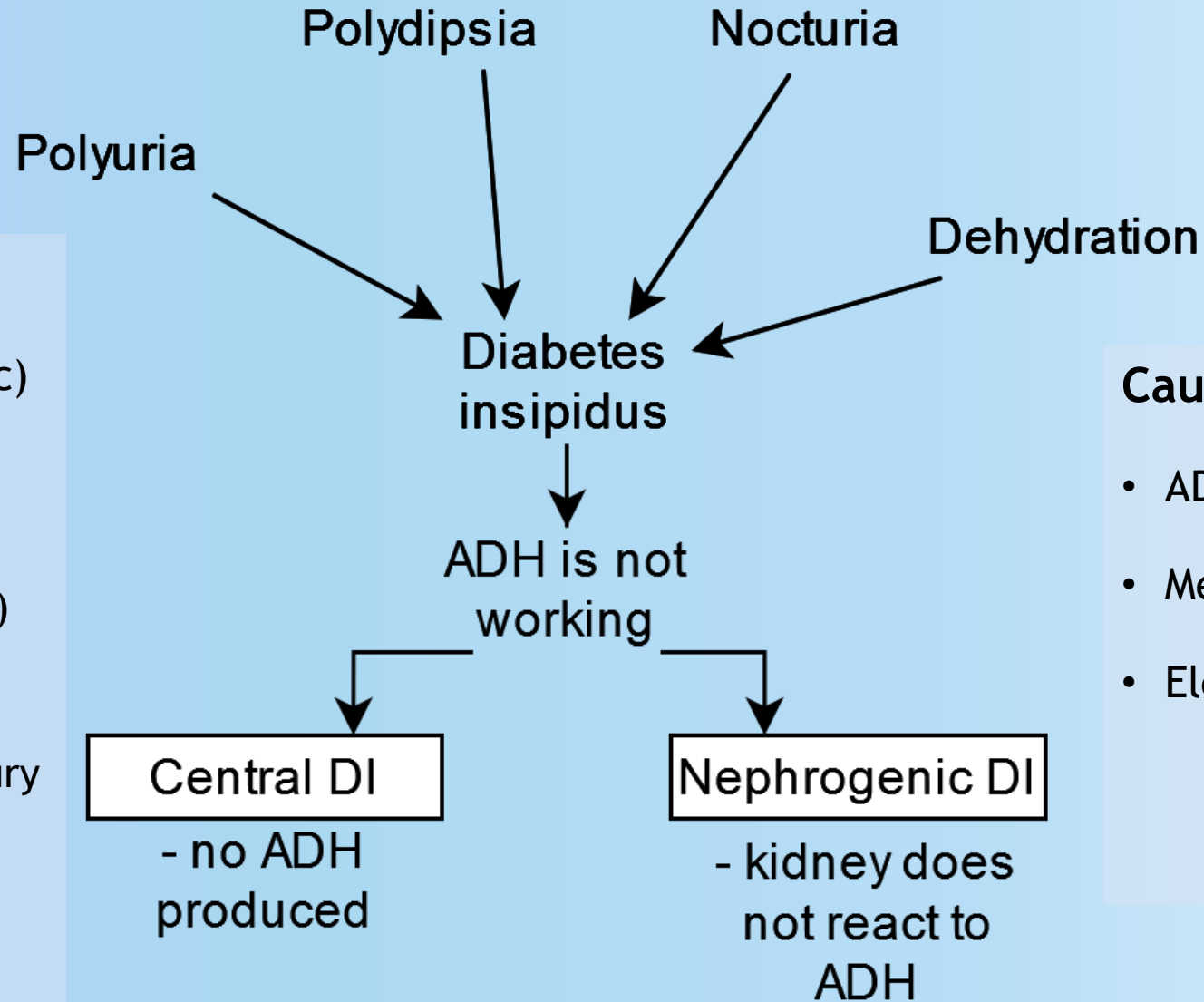


Everything you need to know about ADH

- ADH is produced in the supraoptic and paraventricular nuclei of the hypothalamus.
- ADH secretion is regulated by **serum osmolarity**.
- ADH acts via V2 receptors in the collecting tubules of the nephron.
- It leads to insertion of aquaporins to principal cells.
- Results in **increased free water absorption**.



Diabetes insipidus



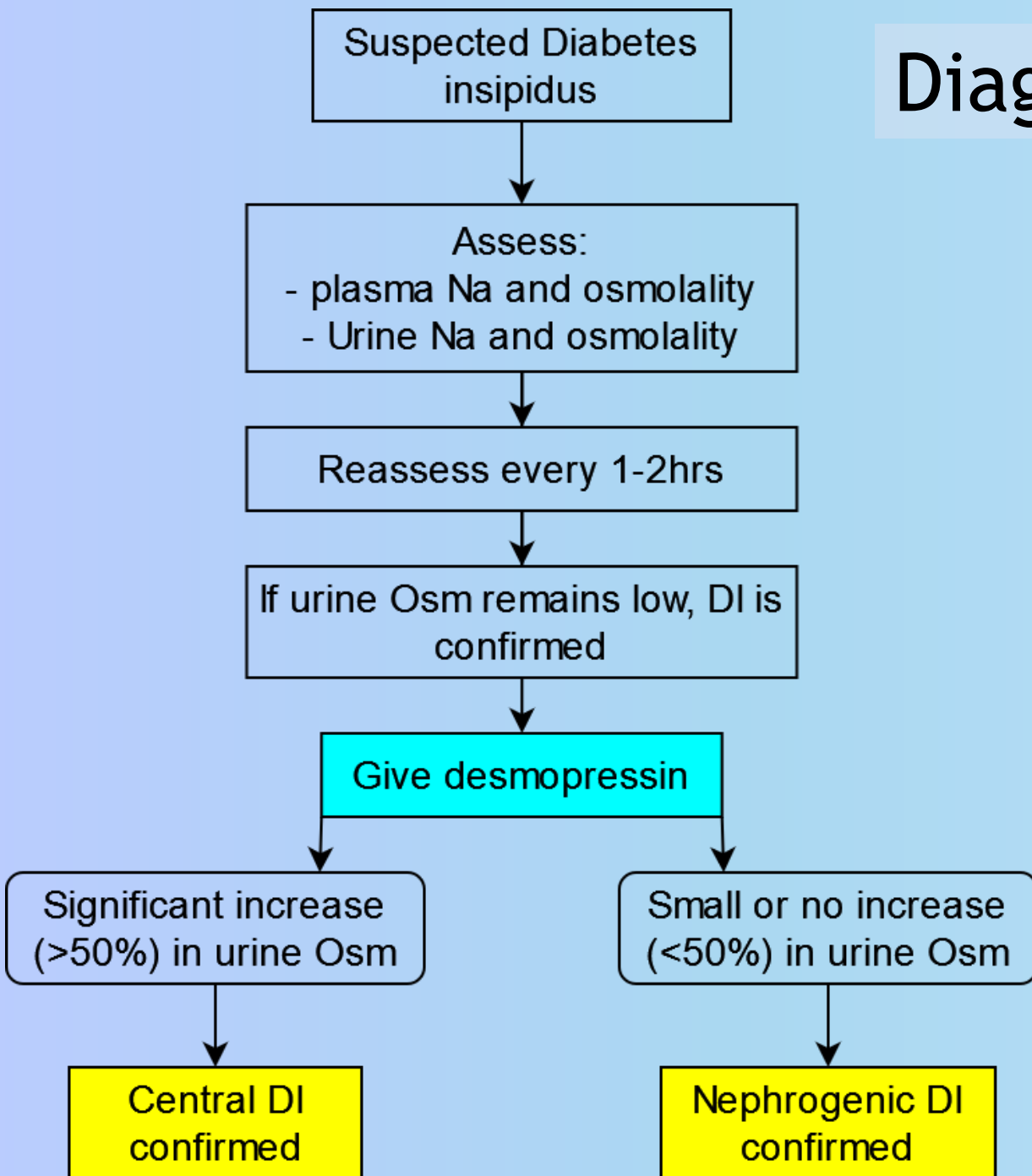
Causes of central DI

- 1/3: Primary (idiopathic)
- 2/3: Secondary
 - Brain tumors (craniopharyngioma)
 - Pituitary surgery
 - Traumatic brain injury or bleeding
 - Ischemia (stroke, Sheehan syndrome)

Causes of nephrogenic DI

- ADH receptor mutation
- Medications (lithium)
- Electrolyte disturbances
 - Hypokalemia
 - Hypercalcemia

Diagnosis of diabetes insipidus



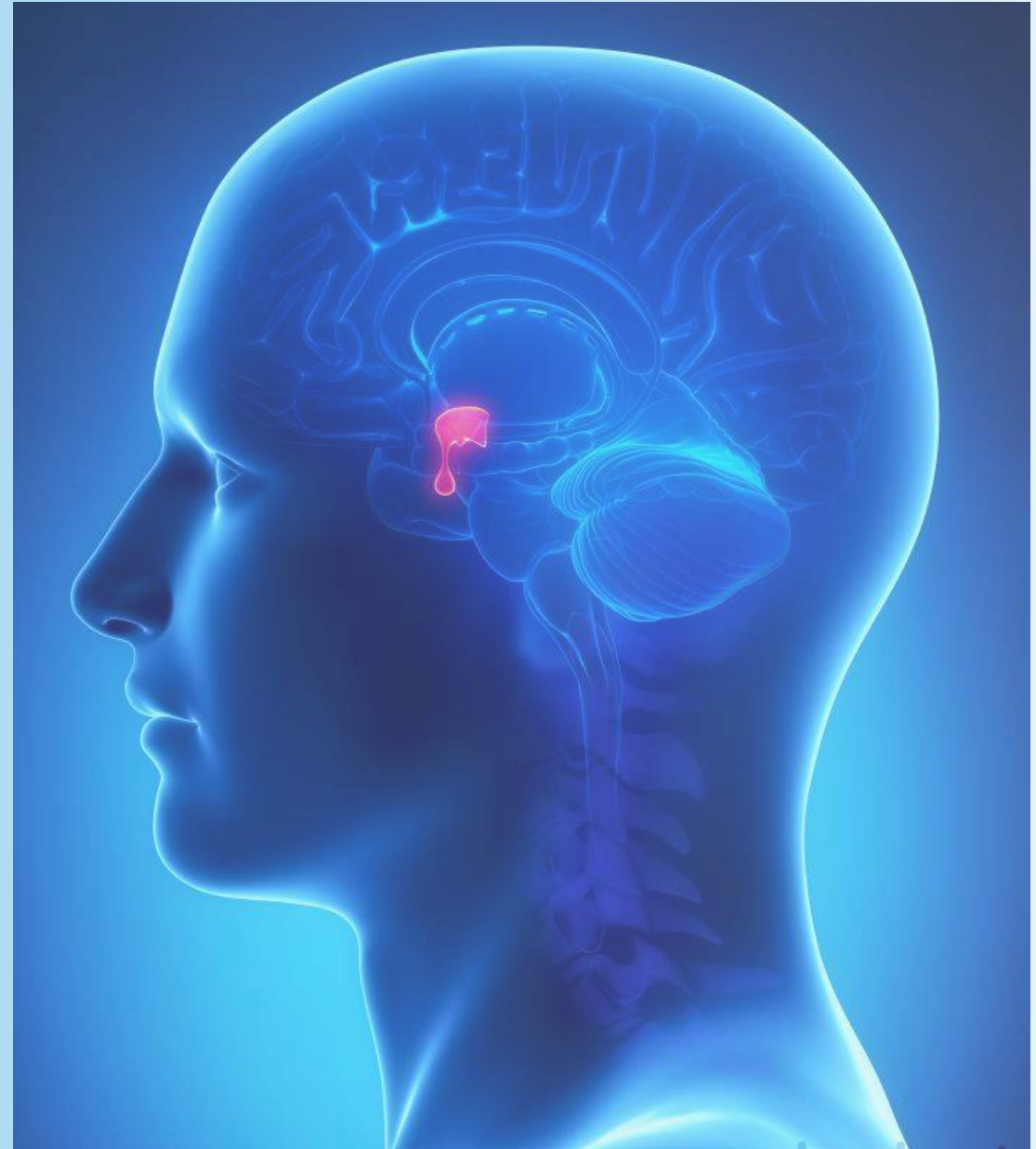
- ADH cannot be reliably measured so hormone function must be indirectly measured.
- The water deprivation test confirms that DI is present.

- Desmopressin is an ADH analog that differentiates between central and nephrogenic.
- Desmopressin is both diagnostic and therapeutic for central DI.

If water deprivation increases the urine osmolality, then the cause is probably primary polydipsia.

Table of Contents

- Endocrine disorder overview ✓
- Hypothalamic-pituitary axis ✓
- GH and acromegaly ✓
- Hyperprolactinemia ✓
- Pituitary adenoma ✓
- ADH and Diabetes Insipidus ✓
- **SIADH**
- Appetite regulation



Syndrome of inappropriate antidiuretic hormone secretion (SIADH)

Increased pituitary ADH

• CNS conditions

- Stroke
- Trauma
- Infection
- Pituitary surgery

• Drugs

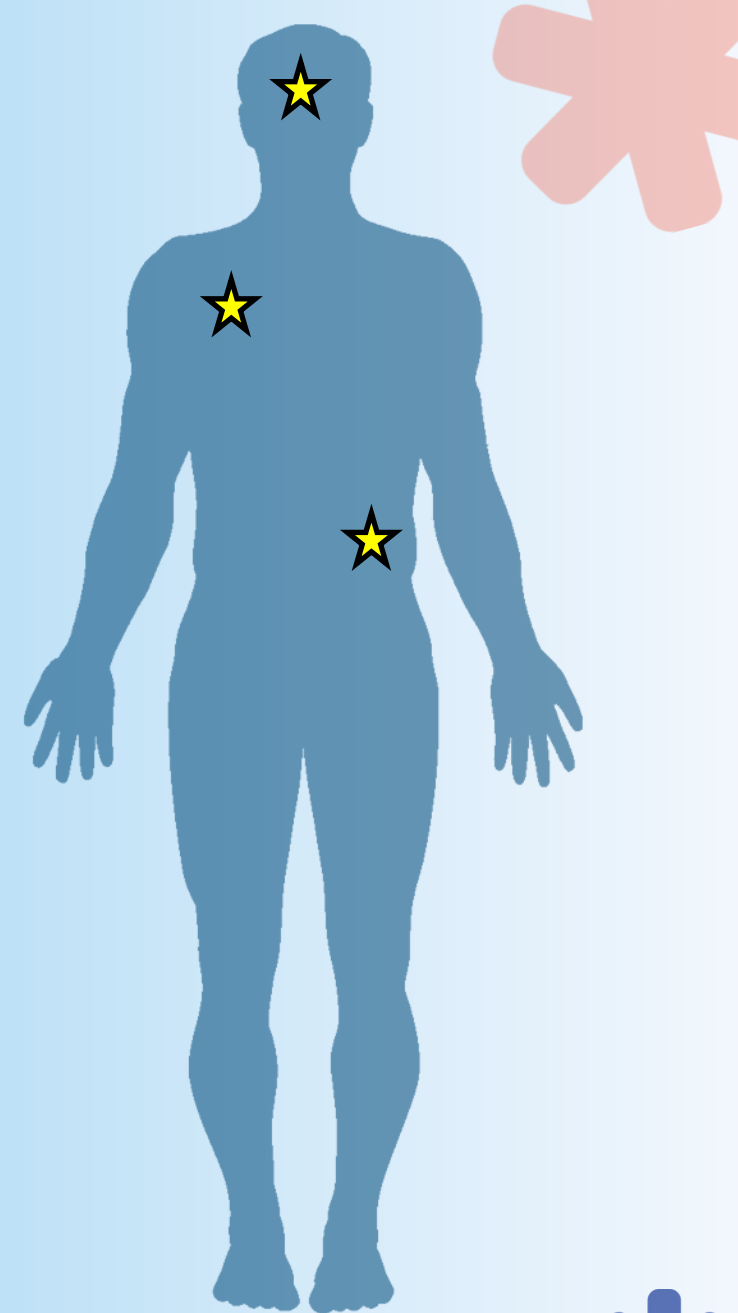
- Anticonvulsants
- Antidepressants (SSRIs)
- Cancer drugs (alkylating agents)

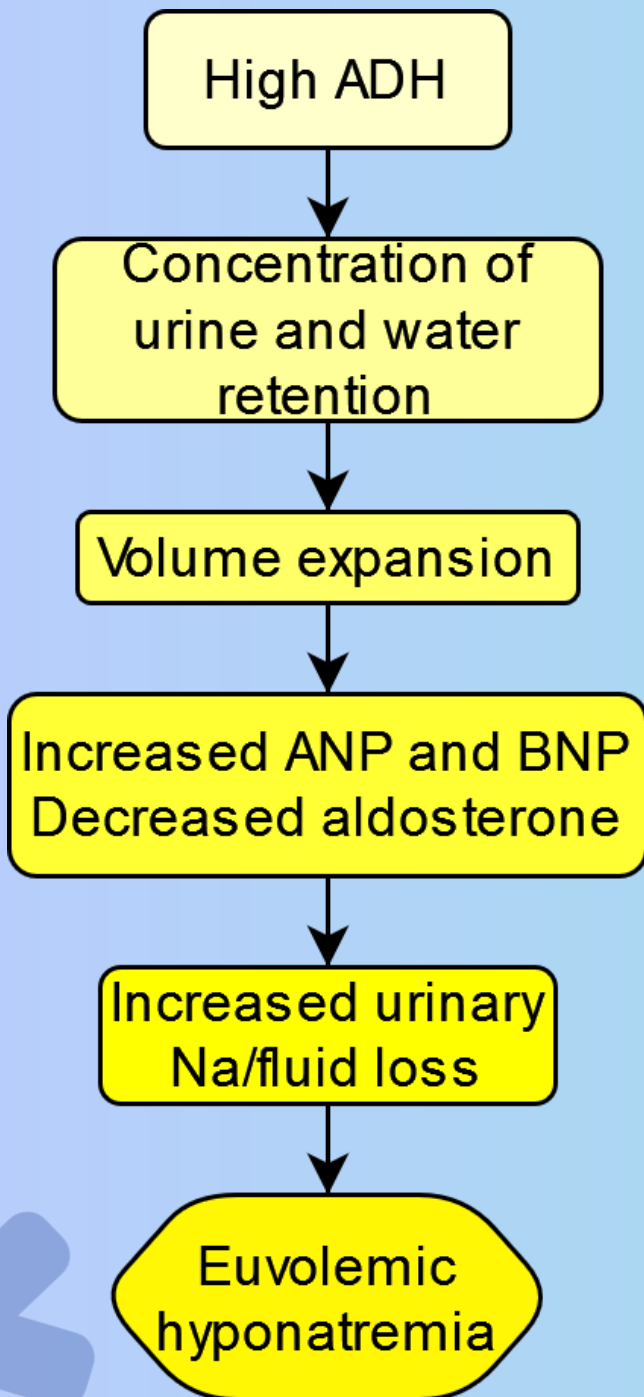
Paraneoplastic ectopic ADH

- Small cell lung cancer

Nephrogenic SIADH

- Mutated V2-receptor





Features of SIADH

Symptoms of hyponatremia

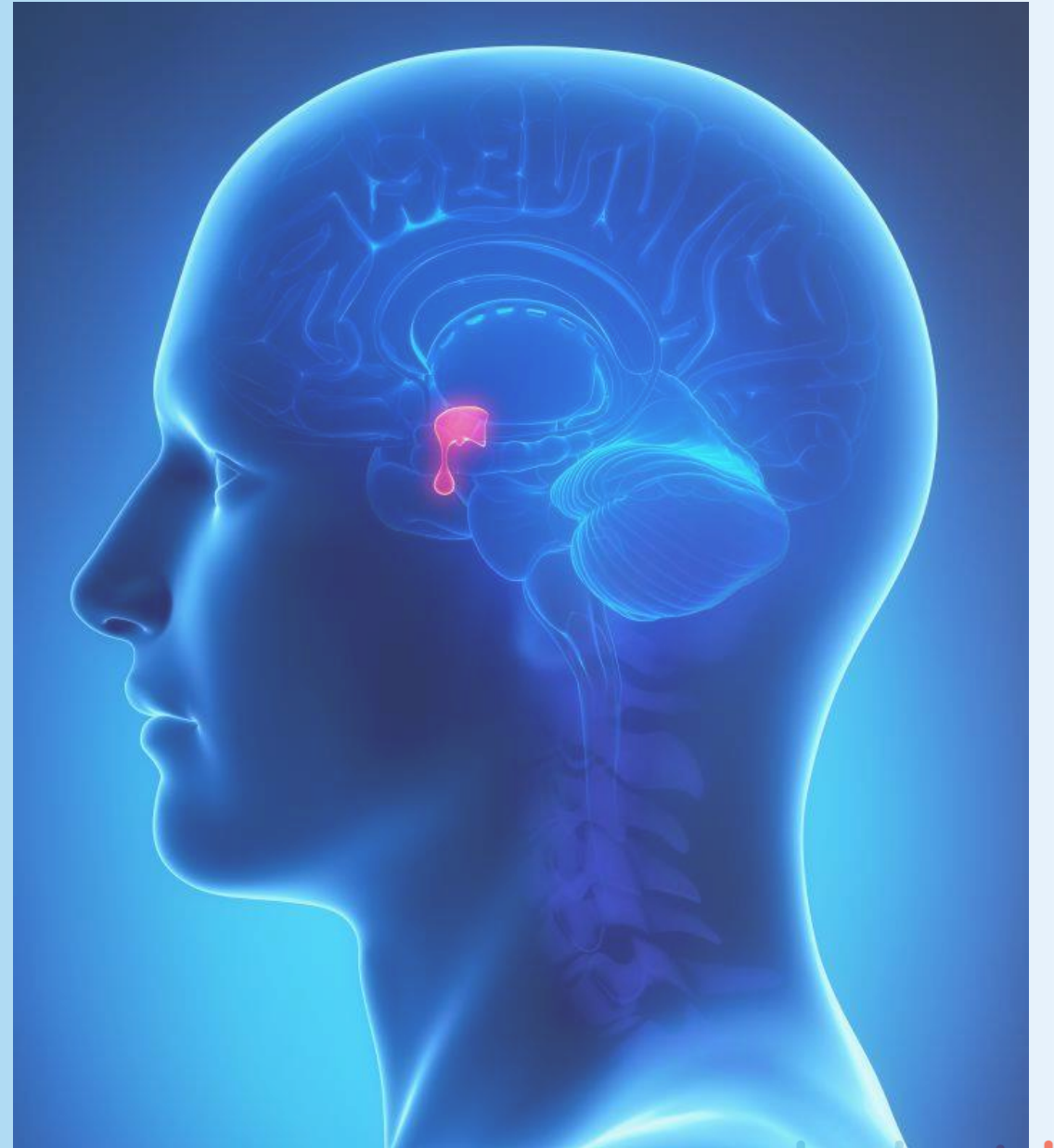
- **Mild:** Anorexia, N/V, headache, muscle cramps
- **Moderate:** Muscle weakness, lethargy, confusion
- **Severe:** Seizures, altered consciousness

SIADH is a diagnosis of exclusion, meaning other causes of hyponatremia have to be ruled out.

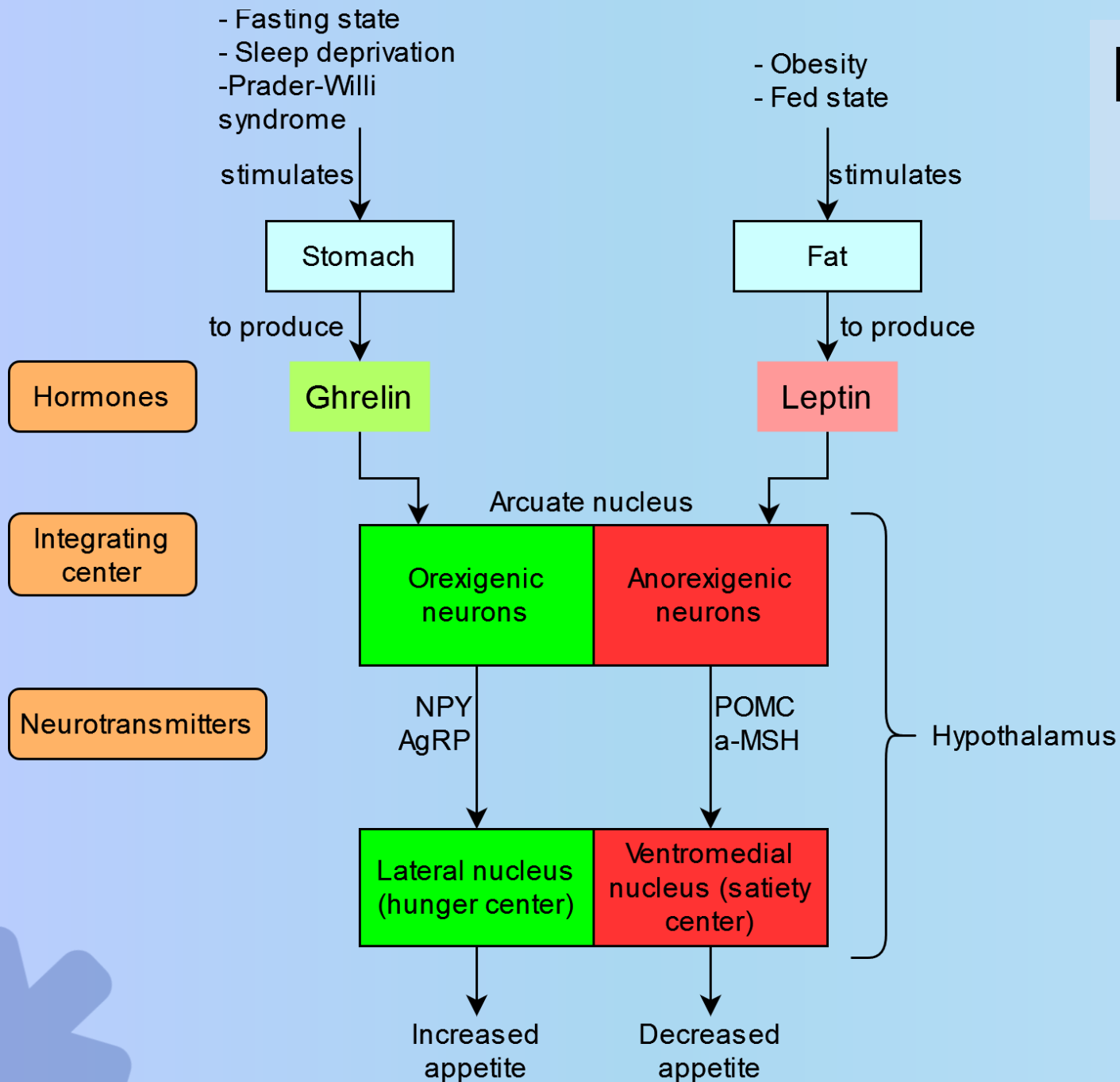
High plasma ADH + euvolemic hyponatremia = SIADH

Table of Contents


- Endocrine disorder overview ✓
- Hypothalamic-pituitary axis ✓
- GH and acromegaly ✓
- Hyperprolactinemia ✓
- Pituitary adenoma ✓
- ADH and Diabetes Insipidus ✓
- SIADH ✓
- **Appetite regulation**



Endocrine regulation of appetite




- Ghrelin increases appetite.
- Leptin decreases appetite.
- NPY and AgRP are released from orexigenic neurons.
- POMC and α -MSH are released from anorexigenic neurons.



A 35-year-old male with a history of epilepsy presents with nausea, vomiting, headache, and weakness. Laboratory tests reveal high urine sodium, low serum osmolality, and high urine osmolality.

What is the most likely cause of his clinical findings and the associated electrolyte disturbance?

- A. SIADH, hyponatremia
- B. SIADH, hyperkalemia
- C. Diabetes insipidus, hyponatremia
- D. Diabetes insipidus, hyperkalemia



A 30 year old woman presents with a persistent headache and double vision that has been increasing for the past 2 months. While obtaining a history, she notes an irregular menstrual cycle, with her last menstruation occurring 3 months ago. Pregnancy tests are negative.

Which option best explains her symptoms?

- A. A prolactin-secreting pituitary microadenoma
- B. Use of an anti-psychotic medication
- C. A non-functioning pituitary macroadenoma
- D. A growth hormone-secreting pituitary macroadenoma

Thank you!