

Introduction to
Pituitary Disorders



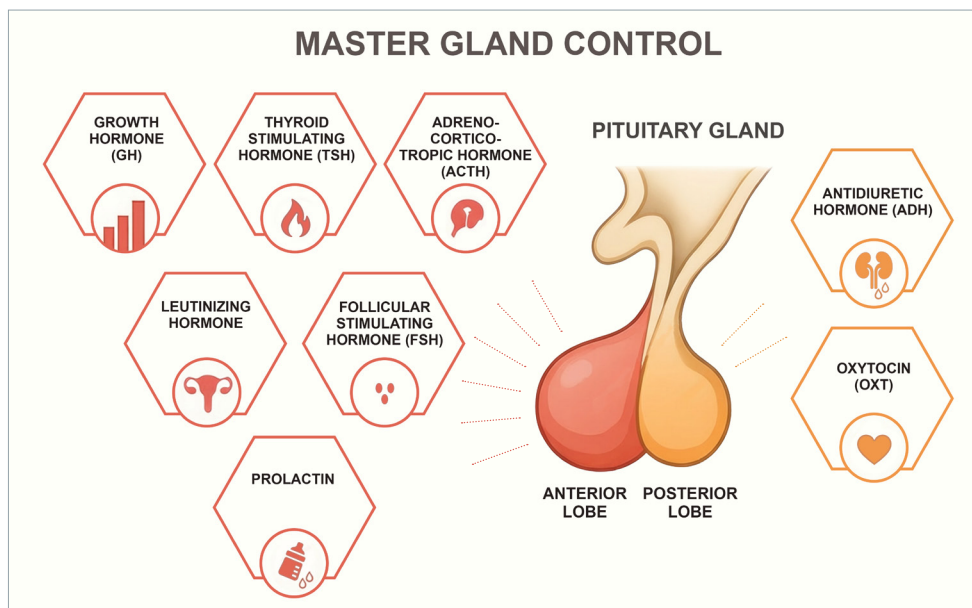
○—○ PITUITARY GLAND

Patient Primer

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Pituitary Gland: Hormones & Functions



The pituitary gland, often called the “Master Gland,” plays a central role in maintaining hormonal balance throughout the body. Despite its small size, about that of a pea, it regulates the activity of many other glands and organs. It sits at the base of the brain, just behind the bridge of the nose, beneath the hypothalamus, which controls its activity.

The pituitary gland has two main parts.

ANTERIOR PITUITARY (Adenohypophysis)

The anterior part produces and secretes several key hormones that regulate other glands.

- **LH (Luteinizing Hormone) and FSH (Follicle-Stimulating Hormone)**

The gonadotropins. They act on the ovaries and testes to control reproductive function and the production of estrogen, progesterone, and testosterone.

- **TSH (Thyroid-Stimulating Hormone)**

Stimulates the thyroid gland to produce thyroxine (T4) and triiodothyronine (T3), which regulate metabolism, energy, and temperature.

- **GH (Growth Hormone)**

Stimulates the liver to produce IGF-1, which promotes growth in children and supports metabolism, muscle maintenance, and tissue repair in adults.

- **ACTH (Adrenocorticotrophic Hormone)**

Stimulates the adrenal glands to produce cortisol, a vital hormone involved in stress response, metabolism, immune modulation, and maintaining blood pressure.

- **Prolactin**

The “lactation hormone,” responsible for breast development and milk production. Levels rise naturally during pregnancy and breastfeeding.

POSTERIOR PITUITARY (Neurohypophysis)

The posterior part stores and releases two hormones that are produced in the hypothalamus.

- **Oxytocin**

Often called the “love hormone,” it promotes trust, bonding, and emotional connection. It also stimulates uterine contractions during childbirth and milk ejection during breastfeeding.

- **Arginine Vasopressin (AVP) or Antidiuretic Hormone (ADH)**

This hormone regulates the body’s water and sodium balance by controlling how much water the kidneys retain.



Pituitary Adenomas

A pituitary adenoma is a noncancerous (benign) growth that develops on the pituitary gland, a small gland located at the base of the brain.

The exact cause of most pituitary adenomas is unknown. They typically occur spontaneously due to DNA mutations in pituitary cells that cause uncontrolled growth. A small percentage are linked to rare genetic syndromes, such as Multiple Endocrine Neoplasia type 1 (MEN1). Diagnosis involves a physical.

Although these tumors are usually not cancerous, they can still cause symptoms by:

Mass Effect

Headaches, pressure on nearby structures such as the optic nerve, which can cause vision problem, and pressure on the pituitary gland itself which can cause hormonal deficiencies.

Hormone Deficiencies

When the tumor affects normal hormone production.

Excess Hormone Production

When the tumor makes too much of a specific hormone (called a functioning pituitary adenoma).

SYMPTOMS OF EXCESS HORMONE PRODUCTION (Functioning Pituitary Adenomas)

Prolactinoma (Too much prolactin)

- Infertility, low sex drive, abnormal breast milk production (galactorrhea)
- In women, can cause irregular or absent menstrual periods in women
- In men, may cause low testosterone and erectile dysfunction

Acromegaly (Too much GH)

- Enlargement of hands, feet, and facial features
- Joint pain
- Excessive sweating
- High blood pressure
- Glucose intolerance or diabetes

Cushing's Disease (Too much ACTH leading to excess cortisol)

- Weight gain (especially in the face, chest, and abdomen)
- Thin skin, easy bruising, purple stretch marks
- Muscle weakness
- High blood pressure
- Diabetes
- Emotional or cognitive changes
- Decreased libido or fertility

Thyrotrophinoma (TSH-secreting tumor; too much TSH)

- This is a rare type of pituitary tumor
- Overactive thyroid (hyperthyroidism) symptoms of rapid heartbeat, anxiety, weight loss, sweating, and high blood pressure

Symptoms from Hormone Deficiencies



Low ACTH ► Secondary Adrenal Insufficiency

- » Fatigue
- » Weight loss
- » Poor appetite
- » Nausea
- » Dizziness
- » Low blood pressure



Low TSH ► Hypothyroidism

- » Fatigue
- » Weight gain
- » Constipation
- » Cold intolerance
- » Low blood pressure



Low GH

- » Fatigue
- » Loss of muscle mass
- » Weight gain
- » Low energy



Low LH and FSH ► Decreased Fertility

In Men:

- » Low testosterone
- » Low libido
- » Erectile dysfunction
- » Metabolic changes

In Women:

- » Low estrogen and progesterone
- » Irregular or absent periods
- » Hot flashes
- » Decreased bone density
- » Low libido



Low Antidiuretic Hormone (AVP/ADH)

- » Rarely present at diagnosis but may occur temporarily or permanently after surgery
- » Causes increased urination and thirst and may lead to dehydration

Work-Up and Diagnosis

Evaluation of a pituitary adenoma usually includes several steps to understand how the tumor affects your body and hormones.

Symptom Review & Physical Exam

Your healthcare provider will ask about your symptoms and perform a focused exam.

Blood and Urine Tests

These check for hormone imbalances that may indicate how the tumor is functioning or if hormonal deficiencies are present.

Imaging Tests (MRI)

An MRI scan of the brain helps locate the tumor, measure its size, and see if it's pressing on nearby structures.

Eye Exam

Because large pituitary tumors can press on the optic nerves, a visual field test may be done to check for any vision changes.



Treatment

Treatment is personalized based on the tumor's type, size, symptoms, hormone activity, overall health and personal preference.



Observation / Monitoring

Small, non-functioning, and symptom-free tumors may be monitored with regular MRI scans and hormone testing ("watchful waiting").



Medication

Used for some hormone-producing (functioning) tumors:

- Prolactinomas often respond well to dopamine agonists (e.g., cabergoline, bromocriptine), which can shrink the tumor and normalize prolactin levels.
- Other hormone-secreting tumors may be managed with medications, when surgery isn't possible, sometimes as a bridge before surgery, or to treat residual or recurrent disease.



Surgery

- The first-line treatment for most larger tumors causing vision problems or for functioning tumors except for prolactinomas.
- The most common approach is minimally invasive transsphenoidal surgery, performed through the nose and sinuses to remove the tumor.



Radiation Therapy

Used to shrink or control remaining tumor tissue, especially if:

- The tumor cannot be completely removed
- Hormone levels remain elevated after surgery

After Pituitary Surgery: What to Expect

Pituitary surgery is usually safe, but your body may need time to adjust after the tumor is removed. Here's what patients commonly experience and how follow-up care works.

Recovery & Monitoring

- Hospital Stay: Most patients stay in the hospital 1–2 days, depending on recovery.
- Vision & Headaches: Your vision and headaches are closely monitored. Improvement may take days to weeks.
- Fluid Balance / Thirst: Your body may temporarily struggle to manage water balance due to changes in AVP.

Three Phases of AVP Response After Surgery

Phase 1: AVP Deficiency

- Occurs 1–2 days after surgery
- Symptoms: very frequent urination, extreme thirst
- Usually temporary and if needed managed with AVP replacement therapy (desmopressin/DDAVP)

Phase 2: Syndrome of Inappropriate Antidiuresis

- Occurs 5–10 days after surgery
- Symptoms: water retention, low sodium, mild swelling, headache
- Usually temporary; you may be instructed to restrict fluid intake to 1 liter a day until 7-10 days after surgery
- We will check your sodium level on day 7 after surgery

Phase 3: Return to Baseline

- Occurs 10-14 days after surgery
- Sometimes, Phases 1 or 2 can last longer than usual, and in rare cases, may even persist.

Follow-Up & Hormone Monitoring

- 6-week follow-up: Blood tests check for hormone deficiencies or excesses.
- Hormones monitored: TSH/free T4, ACTH/cortisol, GH/IGF-1, LH, FSH, prolactin.
- Long-term monitoring ensures early detection of new deficiencies.



HORMONE REPLACEMENT THERAPY

- If you were on hormone replacement before surgery, continue as instructed.
- If new deficiencies are diagnosed after surgery, you may need to start replacement therapy:
 - » Hydrocortisone or prednisone – for adrenal insufficiency
 - » Thyroid hormone – for hypothyroidism
 - » Estrogen/progesterone or testosterone – for low sex hormones
 - » GH analogs – for GH deficiency
 - » Desmopressin – for AVP deficiency



Tips for a Smooth Recovery

- Rest and avoid heavy lifting for a few weeks
- Report sudden headaches, vision changes, nausea, or excessive thirst
- Keep follow-up appointments to ensure hormones stay balanced
- Follow fluid intake limitation instructions if given

Prognosis

Outcomes depend on several factors:

- Whether the tumor is functioning (produces hormones) or non-functioning
- Tumor size and whether it has invaded nearby structures
- Success of surgery or medical treatment
- Presence of any lasting hormone deficiencies
- With proper treatment and follow-up, most people can achieve good control of their condition