About Pituitary Tumors

Overview and Types

If you have been diagnosed with a pituitary tumor or worried about it, you likely have a lot of questions. Learning some basics is a good place to start.

- What Are Pituitary Tumors?

Research and Statistics

See the latest estimates for new cases of pituitary tumors in the US and what research is currently being done.

- Key Statistics About Pituitary Tumors
- What's New in Pituitary Tumor Research?

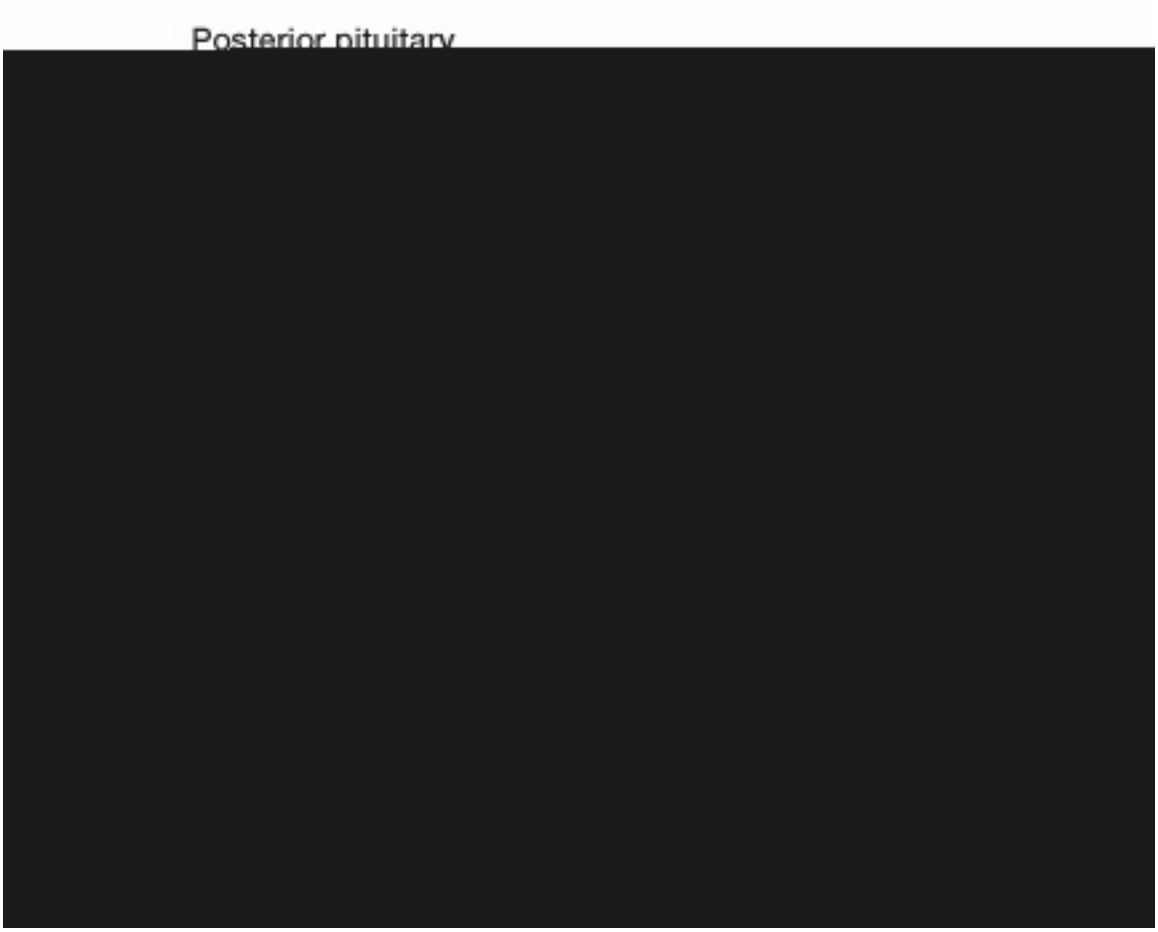
What Are Pituitary Tumors?

A tumor is an abnormal growth of cells. Tumors can start nearly anywhere in the body. Tumors that start in the pituitary gland are called **pituitary tumors**.

To understand pituitary tumors, it helps to know something about the pituitary gland and what it does.

The pituitary gland

The pituitary is a small gland at the base of the skull, just below the brain and above the nasal passages and the fleshy back part of the roof of the mouth (known as the **soft palate**). The pituitary sits in a tiny bony space called the **sella turcica**. The nerves that connect the eyes to the brain, called the **optic nerves**, pass just above it.



The pituitary is connected directly to part of the brain called the **hypothalamus**. This provides a key link between the brain and the **endocrine system**, a collection of glands and organs in the body that make hormones. Hormones are substances released into the blood that control how other organs work**.** The hypothalamus releases hormones into tiny blood vessels connected to the pituitary gland. These then cause the pituitary to make its own hormones. The pituitary is considered the “master control gland” because it makes the hormones that control the levels of other hormones made by most of the endocrine glands in the body.

The pituitary gland has 2 parts, the anterior pituitary and the posterior pituitary. Each part has distinct functions.

The anterior pituitary

Most pituitary tumors start in the larger, front part of the pituitary gland known as the anterior pituitary. This part of the gland makes several hormones:

- **Growth hormone** (GH, also known as somatotropin) promotes body growth during childhood. If a child or teen's body makes too much growth hormone, they will grow very tall (a condition called *gigantism*). If an adult's body makes too much growth hormone, the bones of the hands, feet, and face can grow larger than normal, distorting their features. This condition is called **acromegaly**.
- **Thyroid-stimulating hormone** (TSH, also called thyrotropin) stimulates the thyroid gland to release thyroid hormones, which regulate body metabolism. Too much of these hormones makes you hyperactive and shaky, and too little makes you sluggish. If a pituitary tumor makes too much TSH, it can cause hyperthyroidism (an overactive thyroid gland).
- **Adrenocorticotropic hormone** (ACTH, also known as corticotropin) causes the adrenal glands to make steroid hormones (such as cortisol). Too much ACTH from a pituitary tumor causes Cushing’s disease, the symptoms of which can include rapid weight gain and the build-up of fat in certain parts of the body, as well as high blood pressure and diabetes.
- **Luteinizing hormone (LH)** and **follicle-stimulating hormone (FSH)** are also called gonadotropins. In women their main effects are on the ovaries, where they control ovulation (the release of eggs) and the production of the hormones estrogen and progesterone. In men, LH and FSH control testosterone and sperm production in the testicles.

- **Oxytocin** causes the uterus to contract in women during childbirth and the breasts to release milk when a woman nurses her baby. It might also have other functions in both men and women.

Tumors rarely start in the posterior pituitary.

Pituitary tumors

Almost all pituitary tumors are benign (not cancer) glandular tumors called pituitary adenomas. These tumors don't spread to other parts of the body, like cancers can. Still, even benign pituitary tumors can cause major health problems because:

- They might press on nearby parts of the brain and important nerves.
- They may invade nearby structures (like the skull or the sinuses).
- Many pituitary tumors make excess hormones.

Pituitary cancers (called **pituitary carcinomas**) are very rare.

Pituitary adenomas

Pituitary adenomas are also known as **pituitary neuroendocrine tumors (PitNETs)**. These benign tumors do not grow outside the skull. They usually stay in the sella turcica (the tiny space in the skull that the pituitary gland sits in). Sometimes they grow into the bony walls of the sella turcica and nearby tissues, like blood vessels, nerves, and sinuses. They usually don't grow very large, but they can still have a big impact on a person's health.

There is very little room for tumors to grow in this part of the skull. So, if the tumor gets larger than about a centimeter (about half an inch) across, it may grow upward, where it can press on and damage nearby parts of the brain and the nerves that arise from it. This can lead to problems like vision changes or headaches. (See Signs and Symptoms of Pituitary Tumors[1].)

Microadenoma versus macroadenoma

Pituitary adenomas can be classified by size:

- **Microadenomas** are tumors that are smaller than 1 centimeter (cm) across (less than 1/2 an inch). Because these tumors are small, they rarely damage the rest of

the pituitary or nearby tissues. But they can cause symptoms if they make too much of any of the pituitary hormones. Many people actually have small adenomas that are never found because they don't grow large enough or make enough hormones to cause any problems.

- **Macroadenomas** are tumors 1 cm across or larger. Macroadenomas can cause symptoms if they press on nearby structures such as normal parts of the pituitary or on nearby nerves. They can also sometimes cause symptoms if they make too much of a certain hormone.

Functional or non-functional adenomas

If a pituitary adenoma makes too much of a hormone, it's called a functional (or functioning) adenoma. If it doesn't make enough hormones to cause symptoms, it's called a non-functional (or non-functioning) adenoma.

Functional adenomas: Most pituitary adenomas that cause symptoms make excess hormones:

- **Lactotroph adenomas (prolactinomas)** make prolactin. They account for about 4 out of 10 pituitary tumors.
- **Somatotroph adenomas** make growth hormone (GH). They make up about 2 in 10 pituitary tumors.
- **Corticotroph adenomas** make ACTH. They account for about 1 in 10 pituitary tumors.
- **Gonadotroph adenomas** make LH and FSH. Functional gonadotroph adenomas are very rare.
- **Thyrotroph adenomas** make TSH. They are very rare.
- **Plurihormonal adenomas** make more than one hormone. The most common of these are lactotroph/somatotroph adenomas, which make both prolactin and growth hormone.

The kind of hormone an adenoma makes strongly affects what signs and symptoms[2] it causes. It also affects which tests are used for diagnosis[3], as well as treatment options[4].

Non-functional adenomas: These pituitary adenomas don't make enough excess hormones to cause symptoms. Most often these are gonadotroph adenomas that don't make enough hormones to cause any problems.

Key Statistics About Pituitary Tumors

More than 10,000 pituitary tumors are diagnosed each year in the United States. Almost all of these tumors are benign (pituitary adenomas). Very few pituitary tumors are cancers (pituitary carcinomas).

The actual number of pituitary tumors may be much higher than the number of tumors that are found each year. When examining people who have died or who have had imaging tests (like MRI scans) of their head for other health problems, doctors have found that as many as 1 in 4 people may have a pituitary adenoma without knowing it. These tumors are often small and never cause any symptoms or health problems, so very few of them would normally be diagnosed at all.

Pituitary tumors can occur in people of any age (including in children), but they are most often found in older adults.

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Surgery

Surgery[3] is often used to treat pituitary tumors. Doctors continue to look for better ways to remove these tumors completely while sparing as much of the normal pituitary gland as possible.

Pituitary surgery often uses **minimally invasive techniques**, with a tiny video camera on the end of a small, flexible scope (an endoscope) and very small, thin surgical tools (microinstruments). This can mean shorter recovery times for the patient after surgery, as well as better nasal outcomes, fewer hormone issues, and a better quality of life.

Studies are now looking at which type of surgery might be best for different types and sizes of tumors, as well as ways to combine surgical techniques or use 2-staged surgery to get better results.

pituitary cells in more than one way. This drug is now being studied for use against non-functioning pituitary adenomas.
- **Vorinostat** is a type of drug known as a histone deacetylase (HDAC) inhibitor. It affects which genes a tumor cell is using. This drug is already used to treat some uncommon types of lymphomas, and is now being studied for use against ACTH-secreting pituitary adenomas.

Other drugs are also being studied in clinical trials[6].

Hyperlinks

1. www.cancer.org/cancer/pituitary-tumors/causes-risks-prevention/risk-factors.html
2. www.cancer.org/treatment/understanding-your-diagnosis/tests/biomarker-tests.html
3. www.cancer.org/cancer/pituitary-tumors/treating/surgery.html
4. www.cancer.org/cancer/pituitary-tumors/treating/radiaton-therapy.html
5. www.cancer.org/cancer/pituitary-tumors/treating/medicines.html
6. www.cancer.org/treatment/treatments-and-side-effects/clinical-trials.html

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Written by

The American Cancer Society medical and editorial content team (www.cancer.org/cancer/acs-medical-content-and-news-staff.html)

Our team is made up of doctors and oncology certified nurses with deep knowledge of cancer care as well as journalists, editors, and translators with extensive experience in medical writing.

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