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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?](#)
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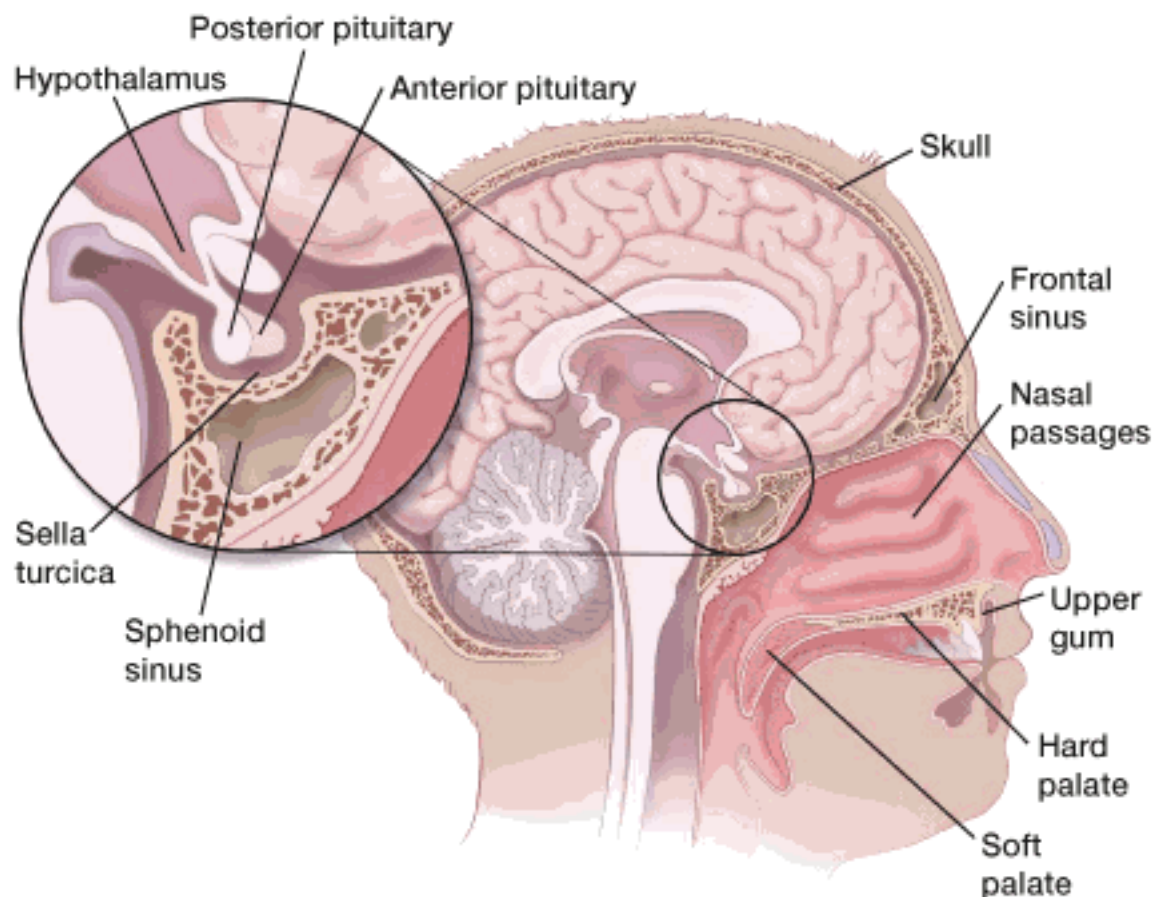
What Are Pituitary Tumors?

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 about the normal pituitary gland and what it does.

The pituitary gland

The pituitary is a small gland found inside the skull just below the brain and above the nasal passages, which are above 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 close by it.



The pituitary gland 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 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 gland to make its own hormones. The pituitary is considered the “master control gland” because it makes the hormones that control the levels of hormones made by most of the other endocrine glands in the body.

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

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 these hormones that control other endocrine glands:

- **Growth hormone** (GH, also known as *somatotropin*) promotes body growth during childhood. If too much is made in a child they will grow very tall. Normally, adults make only small amounts of growth hormone. If an adult makes too much growth hormone, the bones of the hands, feet, and face continue to grow and become quite large, causing their normal features to become distorted. (This condition is called *acromegaly*.)
- **Thyroid-stimulating hormone** (TSH, also called *thyrotropin*) stimulates growth of the thyroid gland and the release of thyroid hormone. Thyroid hormone regulates metabolism. Too much 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 grow and to make steroid hormones (such as cortisol). Too much ACTH from the pituitary 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.
- **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.
- **Prolactin** causes milk production in the female breast. Its function in men is not known.

Posterior pituitary

The smaller, back part of the pituitary gland, called the posterior pituitary, is really an extension of brain tissue from the hypothalamus. The posterior pituitary is where hormones made by the hypothalamus (vasopressin and oxytocin) are stored and released into the bloodstream.

- **Vasopressin** (also called *antidiuretic hormone*, or ADH) causes the kidneys to keep water in the body and not lose it all in the urine. Without vasopressin, a

person urinates too much and becomes dehydrated. This condition is called *diabetes insipidus*. Vasopressin also can raise blood pressure by causing blood vessels to constrict. It might have other functions as well.

- **Oxytocin** causes the uterus to contract in women during childbirth and the breasts to release milk when a woman nurses her baby. It might 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 are called benign because they don't spread to other parts of the body, like cancers can. Still, even benign pituitary tumors can cause major health problems because they are close to the brain, may invade nearby tissues (like the skull or the sinuses), and because many of them make excess hormones.

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

Pituitary adenomas

These benign tumors do not spread 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 don't grow very large, but they can 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 Tumors¹](#).)

Microadenoma versus macroadenoma

Pituitary adenomas can be divided into 2 categories based on size:

- **Microadenomas** are tumors that are smaller than 1 centimeter (cm) across. 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 a certain hormone. Many people actually have small adenomas that are never found because they don't grow large enough or make enough hormones to cause a problem.

- **Macroadenomas** are tumors 1 cm across or larger. Macroadenomas can affect a person's health in 2 ways. First, they can cause symptoms if they make too much of a certain hormone. Second, they can cause symptoms by pressing on normal parts of the pituitary or on nearby nerves, such as the optic nerves.

Functional versus non-functional adenoma

Pituitary adenomas are also classified by whether they make too much of a hormone and, if they do, which type they make. If a pituitary adenoma makes too much of a hormone it's called *functional*. If it doesn't make enough hormones to cause problems it's called *non-functional*.

Functional adenomas: Most of the pituitary adenomas that are found make excess hormones. The hormones can be detected by blood tests or by tests of the tumor when it is removed with surgery. Based on these results, pituitary adenomas are classified as:

- **Lactotroph adenomas** make prolactin and account for about 4 out of 10 pituitary tumors.
- **Somatotroph adenomas** make growth hormones and make up about 2 in 10 pituitary tumors.
- **Corticotroph adenomas** make ACTH and account for about 1 in 10 pituitary tumors.
- **Gonadotroph adenomas** make LH and FSH and are very rare.
- **Thyrotroph adenomas** make TSH and are very rare.
- **Plurihormonal adenomas** make more than one hormone.
- **Null cell adenomas** do not make hormones. (These are non-functional adenomas.)

The kind of hormone an adenoma makes strongly affects what signs and symptoms it causes. It also affects which [tests are used for diagnosis](#)², the [choice of treatment](#)³, and the patient's outlook.

Non-functional adenomas: Pituitary adenomas that don't make excess hormones are called *non-functional adenomas* or *null cell adenomas*. They account for about 3 in 10

of all pituitary tumors that are found. They are usually found as macroadenomas, causing symptoms because of their size as they press on nearby structures.

Pituitary carcinomas

Cancers of the pituitary gland are rare. Only a few hundred have ever been described in medical journals. They can occur at any age, but most are found in older people. These cancers usually make hormones, just like many adenomas do.

Pituitary carcinomas look like pituitary adenomas under a microscope, so doctors have trouble telling them apart. In fact, the only way to tell if a pituitary tumor is a carcinoma and not an adenoma is when the tumor spreads to another part of the body not near the pituitary gland. Most often pituitary carcinoma spreads to the brain, spinal cord, meninges (the covering of the brain and spinal cord), or bone around the pituitary. Rarely, these cancers spread to other organs such as the liver, heart, or lungs.

One of the key issues with pituitary tumors is that there's currently no way to know if a benign pituitary adenoma will become cancer and grow and spread to other parts of the body.

Other tumors of the pituitary region

There are several other types of benign tumors that grow in the region of the pituitary, as well as some malignant (cancerous) ones. All are much less common than pituitary adenomas.

Teratomas, germinomas, and choriocarcinomas are all rare tumors that usually occur in children or young adults. They don't develop from the hormone-making cells of the pituitary gland itself, but they can grow into the pituitary and damage it.

Rathke cleft cysts and gangliocytomas of the pituitary are rare tumors that are usually found in adults.

Craniopharyngiomas are slow-growing tumors that start above the pituitary gland but below the brain itself. They sometimes press on the pituitary and the hypothalamus, causing hormone problems. They're more common in children, but they can be seen in older adults. For more on these tumors, see [Brain and Spinal Cord Tumors in Children](#)⁴.

Cancers that start in some other parts of the body (like the breast) can sometimes spread to the pituitary. These cancers are classified and treated based on where they started (their primary site) and are not thought of as pituitary tumors.

The rest of our information focuses mainly on benign pituitary tumors (pituitary adenomas).

Hyperlinks

1. www.cancer.org/cancer/pituitary-tumors/detection-diagnosis-staging/signs-and-symptoms.html
2. www.cancer.org/cancer/pituitary-tumors/detection-diagnosis-staging/how-diagnosed.html
3. www.cancer.org/cancer/pituitary-tumors/treating.html
4. www.cancer.org/cancer/brain-spinal-cord-tumors-children.html

References

See all references for Pituitary Tumors (www.cancer.org/cancer/pituitary-tumors/references.html)

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Key Statistics About Pituitary Tumors

About 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 (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 brain for other health problems, doctors have found that as many as 1 out of 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 at any age (including in children), but they are most often found in older adults.

References

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What's New in Pituitary Tumor Research?

Research into pituitary tumors is taking place in many university hospitals, medical centers, and other institutions around the world.

Research on pituitary tumor causes

Doctors now have a better understanding of the genetic basis of pituitary tumors. This is already leading to improvements in genetic testing for people who are suspected of having [multiple endocrine neoplasia, type 1](#)¹ (MEN1) or other syndromes. This work is also helping doctors better understand non-functioning adenomas, such as those that don't respond to somatostatin drugs, which may lead to new treatments for these tumors. This might also make it possible to identify genes and markers that could help doctors know whether a benign pituitary adenoma will likely go on to spread and become a pituitary carcinoma (cancer).

Research on tests for pituitary tumors

Imaging tests such as MRI scans continue to improve, leading to better accuracy in finding and determining the size of new tumors and those that come back after treatment. Studies are now looking at whether using MRI during surgery might help to more completely remove tumors. New scans , are also being tested in clinical trials.

Research on treating pituitary tumors

Surgical techniques are improving, allowing doctors to remove tumors with fewer complications than ever before. Studies are now looking at what's the best surgery for different types and sizes of tumors, as well as ways to combine surgical techniques or use 2-staged surgery to get better results. Robotic surgery is also being looked at as a way to reach these tumors and limit side effects. Surgery is often used to treat pituitary tumors, and doctors are looking at ways to remove the tumor, but spare as much of the pituitary gland as possible. This may mean fewer hormone issues after surgery and could give patients a better quality of life.

Radiation therapy techniques are improving as well, letting doctors focus radiation more precisely on tumors and limiting the damage to nearby normal tissues.

New ways of using radiation therapy are also being studied. For instance, doctors are using radioactive implants put right into the tumors. They're also looking at whether radiation after surgery helps keep pituitary tumors from coming back.

Progress is being made in the medicines used to treat both pituitary tumors and the side effects of some other forms of treatment. For instance, studies are looking at whether steroid treatment is really needed when surgery is done for tumors that cause a decrease in the hormone ACTH. (This can lead to low levels of the steroids your body makes and can cause serious side effects.)

Researchers are also studying some newer drugs. An example is lapatinib (Tykerb), a drug that targets a protein called HER2, which is found in large amounts on some fast-growing cells (including some pituitary tumor cells). This drug is already used to treat breast cancer, and it is now being studied for use against pituitary tumors.

Temozolomide (Temodar) is another example. It's a drug used to treat certain brain tumors. It's now being studied to see if it can help treat and improve outcomes in aggressive pituitary tumors.

Because many of the drugs used to treat these tumors must be taken for the rest of a person's life, researchers are trying to make some of these drugs into forms that are easier to use. Octreotide is a drug commonly used to treat certain pituitary tumors. It's give as a shot 3 times a day. Clinical studies are looking at whether a newly created pill form of octreotide works as well.

Many other drugs are also being studied in [clinical trials](#)².

Hyperlinks

1. www.cancer.org/cancer/pituitary-tumors/causes-risks-prevention/risk-factors.html
2. 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)

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