

Pituitary Tumors

The pituitary gland is a small gland found at the base of the brain. The gland has two parts, the **posterior (back) pituitary** and the **anterior (front) pituitary**. This gland sits within a small bone cavity called the **sella turcica** that is located behind the eye sockets and the nose sinuses. It is also close to the optic nerve, which is important for our vision. On both sides of the sella, major blood vessels and nerves pass close to the pituitary gland in an area called the **cavernous sinus** (sinus cavity).

The anterior pituitary makes many hormones:

- Prolactin is a hormone that is needed to make breast milk.
- ACTH controls steroids made by the adrenal gland.
- TSH controls the thyroid.
- Two other hormones (FSH and LH) control the production of sex hormones and fertility.
- Growth hormone is responsible for linear growth and height in children and maintenance of bone and muscle mass in adults.

The posterior part of the pituitary is a direct extension of the brain and stores two hormones:

- Antidiuretic hormone works on the kidneys to regulate water loss.
- Oxytocin controls contractions when a woman goes into labor.

The pituitary gland makes hormones that affect almost every part of the body.

It is a key link between the brain and other glands in the body.

A pituitary tumor is an abnormal growth of cells in the pituitary gland. Almost all tumors begin in the anterior pituitary. A tumor may:

- Cause the pituitary gland to make too many or too few hormones

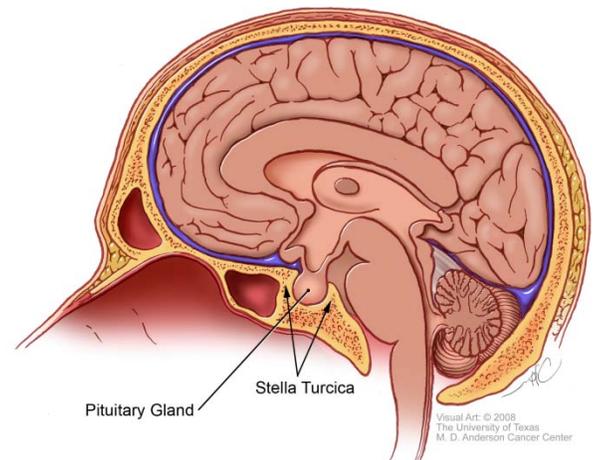


Figure 1. Pituitary Gland

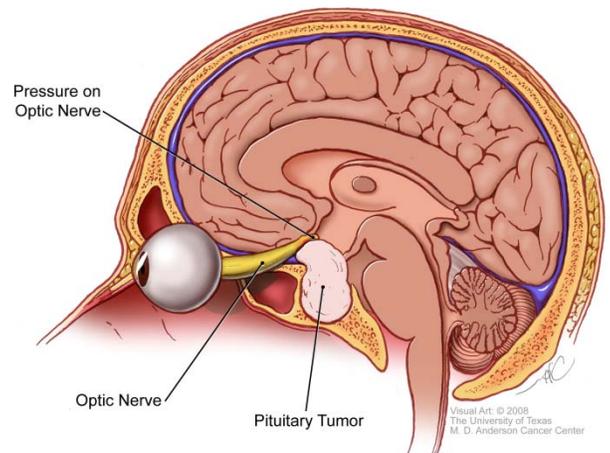


Figure 2. Pituitary Tumor

- Damage normal tissue around the pituitary
- Cause vision loss if it pushes on the optic nerve
- Cause difficulty with eye movement if it pushes on nerves in the sinus cavity
- Cause headaches
- Cause no symptoms at all

Risk Factors

Doctors do not know for sure what causes pituitary tumors. Pituitary tumors can happen at any age, but they are more common in older adults. Having a family history of the disease called multiple endocrine neoplasia type 1 (MEN1) raises the risk of pituitary tumors.

Types of Pituitary Tumors

There are two types of pituitary tumors: **adenomas** and **carcinomas**. Adenomas are not cancer and are the most common type of pituitary tumors. Carcinomas are cancer, and they are very rare.

Adenomas

Most pituitary tumors are benign and do not spread to other parts of the body. These are called **adenomas**, and they stay in the pituitary gland or nearby tissues.

Small tumors (½-inch [1cm] or smaller) are called **microadenomas** and rarely damage the pituitary or nearby tissue. Large tumors (larger than ½-inch [1 cm]) are called **macroadenomas** and may damage normal pituitary tissue and nearby nerves.

Both small and large tumors may affect hormones in the body, which may cause other symptoms. Adenomas can be either functioning or nonfunctioning. Functioning tumors make hormones, and nonfunctioning tumors do not make hormones. Symptoms related to functioning tumors are listed under “Types of Functioning Adenomas.” Nonfunctioning tumors usually present with symptoms that relate to the size of the tumor, which can include:

- Headaches or head pain that may be sudden and severe
- Double vision or less peripheral (side) vision
- Signs of hypopituitarism (low energy, loss of appetite, loss of sex drive), if the tumor has compressed the normal pituitary tissue

Diabetes Insipidus

In case of damage to the posterior pituitary or its connection to the brain (where antidiuretic hormone is initially made), patients experience excessive thirst and frequent urination and thus this is called diabetes insipidus.

Diabetes insipidus is not the same as diabetes mellitus, which is an increase in thirst and urination secondary to high blood sugars. Diabetes insipidus is usually treated by replacing antidiuretic hormone either by an injection, nasal spray, or tablet. For more information about

this type of diabetes, please ask your nurse or doctor for a copy of the patient information sheet “Diabetes Insipidus.”)

Types of Functioning Adenomas

There are different types of functioning tumors, and each type causes different signs and symptoms depending on the type of hormone secreted. Some of these tumors may also cause symptoms due to their large size (see above).

Adrenocorticotrophic hormone-producing tumors cause the adrenal glands to make a hormone called cortisol. If the adrenal glands make too much cortisol, **Cushing’s disease** occurs. Signs and symptoms are:

- Weight gain around the stomach area and upper back
- Round or swollen face
- Stretch marks that are usually wide and purple in color
- Acne
- Hump on the upper back and excessive fat above the collar bones
- High blood pressure
- High blood sugar
- Muscle weakness
- Thinning of the skin
- Easy bruising
- Abnormal periods and excessive hair growth (in women)
- Osteoporosis and broken bones

Growth hormone-producing tumors make too much growth hormone. Signs and symptoms are:

- Rough facial features, such as enlarged jaw and prominence of forehead
- Enlarged hands and feet
- High blood pressure
- Heart problems
- Excessive sweating
- Respiratory disorders such as sleep apnea
- Enlargement of the tongue and widening of the spaces between the teeth
- Arthritis and joint pains
- Excessive growth (gigantism) in children

Prolactin-producing tumors make too much of the hormone called prolactin. It can cause low sex hormone levels – estrogen in women and testosterone in men. High amounts of prolactin in the blood affect women and men differently.

For women, it may cause:

- Irregular or no menstrual periods
- Milky discharge from the breasts

In men, it may cause:

- Enlarged breasts
- Erectile dysfunction (ED) or impotence
- Infertility
- Less body hair
- Loss of interest in sex

In children it may cause a delay in puberty.

Thyroid-stimulating hormone-producing tumors cause the thyroid gland to make too much of the hormone called thyroxine. This condition is called “hyperthyroidism” or overactive thyroid disease. However, this form of hyperthyroidism is very rare compared to other causes of overactive thyroid. Signs and symptoms are:

- Sudden weight loss
- Rapid or irregular heartbeat
- Nervousness or irritability
- Frequent bowel movements
- Excessive sweating

Other Pituitary Tumors

Other tumors can appear in or above the sella. These include Rathke cleft cysts, simple cysts, and craniopharyngiomas. Craniopharyngiomas are the second most common type of tumor occurring in this area. They are not pituitary tumors and are not cancer. However, they are a type of tumor present since birth that develop next to the pituitary gland and press on the pituitary or the stem that connects it to the brain. These tumors often cause hormone, vision and nervous system problems.

There are many other types of tumors that can appear in the area of the pituitary gland, including germinomas, astrocytomas, and cancers that spread to the pituitary. These tumors are not common.

Screening and Diagnosis

Doctors can usually detect changes or abnormal hormone levels with blood tests. This is the most common “red flag” for doctors to order more tests. These tests may include a:

- Computerized tomography (CT) scan of the brain/pituitary
- Magnetic resonance imaging (MRI) scan of the brain/pituitary
- Visual field test to check peripheral vision
- Bone X-ray of the hand and wrist to measure if bone growth is normal (This is only for children.)

Your doctor may also refer you to an endocrinologist for more testing. An endocrinologist is a doctor who specializes in treating hormone problems.

Treatment

Doctors treat pituitary tumors with surgery, radiation treatment and medicines. You may receive these in combination.

Treatment for pituitary tumors depends on the type of tumor, the size and if it has grown into the brain or if there is progressive loss of peripheral vision. Doctors also consider age and overall health. Not all tumors need to be treated, such as tiny adenomas that are not causing symptoms.

Watchful Waiting

Watchful waiting means that the doctor thinks no active medical or surgical treatment is best. This may be an option if the tumor is not causing any symptoms.

Doctors may also recommend watchful waiting if you are older or have other health problems. Most likely, you will need regular follow-up tests. It can also be an option if you are younger, along with regular follow-up tests to watch the tumor.

Health Care Team

Even though watchful waiting is an option for some, treatment may be necessary for many patients, especially if the tumor grows and puts pressure on the brain or optic nerves, which can cause serious problems with hormones, nerve tissue, and loss of vision.

A team of doctors is usually involved in treating a pituitary tumor. They include:

- A brain surgeon (neurosurgeon)
- A doctor who treats hormone disorders (endocrinologist)
- A doctor who reads medical images (radiologist)
- A doctor who practices radiation therapy (radiation oncologist)
- A doctor who treats eye disorders (ophthalmologist)

Surgery

Surgery is the most common treatment for pituitary tumors, especially if the tumor is pressing on the optic nerve or making excessive growth hormone or ACTH. There are two types of surgery for removing a pituitary tumor, depending on the type and the size:

- **Transsphenoidal hypophysectomy** – The doctor removes the tumor through a cut in the nose and sinuses (nasal passages) or the mouth just behind the upper lip. The brain is not affected, and there is no visible scar. If a tumor is too large or has grown into nearby nerves or brain tissue, then it may be difficult to remove with this type of surgery.
- **Transcranial hypophysectomy** – The doctor removes the tumor through a cut in the scalp and skull. It is easier to remove a larger tumor using this type of surgery.

Radiation Treatment

Radiation treatment uses high-energy rays to destroy tumors. It can be used after surgery or alone if surgery is not an option. It can also be used if a tumor comes back and causes signs and symptoms that medicines do not relieve. Radiation treatment includes:

- **External beam radiation** – Small amounts of radiation are given every day over four to six

weeks, usually on an outpatient basis. Although this treatment is often effective in reducing tumor size, it may take years to see results for a functioning tumor.

- **Stereotactic radiosurgery** – Small beams of radiation that are the exact size and shape of the tumor are sent into the tumor to destroy it in a single session. Because a small amount of radiation is used, it is less likely to affect the tissue around the tumor. Sometimes the benefits of this treatment do not happen right away. It may take months or years to see results. This type of treatment cannot be used if a tumor is too close to the optic nerve or other nearby nerves and brain tissue.

Medicines

Some tumors may respond to medicine, depending on the type of tumor. For example, if the tumor is a:

- **Prolactin-producing tumor (prolactinoma)** – These can be treated with drugs, such as bromocriptine (Parlodel[®]) and cabergoline (Dostinex[®]), to lower the amount of prolactin. This often reduces the size of the tumor. These drugs usually work so well that patients do not need surgery.
- **Growth hormone-producing tumors** – These can be treated with drugs called somatostatin analog (Sandostatin[®], Somatoline[®]) to lower the amount of growth hormone produced and may make the tumor smaller. The other drug is pegvisomant (Somavert[®]) that blocks the effect of too much growth hormone. These medicines are often used when surgery does not result in a cure.

If the tumor or removal of the tumor lowers your hormones, then you may need to take hormone replacement therapy.

Follow-up Care

After the pituitary tumor has been treated, it will still be necessary for you to:

- Get your hormone levels checked regularly by an endocrinologist.
- Have vision tests regularly by an ophthalmologist. (Improvement in vision will depend on how long the tumor was there and how much damage it caused.)
- Have an MRI scan and follow up with a neurosurgeon or endocrinologist to make sure the tumor has not come back.

How often these tests are done will depend on the type of tumor and your medical history.

M. D. Anderson Resources

Endocrine Center

Monday through Friday, 8 a.m. to 5 p.m.
Main Building, Floor 10 near Elevator B
713-563-7600

<http://www.mdanderson.org/diseases/pituitary/>

Brain and Spine Center

Monday through Friday, 8 a.m. to 5 p.m.
Main Building, Floor 7 near Elevator B
713-792-6600

Internal Medicine

Monday through Friday, 8 a.m. to 5 p.m.
Main Building, Floor 6 near Elevator A
Mays Clinic, Floor 6 near Elevator U
713-792-2340

Pediatrics – Child & Adolescent Center

Monday through Friday, 8a.m. to 5 p.m.
Main Building, Floor 7 near Elevator C
713-792-6610

Ophthalmology Clinic

Monday through Friday, 8 a.m. to 5 p.m.
Main Building, Floor 9 near Elevator A
713-792-6523

The Learning Center

The Learning Center is a free consumer health library with the latest information on cancer care, support, prevention and general health and wellness issues.
713-745-8063, Theodore N. Law Learning Center, Main Building, Floor 4
713-563-8010, Levit Family Learning Center, Mays Clinic, Floor 2
713-745-0007, Holden Foundation Learning Center, Jesse H. Jones Rotary House International

More Resources**American Cancer Society**

800-227-2345

<http://www.cancer.org>

Across the United States, this voluntary organization offers free booklets, support groups and programs. Search under “pituitary”.

National Cancer Institute

<http://www.cancer.gov/cancerinfo/pdq/treatment/pituitary/patient/>

National Institutes of Health

http://www.ninds.nih.gov/disorders/pituitary_tumors/pituitary_tumors.htm

Pituitary Network Association

805-499-9973

<http://www.pituitary.org>

The Pituitary Network Association is an international non-profit organization for patients with pituitary tumors and disorders, their families, loved ones and the physicians and health care providers who treat them.