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# Pituitary Tumors Early Detection, Diagnosis, and Staging

Learn about the signs and symptoms of pituitary tumors. Find out how pituitary tumors are tested for and diagnosed.

## Detection and Diagnosis

Different types of pituitary tumors can cause different signs and symptoms that lead to them being found.

- [Can Pituitary Tumors Be Found Early?](#)
- [Signs and Symptoms of Pituitary Tumors](#)
- [Tests for Pituitary Tumors](#)

## Staging

For most types of cancer, the stage (extent) of the cancer is an important part of

# Can Pituitary Tumors Be Found Early?

- [For people with an increased risk of pituitary tumors](#)
- [For people who don't have an increased risk](#)

Many pituitary tumors aren't detected until they start to cause [signs and symptoms](#). But some pituitary tumors are found early with imaging tests or blood tests.

## For people with an increased risk of pituitary tumors

For members of families known to have an increased risk of pituitary tumors because of a [genetic syndrome](#)<sup>1</sup> such as multiple endocrine neoplasia, type I (MEN1), doctors often recommend regular blood testing of pituitary hormone levels. These tests can often help find a tumor early so that it can be removed completely, which increases the chance for a cure.

## For people who don't have an increased risk

For most people, screening for pituitary tumors is not recommended. (Screening is testing for a disease such as a pituitary tumor in people without any symptoms.)

Sometimes a pituitary tumor is found early because a person has a CT or MRI scan of the head for some other reason. These tumors are sometimes referred to as **pituitary incidentalomas**, because they are found incidentally (by accident). Incidentalomas might not need to be treated, as long as they aren't causing any problems, although the doctor might recommend watching them over time to make sure they aren't growing.

Functional pituitary adenomas (tumors that make excess hormones like prolactin or ACTH) are often found when they are still small because the excess hormones cause

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# **Signs and Symptoms of Pituitary Tumors**

hormones. These are called **functional (or functioning) pituitary adenomas**, and the symptoms they cause depend on which hormone(s) they make. These tumors tend to cause symptoms while they are still small.

- Tumors that don't make enough hormones to cause symptoms, called **non-functional (or non-functioning) adenomas**, can become large enough to press on (or grow into) nearby structures, such as parts of the brain, nearby nerves, or other parts of the pituitary gland itself.

## Symptoms caused by larger tumors

The pituitary gland sits in a very small space at the base of the skull. Pituitary tumors that grow large enough can press on or grow into nearby parts of the brain, nerves involved with vision, or other important structures. This can lead to symptoms such as:

- Trouble with eye movement, which can lead to blurred or double vision
- Visual field defects (especially loss of peripheral vision)
- Progressive blindness
- Headaches
- Facial numbness or pain
- Dizziness
- Loss of consciousness (passing out)

Tumors that grow large enough can also press on and destroy the normal parts of the pituitary gland. This can lead to **low levels of one or more pituitary hormones**, which can in turn lead to low levels of some body hormones such as cortisol, thyroid hormone, and sex hormones. Depending on which hormones are affected, symptoms might include:

- Feeling tired or weak
- Unexplained weight loss or weight gain
- Low blood pressure
- Loss of body hair
- Feeling cold
- Menstrual changes or loss of menstrual periods in women
- Erectile dysfunction (trouble with erections) in men
- Growth of breast tissue in men
- Decreased interest in sex

## Diabetes insipidus

Large tumors can sometimes press on the posterior (back) part of the pituitary, causing a shortage of the hormone **vasopressin** (also called anti-diuretic hormone or **ADH**). This can lead to diabetes insipidus. In this condition, too much water is lost in the urine, so the person urinates often and becomes very thirsty as the body tries to keep up with the loss of water.

If left untreated, this can cause dehydration and altered blood mineral levels, which can lead to coma and even death. Diabetes insipidus can be treated by replacing vasopressin with a drug called desmopressin. (Diabetes insipidus is not related to diabetes mellitus, in which people have high blood sugar levels.)

## Pituitary apoplexy

Another way that a pituitary tumor (especially a larger one) can cause many of the symptoms above is if it leads to bleeding or a blockage in a blood vessel, reducing the blood supply to the pituitary. This condition, known as **pituitary apoplexy**, isn't common, but it can result in symptoms developing quickly, and it's often a medical emergency.

## Symptoms caused by tumors making excess hormones

Symptoms from excess pituitary hormones depend on which hormone(s) the tumor is making. (Even when a tumor makes excess hormones, it might still cause some of the symptoms above, such as vision changes or headaches.)

### Growth hormone-secreting adenomas (somatotroph adenomas)

The effects of tumors making too much growth hormone (GH) are different in children and teens from those in adults.

**In children and teens**, high GH levels can stimulate the growth of nearly all bones in the body, which is known as **gigantism**. Signs and symptoms can include:

- Being very tall
- Very rapid growth
- Joint pain



- Extra fat on the back of the neck
- Moodiness or depression
- Easy bruising
- High blood sugar levels or even diabetes mellitus
- High blood pressure
- Decreased interest in sex
- Changes in menstrual periods in women
- Weakening of the bones, which can lead to osteoporosis or even fractures

Most of these symptoms can also occur in children. Children with Cushing's disease may also stop growing and have problems with school performance.

### **Prolactin-secreting adenomas (prolactinomas or lactotroph adenomas)**

Prolactinomas are most common in young women and older men.

- In women before menopause, high prolactin levels cause menstrual periods to become less frequent or to stop. High prolactin levels can also cause abnormal breast milk production, called **galactorrhea**.
- In men, high prolactin levels can cause breast growth and milk production, as well as erectile dysfunction (trouble with erections)
- Both men and women can have loss of interest in sex, infertility, and weakening of the bones (osteoporosis).

These tumors can also sometimes grow large enough to press on nearby nerves and parts of the brain, which can cause headaches and vision problems. In females who don't have periods (such as girls before puberty and women after menopause), prolactinomas might not be noticed until they grow large enough to cause these symptoms.

### **Thyrotropin (TSH)-secreting adenomas (thyrotroph adenomas)**

These rare tumors make too much thyroid-stimulating hormone (TSH), which then

- Weight loss
- Increased appetite
- Feeling warm or hot
- Sweating
- Trouble falling asleep
- Anxiety
- Frequent bowel movements
- A lump in the front of the neck (from an enlarged thyroid)

### **Gonadotropin-secreting adenomas (gonadotroph adenomas)**

These tumors make luteinizing hormone (LH) and/or follicle-stimulating hormone (FSH).

Most gonadotropin-secreting adenomas don't make enough hormones to cause symptoms, so they are basically non-functional adenomas. These tumors may grow large enough to cause symptoms such as headaches and vision problems before they are found. (See "Symptoms caused by larger tumors" above.)

By pressing on the rest of the pituitary, these tumors can also sometimes result in **lower levels of sex hormones** such as estrogen, progesterone, and testosterone. This can lead to irregular menstrual periods in women or erectile dysfunction and decreased interest in sex in men.

Less often, gonadotroph adenomas do make excess hormones, resulting in **higher levels of sex hormones**. Most of these tumors occur in middle-aged adults, and the higher levels of hormones don't usually result in any symptoms. But they might cause problems in younger people, such as irregular menstrual periods in younger women or early signs of puberty in girls.

### **Hyperlinks**

1. [www.cancer.org/cancer/types/pituitary-tumors/about/what-is-pituitary-tumor.html](http://www.cancer.org/cancer/types/pituitary-tumors/about/what-is-pituitary-tumor.html)

### **References**

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## Tests for Pituitary Tumors

- [Medical history and physical exam](#)
- [Lab tests of hormone levels](#)
- [Testing for diabetes insipidus](#)
- [Imaging tests](#)
- [Lab tests of pituitary tissue samples](#)

Pituitary tumors are usually found when a person goes to the doctor because of [symptoms](#) they're having. But sometimes these tumors don't cause symptoms, and they're found when a person has an imaging test of the head for some other health issue. (Tumors found this way are known as **pituitary incidentalomas**.)



The first step is usually to check the level of

to make more ACTH. Blood samples are taken from the 2 catheters at different times before and after the injection, as well as from another part of the body. These samples are tested to see if the ACTH level is higher in the blood from the pituitary (and if so, if it is higher on one side than the other). If it is, the source of the high ACTH level is very likely a pituitary tumor.

Often more than one of these tests is needed to help distinguish ACTH-secreting pituitary tumors from other conditions that can cause similar symptoms, such as adrenal gland tumors.

### **Lactotroph (prolactin-secreting) adenoma (prolactinoma)**

Blood **prolactin levels** can be measured to check for a prolactinoma. Blood levels of other hormones might also be checked, as other types of pituitary tumors (and other conditions) can also sometimes cause prolactin levels to rise.

### **Gonadotroph (gonadotropin-secreting) adenoma**

**Luteinizing hormone (LH)** and **follicle-stimulating hormone (FSH)** blood levels can be checked to see if you have a gonadotropin-secreting tumor. Levels of related hormones, such as **estrogen**, **progesterone**, and **testosterone**, are often checked as well.

### **Thyrotroph (thyrotropin-secreting) adenoma**

Tests to measure blood levels of **thyrotropin** (also known as **thyroid-stimulating hormone**, or **TSH**) and **thyroid hormones** can usually identify people with a thyrotropin-secreting adenoma.

### **Non-functional adenoma**

Non-functional (non-functioning) pituitary adenomas don't make enough excess hormones to cause symptoms. Sometimes, though, blood levels of pituitary hormones might still be higher than normal, even if they're not causing symptoms. They might also be **lower** than normal if the tumor has grown big enough to press on the pituitary cells that normally make these hormones. Because of this, checking blood hormone levels might still be helpful.

### **Testing for diabetes insipidus**

Diabetes insipidus can develop if a pituitary tumor grows large enough to damage the part of the pituitary that stores the hormone vasopressin (also known as antidiuretic hormone, or ADH), which leads to too much water being lost in the urine. This condition can also have other causes, including [surgery to treat pituitary tumors](#)<sup>3</sup> or other tumors near the pituitary gland.

In many cases, the cause of diabetes insipidus can be determined with tests that measure the amount of urine made over a 24-hour period, sodium and glucose levels in the blood, and **osmolality** (total salt concentration) of the blood and urine.

If these test results are not clear, then a **water deprivation test** may be done. In this test, you are not allowed to drink fluids for several hours, sometimes overnight. After the water restriction, your blood and urine osmolality and your blood sodium level will be

CT scans can find a pituitary adenoma if it's large enough, but MRI scans are used much more often to look at the brain and pituitary gland.

## Lab tests of pituitary tissue samples

In diagnosing cancers and tumors in most other parts of the body, imaging tests and blood tests may strongly suggest a certain type of tumor, but a [biopsy](#)<sup>7</sup> (removing a sample of the tumor to examine under a microscope) is often the only way to be sure of the diagnosis. In many cases, doctors won't treat a tumor until a biopsy has been done.

A biopsy, however, isn't usually needed before treating a pituitary tumor. One reason is that the hormone tests for most types of pituitary adenomas are very accurate, so a biopsy isn't likely to provide much more information. Biopsies in this part of the body can also pose a risk of serious side effects, even though this risk is small. Also, some types of adenomas can be treated without surgery, using [medicines](#)<sup>8</sup> or [radiation therapy](#)<sup>9</sup>.

When pituitary tumors are [removed by surgery](#)<sup>10</sup>, they're looked at under a microscope to determine their exact type. Special stains may be used on the tumor to color the areas making hormones, and [other lab tests](#)<sup>11</sup> may be done as well to help classify the tumor.

## Hyperlinks

1. [www.cancer.org/cancer/types/pituitary-tumors/about/what-is-pituitary-tumor.html](http://www.cancer.org/cancer/types/pituitary-tumors/about/what-is-pituitary-tumor.html)
2. [www.cancer.org/cancer/types/pituitary-tumors/causes-risks-prevention/risk-factors.html](http://www.cancer.org/cancer/types/pituitary-tumors/causes-risks-prevention/risk-factors.html)
3. [www.cancer.org/cancer/types/pituitary-tumors/treating/surgery.html](http://www.cancer.org/cancer/types/pituitary-tumors/treating/surgery.html)
4. [www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/imaging-radiology-tests-for-cancer.html](http://www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/imaging-radiology-tests-for-cancer.html)
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6. [www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/ct-scan-for-cancer.html](http://www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/ct-scan-for-cancer.html)
7. [www.cancer.org/cancer/diagnosis-staging/tests/biopsy-and-cytology-tests.html](http://www.cancer.org/cancer/diagnosis-staging/tests/biopsy-and-cytology-tests.html)
8. [www.cancer.org/cancer/types/pituitary-tumors/treating/medicines.html](http://www.cancer.org/cancer/types/pituitary-tumors/treating/medicines.html)
9. [www.cancer.org/cancer/types/pituitary-tumors/treating/radiation-therapy.html](http://www.cancer.org/cancer/types/pituitary-tumors/treating/radiation-therapy.html)
10. [www.cancer.org/cancer/types/pituitary-tumors/treating/surgery.html](http://www.cancer.org/cancer/types/pituitary-tumors/treating/surgery.html)
11. [www.cancer.org/cancer/diagnosis-staging/tests/biopsy-and-cytology-tests.html](http://www.cancer.org/cancer/diagnosis-staging/tests/biopsy-and-cytology-tests.html)

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## Are Pituitary Tumors Staged?

related to changes in hormone levels

- Whether it is functional (making enough excess hormones to cause symptoms) or non-functional
- If it is functional, which hormone(s) it is making

## Hyperlinks

1. [www.cancer.org/cancer/types/pituitary-tumors/treating.html](http://www.cancer.org/cancer/types/pituitary-tumors/treating.html)

## References

Dorsey JF, Salinas RD, Dang M, et al. Chapter 63: Cancer of the central nervous system. In: Niederhuber JE, Armitage JO, Doroshow JH, Kastan MB, Tepper JE, eds. *Abeloff's Clinical Oncology*. 6th ed. Philadelphia, Pa. Elsevier: 2020.

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# What Should You Ask Your Doctor About Pituitary Tumors?

As you go through your diagnosis and treatment, you need to have honest, open discussions with your health care team. Ask any question, no matter how small it might seem. Here are some questions you might want to ask. Be sure to add your own as you think of them. Nurses, social workers, and other members of your treatment team may



also be able to answer many of your questions.

- How sure are you that I have a pituitary tumor? Could it be something else?
- Has my tumor spread into the nearby brain tissue or other structures?
- Is my tumor making excess hormones? If so, which one?
- Do I need any other [tests](#) before we can decide on treatment?
- Do I need to see any other types of doctors?
- How much experience do you have treating this type of tumor?
- Should I get a [second opinion](#)<sup>1</sup>? Can you recommend a doctor or hospital?
- Does the tumor need to be treated? If so, how soon do we need to start?
- What are my [treatment choices](#)<sup>2</sup>? What do you recommend? Why?
- What is the goal of treatment (cure, keeping the tumor in check, etc.)?
- What are the possible risks or side effects of treatment?
- Will this treatment affect my ability to have children?
- What should I do to be ready for treatment?
- How long will treatment take? What will it be like? Where will it be given?
- What is my expected prognosis (outlook)?
- What will we do if the treatment doesn't work or if the tumor comes back?
- What type of [follow-up](#)<sup>3</sup> will I need after treatment?

Along with these examples, be sure to write down any other questions you might want to ask. For instance, you might want information about recovery times so that you can plan your work or activity schedule. Or you may want to ask if you qualify for any [clinical trials](#)<sup>4</sup>.

## Hyperlinks

1. [www.cancer.org/cancer/managing-cancer/finding-care/seeking-a-second-opinion.html](http://www.cancer.org/cancer/managing-cancer/finding-care/seeking-a-second-opinion.html)
2. [www.cancer.org/cancer/types/pituitary-tumors/treating.html](http://www.cancer.org/cancer/types/pituitary-tumors/treating.html)
3. [www.cancer.org/cancer/types/pituitary-tumors/after-treatment/follow-up.html](http://www.cancer.org/cancer/types/pituitary-tumors/after-treatment/follow-up.html)
4. [www.cancer.org/cancer/managing-cancer/making-treatment-decisions/clinical-trials.html](http://www.cancer.org/cancer/managing-cancer/making-treatment-decisions/clinical-trials.html)

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