



# Adrenal Cancer Early Detection, Diagnosis, and Staging

## Detection and Diagnosis

Catching cancer early often allows for more treatment options. Some early cancers may have signs and symptoms that can be noticed, but that is not always the case.

- [Can Adrenal Cancer Be Found Early?](#)
- [Signs and Symptoms of Adrenal Cancers](#)
- [Tests for Adrenal Cancer](#)

## Stages and Outlook (Prognosis)

After a cancer diagnosis, staging provides important information about the extent of cancer in the body and anticipated response to treatment.

- [Adrenal Cancer Stages](#)
- [Survival Rates for Adrenal Cancer](#)

## Questions to Ask About Adrenal Cancer

Here are some questions you can ask your cancer care team to help you better understand your cancer diagnosis and treatment options.

- [Questions to Ask About Adrenal Cancer](#)

## Can Adrenal Cancer Be Found Early?

It is hard to find adrenal cancers early, and they are often quite large by the time they are diagnosed.

Adrenal cancers are often found earlier in children than in adults because cancers in children are more likely to secrete hormones that lead to [signs and symptoms](#). For example, children may develop signs of puberty at an early age due to sex hormones made by adrenal cancer cells.

These tumors are sometimes found early by accident in adults, such as when a [CT \(computed tomography\) scan](#) of the abdomen is done for some other health concern.

The American Cancer Society has official [recommendations for the early detection of several types of cancer](#). But because adrenal cancers occur so rarely, the Society does not recommend routine testing for this cancer in people without any symptoms.

- [References](#)

Lirov R, Tobias E, Lerario AM, Hammer GD. Adrenal tumors In: DeVita VT, Lawrence TS, Rosenberg SA, eds. *DeVita, Hellman, and Rosenberg's Cancer: Principles and Practice of Oncology*. 10th ed. Philadelphia, PA: Lippincott Williams & Wilkins 2015: Chapter 84.

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## Signs and Symptoms of Adrenal Cancers

In about half of people with adrenal cancer, symptoms are caused by the hormones made by the tumor. In the other half, symptoms occur because the tumor has grown so large that it presses on nearby organs. If you or your child has any of the signs or symptoms described here, discuss them with your doctor without delay. These symptoms may be caused by an adrenal tumor or by something else. Getting the proper medical tests is the only way to find out and to get the proper treatment, if needed.

## Symptoms caused by androgen or estrogen production

In children, symptoms are most often caused by the **androgens** (male-type hormones) that the tumor secretes. The most common symptoms are excessive growth of facial and body hair (such as in the pubic and underarm areas). Male hormones may also enlarge the penis in boys or the clitoris in girls.

If the tumor secretes **estrogens** (female-type hormones), girls can start puberty early. This can cause breasts to develop and menstrual periods to start. Estrogen-producing tumors can also enlarge breasts in boys.

The symptoms from high levels of sex hormones are less noticeable in adults because they have already gone through puberty and have breasts and adult patterns of body hair. Women with estrogen-producing tumors and men with androgen-producing tumors usually do not have any symptoms from the hormones, so they might not have symptoms until the tumor is large enough to press on nearby organs.

Symptoms are easier to notice if the tumor is making the hormone usually found in the opposite sex. For example, men with tumors that make estrogen may notice their breasts becoming enlarged and tender. They may also have sexual problems such as erectile dysfunction (impotence) and loss of sex drive. Women with tumors that make androgens (male hormones) may notice excessive facial and body hair growth, a receding hairline, irregular menstrual periods, and deepening of their voice.

## Symptoms caused by cortisol production

Excessive levels of cortisol causes a problem known as **Cushing syndrome**. Some people have all of these symptoms, but many people with high cortisol levels have only a few. Possible signs and symptoms include:

- Weight gain, usually greatest above the collar bone, in the cheek area (moon face), and around the abdomen
- Fat deposits behind the neck and shoulders (fatty hump or buffalo hump)
- Purple stretch marks on the abdomen
- Excessive hair growth on the face, chest, and back in women
- Menstrual irregularities
- Weakness and loss of muscle mass in the legs
- Easy bruising

- Depression and/or moodiness
- Weakened bones (osteoporosis), which can lead to fractures
- High blood sugar levels, often leading to diabetes
- High blood pressure

Cushing syndrome may be caused by an adrenal cancer or an adrenal adenoma that makes high levels of cortisol and/or related hormones, but it can also have other causes. For example, benign pituitary gland tumors can make high levels of another hormone called **adrenocorticotropic hormone**(ACTH). This is often called Cushing disease. The high levels of ACTH in turn cause normal adrenal gland tissue to make more cortisol. This results in the same symptoms as Cushing syndrome. Very rarely, other tumors can make ACTH and cause the same symptoms.

Some people with immune system problems or some cancers, such as [lymphomas](#), are treated with drugs chemically related to cortisol.

Because there are so many causes of high cortisol levels that can lead to Cushing syndrome, doctors do a number of [tests](#) to find out whether the patient has an adrenal cortical tumor or some other cause of Cushing syndrome.

## Symptoms caused by aldosterone production

The main signs and symptoms caused by aldosterone-producing adrenal tumors are:

- High blood pressure
- Weakness
- Muscle cramps
- Low blood potassium levels

Adrenal adenomas often make aldosterone, but adrenal cancers rarely do.

## Symptoms caused by a large adrenal cancer pressing on nearby organs

As an adrenal cancer grows, it presses on nearby organs and tissues. This may cause pain near the tumor, a feeling of fullness in the abdomen, or trouble eating because of a feeling of filling up easily.

- [References](#)

Lirov R, Tobias E, Lerario AM, Hammer GD. Adrenal tumors In: DeVita VT, Lawrence

TS, Rosenberg SA, eds. *DeVita, Hellman, and Rosenberg's Cancer: Principles and Practice of Oncology*. 10th ed. Philadelphia, PA: Lippincott Williams & Wilkins 2015: Chapter 84.

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# Tests for Adrenal Cancer

## Medical history and physical exam

If you have [signs or symptoms](#) that suggest adrenal cancer, the first step is usually for the doctor to take your complete medical history to find out more about them.

- Your doctor will want to know if anyone in your family has had adrenal cancer or any other type of cancer.
- Your doctor might also ask about your menstrual or sexual function and about any other symptoms you may be having.

A physical exam will give other information about possible signs of adrenal cancer or other health problems.

- Your doctor will thoroughly examine your abdomen for evidence of a tumor (or mass).
- Your blood and urine will likely be tested to look for high levels of the hormones made by some adrenal tumors.
- If an adrenal tumor is suspected, imaging tests will be done to look for it. These tests can also help see if it has spread.

If a mass is seen on an imaging test and it is likely to be an adrenal cancer, doctors will recommend [surgery](#) to remove the cancer. Generally, doctors do not recommend a biopsy (removing a sample of the tumor to look at under the microscope to see if it is

cancer) before surgery to remove the tumor. This is because doing a biopsy can increase the risk that an adrenal cancer will spread outside of the adrenal gland.

## Imaging tests

### Chest x-ray

A [chest x-ray](#) can show if the cancer has spread to the lungs. It may also be useful to determine if there are any serious lung or heart diseases.

### Ultrasound

[Ultrasound tests](#) use sound waves to make pictures of parts of the body. A device called a transducer makes the sound waves, which are reflected off of tissues and organs in the body. The pattern of sound wave echoes is detected by the transducer and analyzed by a computer to create an image of these tissues and organs. This test can show if there is a tumor in the adrenal gland. It can also show tumors in the liver if the cancer has spread there. In general, ultrasound is not used to look for adrenal tumors unless a CT scan can't be done for some reason.

### Computed tomography (CT)

[CT scans](#) show the adrenal glands fairly clearly and often can confirm the location of the cancer. It can also help show if the cancer has spread into your liver or other nearby organs. CT scans can also show lymph nodes and distant organs where metastatic cancer might be present. The CT scan can help determine if surgery is a good treatment option.

### Magnetic resonance imaging (MRI)

Like CT scans, [MRI scans](#) show detailed images of soft tissues in the body. But MRI scans use radio waves and strong magnets instead of x-rays. MRI may sometimes provide more information than CT scans because it can better distinguish adrenal cancers from benign tumors.

MRI scans are particularly helpful in examining the brain and spinal cord. In people with suspected adrenal tumors, an MRI of the brain may be done to examine the pituitary gland. Tumors of the pituitary gland, which lies underneath the front of the brain, can cause symptoms and signs similar to adrenal tumor.

## Positron emission tomography (PET)

For a [PET](#) scan, you are injected with a slightly radioactive form of sugar, which collects mainly in cancer cells. A special camera then creates a picture of areas of radioactivity in the body. The picture is not detailed like a CT or MRI scan, but a PET scan can look for possible areas of cancer spread in all areas of the body at once.

Some machines do both a PET and CT scan at the same time (PET/CT scan). This lets the doctor see areas that "light up" on the PET scan in more detail.

PET scans can be helpful in deciding if an adrenal tumor is likely to be benign or malignant (cancer), and if it may have spread.

## Other tests

### Laparoscopy

A laparoscope, a thin, flexible tube with a tiny video camera on the end, is inserted through a small surgical opening in the patient's side to allow the surgeon to see where the cancer is growing. It can be used to help spot distant spread as well as enlarged lymph nodes (which might contain cancer). Sometimes it is combined with ultrasound to give a better picture of the cancer. Laparoscopy may be done to help predict whether it will be possible to completely remove the cancer by surgery. In addition to viewing adrenal tumors through the laparoscope, surgeons can sometimes remove small benign adrenal tumors through this instrument. This method is described in [Surgery for Adrenal Cancer](#).

### Biopsy

Imaging tests may find tumors, but often the only way to know for sure that a tumor is cancer is to remove a sample of tumor tissue to look at under the microscope. This is called a [biopsy](#).

Since adrenal adenomas (benign tumors) and cancers can look alike under the microscope, a biopsy may not be able to tell whether or not an adrenal tumor is cancerous. A needle biopsy of an adrenal cancer also can actually spread tumor cells. For these reasons, a biopsy is generally not done before surgery if an adrenal tumor's size and certain features seen on imaging tests suggest it is most likely cancer. Blood tests of hormone levels and imaging tests are more useful than biopsies in diagnosing adrenal cancer.

If the cancer appears to have metastasized (spread) to another part of the body such as the liver, then a needle biopsy of the metastasis may be done. If a patient is known to have an adrenal tumor and a liver biopsy shows adrenal cells are present in the liver, then the tumor is cancer.

In general, a biopsy is only done in a patient with adrenal cancer when there are tumors outside the adrenals and the doctor needs to know if these tumors are from the adrenal cancer or are caused by some other cancer or disease. Tumors in the adrenal glands are sometimes biopsied when the patient is known to have a different type of cancer (like lung cancer), and knowing if it has spread to the adrenal glands would alter treatment.

## **Blood and urine tests for adrenal hormones**

Blood and urine tests to measure levels of adrenal hormones are important in deciding whether a patient with signs and symptoms of adrenal cancer has the disease. For urine tests, you may be asked to collect all of your urine for 24 hours. Blood and urine tests are as important as imaging tests in diagnosing adrenal cancer. Doctors might choose which tests to do based on the patient's symptoms. But often doctors will check hormone levels even when symptoms of high hormone levels are not present. This is because symptoms of abnormal hormone levels can be very subtle, and blood tests might be able to detect changes in hormone levels even before symptoms occur.

### **Tests for high cortisol levels**

The levels of cortisol are measured in the blood and in the urine. If an adrenal tumor is making cortisol, these levels will be abnormally high. These tests may be done after giving the patient a dose of dexamethasone. Dexamethasone is a drug that acts like cortisol. If given to someone who does not have an adrenal tumor, it will lower levels of cortisol and similar hormones. In someone with an adrenal cortex tumor, these hormone levels will remain high after they receive dexamethasone. Blood levels of another hormone called ACTH will also be measured to help distinguish adrenal tumors from other diseases that can cause high cortisol levels.

### **Tests for high aldosterone levels**

The level of aldosterone will be measured and will be high if the tumor is making aldosterone. High aldosterone can also lead to low blood levels of potassium and renin (a hormone made by the kidneys) .



## Tests for high androgen or estrogen levels

Patients with androgen-producing tumors will have high levels of dehydroepiandrosterone sulfate (DHEAS) or testosterone. Patients with estrogen-producing tumors will have high levels of estrogen in their blood.

- [References](#)

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# Adrenal Cancer Stages

After someone is diagnosed with adrenal cancer, doctors will try to figure out if it has spread, and if so, how far. This process is called *staging*. The stage of a cancer describes how far the cancer has spread in the body. It helps determine how serious the cancer is and how best to treat it. **The stage is one of the most important factors in deciding [how to treat the cancer](#) and determining how successful treatment might be.**

To determine the cancer's stage after an adrenal cancer diagnosis, doctors try to answer these questions:

- How large is the cancer?
- Has the cancer grown into nearby structures or organs?
- Has the cancer spread to nearby lymph nodes or to distant organs?

The stage of adrenal cancer is based on the results of physical exams, biopsies, and imaging tests (CT or MRI scan, x-rays, PET scan, etc.), which are described in [Tests for Adrenal Cancer](#), as well as the results of [surgery](#).

**The adrenal cancer stages range from stages I (1) through IV (4).** As a rule, the lower the number, the less the cancer has spread. A higher number, such as stage IV, means a more advanced cancer. Cancers with similar stages tend to have a similar outlook and are often treated in much the same way.

## Understanding your adrenal cancer stage

A staging system is a standard way for the cancer care team to describe how far a cancer has spread. Two major staging systems used for adrenal cancer are the American Joint Committee on Cancer (AJCC) TNM staging system and the ENSAT (European Network for the Study of Adrenal Tumors) staging system. Both are based on the same TNM categories, which are based on 3 key pieces of information:

- **T** describes the size of the main (primary) **tumor** and whether it has grown into nearby areas.
- **N** indicates any cancer spread to lymph **nodes** near the adrenal gland (*regional lymph nodes*). Lymph nodes are small bean-sized collections of immune system cells, to which cancers often spread first.
- **M** indicates if the cancer has spread (**metastasized**) to distant sites, such as other

organs or lymph nodes that are not near the adrenal gland (*distant lymph nodes*). Numbers or letters after T, N, and M provide more details about each of these factors. Higher numbers mean the cancer is more advanced. Once a person's T, N, and M categories have been determined, usually after surgery, this information is combined in a process called stage grouping to assign an overall stage (numbered I through IV).

The staging system in the table below uses the *pathologic stage*. It is based on the results of physical exam, biopsy, imaging tests, and the results of surgery. This is likely to be more accurate than *clinical staging*, which only takes into account the tests done before surgery.

Adrenal cancer staging can be complex. If you have any questions about your stage, please ask your doctor to explain it to you in a way you understand.

ENSA T stage	AJCC Stage	Stage grouping	Stage description
I	I	T1 N0 M0	The tumor is 5 cm (about 2 inches) or less in size and it has not grown into tissues outside the adrenal gland (T1). It has not spread to nearby lymph nodes (N0) or distant sites (M0).
II	II	T2 N0 M0	The tumor is greater than 5 cm (2 inches) in size and it has not grown into tissues outside the adrenal gland (T2). It has not spread to nearby lymph nodes (N0) or distant sites (M0).
III	III	T1 N1 M0	The tumor is 5 cm (about 2 inches) or less in size and it has not grown into tissues outside the adrenal gland (T1). The cancer has spread to nearby lymph nodes (N1) but not to distant sites (M0).
		OR	
		T2 N1 M0	The tumor is greater than 5 cm (2 inches) in size and it has not grown into tissues outside the adrenal gland (T2). The cancer has spread to nearby lymph nodes (N1) but not to distant sites (M0).
		OR	
		T3 Any N M0	The tumor is growing in the fat that surrounds the adrenal gland. The tumor can be any size (T3). It might or might not have spread to nearby lymph nodes (Any N0). It has not spread to distant sites (M0).
OR			
		T4 Any N	The tumor is growing into nearby organs, such as the kidney, pancreas, spleen, and liver or large blood vessels

		M0	(renal vein or vena cava). The tumor can be any size (T4). It may or may not have spread to nearby lymph nodes (Any N). It has not spread to distant organs (M0).
IV	IV	Any T Any N M1	The cancer has spread to distant sites like the liver or lungs (M1). It can be any size (Any T) and may or may not have spread to nearby tissues (Any T) or lymph nodes (Any N).

The following additional categories are not listed on the table above:

- **TX:** Main tumor cannot be assessed due to lack of information
- **T0:** No evidence of a primary tumor
- **NX:** Regional lymph nodes cannot be assessed due to lack of information
- [References](#)

American Joint Committee on Cancer. Adrenal Cortical. In: *AJCC Cancer Staging Manual*. 8th ed. New York: Springer. 2017:911-918.

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## Survival Rates for Adrenal Cancer

Survival rates tell you what portion of people with the same type and [stage](#) of cancer are still alive a certain length of time (usually 5 years) after they were diagnosed. These numbers can't tell you how long you will live, but they might help give you a better understanding about how likely it is that your treatment will be successful.

### What is a 5-year survival rate?

Statistics on the outlook for people with a certain type and stage of cancer are often given as 5-year survival rates, but many people live longer – often much longer – than 5 years. The 5-year survival rate is the percentage of people who live *at least* 5 years

after being diagnosed with cancer. For example, a 5-year survival rate of 90% means that an estimated 90 out of 100 people who have that cancer are still alive 5 years after being diagnosed.

**Relative survival rates** are often a more accurate way to estimate the effect of cancer on survival. These rates compare people with adrenal cancer to people in the overall population. For example, if the 5-year relative survival rate for a specific type and stage of cancer is 90%, it means that people who have that cancer are, on average, about 90% as likely as people who don't have that cancer to live for at least 5 years after being diagnosed.

But remember, the 5-year relative survival rates are estimates – your outlook can vary based on a number of factors specific to you.

## Cancer survival rates don't tell the whole story

Survival rates are often based on previous outcomes of large numbers of people who had the disease, but they can't predict what will happen in any particular person's case. There are a number of limitations to remember:

- The numbers below are among the most current available. But to get 5-year survival rates, doctors have to look at people who were treated at least 5 years ago. As treatments are improving over time, people who are now being diagnosed with adrenal cancer may have a better outlook than these statistics show.
- These statistics are based on the stage of the cancer when it was first diagnosed. They do not apply to cancers that come back later or spread, for example.
- Besides the cancer stage, many other factors can affect a person's outlook, such as age and overall health, and how well the cancer responds to treatment.

Your doctor can tell you how these numbers may apply to you, as he or she is familiar with your situation.

## Survival rates for adrenal cancer

These survival rates come from the National Cancer Database (NCDB). The database does not list survival statistics by [AJCC or ENSAT stages](#). Instead, it divides patients into 3 groups:

- **Localized** means that the cancer hasn't grown outside of the adrenal gland at diagnosis (like stages I and II).

- **Regional** means that the cancer has grown into nearby tissues or has spread to nearby lymph nodes (like stage III).
- **Distant** means that the cancer has spread further to distant sites (like stage IV).

The 5-year relative survival rates by stage for adrenal cancer are as follows:

Stage	5-year Relative Survival
Localized	65%
Regional	44%
Distant	7%

- [References](#)

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## Questions to Ask About Adrenal Cancer

As you deal with adrenal cancer and the process of treatment, you should be able to have frank, open discussions with your cancer care team. Ask any questions, no matter how trivial they might seem. Among the questions you might want to ask are:

- Do I have a benign or malignant (cancerous) adrenal gland tumor?
- Will I need more tests?
- Will I need to see any other types of doctors?

- Has my cancer spread beyond the adrenal gland?
- Is my tumor secreting excessive amounts of hormones?
- How will we treat the hormone excess?
- Are the changes to my body permanent?
- How will we treat the changes to my body?
- Is this form of adrenal gland cancer hereditary?
- What are my [treatment](#) choices?
- What [side effects](#) can I expect from my treatments?
- What are the other risks of treatment?
- How soon do we need to start treatment?
- What will treatment be like?
- Where will treatment be done?
- How long will it take to recover from treatment?
- When can I [go back to work](#) after treatment?
- What are the chances that the [cancer will come back](#)?
- What should I do to be ready for treatment?
- Do I need a [second opinion](#)?
- Based on what you've learned about my cancer, will it shorten my life?

You will no doubt have other questions about your personal situation. Be sure and write your questions down so you remember to ask them during each visit with your cancer care team. Keep in mind, too, that doctors aren't the only ones who can give you information. Other health care professionals, such as nurses and social workers, may have the answers you seek. You can find more information about communicating with your health care team in [The Doctor-Patient Relationship](#).

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