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## About Kidney Cancer

### Overview and Types

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

- [What Is Kidney Cancer?](#)

### Research and Statistics

See the latest estimates for new cases of kidney cancer and deaths in the US and what research is currently being done.

- [Key Statistics About Kidney Cancer](#)
  - [What's New in Kidney Cancer Research and Treatment?](#)
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## What Is Kidney Cancer?

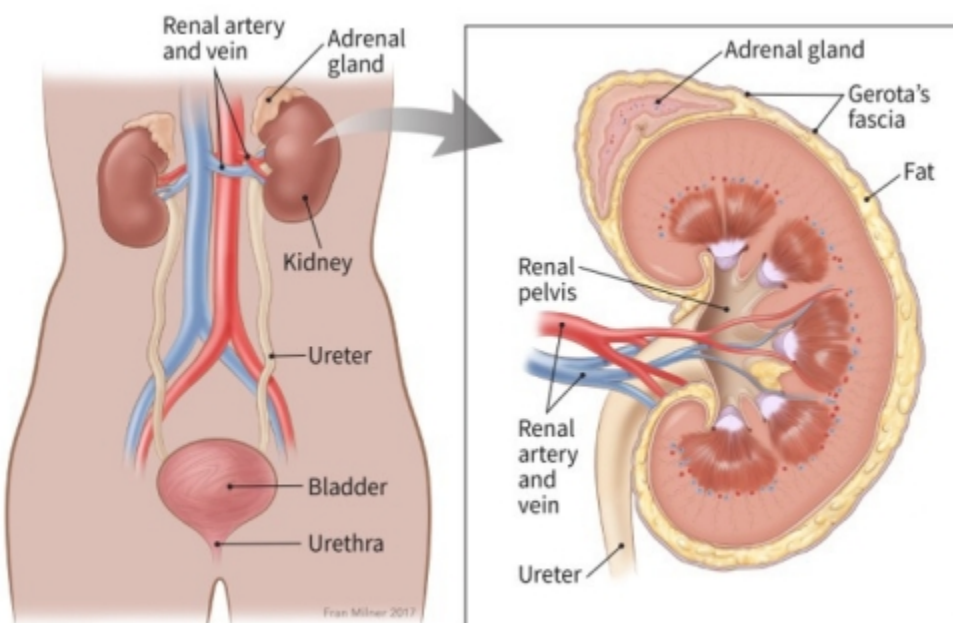
Kidney cancer is a cancer that starts in the kidneys. Cancer starts when cells in the body begin to grow out of control. Cells in nearly any part of the body can become cancer, and can spread to other areas. To learn more about how cancers start and spread, see [What Is Cancer?](#)<sup>1</sup>

### About the kidneys

To understand more about kidney cancer, it helps to know about the kidneys and what they do.

The kidneys are a pair of bean-shaped organs, each about the size of a fist. They are attached to the upper back wall of the abdomen and protected by the lower rib cage. One kidney is just to the left and the other just to the right of the backbone.

Small glands called *adrenal glands* sit above each of the kidneys. Each kidney and adrenal gland is surrounded by fat and a thin, fibrous layer known as *Gerota's fascia*.



The kidneys' main job is to filter the blood coming in from the renal arteries to remove excess water, salt, and waste products. These substances become urine. Urine leaves the kidneys through long slender tubes called *ureters* which connect to each kidney at an area called the *renal pelvis*. Urine travels down the ureters to the bladder, where it is stored until you urinate (pee).

The kidneys also have other jobs:

- They help control blood pressure by making a hormone called *renin*.
- They help make sure the body has enough red blood cells by making a hormone called *erythropoietin*. This hormone tells the bone marrow to make more red blood cells.

Our kidneys are important, but we can function with only one kidney. Many people in the

United States are living normal, healthy lives with just one kidney.

Some people do not have any working kidneys at all, and survive with the help of a medical procedure called *dialysis*. The most common form of dialysis uses a specially designed machine that filters blood much like a real kidney would.

## Types of kidney cancer

### Renal cell carcinoma

Renal cell carcinoma (RCC), also known as *renal cell cancer* or *renal cell adenocarcinoma*, is by far the most common type of kidney cancer. About 9 out of 10 kidney cancers are renal cell carcinomas.

Although RCC usually grows as a single tumor within a kidney, sometimes there are 2 or more tumors in one kidney or even tumors in both kidneys at the same time.

There are several subtypes of RCC, based mainly on how the cancer cells look under a microscope. Knowing the subtype of RCC can be a factor in deciding treatment and can also help your doctor determine if your cancer might be due to an inherited genetic syndrome. See [What Are the Risk Factors for Kidney Cancer?](#)<sup>2</sup> for more information about inherited kidney cancer syndromes.

**Clear cell renal cell carcinoma:** this is the most common form of renal cell carcinoma. About 7 out of 10 people with RCC have this kind of cancer. When seen under a microscope, the cells that make up clear cell RCC look very pale or clear.

**Papillary renal cell carcinoma:** this is the second most common subtype – about 1 in 10 RCCs are of this type. These cancers form little finger-like projections (called *papillae*) in some, if not most, of the tumor. Some doctors call these cancers *chromophilic* because the cells take in certain dyes and look pink under the microscope.

**Chromophobe renal cell carcinoma:** this subtype accounts for about 5% (5 cases in 100) of RCCs. The cells of these cancers are also pale, like the clear cells, but are much larger and have certain other features that can be recognized when looked at with a microscope .

**Rare types of renal cell carcinoma:** these subtypes are very rare, each making up less than 1% of RCCs:

- Collecting duct RCC

- Multilocular cystic RCC
- Medullary carcinoma
- Mucinous tubular and spindle cell carcinoma
- Neuroblastoma-associated RCC

**Unclassified renal cell carcinoma:** rarely, renal cell cancers are labeled as *unclassified* because the way they look doesn't fit into any of the other categories or because there is more than one type of cell present.

### Other types of kidney cancers

Other types of kidney cancers include transitional cell carcinomas, Wilms tumors, and renal sarcomas.

**Transitional cell carcinoma:** of every 100 cancers in the kidney, about 5 to 10 are transitional cell carcinomas (TCCs), also known as *urothelial carcinomas*.

Transitional cell carcinomas don't start in the kidney itself, but in the lining of the renal pelvis (where the ureters meet the kidneys). This lining is made up of cells called *transitional cells* that look like the cells that line the ureters and bladder. Cancers that develop from these cells look like other urothelial carcinomas, such as bladder cancer, under the microscope. Like bladder cancer, these cancers are often linked to cigarette smoking and being exposed to certain cancer-causing chemicals in the workplace.

People with TCC often have the same signs and symptoms as people with renal cell cancer: blood in the urine and, sometimes, back pain.

For more information about transitional cell carcinoma, see [Bladder Cancer](#)<sup>3</sup>.

**Wilms tumor (nephroblastoma):** Wilms tumors almost always occur in children. This type of cancer is very rare among adults. To learn more about this type of cancer, see [Wilms Tumor](#)<sup>4</sup>.

**Renal sarcoma:** renal sarcomas are a rare type of kidney cancer that begin in the blood vessels or connective tissue of the kidney. They make up less than 1% of all kidney cancers.

Sarcomas are discussed in more detail in [Sarcoma- Adult Soft Tissue Cancer](#)<sup>5</sup>.

### Benign (non-cancerous) kidney tumors

Some kidney tumors are benign (non-cancerous). This means they do not metastasize (spread) to other parts of the body, although they can still grow and cause problems.

Benign kidney tumors can be treated by removing or destroying them, using many of the same treatments that are also used for kidney cancers, such as surgery, radiofrequency ablation, and arterial embolization. The choice of treatment depends on many factors, such as the size of the tumor and if it is causing any symptoms, the number of tumors, whether tumors are in both kidneys, and the person's general health.

**Renal adenoma:** renal adenomas are the most common benign kidney tumors. They are small, slow-growing tumors that are often found on imaging tests (such as CT scans) when the doctor is looking for something else. Seen with a microscope, they look a lot like low-grade (slow growing) renal cell carcinomas.

In rare cases, tumors first thought to be renal adenomas turn out to be small renal cell carcinomas. Because they are hard to tell apart, suspected adenomas are often treated like renal cell cancers.

**Oncocytoma:** oncocytomas are benign kidney tumors that can sometimes grow quite large. As with renal adenomas, it can sometimes be hard to tell them apart from kidney cancers. Oncocytomas do not normally spread to other organs, so surgery often cures them.

**Angiomyolipoma:** angiomyolipomas are rare. They often develop in people with tuberous sclerosis, a genetic condition that also affects the heart, eyes, brain, lungs, and skin. These tumors are made up of different types of connective tissues (blood vessels, smooth muscles, and fat). If they aren't causing any symptoms, they can often just be watched closely. If they start causing problems (like pain or bleeding), they may need to be treated.

**The rest of our information about kidney cancer focuses on renal cell carcinoma and not on less common types of kidney tumors.**

## Hyperlinks

1. [www.cancer.org/cancer/cancer-basics/what-is-cancer.html](http://www.cancer.org/cancer/cancer-basics/what-is-cancer.html)
2. [www.cancer.org/cancer/kidney-cancer/causes-risks-prevention/risk-factors.html](http://www.cancer.org/cancer/kidney-cancer/causes-risks-prevention/risk-factors.html)
3. [www.cancer.org/cancer/bladder-cancer.html](http://www.cancer.org/cancer/bladder-cancer.html)
4. [www.cancer.org/cancer/wilms-tumor.html](http://www.cancer.org/cancer/wilms-tumor.html)
5. [www.cancer.org/cancer/soft-tissue-sarcoma.html](http://www.cancer.org/cancer/soft-tissue-sarcoma.html)

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## Key Statistics About Kidney Cancer

The American Cancer Society's most recent estimates for kidney cancer in the United States are for 2019:

- About 73,820 new cases of kidney cancer (44,120 in men and 29,700 in women) will occur.
- About 14,770 people (9,820 men and 4,950 women) will die from this disease.

These numbers include all types of kidney and renal pelvis cancers.

Most people with kidney cancer are older. The average age of people when they are diagnosed is 64. Kidney cancer is very uncommon in people younger than age 45.

Kidney cancer is among the 10 most common cancers in both men and women. Overall, the lifetime risk for developing kidney cancer in men is about 1 in 48. The lifetime risk for women is 1 in 83. A number of other factors (described in [Risk Factors for Kidney Cancer](#)<sup>1</sup>) also affect a person's risk.

For reasons that are not totally clear, the rate of new kidney cancers has been rising since the 1990s, although this seems to have leveled off in the past few years. Part of this rise was probably due to the use of newer imaging tests such as CT scans, which picked up some cancers that might never have been found otherwise. The death rates for these cancers have gone down slightly since the middle of the 1990s.

Survival rates for people diagnosed with kidney cancer are discussed in [Survival Rates for Kidney Cancer by Stage](#)<sup>2</sup>.

Visit the [American Cancer Society's Cancer Statistics Center](#)<sup>3</sup> for more key statistics.

## Hyperlinks

1. [www.cancer.org/cancer/kidney-cancer/causes-risks-prevention/risk-factors.html](http://www.cancer.org/cancer/kidney-cancer/causes-risks-prevention/risk-factors.html)
2. [www.cancer.org/cancer/kidney-cancer/detection-diagnosis-staging/survival-rates.html](http://www.cancer.org/cancer/kidney-cancer/detection-diagnosis-staging/survival-rates.html)
3. <https://cancerstatisticscenter.cancer.org/>

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# What's New in Kidney Cancer Research and Treatment?

Research into the [causes](#)<sup>1</sup>, [detection](#)<sup>2</sup>, [diagnosis](#)<sup>3</sup>, and [treatment](#)<sup>4</sup> of kidney cancer is now being done at many medical centers, university hospitals, and other institutions across the nation.

## Genetics

Scientists are studying several genes that seem to play a part in changing normal kidney cells into renal cell carcinoma (RCC).

For example, problems with the [VHL tumor suppressor gene](#)<sup>5</sup> are found in most clear cell RCCs. This allows other genes such as the hypoxia-inducible factor (*HIF*) gene to be activated when they shouldn't be, which drives a cell toward being cancerous. Some newer treatments focus on attacking this cellular pathway.

Researchers now also have a better idea of the gene changes responsible for some other forms of RCC. Doctors are trying to determine which treatments are most likely to be effective for certain types of RCC. This information can also be used to develop new treatments.

## Targeted therapies

Because chemotherapy is not very effective against advanced kidney cancer, [targeted therapies](#)<sup>6</sup> are now usually the first-line option to treat kidney cancers that cannot be removed by surgery or have spread outside the kidney. At this time they are usually given separately. [Clinical trials](#)<sup>7</sup> are now under way to see if combining these drugs, either with each other or with other types of treatment, might be better than using them alone.

## Neoadjuvant Therapy

The potential roles of giving targeted drugs *before* surgery (called neoadjuvant therapy) are also being studied. The hope with these studies is to shrink tumors to allow for less extensive surgery, prevent cancer spread and hopefully improve cure rates. This could also help people retain more of their normal kidney function.



## Adjuvant Therapy

The potential roles of giving targeted drugs *after* surgery (called adjuvant therapy) are also being studied. The hope with these studies is to see if patients at high risk would benefit from taking certain targeted drugs after their kidney cancer surgery to reduce the chances of the cancer coming back.

Along with finding new medicines and looking at the best way to combine and sequence existing ones, a major area of research is finding better ways to choose the best treatment for each person. Researchers are looking for which factors might make a person's cancer more likely to respond to a certain medicine. This can increase the chances of being helped by a therapy and lower the chances a person will get a treatment that is unlikely to help them (and which could still have side effects).

## Predicting Survival

Kidney cancer is typically unpredictable. Some cancers are very aggressive, while others can be very slow growing and last for many years. The way a tumor behaves depends on the specific type of kidney cancer it is. Given this, scientists are looking to see if they can more accurately predict how long someone with kidney cancer may live by testing the kidney cancer for specific traits. For example, one test checks how fast the cancer cells are dividing. Many factors of the cancer cell are looked at and a “score” is given to indicate how fast or slow the cells are growing. A lower score seems to match with a better outcome for the patient. More studies are being done in this area.

## Immunotherapy

Kidney cancer seems to be one of the cancers most likely to respond to [immunotherapy](#)<sup>8</sup>, which is treatment that boosts the body's immune response against cancer cells. [Clinical trials](#)<sup>9</sup> of many new immunotherapy methods are being tested. Basic research is now being directed toward a better understanding of the immune system, how to activate it, and how it reacts to cancer.

## Hyperlinks

1. [www.cancer.org/cancer/kidney-cancer/causes-risks-prevention/what-causes.html](http://www.cancer.org/cancer/kidney-cancer/causes-risks-prevention/what-causes.html)
2. [www.cancer.org/cancer/kidney-cancer/detection-diagnosis-staging/detection.html](http://www.cancer.org/cancer/kidney-cancer/detection-diagnosis-staging/detection.html)
3. [www.cancer.org/cancer/kidney-cancer/detection-diagnosis-staging/detection.html](http://www.cancer.org/cancer/kidney-cancer/detection-diagnosis-staging/detection.html)
4. [www.cancer.org/cancer/kidney-cancer/treating.html](http://www.cancer.org/cancer/kidney-cancer/treating.html)
5. [www.cancer.org/cancer/kidney-cancer/causes-risks-prevention/what-causes.html](http://www.cancer.org/cancer/kidney-cancer/causes-risks-prevention/what-causes.html)

6. [www.cancer.org/cancer/kidney-cancer/treating/targeted-therapy.html](http://www.cancer.org/cancer/kidney-cancer/treating/targeted-therapy.html)
7. [www.cancer.org/treatment/treatments-and-side-effects/clinical-trials.html](http://www.cancer.org/treatment/treatments-and-side-effects/clinical-trials.html)
8. [www.cancer.org/cancer/kidney-cancer/treating/immunotherapy.html](http://www.cancer.org/cancer/kidney-cancer/treating/immunotherapy.html)
9. [www.cancer.org/treatment/treatments-and-side-effects/clinical-trials.html](http://www.cancer.org/treatment/treatments-and-side-effects/clinical-trials.html)

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# Kidney Cancer Causes, Risk Factors, and Prevention

## Risk Factors

A risk factor is anything that affects your chance of getting a disease such as cancer. Learn more about the risk factors for kidney cancer.

- [Risk Factors for Kidney Cancer](#)
- [What Causes Kidney Cancer?](#)

## Prevention

At this time there is no way to prevent kidney cancer. But there are things you can do that might lower your risk for it. Learn more.

- [Can Kidney Cancer Be Prevented?](#)

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# Risk Factors for Kidney Cancer

A risk factor is anything that affects your chance of getting a disease such as cancer. Different cancers have different risk factors. Some risk factors, like smoking, can be changed. Others, like your age or family history, can't be changed.

But having a risk factor, or even several risk factors, does not mean that you will get the

disease. And some people who get the disease may have few or no known risk factors. Even if a person with kidney cancer has a risk factor, it is often very hard to know how much that risk factor contributed to the cancer.

Scientists have found several risk factors that could make you more likely to develop kidney cancer.

## Smoking

[Smoking](#)<sup>1</sup> increases the risk of developing renal cell carcinoma (RCC). The increased risk seems to be related to how much you smoke. The risk drops if you stop smoking, but it takes many years to get to the risk level of someone who never smoked.

## Obesity

People who are very [overweight](#)<sup>2</sup> have a higher risk of developing RCC. Obesity may cause changes in certain hormones that can lead to RCC.

## Workplace exposures

Many studies have suggested that workplace exposure to certain substances increases the risk for RCC. Some of these substances are cadmium (a type of metal), some herbicides, and organic solvents, particularly trichloroethylene.

## Family history of kidney cancer

People with a strong family history of renal cell cancer (without one of the known inherited conditions listed below) have a higher chance of developing this cancer. This risk is highest for people who have a brother or sister with the cancer. It's not clear whether this is due to shared genes, something that both people were exposed to in the environment, or both.

## High blood pressure

The risk of kidney cancer is higher in people with high blood pressure. Some studies have suggested that certain medicines used to treat high blood pressure may raise the risk of kidney cancer, but it is hard to tell if it's the condition or the medicine (or both) that may be the cause of the increased risk.

## Certain medicines

**Phenacetin:** This drug used to be a popular non-prescription pain reliever and has been linked to RCC in the past. But it has not been available in the United States for over 30 years, so it no longer appears to be a major risk factor.

**Diuretics:** Some studies have suggested that diuretics (water pills) may be linked to a small increase in the risk of RCC. It is not clear whether the cause is the drugs or the high blood pressure they treat. If you need to take diuretics, don't avoid them to try to reduce the risk of kidney cancer.

## Advanced kidney disease

People with advanced kidney disease, especially those needing dialysis, have a higher risk of RCC. Dialysis is a treatment used to remove toxins from your body if the kidneys do not work properly.

## Gender

RCC is about twice as common in men as in women. Men are more likely to be smokers and are more likely to be exposed to cancer-causing chemicals at work, which may account for some of the difference.

## Race

African Americans and American Indians/Alaska Natives have slightly higher rates of RCC than do whites. The reasons for this are not clear.

## Genetic and hereditary risk factors

Some people inherit a tendency to develop certain types of cancer. The DNA in each of your cells that you get from your parents may have changes that give you this tendency. Some rare inherited conditions can cause kidney cancer. It is important that people who have hereditary causes of RCC see their doctors often, especially if they have already been diagnosed with RCC. Some doctors recommend regular imaging tests (such as CT scans) to look for new kidney tumors in these people.

People who have the conditions listed here have a much higher risk for getting kidney cancer, although they account for only a small portion of cases overall.

## von Hippel-Lindau disease

People with this condition often develop several kinds of tumors and cysts (fluid-filled sacs) in different parts of the body. They have an increased risk for developing clear cell RCC, especially at a younger age. They may also have benign tumors in their eyes, brain, spinal cord, pancreas, and other organs; and a type of adrenal gland tumor called *pheochromocytoma*. This condition is caused by mutations (changes) in the *VHL* gene.

## Hereditary papillary renal cell carcinoma

People with this condition have a tendency to develop one or more papillary RCCs, but they do not have tumors in other parts of the body, as is the case with the other inherited conditions listed here. This disorder is usually linked to changes in the *MET* gene.

## Hereditary leiomyoma-renal cell carcinoma

People with this syndrome develop smooth muscle tumors called *leiomyomas* (fibroids) of the skin and uterus (in women) and have a higher risk for developing papillary RCCs. It has been linked to changes in the *FH* gene.

## Birt-Hogg-Dube (BHD) syndrome

People with this syndrome develop many small benign skin tumors and have an increased risk of different kinds of kidney tumors, including RCCs and oncocytomas. They may also have benign or malignant tumors of several other tissues. The gene linked to BHD is known as *FLCN*.

## Familial renal cancer

People with this condition develop tumors called *paragangliomas* of the head and neck region, as well as tumors known as *pheochromocytomas* of the adrenal glands and thyroid cancers. They also tend to get kidney cancer in both kidneys before age 40. It is caused by defects in the genes *SDHB* and *SDHD*.

## Cowden syndrome

People with this syndrome have a high risk of [breast](#)<sup>3</sup>, [thyroid](#)<sup>4</sup> and kidney cancers. It is linked to changes in the *PTEN* gene.

## Tuberous sclerosis

People with this syndrome develop many, usually benign (noncancerous) tumors in different parts of the body including the skin, brain, lungs, eyes, kidneys, and heart. Although the kidney tumors are most often benign, occasionally they can be clear cell RCC. It is caused by defects in the genes *TSC1* and *TSC2*.

## Hereditary renal oncocytoma

Some people inherit the tendency to develop a kidney tumor called an *oncocytoma*, which is almost always benign (not cancer).

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3. [www.cancer.org/cancer/breast-cancer.html](http://www.cancer.org/cancer/breast-cancer.html)
4. [www.cancer.org/cancer/thyroid-cancer.html](http://www.cancer.org/cancer/thyroid-cancer.html)

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## What Causes Kidney Cancer?

Although many [risk factors](#) can increase the chance of developing renal cell cancer (RCC), it is not yet clear how some of these risk factors cause kidney cells to become cancerous.

### Changes (mutations) in genes

Cancer is caused by changes in the DNA inside our cells. DNA is the chemical in our cells that makes up our genes, which control how our cells function. DNA, which comes

from both our parents, affects more than just how we look.

Some genes help control when our cells grow, divide into new cells, and die:

- Certain genes that help cells grow, divide, and stay alive are called *oncogenes*.
- Genes that help keep cell division under control or cause cells to die at the right time are called *tumor suppressor genes*.

Cancers can be caused by DNA mutations (changes) that turn on oncogenes or turn off tumor suppressor genes, resulting in cells growing out of control. Changes in many different genes are usually needed to cause kidney cancer.

### **Inherited gene mutations**

Certain *inherited* DNA changes can lead to conditions running in some families that increase the risk of kidney cancer. These syndromes, which cause a small portion of all kidney cancers, were described in [What Are the Risk Factors for Kidney Cancer?](#)

For example, *VHL*, the gene that causes von Hippel-Lindau (VHL) disease, is a tumor suppressor gene. It normally helps keep cells from growing out of control. Mutations (changes) in this gene can be inherited from parents. When the *VHL* gene is mutated, it is no longer able to control the abnormal growth, and kidney cancer is more likely to develop. The genes linked to hereditary leiomyoma (the *FH* gene), Birt-Hogg-Dube syndrome (the *FLCN* gene), and familial renal cancer (the *SDHB* and *SDHD* genes) are also tumor suppressor genes, and inherited changes in these genes lead to an increased risk of kidney cancer.

People with hereditary papillary renal cell carcinoma have inherited changes in the *MET* oncogene that cause it to be turned on all the time. This can lead to uncontrolled cell growth and makes the person more likely to develop papillary RCC.

Special genetic tests can detect some of the gene mutations associated with these inherited syndromes. If you have a family history of kidney cancer or other cancers linked to these syndromes, you may want to ask your doctor about genetic counseling and genetic testing. The American Cancer Society recommends discussing genetic testing with a qualified cancer genetics professional before any genetic testing is done. For more on this, see [Understanding Genetic Testing for Cancer](#)<sup>1</sup> and [What Happens during Genetic Testing for Cancer?](#)<sup>2</sup>

### **Acquired gene mutations**

Some gene mutations happen during a person's lifetime and are not passed on. They affect only cells that come from the original mutated cell. These DNA changes are due to *acquired* mutations.

In most cases of kidney cancer, the DNA mutations that lead to cancer are acquired during a person's life rather than having been inherited. Certain risk factors, such as exposure to cancer-causing chemicals (like those found in tobacco smoke), probably play a role in causing these acquired mutations, but so far it's not known what causes most of them. Progress has been made in understanding how tobacco increases the risk for developing kidney cancer. Your lungs absorb many of the cancer-causing chemicals in tobacco smoke into the bloodstream. Because your kidneys filter this blood, many of these chemicals become concentrated in the kidneys. Several of these chemicals are known to damage kidney cells in ways that can cause the cells to become cancerous.

[Obesity](#)<sup>3</sup>, another risk factor for this cancer, alters the balance of some of the body's hormones. Researchers are now learning how certain hormones help control the growth (both normal and abnormal) of many different tissues in the body, including the kidneys.

Most people with sporadic (non-inherited) clear cell RCC have changes in the *VHL* gene in their tumor cells that have caused it to stop working properly. These changes are acquired during life rather than being inherited.

Other gene changes may also cause renal cell carcinomas. Researchers continue to look for these changes. For more about how genes changes can lead to cancer, see [Genes and Cancer](#)<sup>4</sup>.

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1. [www.cancer.org/cancer/cancer-causes/genetics/understanding-genetic-testing-for-cancer.html](http://www.cancer.org/cancer/cancer-causes/genetics/understanding-genetic-testing-for-cancer.html)
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## Can Kidney Cancer Be Prevented?

In many cases, the cause of kidney cancer is not known. In some other cases (such as with [inherited conditions](#) that raise kidney cancer risk), even when the cause is known it may not be preventable. But there are some ways you may be able to reduce your risk of this disease.

[Cigarette smoking](#)<sup>1</sup> is responsible for a large percentage of cases, so stopping smoking may lower your risk.

[Obesity](#)<sup>2</sup> and high blood pressure are also risk factors for renal cell cancer. Maintaining a healthy weight by exercising and choosing a diet high in fruits and vegetables, and getting treatment for high blood pressure may also reduce your chance of getting this disease.

Finally, avoiding workplace exposure to harmful substances such as cadmium and organic solvents may reduce your risk for renal cell cancer.

## Hyperlinks

1. [www.cancer.org/cancer/cancer-causes/tobacco-and-cancer.html](http://www.cancer.org/cancer/cancer-causes/tobacco-and-cancer.html)
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# Kidney 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 Kidney Cancer Be Found Early?](#)
- [Kidney Cancer Signs and Symptoms](#)
- [Tests for Kidney 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.

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

## Questions to Ask About Kidney Cancer

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

- [What Should You Ask Your Doctor About Kidney Cancer?](#)

# Can Kidney Cancer Be Found Early?

Many kidney cancers are found fairly early, while they are still confined to the kidney, but others are found at a more advanced stage. There are a few reasons for this:

- These cancers can sometimes grow quite large without causing any pain or other problems.
- Because the kidneys are deep inside the body, small kidney tumors cannot be seen or felt during a physical exam.
- There are no recommended screening tests for kidney cancer in people who are not at increased risk. This is because no test has been shown to lower the overall risk of dying from kidney cancer.

## For people at average risk of kidney cancer

Some tests can find some kidney cancers early, but none of these is recommended to screen for kidney cancer in people at average risk.

A routine urine test (urinalysis), which is sometimes part of a complete medical checkup, may find small amounts of blood in the urine of some people with early kidney cancer. But many things other than kidney cancer cause blood in the urine, including urinary tract infections, bladder infections, bladder cancer, and benign (non-cancerous) kidney conditions such as kidney stones. Sometimes people with kidney cancer do not have blood in their urine until the cancer is quite large and might have spread to other parts of the body.

[Imaging tests](#)<sup>1</sup> such as computed tomography (CT) scans and magnetic resonance imaging (MRI) scans can often find small kidney cancers, but these tests are expensive. Ultrasound is less expensive and can also detect some early kidney cancers. One problem with these tests is that they can't always tell benign tumors from small renal cell carcinomas.

Often, kidney cancers are found incidentally (by accident) during imaging tests for some other illness such as gallbladder disease. These cancers usually are causing no pain or other symptoms when they are found. The survival rate for these kidney cancers is very high because they are usually found at a very early stage.

## For people at increased risk of kidney cancer



People who have certain [inherited conditions](#)<sup>2</sup>, such as von Hippel-Lindau disease, have a higher risk of kidney cancer. Doctors often recommend that these people get regular imaging tests such as CT, MRI, or ultrasound scans to look for kidney tumors. Kidney cancers that are found early with these tests can often be cured.

It is important to tell your doctor if any of your family members (blood relatives) has or had kidney cancer, especially at a younger age, or if they have been diagnosed with an inherited condition linked to this cancer, such as von Hippel-Lindau disease. Your doctor may recommend that you consider genetic counseling and testing to see if you have the condition.

Before having genetic tests, it's important to talk with a genetic counselor so that you understand what the tests can and can't tell you, and what any results would mean. Genetic tests look for the gene mutations that cause these conditions in your DNA. They are used to diagnose these inherited conditions, not kidney cancer itself. Your risk may be increased if you have one of these conditions, but it does not mean that you have (or definitely will get) kidney cancer. For more information on genetic testing, see [Genetics and Cancer](#)<sup>3</sup>.

Some doctors also recommend that people with kidney diseases treated by long-term dialysis or those who have had radiation to their kidney in the past have regular tests to look for kidney cancer.

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## Kidney Cancer Signs and Symptoms

Early kidney cancers do not usually cause any signs or symptoms, but larger ones might. Some possible signs and symptoms of kidney cancer include:

- Blood in the urine (hematuria)
- Low back pain on one side (not caused by injury)
- A mass (lump) on the side or lower back
- Fatigue (tiredness)
- Loss of appetite

- Weight loss not caused by dieting
- Fever that is not caused by an infection and that doesn't go away
- Anemia (low red blood cell counts)

These signs and symptoms can be caused by kidney cancer (or another type of cancer), but more often they are caused by other, benign, diseases. For example, blood in the urine is most often caused by a bladder or urinary tract infection or a kidney stone. Still, if you have any of these symptoms, see a doctor so that the cause can be found and treated, if needed.

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## Tests for Kidney Cancer

Kidney cancer might be found because of [signs or symptoms](#) a person is having, or it might be found because of lab tests or imaging tests a person is getting for another reason. If cancer is suspected, tests will be needed to confirm the diagnosis.

## Medical history and physical exam

If you have any signs or symptoms that suggest you might have kidney cancer, your doctor will want to take a complete medical history to check for risk factors and to learn more about your symptoms.

A physical exam can provide information about signs of kidney cancer and other health problems. For example, the doctor may be able to feel an abnormal mass (lump) when he or she examines your abdomen (belly).

If symptoms or the results of the physical exam suggest you might have kidney cancer, more tests will probably be done. These might include lab tests and imaging tests.

## Blood tests

Lab tests cannot show for sure if a person has kidney cancer, but they can sometimes give the first hint that there may be a kidney problem. If cancer has already been diagnosed, they are also done to get a sense of a person's overall health and to help tell if the cancer might have spread to other areas. They also can help show if a person is healthy enough to have an operation.

**Urinalysis (urine testing):** This test may be done if your doctor suspects a kidney problem.

Microscopic and chemical tests are done on a urine sample to look for small amounts of blood and other substances not seen with the naked eye. About half of all patients with renal cell cancer will have blood in their urine. If the patient has transitional cell carcinoma (in the renal pelvis, the ureter, or the bladder), sometimes a special exam of the urine sample (called *urine cytology*) in the lab will show actual cancer cells in the urine.

**Complete blood count (CBC):** This is a test that measures the amounts of different cells in the blood. This test result is often abnormal in people with renal cell cancer. Anemia (having too few red blood cells) is very common. Less often, a person may have too many red blood cells (called *polycythemia*) because the kidney cancer cells make a hormone (erythropoietin) that causes the bone marrow to make more red blood cells. Blood counts are also important to make sure a person is healthy enough for

[surgery](#)<sup>1</sup>.

**Blood chemistry tests:** These tests are usually done in people who might have kidney cancer, because the cancer can affect the levels of certain chemicals in the blood. For example, high levels of liver enzymes are sometimes found. High blood calcium levels may indicate that cancer has spread to the bones, and may therefore prompt a doctor to order a bone scan. Blood chemistry tests also look at kidney function, which is especially important if certain imaging tests or if surgery is planned.

## Imaging tests to look for kidney cancer

Imaging tests use x-rays, magnetic fields, sound waves, or radioactive substances to create pictures of the inside of your body. Imaging tests can be done for a number of reasons, such as:

- To look at suspicious areas that might be cancer
- To learn how far cancer has spread
- To help determine if treatment is working

Unlike most other cancers, doctors can often diagnose kidney cancer with fair certainty based on imaging tests without doing a biopsy (removing a sample of the tumor to be looked at under a microscope). In some patients, however, a biopsy may be needed.

### Computed tomography (CT) scan

The [CT scan](#)<sup>2</sup> uses x-rays to produce detailed cross-sectional images of your body. It is one of the most useful tests for finding and looking at a tumor in your kidney. It can provide precise information about the size, shape, and location of a tumor. It is also useful in checking to see if a cancer has spread to nearby lymph nodes or to organs and tissues outside the kidney. If a kidney biopsy is needed, this test can also be used to guide a biopsy needle into the mass (lump) to obtain a sample.

When a CT is done to look at the kidneys, an IV (intravenous) contrast dye is often needed to make certain areas stand out better on the scan. This CT contrast can damage the kidneys. This happens more often in patients whose kidneys are not working well in the first place. Because of this, your kidney function will be checked with a blood test before you get IV contrast.

### Magnetic resonance imaging (MRI) scan

[MRI scan](#)<sup>3</sup>s are used less often than CT scans in people with kidney cancer. They may be done in cases where CT scans aren't practical, such as if a person can't have the CT contrast dye because they have an allergy to it or they don't have good kidney function. MRI scans may also be done if there's a chance that the cancer has grown into major blood vessels in the abdomen (like the inferior vena cava), because they provide a better picture of blood vessels than CT scans. Finally, they may be used to look at abnormal areas in the brain and spinal cord that might be due to cancer spread.

## Ultrasound

[Ultrasound](#)<sup>4</sup> can help find a kidney mass and show if it is solid or filled with fluid (kidney tumors are more likely to be solid). Different echo patterns also can help doctors tell some types of benign and malignant kidney tumors from one another.

If a kidney biopsy is needed, this test can also be used to guide a biopsy needle into the mass to obtain a sample.

## Positron emission tomography (PET) scan

A [PET scan](#)<sup>5</sup> uses a form of radioactive sugar that is put into the blood. Body cells take in different amounts of the sugar, depending on how fast they are growing. Cancer cells, which grow quickly, are more likely to take up larger amounts of the sugar than normal cells. A special camera is used to create a picture of areas of radioactivity in the body. The picture from a PET scan is not as detailed as a CT or MRI scan, but it provides helpful information about whether abnormal areas seen on these other tests are likely to be cancer or not. This scan can be useful in seeing if the cancer has spread to lymph nodes near the kidney. PET scans can also be useful if your doctor thinks the cancer may have spread but doesn't know where.

Special machines can perform both a PET and CT scan at the same time (PET/CT scan). This lets the doctor compare areas of higher radioactivity (suggesting an area of cancer) on the PET scan with the more detailed picture of that area on the CT.

Still, PET and PET/CT scans are not a standard part of the work-up for kidney cancers.

## Intravenous pyelogram

An intravenous pyelogram (IVP) is an x-ray of the urinary system taken after a special dye is injected into a vein. The kidneys remove the dye from the bloodstream and it then concentrates in the ureters and bladder. An IVP can help find abnormalities of the renal pelvis and ureter, such as cancer, but this test is not often used when kidney cancer is

suspected.

## Angiography

Angiography is an x-ray test for looking at blood vessels. A contrast dye is injected into the renal artery, and the dye outlines the blood vessels. X-rays are taken to identify and map the blood vessels that supply a kidney tumor. This type of contrast dye though, is not the same as the one used for an IVP.

This test can help in planning surgery for some patients. Angiography can also help diagnose renal cancers since the blood vessels usually have a special appearance with this test.

Angiography can often be done as a part of a CT or MRI scan, instead of as a separate x-ray test. This means less contrast dye is used, which is helpful since the dye can damage kidney function further if it is given to people whose kidneys aren't working well.

## Chest x-ray

An [x-ray](#)<sup>6</sup> may be done after kidney cancer has been diagnosed to see if cancer has spread to the lungs.

## Bone scan

A bone scan can help show if a cancer has spread to your bones. It might be done if there is reason to think the cancer might have spread to the bones (because of symptoms such as bone pain or blood test results showing an increased calcium level). PET scans can usually show the spread of cancer to bones as well, so if you've had a PET scan you might not need a bone scan.

## Kidney biopsy

Unlike with most other types of cancer, biopsies are not often used to diagnose kidney tumors. Imaging tests usually provide enough information for a surgeon to decide if an operation is needed. The diagnosis is then confirmed when part of the kidney that was removed is looked at in the lab.

However, a biopsy is sometimes done to get a small sample of tissue from an area that may be cancer when the imaging tests are not clear enough to permit surgery. Biopsy may also be done to confirm cancer if a person might not be treated with surgery, such

as with small tumors that will be [watched and not treated](#)<sup>7</sup>, or when [other treatments](#)<sup>8</sup> are being considered.

Fine needle aspiration (FNA) and needle core biopsy are 2 types of kidney biopsies that may be done.

In cases where the doctors think kidney cancer might have spread to other sites, they may take a biopsy of the metastatic site instead of the kidney.

## Biopsy results

The biopsy samples are sent to a lab, where they are looked at by a pathologist, a doctor who specializes in diagnosing diseases with lab tests. If kidney cancer is found, an important feature that is evaluated is the grade, specifically called Fuhrman grade.

The Fuhrman grade is found by looking at kidney cancer cells (taken during a biopsy or during surgery) in a lab. Many doctors use it to describe how quickly the cancer is likely to grow and spread. The grade is based on how closely the cancer cells look like those of normal kidney cells. Renal cell cancers are usually graded on a scale of 1 through 4. Grade 1 renal cell cancers have cells that look a lot like normal kidney cells. These cancers usually grow and spread slowly and tend to have a good prognosis (outlook). At the other extreme, grade 4 renal cell cancer looks quite different from normal kidney cells. These cancers have a worse prognosis.

Although the cell type and grade can sometimes help predict prognosis (outlook), the cancer's *stage* is by far the best predictor of survival. The stage describes the cancer's size and how far it has spread beyond the kidney. Staging is explained in [Kidney Cancer Stages](#).

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## Kidney Cancer Stages

After someone is diagnosed with kidney cancer, doctors will try to figure out whether it has spread, and if so, how far. This process is called staging. The stage of a cancer describes the extent of the cancer 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 a kidney cancer diagnosis, doctors try to answer these questions:

- How large has the cancer grown in the kidney?
- Has the cancer reached nearby structures, such as major blood vessels?
- Has the cancer spread to the nearby lymph nodes or to distant organs?

The stage of kidney cancer is based on the results of the physical exam, imaging tests (CT scan, chest x-ray, PET scan, etc.), and sometimes biopsies which are described in [Tests for Kidney Cancer](#)

## Understanding your kidney cancer stage

After looking at your test results, your doctor will tell you the stage of your cancer. The staging system most often used for kidney cancer is the American Joint Committee on Cancer (AJCC) **TNM** system. The TNM system is based on 3 key pieces of information:

- The size of the main (primary) **tumor (T)** and whether it has grown into nearby areas.
- If the cancer has spread to nearby (regional) lymph **nodes (N)**. Lymph nodes are small bean-shaped collections of immune system cells to which cancers often spread first.
- If the cancer has spread (**metastasized**) to other organs (**M**). Kidney cancer can spread almost anywhere in the body, but common sites of spread are the bones, brain, and lungs.

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.

The earliest stage cancers are called stage 0 (carcinoma in situ), and then range from stages I (1) through IV (4). Some of the stages have sub-stages with the letters A, B, and C. The letter X means "cannot be assessed because the information is not available."

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. And within a stage, an earlier letter means a lower stage. Cancers with similar stages tend to have a similar outlook and are often treated in much the same way. Patients with lower stage numbers tend to have a better prognosis.

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 considers the tests done *before* surgery.

Kidney 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. (An explanation of the TNM system also follows the stage table below.)

Stage	Stage grouping	Stage description
I	<b>T1, N0, M0</b>	The tumor is 7 cm across or smaller and is only in the kidney (T1). There is no spread to lymph nodes (N0) or distant organs (M0).
II	<b>T2, N0, M0</b>	The tumor is larger than 7 cm across but is still only in the kidney (T2). There is no spread to lymph nodes (N0) or distant organs (M0).
III	<b>T3, N0, M0</b>	The tumor is growing into a major vein (like the renal vein or the vena cava) or into tissue around the kidney, but it is not growing into the adrenal gland or beyond Gerota's fascia (T3). There is no spread to lymph nodes (N0) or distant organs (M0).
	<b>OR</b>	
	<b>T1 to T3, N1, M0</b>	The main tumor can be any size and may be outside the kidney, but it has not spread beyond Gerota's fascia. The cancer has spread to nearby lymph nodes (N1) but has not spread to distant lymph nodes or other organs (M0).
IV	<b>T4, Any N, M0</b>	The main tumor is growing beyond Gerota's fascia and may be growing into the adrenal gland on top of the kidney (T4). It may or may not have spread to nearby lymph nodes (any N). It has not spread to distant lymph nodes or other organs (M0).
	<b>OR</b>	
	<b>Any T, Any N, M1</b>	The main tumor can be any size and may have grown outside the kidney (any T). It may or may not have spread to nearby lymph nodes (any N). It has spread to distant lymph nodes and/or other organs (M1).

## Explaining the TNM system

### T categories for kidney cancer

**TX:** The primary tumor cannot be assessed (information not available).

**T0:** No evidence of a primary tumor.

**T1:** The tumor is only in the kidney and is no larger than 7 centimeters (cm), or a little less than 3 inches, across.

**T1a:** The tumor is 4 cm (about 1½ inches) across or smaller and is only in the kidney.

**T1b:** The tumor is larger than 4 cm but not larger than 7 cm across and is only in the kidney.

**T2:** The tumor is larger than 7 cm across but is still only in the kidney.

**T2a:** The tumor is more than 7 cm but not more than 10 cm (about 4 inches) across and is only in the kidney.

**T2b:** The tumor is more than 10 cm across and is only in the kidney.

**T3:** The tumor is growing into a major vein or into tissue around the kidney, but it is not growing into the adrenal gland (on top of the kidney) or beyond Gerota's fascia (the fibrous layer that surrounds the kidney and nearby fatty tissue).

**T3a:** The tumor is growing into the main vein leading out of the kidney (renal vein) or into fatty tissue around the kidney.

**T3b:** The tumor is growing into the part of the large vein leading into the heart (vena cava) that is within the abdomen.

**T3c:** The tumor has grown into the part of the vena cava that is within the chest or it is growing into the wall of the vena cava.

**T4:** The tumor has spread beyond Gerota's fascia (the fibrous layer that surrounds the kidney and nearby fatty tissue). The tumor may have grown into the adrenal gland (on top of the kidney).

### N categories for kidney cancer

**NX:** Regional (nearby) lymph nodes cannot be assessed (information not available).

**N0:** No spread to nearby lymph nodes.

**N1:** Tumor has spread to nearby lymph nodes.

### **M categories for kidney cancer**

**M0:** There is no spread to distant lymph nodes or other organs.

**M1:** Distant metastasis is present; includes spread to distant lymph nodes and/or to other organs. Kidney cancer most often spreads to the lungs, bones, liver, or brain.

### **Other staging and prognostic systems**

The TNM staging system is useful, but some doctors have pointed out that there are factors other than the extent of the cancer that should be considered when determining prognosis and treatment.

#### **University of California Los Angeles (UCLA) Integrated Staging System**

This is a more complex system that came out in 2001. It was meant to improve upon the AJCC staging that was then in place. Along with the stage of the cancer, it takes into account a person's overall health and the [Fuhrman grade](#) of the tumor. These factors are combined to put people into low-, intermediate-, and high-risk groups. Ask your doctor if he or she uses this system and how it might apply to you.

#### **Survival predictors**

The stage of the cancer is an important predictor of survival, but other factors are also important. For example, researchers have linked certain factors with shorter survival times in people with kidney cancer that has spread outside the kidney. These include:

- High blood lactate dehydrogenase (LDH) level
- High blood calcium level
- Anemia (low red blood cell count)
- Cancer spread to 2 or more distant sites
- Less than a year from diagnosis to the need for systemic treatment ([targeted therapy](#)<sup>1</sup>, [immunotherapy](#)<sup>2</sup>, or [chemotherapy](#)<sup>3</sup>)
- Poor performance status (a measure of how well a person can do normal daily

activities)

People with none of the above factors are considered to have a good prognosis; 1 or 2 factors are considered intermediate prognosis, and 3 or more of these factors are considered to have a poor prognosis and may be less likely to benefit from certain treatments.

## Hyperlinks

1. [www.cancer.org/cancer/kidney-cancer/treating/targeted-therapy.html](http://www.cancer.org/cancer/kidney-cancer/treating/targeted-therapy.html)
2. [www.cancer.org/cancer/kidney-cancer/treating/immunotherapy.html](http://www.cancer.org/cancer/kidney-cancer/treating/immunotherapy.html)
3. [www.cancer.org/cancer/kidney-cancer/treating/chemotherapy.html](http://www.cancer.org/cancer/kidney-cancer/treating/chemotherapy.html)

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# Survival Rates for Kidney Cancer

Survival rates can give you an idea of what percentage of people with the same type and stage of cancer are still alive a certain amount of time (usually 5 years) after they were diagnosed. They can't tell you how long you will live, but they may help give you a better understanding of how likely it is that your treatment will be successful.

**Keep in mind that survival rates are estimates and are often based on previous outcomes of large numbers of people who had a specific cancer, but they can't predict what will happen in any particular person's case. These statistics can be confusing and may lead you to have more questions. Talk with your doctor about how these numbers may apply to you, as he or she is familiar with your situation.**

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

A **relative survival rate** compares people with the same type and stage of kidney cancer to people in the overall population. For example, if the **5-year relative survival rate** for a specific stage of kidney cancer is 80%, it means that people who have that cancer are, on average, about 80% as likely as people who don't have that cancer to live for at least 5 years after being diagnosed.

## Where do these numbers come from?

The American Cancer Society relies on information from the SEER\* database, maintained by the National Cancer Institute (NCI), to provide survival statistics for different types of cancer.

The SEER database tracks 5-year relative survival rates for kidney cancer in the United States, based on how far the cancer has spread. The SEER database, however, does not group cancers by [AJCC TNM stages](#) (stage 1, stage 2, stage 3, etc.). Instead, it groups cancers into localized, regional, and distant stages:

- **Localized:** There is no sign that the cancer has spread outside of the kidney. This includes AJCC stage I and II cancers.
- **Regional:** The cancer has spread outside the kidney to nearby structures or lymph nodes. This includes stage III and some stage IV cancers in the AJCC system.
- **Distant:** Includes cancers that have spread to distant parts of the body such as the lungs, brain, or bones. This includes most stage IV cancers.

## 5-year relative survival rates for kidney cancer

(Based on people diagnosed with cancers of the kidney (or renal pelvis) between 2008 and 2014.)

SEER stage	5-year relative survival rate
Localized	93%
Regional	69%
Distant	12%
All SEER stages combined	75%

### Understanding the numbers

- **People now being diagnosed with kidney cancer may have a better outlook than these numbers show.** Treatments improve over time, and these numbers are based on people who were diagnosed and treated at least five years earlier.
- **These numbers apply only to the stage of the cancer when it is first diagnosed.** They do not apply later on if the cancer grows, spreads, or comes back after treatment.
- **These numbers don't take everything into account.** Survival rates are grouped based on how far the cancer has spread, but your age, overall health, how well the cancer responds to treatment, and other factors will also affect your outlook.

\*SEER = Surveillance, Epidemiology, and End Results

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submission, posted to the SEER web site, April 2018.

Last Medical Review: August 1, 2017 Last Revised: January 31, 2019

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## What Should You Ask Your Doctor About Kidney Cancer?

It's important to have honest, open discussions with your cancer care team. They want to answer all your questions, so that you can make informed treatment and life decisions. For instance, consider these questions:

### When you're told you have kidney cancer

- What type of kidney cancer do I have?
- Where is the cancer located?
- Has the cancer spread beyond where it started?
- What is the [cancer's stage \(extent\)](#), and what does that mean?
- Will I need other [tests](#) before we can decide on treatment?
- Do I need to see any other doctors or health professionals?
- If I'm concerned about the costs and insurance coverage for my diagnosis and treatment, who can help me?

### When deciding on a treatment plan

- What are my [treatment options](#)<sup>1</sup>?
- What do you recommend and why?
- How much experience do you have treating this type of cancer?
- Should I get a second opinion? How do I do that? Can you recommend someone?

- What would the goal of the treatment be?
- How quickly do we need to decide on treatment? What should I do to be ready for treatment?
- How long will treatment last? What will it be like? Where will it be done?
- What risks or side effects are there to the treatments you suggest? Are there things I can do to reduce these side effects?
- How might treatment affect my daily activities? Can I still work full time?
- What are the chances the cancer will recur (come back) with these treatment plans?
- What will we do if the treatment doesn't work or if the cancer recurs?
- What if I have trouble getting to and from my treatments because of transportation problems?

## During treatment

Once treatment begins, you'll need to know what to expect and what to look for. Not all of these questions may apply to you, but asking the ones that do may be helpful.

- How will we know if the treatment is working?
- Is there anything I can do to help manage [side effects](#)<sup>2</sup>?
- What symptoms or side effects should I tell you about right away?
- How can I reach you on nights, holidays, or weekends?
- Do I need to change what I eat during treatment?
- Are there any limits on what I can do?
- Can I exercise during treatment? If so, what kind of exercise should I do, and how often?
- Can you suggest a mental health professional I can see if I start to feel overwhelmed, depressed, or distressed?
- What if I need some social support during treatment because my family lives far away?

## After treatment

- Do I need a special diet after treatment?
- Are there any limits on what I can do?
- What other symptoms should I watch for?

- What kind of exercise should I do now?
- What type of [follow-up](#)<sup>3</sup> will I need after treatment?
- How often will I need to have follow-up exams and imaging tests?
- Will I need any blood tests?
- How will we know if the cancer has come back? What should I watch for?

Along with these sample questions, be sure to write down some of your own. For instance, you might want more information about recovery times so you can plan your work or activity schedule. You might also want to ask about [clinical trials](#)<sup>4</sup> for which you may qualify.

Keep in mind that doctors are not the only ones who can provide you with information. Other health care professionals, such as nurses and social workers, may have the answers to some of your questions. You can find more information about communicating with your health care team in [The Doctor-Patient Relationship](#)<sup>5</sup>.

## Hyperlinks

1. [www.cancer.org/cancer/kidney-cancer/treating.html](http://www.cancer.org/cancer/kidney-cancer/treating.html)
2. [www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects.html](http://www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects.html)
3. [www.cancer.org/cancer/kidney-cancer/after-treatment/follow-up.html](http://www.cancer.org/cancer/kidney-cancer/after-treatment/follow-up.html)
4. [www.cancer.org/treatment/treatments-and-side-effects/clinical-trials.html](http://www.cancer.org/treatment/treatments-and-side-effects/clinical-trials.html)
5. [www.cancer.org/treatment/understanding-your-diagnosis/talking-about-cancer/the-doctor-patient-relationship.html](http://www.cancer.org/treatment/understanding-your-diagnosis/talking-about-cancer/the-doctor-patient-relationship.html)

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# Kidney Cancer Treatment

## Local treatments

Some treatments are called *local therapies*, meaning they treat the tumor without affecting the rest of the body. These treatments are more likely to be useful for earlier stage (less advanced) cancers, although they might also be used in some other situations.

- [Surgery for Kidney Cancer](#)
- [Ablation and Other Local Therapy for Kidney Cancer](#)
- [Active Surveillance for Kidney Cancer](#)
- [Radiation Therapy for Kidney Cancer](#)

## Systemic treatments

Kidney cancer can also be treated using drugs, which can be given by mouth or directly into the bloodstream. These are called *systemic therapies* because they can reach cancer cells almost anywhere in the body. Depending on the type of kidney cancer, several different types of drugs might be used.

- [Targeted Therapies for Kidney Cancer](#)
- [Immunotherapy for Kidney Cancer](#)
- [Chemotherapy for Kidney Cancer](#)

## Common treatment approaches

Depending on the [stage of the cancer](#)<sup>1</sup> and other factors, different types of treatment may be combined at the same time or used after one another. Some of these treatments can also be used as palliative treatment when all the cancer cannot be

removed. [Palliative treatment](#)<sup>2</sup> is meant to relieve symptoms, such as pain, but it is not expected to cure the cancer.

- [Treatment Choices by Stage for Kidney Cancer](#)

## Who treats kidney cancer?

Doctors on your cancer treatment team might include:

- A **urologist**: a doctor who specializes in treating diseases of the urinary system (and male reproductive system)
- A **radiation oncologist**: a doctor who treats cancer with radiation therapy
- A **medical oncologist**: a doctor who treats cancer with medicines such as chemotherapy or targeted therapy

You might have many other specialists on your treatment team as well, including physician assistants (PAs), nurse practitioners (NPs), nurses, psychologists, nutritionists, social workers, and other health professionals.

- [Health Professionals Associated With Cancer Care](#)<sup>3</sup>

## Making treatment decisions

It's important to discuss all treatment options, including their goals and possible side effects, with your doctors to help make the decision that best fits your needs. You may feel that you need to make a decision quickly, but it's important to give yourself time to absorb the information you have learned. Ask your cancer care team questions.

If time permits, it is often a good idea to seek a second opinion. A second opinion can give you more information and help you feel more confident about the treatment plan you choose.

- [What Should You Ask Your Doctor About Kidney Cancer?](#)<sup>4</sup>
- [Seeking a Second Opinion](#)<sup>5</sup>

## Thinking about taking part in a clinical trial

Clinical trials are carefully controlled research studies that are done to get a closer look at promising new treatments or procedures. Clinical trials are one way to get state-of-

the art cancer treatment. In some cases they may be the only way to get access to newer treatments. They are also the best way for doctors to learn better methods to treat cancer. Still, they're not right for everyone.

If you would like to learn more about clinical trials that might be right for you, start by asking your doctor if your clinic or hospital conducts clinical trials.

- [Clinical Trials](#)<sup>6</sup>

### **Considering complementary and alternative methods**

You may hear about alternative or complementary methods that your doctor hasn't mentioned to treat your cancer or relieve symptoms. These methods can include vitamins, herbs, and special diets, or other methods such as acupuncture or massage, to name a few.

Complementary methods refer to treatments that are used along with your regular medical care. Alternative treatments are used instead of a doctor's medical treatment. Although some of these methods might be helpful in relieving symptoms or helping you feel better, many have not been proven to work. Some might even be harmful.

Be sure to talk to your cancer care team about any method you are thinking about using. They can help you learn what is known (or not known) about the method, which can help you make an informed decision.

- [Complementary and Alternative Medicine](#)<sup>7</sup>

### **Help getting through cancer treatment**

Your cancer care team will be your first source of information and support, but there are other resources for help when you need it. Hospital- or clinic-based support services are an important part of your care. These might include nursing or social work services, financial aid, nutritional advice, rehab, or spiritual help.

The American Cancer Society also has programs and services – including rides to treatment, lodging, and more – to help you get through treatment. Call our National Cancer Information Center at 1-800-227-2345 and speak with one of our trained specialists.

- [Find Support Programs and Services in Your Area](#)<sup>8</sup>

## Choosing to stop treatment or choosing no treatment at all

For some people, when treatments have been tried and are no longer controlling the cancer, it could be time to weigh the benefits and risks of continuing to try new treatments. Whether or not you continue treatment, there are still things you can do to help maintain or improve your quality of life.

Some people, especially if the cancer is advanced, might not want to be treated at all. There are many reasons you might decide not to get cancer treatment, but it's important to talk to your doctors and you make that decision. Remember that even if you choose not to treat the cancer, you can still get supportive care to help with pain or other symptoms.

- [If Cancer Treatments Stop Working](#)<sup>9</sup>
- [Palliative or Supportive Care](#)<sup>10</sup>

*The treatment information given here is not official policy of the American Cancer Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor. Your doctor may have reasons for suggesting a treatment plan different from these general treatment options. Don't hesitate to ask him or her questions about your treatment options.*

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## Surgery for Kidney Cancer

Surgery is the main treatment for most kidney cancers. The chances of surviving kidney cancer without having surgery are small.

Even people whose cancer has spread to other organs may benefit from surgery to take out the kidney tumor. Removing the kidney containing the cancer can help some people live longer, so a doctor may suggest surgery even if the cancer has spread beyond the kidney. Kidney removal can also be used to ease symptoms such as pain and bleeding.

Depending on the stage and location of the cancer and other factors, surgery might be done to remove either the cancer along with some of the surrounding kidney tissue (known as a *partial nephrectomy*), or the entire kidney (known as a *radical nephrectomy*). The adrenal gland (the small gland that sits on top of each kidney) and



fatty tissue around the kidney is sometimes removed as well.

## Radical nephrectomy

In this operation, the surgeon removes your whole kidney, the attached adrenal gland, nearby lymph nodes, and the fatty tissue around the kidney. Most people do just fine with only one working kidney.

The surgeon can make the incision in several places. The most common sites are the middle of the abdomen (belly), under the ribs on the same side as the cancer, or in the back, just behind the kidney. Each approach has its advantages in treating cancers of different sizes and in different parts of the kidney. Although removing the adrenal gland is a part of a standard radical nephrectomy, the surgeon may be able to leave it behind in some cases where the cancer is in the lower part of the kidney and is far away from the adrenal gland.

If the tumor has grown from the kidney through the renal vein (the vein leading away from the kidney) and into the inferior vena cava (the large vein that empties into the heart), the heart may need to be stopped for a short time in order to remove the tumor. The patient is put on cardiopulmonary bypass (a heart-lung machine) that circulates the blood while bypassing the heart. If you need this, a heart surgeon will work with your urologist during your operation.

### **Laparoscopic nephrectomy and robotic-assisted laparoscopic nephrectomy:**

These newer approaches to the operation are done through several small incisions instead of one large one. If a radical nephrectomy is needed, many doctors and patients now prefer these approaches when they can be used.

For a laparoscopic nephrectomy, special long instruments are inserted through the incisions, each of which is about 1/2-inch (1.27cm) long, to remove the kidney. One of the instruments, the laparoscope, is a long tube with a small video camera on the end. This lets the surgeon see inside the abdomen. Usually, one of the incisions has to be made longer in order to remove the kidney (although it's not as long as the incision for a standard nephrectomy).

A newer approach is to do the laparoscopic surgery remotely using a robotic system. The surgeon sits at a panel near the operating table and controls robotic arms to perform the operation. For the surgeon, the robotic system may provide more maneuverability and more precision when moving the instruments than standard laparoscopic surgery. But the most important factor in the success of either type of laparoscopic surgery is the surgeon's experience and skill. This is a difficult approach to

learn. If you are considering this type of operation, be sure to find a surgeon with a lot of experience.

The laparoscopic approach can be used to treat most renal tumors that cannot be treated with nephron-sparing surgery (see below). In experienced hands, the technique is as effective as a standard (open) radical nephrectomy and usually results in a shorter hospital stay, a faster recovery, and less pain after surgery. This approach may not be an option for tumors larger than about 10 cm (4 inches) across or tumors that have grown into the renal vein or spread to lymph nodes around the kidney.

### **Partial nephrectomy (nephron-sparing surgery)**

In this procedure, the surgeon removes only the part of the kidney that contains cancer, leaving the rest of the kidney behind. As with a radical nephrectomy, the surgeon can make the incision in several places, depending on factors like the location of the tumor.

Partial nephrectomy is now the preferred treatment for many people with early stage kidney cancer. It is often done to remove single small tumors (less than 4 cm across), and can also be done to remove larger tumors (up to 7 cm across). Studies have shown the long-term results to be about the same as when the whole kidney is removed. The obvious benefit is that the patient keeps more of their kidney function.

A partial nephrectomy might not be an option if the tumor is in the middle of the kidney or is very large, if there is more than one tumor in the same kidney, or if the cancer has spread to the lymph nodes or distant organs. Not all doctors can do this type of surgery. It should only be done by someone with a lot of experience.

**Laparoscopic partial nephrectomy and robotic-assisted laparoscopic partial nephrectomy:** Many doctors now do partial nephrectomies laparoscopically or using a robot (as described above). But again, this is a difficult operation, and it should only be done by a surgeon with a great deal of experience.

### **Regional lymphadenectomy (lymph node dissection)**

This procedure removes nearby lymph nodes to see if they contain cancer. Some doctors do this when doing a radical nephrectomy. The number of lymph nodes removed may be more extensive if the tumor has characteristics suggesting it has a high risk to spread.

Most doctors agree that the lymph nodes should be removed if they look enlarged on imaging tests or feel abnormal during the operation. Some doctors also remove these

lymph nodes to check them for cancer spread even when they aren't enlarged, in order to better stage the cancer. Before surgery, ask your doctor if they plan to remove the lymph nodes near the kidney.

## Removal of an adrenal gland (adrenalectomy)

Although this is a standard part of a radical nephrectomy, if the cancer is in the lower part of the kidney (away from the adrenal gland) and imaging tests show the adrenal gland is not affected, it may not have to be removed. Just like with lymph node removal, this is decided on an individual basis and should be discussed with the doctor before surgery.

## Removal of metastases

In about 1 in 4 people with kidney cancer, the cancer will already have spread (metastasized) to other parts of the body when it is diagnosed. The lungs, lymph nodes, bones, and liver are the most common sites of spread. For some people, surgery may still be helpful.

**Attempts at curative surgery:** In rare cases where there is only a single metastasis or if there are only a few that can be removed easily without causing serious side effects, surgery may lead to long-term survival in some people.

The metastasis may be removed at the same time as a radical nephrectomy or at a later time if the cancer recurs (comes back).

**Surgery to relieve symptoms (palliative surgery):** When other treatments aren't helpful, surgically removing the metastases can sometimes relieve pain and other symptoms, although this usually does not help people live longer.

## Risks and side effects of surgery

The short-term risks of any type of surgery include reactions to anesthesia, excess bleeding (which might require blood transfusions), blood clots, and infections. Most people will have at least some pain after the operation, which can usually be helped with pain medicines, if needed.

Other possible risks of surgery include:

- Damage to internal organs and blood vessels (such as the spleen, pancreas, aorta,

- vena cava, large or small bowel) during surgery
- Pneumothorax (unwanted air in the chest cavity)
- Incisional hernia (bulging of internal organs near the surgical incision due to problems with wound healing)
- Leakage of urine into the abdomen (after partial nephrectomy)
- Kidney failure (if the remaining kidney fails to function well)

For more general information about surgery as a treatment for cancer, see [Cancer Surgery](#)<sup>1, 2</sup>.

## Hyperlinks

1. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/surgery.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/surgery.html)
2. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/surgery.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/surgery.html)

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## Ablation and Other Local Therapy for Kidney Cancer

Whenever possible, [surgery](#) is the main treatment for kidney cancers that can be removed. But for people who are too sick to have surgery, other approaches can sometimes be used to destroy kidney tumors. They might be helpful for some people, but there is much less data on how well they work over time than there is for surgery, so they are not yet considered a standard treatment.

### Cryotherapy (cryoablation)

This approach uses extreme cold to destroy the tumor. A hollow probe (needle) is inserted into the tumor either through the skin (percutaneously) or during laparoscopy (see [Surgery for Kidney Cancer](#)). Very cold gases are passed through the probe, creating an ice ball at its tip that destroys the tumor. To be sure the tumor is destroyed without too much damage to nearby tissues, the doctor carefully watches images of the tumor during the procedure (with ultrasound) or measures tissue temperature.

The type of anesthesia used for cryotherapy depends on how the procedure is being done. Possible side effects include bleeding and damage to the kidneys or other nearby organs.

### Radiofrequency ablation (RFA)

This technique uses high-energy radio waves to heat the tumor. A thin, needle-like probe is placed through the skin and advanced until the end is in the tumor. Placement of the probe is guided by ultrasound or CT scans. Once it is in place, an electric current is passed through the tip of the probe, which heats the tumor and destroys the cancer cells.

RFA is usually done as an outpatient procedure, using local anesthesia (numbing medicine) where the probe is inserted. You may be given medicine to help you relax as well.

Major complications are uncommon, but they can include bleeding and damage to the kidneys or other nearby organs.

## Arterial embolization

This technique is used to block the artery that feeds the kidney that has the tumor. A small catheter (tube) is placed in an artery in the inner thigh and is moved up until it reaches the renal artery going from the aorta to the kidney. Material is then injected into the artery to block it, cutting off the kidney's blood supply. This will cause the kidney (and the tumor in it) to die.

Although this procedure is not used very often, it is sometimes done before a [radical nephrectomy](#) to reduce bleeding during the operation or in patients who have persistent bleeding from the kidney tumor.

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## Active Surveillance for Kidney Cancer

One option for some people with small kidney tumors (less than 4 cm[about 1½ inches]), may be to give no treatment at first and watch the tumor carefully to see if it grows. The tumor is removed (or treated another way) if it grows quickly or gets larger than 4 cm.

This approach is most often used for elderly or frail patients as it avoids the risks of treatment, such as surgery or ablation. Often, a biopsy is done before deciding to watch the tumor to see if the growth is really cancer. Some of these small tumors turn out not to be cancers at all. Watching them closely for a time helps doctors decide which tumors are more likely to be cancer based on their growth.

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## Radiation Therapy for Kidney Cancer

Radiation therapy uses high-energy radiation to kill cancer cells.

Kidney cancers are not very sensitive to radiation, but it is sometimes used if a person is not healthy enough to have [surgery](#). Sometimes [other treatments](#) will be tried first instead. When radiation therapy is used to treat kidney cancer, it is usually *external beam therapy*, which focuses radiation from a source outside the body on the cancer.

For people with kidney cancer, radiation therapy is more often used to *palliate*, or ease, cancer symptoms such as pain, bleeding, or problems caused by cancer spread (especially to the bones or brain).

### Possible side effects

Side effects of radiation therapy depend on where it is aimed and can include skin changes (similar to sunburn) and hair loss where the radiation passes through the skin, nausea, diarrhea, or tiredness. Often these go away after a short while. Radiation may also make side effects from some other treatments worse.

### More information about radiation therapy

To learn more about how radiation is used to treat cancer, see [Radiation Therapy](#)<sup>1</sup>.

To learn about some of the side effects listed here and how to manage them, see [Managing Cancer-related Side Effects](#)<sup>2</sup>.



## Hyperlinks

1. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/radiation.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/radiation.html)
2. [www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects.html](http://www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects.html)

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## Targeted Therapies for Kidney Cancer

As researchers have learned more about the molecular and genetic changes in cells that cause cancer, they have developed newer drugs that target some of these changes. These targeted drugs are different from standard [chemotherapy](#) drugs. They sometimes work when standard chemo drugs don't, and they often have different side effects.

Targeted drugs are proving to be especially important in kidney cancer, where chemotherapy has not been shown to be very effective.

## When might targeted drugs be used?

### Treating advanced kidney cancer

All of the targeted drugs below can be used as to treat advanced kidney cancers. They can often shrink or slow the growth of the cancer for a time, but it doesn't seem that any of these drugs can actually cure kidney cancer.

Targeted drugs are most often used one at a time. If one doesn't work, another can be tried. It's not yet known if any one of these drugs is clearly better than the others, if combining them might be more helpful than giving them one at a time, or if one sequence is better than another. Studies are being done to help answer these questions.

### Adjuvant therapy after surgery

Sunitinib (Sutent) can also be used after [surgery](#) is done to remove the cancer, to help lower the risk that the cancer will come back. This is known as *adjuvant therapy*.

## Which targeted drugs are used to treat kidney cancer?

The targeted drugs used to treat advanced kidney cancer work by blocking angiogenesis (growth of the new blood vessels that nourish cancers) or important proteins in cancer cells (called *tyrosine kinases*) that help them grow and survive. Some targeted drugs affect both.

### Sorafenib (Nexavar)

Sorafenib acts by blocking both angiogenesis and growth-stimulating proteins in the cancer cell itself. Sorafenib does this by blocking several tyrosine kinases that are important for cell growth and survival. It is taken as a pill twice a day.

The most common side effects seen with this drug include fatigue, rash, diarrhea, increases in blood pressure, and redness, pain, swelling, or blisters on the palms of the hands or soles of the feet (hand-foot syndrome).

### Sunitinib (Sutent)

Sunitinib also blocks several tyrosine kinases, similar to the ones blocked by sorafenib. It attacks both blood vessel growth and other targets that help cancer cells grow. This drug is taken as a pill.

The most common side effects are nausea, diarrhea, changes in skin or hair color, mouth sores, weakness, and low white and red blood cell counts. Other possible effects include tiredness, high blood pressure, congestive heart failure, bleeding, hand-foot syndrome, and low thyroid hormone levels.

### **Temsirolimus (Torisel)**

Temsirolimus works by blocking a protein known as *mTOR*, which normally helps cells grow and divide. This drug has been shown to be helpful against advanced kidney cancers that have a poorer prognosis because of certain factors. It is given as an intravenous (IV) infusion, typically once a week.

The most common side effects of this drug include skin rash, weakness, mouth sores, nausea, loss of appetite, fluid buildup in the face or legs, and increases in blood sugar and cholesterol levels. Rarely, more serious side effects have been reported.

### **Everolimus (Afinitor)**

Everolimus also blocks the mTOR protein. It is used to treat advanced kidney cancers after other drugs such as sorafenib or sunitinib have been tried. Everolimus is taken as a pill once a day.

Common side effects of this drug include mouth sores, an increased risk of infections, nausea, loss of appetite, diarrhea, skin rash, feeling tired or weak, fluid buildup (usually in the legs), and increases in blood sugar and cholesterol levels. A less common but serious side effect is lung damage, which can cause shortness of breath or other problems.

### **Bevacizumab (Avastin)**

Bevacizumab is an IV drug that works by slowing the growth of new blood vessels. It may help some people with kidney cancer when used with [interferon-alfa](#).

More common side effects include high blood pressure, tiredness, and headaches. Less common but possibly serious side effects include bleeding, blood clots, holes forming in the intestines, heart problems, and slow wound healing.

### **Pazopanib (Votrient)**

Pazopanib is another drug that blocks several tyrosine kinases involved in cancer cell growth and the formation of new blood vessels in the tumor. It is taken as a pill once a day.

Common side effects include high blood pressure, nausea, diarrhea, headaches, low blood cell counts, and liver problems. It can cause lab test results of liver function to become abnormal, but it rarely leads to severe liver damage that could be life threatening. Problems with bleeding, clotting, and wound healing can occur, as well. In rare cases it can also cause a problem with the heart rhythm or even a heart attack. If you are taking this drug, your doctor will monitor your heart with EKGs as well as check your blood tests to check for liver or other problems.

### **Axitinib (Inlyta)**

Axitinib also inhibits several tyrosine kinases involved in the formation of new blood vessels. It is typically used after at least one other treatment has been tried. Axitinib is taken as a pill twice a day.

Common side effects include high blood pressure, fatigue, nausea and vomiting, diarrhea, poor appetite and weight loss, voice changes, hand-foot syndrome, and constipation. High blood pressure requiring treatment is fairly common, but in a small number of patients it can get high enough to be life-threatening. It can also cause problems with bleeding, clotting, and wound healing. In some patients, lab test results of liver function can become abnormal. Axitinib may also cause the thyroid gland to become underactive, so your doctor will watch your blood levels of thyroid hormone while you are on this drug.

### **Cabozantinib (Cabometyx)**

Cabozantinib is another drug that blocks several tyrosine kinases, including some that help form new blood vessels. It is taken as a pill once a day.

Common side effects include diarrhea, fatigue, nausea and vomiting, poor appetite and weight loss, high blood pressure, hand-foot syndrome, and constipation. Less common but more serious side effects can include serious bleeding, blood clots, very high blood pressure, severe diarrhea, and holes forming in the intestines.

### **Lenvatinib (Lenvima)**

Lenvatinib (Lenvima) is another kinase inhibitor that helps block tumors from forming new blood vessels, as well as targeting some of the proteins in cancer cells that normally help them grow. It is typically used along with everolimus after at least one other treatment has been tried. Lenvatinib is taken as capsules once a day.

Common side effects include diarrhea, fatigue, joint or muscle pain, loss of appetite, nausea and vomiting, mouth sores, weight loss, high blood pressure, and swelling in the arms or legs. Less common but more serious side effects can include serious bleeding, blood clots, very high blood pressure, severe diarrhea, holes forming in the intestines, and kidney, liver, or heart failure.

## More information about targeted therapy

To learn more about how targeted drugs are used to treat cancer, see [Targeted Cancer Therapy](#)<sup>1</sup>.

To learn about some of the side effects listed here and how to manage them, see [Managing Cancer-related Side Effects](#)<sup>2</sup>.

## Hyperlinks

1. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/targeted-therapy.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/targeted-therapy.html)
2. [www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects.html](http://www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects.html)

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## Immunotherapy for Kidney Cancer

The goal of immunotherapy (sometimes called biologic therapy) is to boost the body's immune system to help fight off or destroy cancer cells.

### Cytokines

Cytokines are man-made versions of natural proteins that activate the immune system. The cytokines used most often to treat kidney cancer are interleukin-2 (IL-2) and interferon-alpha. Both cytokines can cause kidney cancers to shrink in a small percentage of patients.

### Interleukin-2 (IL-2)

In the past, IL-2 was commonly used as first-line therapy for advanced kidney cancer, and it may still be helpful for some people. But it can cause serious side effects, so many doctors only use it for people who are healthy enough to withstand the side effects, or for cancers that aren't responding to [targeted drugs](#).

Although only a small percentage of patients respond to IL-2, it is the only therapy that appears to result in long-lasting responses. Doctors are now looking to see if certain

patient and cancer characteristics can help predict if IL-2 will be helpful.

Giving high doses of IL-2 seems to offer the best chance of shrinking the cancer, but this can cause serious side effects, so it is not used in people who are in poor overall health to begin with. Special care is needed to recognize and treat these side effects. Because of this, high-dose IL-2 is only given in the hospital at certain centers that are experienced with giving this type of treatment. IL-2 is given through a vein (IV).

The possible side effects of high-dose IL-2 include:

- Extreme fatigue
- Low blood pressure
- Fluid buildup in the lungs
- Trouble breathing
- Kidney damage
- Heart attacks
- Intestinal bleeding
- Diarrhea or abdominal pain
- High fever and chills
- Rapid heart beat
- Mental changes

These side effects are often severe and, rarely, can be fatal. Only doctors experienced in the use of these cytokines should give this treatment.

## Interferon-alfa

Interferon has less serious side effects than IL-2, but it does not seem to be as effective when used by itself. It is more often used in combination with the [targeted drug bevacizumab \(Avastin\)](#). Interferon is given as a subcutaneous injection (under the skin) usually three times a week.

Common side effects of interferon include flu-like symptoms (fever, chills, muscle aches), fatigue, and nausea.

## Immune checkpoint inhibitors

An important part of the immune system is its ability to keep itself from attacking normal cells in the body. To do this, it uses “checkpoints,” which are molecules on immune cells

that need to be turned on (or off) to start an immune response. Cancer cells sometimes use these checkpoints to avoid being attacked by the immune system. But newer drugs that target these checkpoints hold a lot of promise as cancer treatments.

**Nivolumab (Opdivo)** is a drug that targets PD-1, a protein on immune system cells called *T cells* that normally helps keep these cells from attacking other cells in the body. By blocking PD-1, this drug boosts the immune response against cancer cells. This can shrink some tumors or slow their growth.

This drug can be used for people whose kidney cancer starts growing again after other drug treatments.

For patients with intermediate or poor risk advanced kidney cancer who have not received any treatment, nivolumab can be given with ipilimumab (a CTLA-4 inhibitor) for 4 doses followed by nivolumab alone. This drug combination has been shown to shrink the tumor significantly as well as help people live longer.

Nivolumab is given as an intravenous (IV) infusion, typically every 2 weeks.

### **Possible side effects**

Side effects of immune checkpoint inhibitors can include fatigue, cough, nausea, itching, skin rash, loss of appetite, constipation, joint pain, and diarrhea.

Other, more serious side effects occur less often. These drugs work by basically removing the brakes on the body's immune system. Sometimes the immune system starts attacking other parts of the body, which can cause serious or even life-threatening problems in the lungs, intestines, liver, hormone-making glands (like the thyroid), kidneys, or other organs.

It's very important to report any new side effects to your health care team promptly. If serious side effects do occur, treatment may need to be stopped and you may get high doses of steroids to suppress your immune system and treat the side effects.

### **CTLA-4 inhibitors**

**Ipilimumab (Yervoy)** is another drug that boosts the immune response, but it has a different target. It blocks CTLA-4, another protein on T cells that normally helps keep them in check.

For patients with intermediate or poor risk advanced kidney cancer who have not



received any treatment, ipilimumab can be given with nivolumab (an immune checkpoint inhibitor) for 4 doses followed by nivolumab alone. This drug combination has been shown to shrink the tumor significantly as well as help people live longer.

Ipilimumab is given as an intravenous (IV) infusion, usually once every 3 weeks for 4 treatments.

The most common side effects from Ipilimumab include fatigue, diarrhea, skin rash, and itching.

Like the PD-1 inhibitors, this drug can cause the immune system to attack other parts of the body, which can lead to serious problems in the intestines, liver, hormone-making glands, nerves, skin, eyes, or other organs. In some people these side effects can be life threatening.

It's very important to report any new side effects during or after treatment to your health care team promptly. If serious side effects do occur, you may need to stop treatment and take high doses of corticosteroids to suppress your immune system.

## More information about immunotherapy

To learn more about how targeted drugs are used to treat cancer, see [Cancer Immunotherapy](#)<sup>1</sup>.

To learn about some of the side effects listed here and how to manage them, see [Managing Cancer-related Side Effects](#)<sup>2</sup>.

## Hyperlinks

1. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/immunotherapy.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/immunotherapy.html)
2. [www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects.html](http://www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects.html)

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# Chemotherapy for Kidney Cancer

Chemotherapy (chemo) uses anti-cancer drugs that are given into a vein (IV) or taken by mouth (as pills). These drugs enter your blood and reach nearly all areas of the body, which makes this treatment potentially useful for cancer that has spread (metastasized) to organs beyond the kidney.

Unfortunately, kidney cancer cells usually do not respond well to chemo, so chemo is not a standard treatment for kidney cancer. Some chemo drugs, such as vinblastine, floxuridine, 5-fluorouracil (5-FU), capecitabine, and gemcitabine have been shown to help a small number of patients. Still, chemo is often only used for kidney cancer after [targeted drugs](#) and/or [immunotherapy](#) have already been tried.

Doctors give chemotherapy in cycles, with each period of treatment followed by a rest period to allow the body time to recover. Chemo cycles generally last a few weeks.

## Possible side effects of chemotherapy

Chemo drugs attack cells that are dividing quickly, which is why they often work against cancer cells. But other cells in the body, such as those in the bone marrow (where new blood cells are made), the lining of the mouth and intestines, and the hair follicles, also divide quickly. These cells are also likely to be affected by chemo, which can lead to certain side effects.

The side effects of chemo depend on the type of drugs, the amount taken, and the length of treatment. Possible side effects can include:

- Hair loss
- Mouth sores
- Loss of appetite
- Nausea and vomiting
- Diarrhea or constipation
- Increased chance of infections (due to low white blood cell counts)
- Easy bruising or bleeding (due to low blood platelet counts)
- Fatigue (due to low red blood cell counts)

These side effects usually go away after treatment is finished. There are often ways to prevent or lessen them. For example, drugs can be given to help prevent or reduce nausea and vomiting. Specific chemo drugs may each cause specific side effects. Ask

your health care team about the side effects your chemo drugs may cause.

## More information about chemotherapy

For more general information about how chemotherapy is used to treat cancer, see [Chemotherapy](#)<sup>1</sup>.

To learn about some of the side effects listed here and how to manage them, see [Managing Cancer-related Side Effects](#)<sup>2</sup>.

## Hyperlinks

1. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/chemotherapy.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/chemotherapy.html)
2. [www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects.html](http://www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects.html)

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# Treatment Choices by Stage for Kidney Cancer

The type of treatment(s) your doctor recommends will depend on the [stage](#)<sup>1</sup> of the cancer and on your overall health. This section sums up the options usually considered for each stage of kidney cancer.

## Stages I, II, or III

Stage I and II cancers are still contained within the kidney. Stage III cancers have either grown into nearby large veins or have spread to nearby lymph nodes.

These cancers are usually removed with [surgery](#) when possible. There are two common approaches:

- Partial nephrectomy (removing part of the kidney). This is often the treatment of choice in tumors up to 7 cm (a little less than 3 inches) if it can be done.
- Radical nephrectomy (removing the entire kidney).

The lymph nodes near the kidney may be removed as well, especially if they are enlarged.

If the cancer has grown into nearby veins (as with some stage III cancers), your surgeon may need to cut open these veins to remove all of the cancer. This may require putting you on bypass (a heart-lung machine), so that the heart can be stopped for a short time to remove the cancer from the large vein leading to the heart.

After surgery, some people at high risk of the cancer returning might be helped by getting the [targeted drug](#) sunitinib (Sutent) for about a year, which can help lower this risk. Treatment given after surgery is known as *adjuvant therapy*. Sunitinib can have side effects, so it's important to talk to your doctor about the benefits and risks. [Clinical trials](#)<sup>2</sup> are also looking at other adjuvant treatments for kidney cancer. Ask your doctor if you are interested in learning more about adjuvant therapies being studied in clinical trials.

If you cannot have kidney surgery because of other serious medical problems, you might benefit from [other local treatments](#) such as cryotherapy, radiofrequency ablation, or arterial embolization. Radiation therapy may be another option. These treatments are

generally only given when surgery can't be done. Although these types of treatments can have similar outcomes to surgery as far as the chances of the cancer spreading to other parts of the body, some studies show the cancer might be more likely to come back in the same area.

[Active surveillance](#) is another option for some people with small kidney tumors. With active surveillance, the tumor is watched closely (with CTs or ultrasounds) and only treated if it grows.

## Stage IV

Stage IV kidney cancer means the cancer has grown outside of the kidney or has spread to other parts of the body such as distant lymph nodes or other organs.

Treatment of stage IV kidney cancer depends on how extensive the cancer is and on the person's general health. In some cases, [surgery](#) may still be a part of treatment.

In rare cases where the main tumor appears to be removable and the cancer has only spread to one other area (such as to one or a few spots in the lungs), surgery to remove both the kidney and the metastasis (the outside area of cancer spread) may be an option if a person is in good enough health. Otherwise, treatment with one of the [targeted therapies](#) is usually the first option.

If the main tumor is removable but the cancer has spread extensively elsewhere, removing the kidney may still be helpful. This would likely be followed by systemic therapy, which might consist of one of the targeted therapies or [immunotherapy](#) (interleukin-2). More often targeted therapy is used first. It's not clear if any one of the targeted therapies or any particular sequence is better than another, although temsirolimus appears to be most helpful for people with kidney cancers that have a poorer prognosis (outlook).

For cancers that can't be removed surgically (because of the extent of the tumor or the person's health), first-line treatment is likely to be one of the targeted therapies or cytokine therapy.

Because advanced kidney cancer is very hard to cure, [clinical trials](#)<sup>3</sup> of new combinations of targeted therapies, immunotherapy, or other new treatments are also options.

For some people, palliative treatments such as [embolization](#) or [radiation therapy](#) may be the best option. A special form of radiation therapy called *stereotactic radiosurgery*

can be very effective in treating single brain metastases. Surgery or radiation therapy can also be used to help reduce pain or other symptoms of metastases in some other places, such as the bones. You can read more about palliative treatment for cancer in [Palliative \(Supportive\) Care](#)<sup>4</sup> or in [Advanced Cancer, Metastatic Cancer, and Bone Metastasis](#)<sup>5</sup>.

Having your [pain controlled](#)<sup>6</sup> can help you maintain your quality of life. Medicines to relieve pain do not interfere with your other treatments, and controlling pain will often help you be more active and continue your daily activities.

## Recurrent cancer

Cancer is called *recurrent* when it come backs after treatment. Recurrence can be local (near the area of the initial tumor) or it may be in distant organs. Treatment of kidney cancer that comes back (recurs) after initial treatment depends on where it recurs and what treatments have been used, as well as a person's health and wishes for further treatment.

### Local recurrence

For cancers that recur after initial surgery, further surgery might be an option. Otherwise, treatment with targeted therapies or immunotherapy will probably be recommended. Clinical trials of new treatments are an option as well.

### Distant recurrence

Kidney cancer that recurs in distant parts of the body is treated like a stage IV cancer. Your options depend on which, if any, drugs you received before the cancer came back and how long ago you received them, as well as on your health.

For cancers that progress (continue to grow or spread) during treatment with targeted therapy or cytokine therapy, another type of targeted therapy or immunotherapy may be helpful. If these don't work, [chemotherapy](#) may be tried, especially for people with non-clear cell types of renal cell cancer. Recurrent cancers can sometimes be hard to treat, so you might also want to ask your doctor about [clinical trials](#)<sup>7</sup> of newer treatments.

For some people with recurrent kidney cancer, palliative treatments such as embolization or radiation therapy may be the best option. Controlling symptoms such as [pain](#)<sup>8</sup> is an important part of treatment at any stage of the disease.

For more information see [Understanding Recurrence](#)<sup>9</sup>.

*The treatment information given here is not official policy of the American Cancer Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor. Your doctor may have reasons for suggesting a treatment plan different from these general treatment options. Don't hesitate to ask him or her questions about your treatment options.*

## Hyperlinks

1. [www.cancer.org/cancer/kidney-cancer/detection-diagnosis-staging/staging.html](http://www.cancer.org/cancer/kidney-cancer/detection-diagnosis-staging/staging.html)
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# After Kidney Cancer Treatment

## Living as a Cancer Survivor

For many people, cancer treatment often raises questions about next steps as a survivor.

- [Living as a Kidney Cancer Survivor](#)

## Cancer Concerns After Treatment

Treatment may remove or destroy the cancer, but it is very common to worry about the risk of another cancer, the cancer coming back, or treatment no longer working.

- [Second Cancers After Kidney Cancer](#)

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# Living as a Kidney Cancer Survivor

For some people with kidney cancer, treatment can remove or destroy the cancer. The end of treatment can be both stressful and exciting. You may be relieved to finish treatment, but yet it's hard not to worry about cancer coming back. This is very common if you've had cancer.

For other people, the kidney cancer might never go away completely. Some people may get regular treatment with chemotherapy or targeted therapy or other treatments to try and help keep the cancer in check. Learning to live with cancer that does not go away

can be difficult and very stressful.

Life after kidney cancer means returning to some familiar things and also making some new choices.

## **Ask your doctor for a survivorship care plan**

Talk with your doctor about developing a survivorship care plan for you. This plan might include:

- A suggested schedule for follow-up exams and tests
- A schedule for other tests you might need in the future, such as early detection (screening) tests for other types of cancer, or tests to look for long-term health effects from your cancer or its treatment
- A list of possible late- or long-term side effects from your treatment, including what to watch for and when you should contact your doctor
- Diet and physical activity suggestions
- Reminders to keep your appointments with your primary care provider (PCP), who will monitor your general health care

## **Follow-up care**

Even if you have completed treatment, you will likely have follow-up visits with your doctor for many years. It's very important to go to all your follow-up appointments. During these visits, your doctors will ask if you are having any problems and may do exams and lab tests or imaging tests to look for signs of cancer or treatment side effects.

Some treatment side effects might last a long time or might not even show up until years after you have finished treatment. Your doctor visits are a good time to ask questions and talk about any changes or problems you notice or concerns you have. It's very important to report any new symptoms to the doctor right away.

To some extent, the frequency of follow up visits and tests will depend on the stage of your cancer, the treatment you received, and the chance of it coming back.

Survivors of kidney cancer should also follow the [American Cancer Society guidelines for the early detection of cancer](#)<sup>1</sup>, such as those for breast, cervical, lung, and prostate cancer.

## Keeping health insurance and copies of your medical records

Even after treatment, it's very important to keep health insurance. Tests and doctor visits cost a lot, and even though no one wants to think of their cancer coming back, this could happen.

At some point after your cancer treatment, you might find yourself seeing a new doctor who doesn't know about your medical history. It's important to keep copies of your medical records to give your new doctor the details of your diagnosis and treatment. Learn more in [Keeping Copies of Important Medical Records<sup>2</sup>](#).

## Can I lower my risk of kidney cancer coming back?

Most people want to know if there are specific lifestyle changes they can make to reduce their risk of cancer coming back. Unfortunately, for most cancers there is little solid evidence to guide people. This doesn't mean that nothing will help – it's just that for the most part this is an area that hasn't been well studied. Most studies have looked at lifestyle changes as ways of preventing cancer in the first place, not slowing it down or keeping it from coming back.

At this time, not enough is known about kidney cancer to say for sure if there are things you can do that will be helpful. Adopting healthy behaviors such as not smoking, eating well, being active, and staying at a healthy weight may help, but no one knows for sure. Still, we do know that these types of changes can have positive effects on your health that can extend beyond your risk of kidney cancer or other cancers.

## Lifestyle Changes After Cancer of the Kidney

You can't change the fact that you have had cancer. What you can change is how you live the rest of your life – making choices to help you stay healthy and feel as well as you can. This can be a time to look at your life in new ways. Maybe you are thinking about how to improve your health over the long term. Some people even start during cancer treatment.

### Making healthier choices

For many people, a diagnosis of cancer helps them focus on their health in ways they may not have thought much about in the past. Are there things you could do that might make you healthier? Maybe you could try [to eat better or get more exercise<sup>3</sup>](#). Maybe you could cut down on [alcohol<sup>4</sup>](#), or [give up tobacco<sup>5</sup>](#). Even things like keeping your

stress level under control may help. Now is a good time to think about making changes that can have positive effects for the rest of your life. You will feel better and you will also be healthier.

You can start by working on those things that worry you most. Get help with those that are harder for you. For instance, if you are [thinking about quitting smoking and need help](#)<sup>6</sup>, call the American Cancer Society at 1-800-227-2345.

## Eating better

Eating right can be hard for anyone, but it can get even tougher during and after cancer treatment. Treatment may change your sense of taste. Nausea can be a problem. You may not feel like eating and lose weight when you don't want to. Or you may have gained weight that you can't seem to lose. All of these things can be very frustrating.

**During treatment:** Many people lose weight or have taste problems during treatment. If this happens to you, do the best you can. Eat whatever appeals to you. Eat what you can, when you can. Now is not the time to restrict your diet. You may find it helps to eat small portions every 2 to 3 hours. Try to keep in mind that these problems usually improve over time. You may want to ask your cancer team about seeing a dietitian, an expert in nutrition who can give you ideas on how to optimize your weight and diet during treatment.

**After treatment:** One of the best things you can do after cancer treatment is put healthy eating habits into place. You may be surprised at the long-term benefits of some simple changes.

To help maintain good health, survivors should:

- Get to and stay at a healthy weight
- Keep physically active
- Eat a healthy diet, with an emphasis on plant foods
- Limit alcohol to no more than 1 drink per day for women or 2 drinks per day for men

These steps may also lower the risk of some cancers, as well as having many other health benefits.

For more information, see [Nutrition and Physical Activity During and After Cancer Treatment: Answers to Common Questions](#)<sup>7</sup>.

## Rest, fatigue, and exercise

Extreme tiredness, called *fatigue*, is very common in people treated for cancer. This is not a normal tiredness, but a bone-weary exhaustion that often doesn't get better with rest. For some people, fatigue lasts a long time after treatment, and can make it hard for them to be active and do other things they want to do. But exercise can help reduce fatigue. Studies have shown that patients who follow an exercise program tailored to their personal needs feel better physically and emotionally and can cope better, too.

If you were sick and not very active during treatment, it is normal for your fitness, endurance, and muscle strength to decline. Any plan for physical activity should fit your own situation. A person who has never exercised will not be able to take on the same amount of exercise as someone who plays tennis twice a week. If you haven't been active in a few years, you will have to start slowly – maybe just by taking short walks.

Talk with your health care team before starting any exercises. Get their opinion about your exercise plans. Then, try to find an exercise buddy so you're not doing it alone. Having family or friends involved when starting a new activity program can give you that extra boost of support to keep you going when the push just isn't there.

If you are very tired, you will need to balance activity with rest. It is OK to rest when you need to. Sometimes it's hard for people to allow themselves to rest when they are used to working all day or taking care of a household, but this is not the time to push yourself too hard. Listen to your body and rest when you need to. For more information on dealing with fatigue, see [Cancer-related Fatigue](#)<sup>8</sup> and [Anemia in People with Cancer](#)<sup>9</sup>.

Keep in mind exercise can improve your physical and emotional health.

- It improves your cardiovascular (heart and circulation) fitness.
- Along with a good diet, it will help you get to and stay at a healthy weight.
- It makes your muscles stronger.
- It reduces fatigue and helps you have more energy.
- It can help lower anxiety and depression.
- It can make you feel happier.
- It helps you feel better about yourself.

And long term, we know that getting regular physical activity plays a role in helping to lower the risk of some cancers, as well as having other health benefits.

## **If the cancer comes back**

If the cancer does recur at some point, your treatment options will depend on where the

cancer is located, what treatments you've had before, and your health. For more information on how recurrent cancer is treated, see [Treatment Choices by Stage of Kidney Cancer](#)<sup>10</sup>.

For more general information on recurrence, you may also want to see [Understanding Recurrence](#)<sup>11</sup>.

## Could I get a second cancer after kidney cancer treatment?

People who've had kidney cancer can still get other cancers. In fact, kidney cancer survivors are at higher risk for getting another kidney cancer, as well as some other types of cancer. Learn more in [Second Cancers After Kidney Cancer](#).

## Moving on after kidney cancer

Some amount of feeling [depressed, anxious, or worried](#)<sup>12</sup> is normal when kidney cancer is a part of your life. Some people are affected more than others. But everyone can benefit from help and support from other people, whether friends and family, religious groups, support groups, professional counselors, or others.

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## Second Cancers After Kidney Cancer

Cancer survivors can be affected by many health problems, but often their greatest concern is facing cancer again. If a cancer comes back after treatment it is called a recurrence. But some cancer survivors may develop a new, unrelated cancer later. This is called a second cancer. No matter what type of cancer you have had, it is still possible to get another (new) cancer, even after surviving the first.

Unfortunately, being treated for cancer doesn't mean you can't get another cancer. People who have had cancer can still get the same types of cancers that other people get. In fact, certain types of cancer and cancer treatments can be linked to a higher risk of specific second cancers.

Survivors of kidney cancer can get any type of second cancer, but they have an increased risk of:

- A second kidney cancer (this is different than the first cancer coming back)
- [Bladder cancer](#)<sup>1</sup>
- Cancer of the ureter (the tube that connects the kidney to the bladder)
- [Prostate cancer](#)<sup>2</sup>
- [Thyroid cancer](#)<sup>3</sup>
- [Melanoma of the skin](#)<sup>4</sup>

The risk of a second kidney cancer is highest in patients who were diagnosed before age 50.

See [Second Cancers in Adults](#)<sup>5</sup> for more information about causes of second cancers.

## Hyperlinks

1. [www.cancer.org/cancer/bladder-cancer.html](http://www.cancer.org/cancer/bladder-cancer.html)
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