Kidney Cancer (Adult) - Renal Cell Carcinoma Overview

The information that follows is an overview of this type of cancer. It is based on the more detailed information in our document, *Kidney Cancer (Adult) Renal Cell Carcinoma*. This document and other information can be obtained by calling 1-800-227-2345 or visiting our Web site at www.cancer.org.

What is cancer?

The body is made up of trillions of living cells. Normal body cells grow, divide into new cells, and die in an orderly way. During the early years of a person's life, normal cells divide faster to allow the person to grow. After the person becomes an adult, most cells divide only to replace worn-out, damaged, or dying cells.

Cancer begins when cells in a part of the body start to grow out of control. There are many kinds of cancer, but they all start because of this out-of-control growth of abnormal cells.

Cancer cell growth is different from normal cell growth. Instead of dying, cancer cells keep on growing and form new cancer cells. These cancer cells can grow into (invade) other tissues, something that normal cells cannot do. Being able to grow out of control and invade other tissues is what makes a cell a cancer cell.

In most cases the cancer cells form a tumor. But some cancers, like leukemia, rarely form tumors. Instead, these cancer cells are in the blood and bone marrow.

When cancer cells get into the bloodstream or lymph vessels, they can travel to other parts of the body. There they begin to grow and form new tumors that replace normal tissue. This process is called *metastasis* (muh-**tas**-tuh-sis).

No matter where a cancer may spread, it is always named for the place where it started. For instance, breast cancer that has spread to the liver is still called breast cancer, not

liver cancer. Likewise, prostate cancer that has spread to the bone is called metastatic prostate cancer, not bone cancer.

Different types of cancer can behave very differently. For example, lung cancer and breast cancer are very different diseases. They grow at different rates and respond to different treatments. That is why people with cancer need treatment that is aimed at their own kind of cancer.

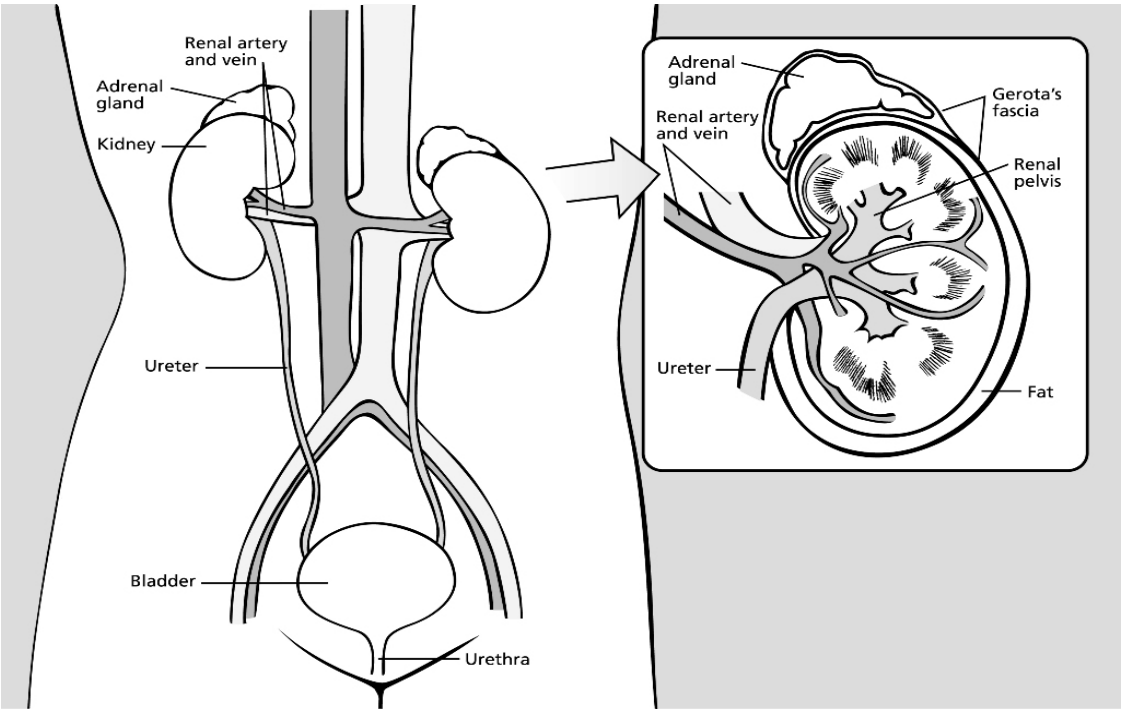
Not all tumors are cancerous. Tumors that aren't cancer are called *benign* (be-**nine**). Benign tumors can cause problems – they can grow very large and press on healthy organs and tissues. But they cannot grow into other tissues. Because of this, they also can't spread to other parts of the body (metastasize). These tumors are almost never life threatening.

What is kidney cancer?

Kidney cancer is also called *renal carcinoma*. In order to understand kidney cancer, it helps to know how the normal kidneys look and work.

About the kidneys

The kidneys are a pair of bean-shaped organs, each about the size of a fist. They are shown in the picture below. One is on either side of the spine. The lower ribcage protects the kidneys.



The kidneys' main job is to filter your blood and help the body get rid of excess water, salt, and waste products. The waste is made into urine. Urine travels through long, thin tubes (called ureters) to the bladder where it is stored until you urinate (pee).

We have 2 kidneys, but a person can live with less than even one complete kidney. Some people live without any working kidneys at all. Their blood is filtered by a machine in a process called dialysis.

Renal cell carcinoma

The most common type of kidney cancer is called renal cell cancer (also known as RCC, *renal cell carcinoma*, or *renal cell adenocarcinoma*). It accounts for more than 9 out of 10 cases of kidney cancer. While there are other types of kidney tumors, the information here refers only to renal cell cancer.

Like all cancers, kidney cancer begins small and grows larger over time. It usually grows as a single mass or tumor within the kidney. But a kidney can have more than one tumor. Sometimes tumors are found in both kidneys at the same time. Kidney tumors are often found on CT scans or ultrasounds being done for concerns other than kidney cancer. The cancer might be found only after it has become very large. Most of the time it is found before it has spread to other organs. Like most cancers, RCC is hard to treat once it has spread.

Types of kidney cancer

There are several subtypes of renal cell cancer (RCC), based mainly on how the cancer cells look under a microscope. Knowing an RCC subtype can be a factor in choosing treatment and can also help your doctor figure out if your cancer may be due to an inherited genetic syndrome.

Clear cell renal cell carcinoma: This is the most common form of RCC. 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 out of 10 people with RCC have this kind. These cancers make little finger-like projections (called papillae) in some, if not most, of the tumor. Some doctors call these cancers *chromophilic* because the cells take up certain dyes used to prepare the tissue to be looked at under the microscope. The dyes make them look pink.

Chromophobe renal cell carcinoma: This subtype accounts for a few cases of RCCs. The cells of these cancers are also pale, like the clear cells, but are much larger and differ in other ways.

Collecting duct renal cell carcinoma: This subtype is very rare. The major feature is that the cancer cells can form irregular tubes.

Unclassified renal cell carcinoma: In rare cases, renal cell cancers are labeled as "unclassified" because they don't fit into any of the other groups or because more than one type of cell is present.

Other kidney tumors that are cancer

Transitional cell carcinoma: About 5% to 10% of cancers in the kidney are transitional cell carcinomas, also known as *urothelial carcinomas*. Transitional cell carcinomas don't start in the kidney itself but rather in the lining of the renal pelvis (where the urine goes before it enters the ureter). This lining is made up of cells called *transitional cells* that look like the cells that line the bladder under the microscope. The cells of this kind of cancer look like bladder cancer cells. People with transitional cell carcinoma often have the same signs and symptoms as people with renal cell cancer – blood in the urine and, sometimes, back pain.

To find out more about transitional cell carcinoma, see our document, *Bladder Cancer*.

Wilms tumor: About 5% of all kidney cancers are Wilms tumors or nephroblastomas. This type of cancer is almost always found in children and is very rare in adults. If you want to learn more, see our document, *Wilms Tumor*.

Renal sarcoma: Renal sarcomas are a rare type of kidney cancer that starts in the kidney's connective tissue or blood vessels. Renal sarcomas are discussed in more detail in our document, *Sarcoma-Adult Soft Tissue Cancer*.

*The rest of this document is about **renal cell carcinoma** and not other types of kidney tumors.*

How many people get kidney cancer?

The American Cancer Society's estimates for kidney cancer in the United States for 2013 are:

- About 65,150 new cases of kidney cancer
- About 13,680 deaths from kidney cancer

Most people with this cancer are older. It is not at all common in people under age 45. Overall, the lifetime risk of getting kidney cancer is about 1 in 63. This risk is higher in men than in women.

What are the risk factors for kidney cancer?

We do not yet know exactly what causes kidney cancer, but we do know that certain risk factors are linked to the disease. A risk factor is anything that affects a person's chance of getting a disease such as cancer. Different cancers have different risk factors. Some risk factors, such as smoking, can be controlled. Others, like a person's age or family history, can't be changed. But risk factors don't tell us everything. Having a risk factor, or even several risk factors, does not mean you will get the disease. And some people who get the disease may not have had any known risk factors.

Lifestyle and job-related risk factors

Smoking: Smoking increases the risk of getting kidney cancer. The risk seems to be linked to how much you smoke and drops if you stop smoking, but it takes many years to get to the risk level of someone who never smoked.

Weight: A very overweight person has a higher risk of getting kidney cancer.

Job hazards: Many studies suggest that exposure to certain chemicals on the job increases the risk of kidney cancer. Some of these are asbestos, cadmium (a type of metal), some herbicides, benzene, and organic solvents, particularly trichloroethylene.

Inherited risk factors

Kidney cancer can be caused by some rare inherited conditions such as those listed below. People who have these conditions have a much higher risk for getting kidney cancer, but they account for only a small portion of cases overall.

- von Hippel-Lindau disease
- Hereditary papillary renal cell carcinoma
- Hereditary leiomyoma-renal cell carcinoma
- Birt-Hogg-Dube syndrome
- Hereditary renal oncocytoma
- Familial renal cancer

If you know that you have one of these, it is important that you see your doctor often. Some doctors recommend that you have regular imaging tests (such as CT scans).

Other risk factors

Family history: People with family members who have kidney cancer (especially a brother or sister) have a much higher chance of getting the disease.

High blood pressure: The risk of kidney cancer is higher in people with high blood pressure. People with high blood pressure are often treated with drugs, so it is hard to tell if the higher risk is caused by the drugs, by the high blood pressure itself, or both.

Certain medicines: A once popular pain-reliever (called phenacetin) has been linked to kidney cancer. But this medicine has not been used in the United States for over 20 years, and it no longer appears to be a major risk factor. Some drugs used to treat high blood pressure have also been linked to kidney cancer. It's not clear whether the higher risk is caused by the drugs or the high blood pressure. But people who need these drugs should take them.

Advanced kidney disease: People with advanced kidney disease who need to be on dialysis have a higher risk of kidney cancer. Dialysis is a treatment used to remove toxins from the body in people whose kidneys are not working.

Gender: Kidney cancer is found about twice as often 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 have a slightly higher rate of renal cell cancer than whites. The reasons for this are not clear.

Can kidney cancer be prevented?

In many cases the cause of kidney cancer is not known. In some other cases, even when the cause is known there may not be anything that could have been done to prevent it.

Still, there are some ways you may be able to reduce your risk of kidney cancer. Cigarette smoking accounts for a large number of cases, and stopping smoking may lower your risk. Obesity and high blood pressure are also risk factors for renal cell cancer.

Stay at a healthy weight by exercising and choosing a diet high in fruits and vegetables. Getting treatment for high blood pressure may help reduce your chance of getting this disease, too. You should also avoid exposure to harmful substances in the workplace.

How is kidney cancer found?

Many kidney cancers are found fairly early, while they are still only in the kidney. But others are found at a more advanced stage. There are a few reasons why kidney cancer may not be found early:

- The cancer can become 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.

Small amounts of blood in the urine could point to kidney cancer. But there are many other causes of blood in the urine, including infections and kidney stones. And some people with kidney cancer don’t have blood in their urine until the cancer is quite large.

While tests like ultrasound, CT scans, and MRI can sometimes find small tumors, these tests cost a lot and often can't show whether a tumor is cancer. They are only recommended to screen for kidney cancer in those people who have a high risk of getting the disease.

It is important to tell your doctor if members of your family have had kidney cancer or other problems linked to kidney disease.

Often kidney cancer is found “incidentally,” meaning that the cancer is found by accident during tests for some other illness. The survival rate for kidney cancer found this way is very high because the cancer is usually found at a very early stage.

Genetic tests for inherited conditions linked to kidney cancer

It is important to tell your doctor if family members (blood relatives) have or had kidney cancer, especially at a younger age, or if they have an inherited condition linked to this cancer, like von Hippel-Lindau disease. Your doctor may suggest that you think about genetic testing.

Before having these 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. The tests are used to find these 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 will get kidney cancer. To learn more about genetic testing, see our document, *Genetic Testing: What You Need to Know*.

Signs and symptoms of kidney cancer

While early kidney cancers do not usually cause any signs or symptoms, larger ones might. Possible signs and symptoms of kidney cancer include:

- Blood in the urine
- Low back pain on one side (not from an injury)

- A mass or lump on the side or lower back
- Tiredness
- Weight loss, if you are not trying to lose weight
- Fever that doesn't go away after a few weeks and that is not from an infection
- Anemia (low red blood cell counts)

Talk to a doctor if you notice any of these problems. They are often caused by other, benign conditions, but only a doctor can tell for sure. The doctor can take your medical history and do a physical exam. Then, if there is any reason to suspect kidney cancer, one or more tests may be done.

Lab tests

Lab tests may be done to get a sense of a person’s overall health and to help tell if cancer has spread to other areas. Before surgery, they can help tell if a person is healthy enough to have an operation.

Urinalysis

This is likely to be one of the first tests done if the doctor thinks you may have a kidney problem. Urine tests look for blood and other substances in a urine sample. Sometimes the urine will be looked at under the microscope to look for cancer cells (called urine cytology).

Blood tests

The complete blood count (CBC) is a test that measures the different cells in the blood, such as the red blood cells, the white blood cells, and the platelets. The test results are often not normal in people with kidney cancer. Blood counts are important to make sure a person is healthy enough for surgery. Other blood tests may be done, too.

Imaging tests

Imaging tests are used to make pictures of the inside of your body. These tests may be done to:

- Help find out whether a certain area might be cancer
- Learn how far cancer may have spread
- Find out whether treatment is working

In many cases, imaging tests are able to be show whether a tumor in the kidney is cancer, but in some cases a biopsy (taking out a piece of the tumor to be looked at under a microscope) may be need to be done.

CT scan (computed tomography)

A CT (or CAT scan) is a special type of x-ray in which many pictures are taken from different angles and then combined by a computer to give detailed pictures of the inside of the body.

A CT scanner has been described as a large donut, with a narrow table in the “hole.” You will need to lie still on the table while the scan is being done. CT scans take longer than regular x-rays and you might feel a bit confined by the ring while the pictures are being taken.

Before any pictures are taken, you may be asked to drink 1 to 2 pints of a liquid called oral contrast. This helps outline the intestine so that certain areas are not confused with tumors. You may also get an IV (intravenous) line through which a different kind of contrast dye is put in. This helps better outline structures in your body. Some people are allergic to the IV contrast and get hives. Rarely, more serious reactions like trouble breathing or low blood pressure can happen. Be sure to tell the doctor if you have ever had a reaction to any contrast material used for x-rays.

IV 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 the contrast.

A CT scan is one of the most useful tests for finding and looking at a tumor inside your kidney. It is also useful in seeing whether cancer has spread to other parts of the body. The CT scan will give precise information about the size, shape, and place of a tumor. It can also help find swollen lymph nodes that might contain cancer.

MRI (magnetic resonance imaging) scan

MRI scans use strong magnets and radio waves instead of x-rays to take pictures. MRI scans take longer than x-rays, often up to an hour. Also, you have to be placed inside a narrow, tube-like machine, which upsets some people. Special, more open MRI machines can sometimes help with this if needed. MRI scans are used less often than CT scans in people with kidney cancer. They may be done in cases where a person can’t have the CT contrast dye, such as when they have an allergy to it or they don’t have good kidney function.

Ultrasound

Ultrasound uses sound waves to make pictures of your insides. A wand is moved over the skin after a gel is applied; it gives off sound waves and picks up the echoes as they bounce back. This test is painless and does not use radiation. Ultrasound can help find out whether a kidney mass is solid or filled with fluid. If a kidney biopsy is needed, ultrasound can be used to guide a needle into the mass to take a sample.

PET scan (positron emission tomography)

PET scans involve putting a slightly radioactive form of sugar into the bloodstream. The sugar travels throughout the body. Cancer cells take in large amounts of the sugar and a special camera is then used to find these deposits and turn them into pictures. This test is useful to see if the cancer has spread to lymph nodes. PET scans can also be used when the doctor thinks the cancer has spread but doesn't know where. Some machines are able to do both a PET and CT scan at the same time. But PET and PET/CT scans are not a standard part of the work-up for kidney cancers.

Intravenous pyelogram (IVP)

An IVP is an x-ray of the kidney taken after a special dye is put into a vein. This dye travels from the blood into the kidneys and then passes into the ureters and bladder. X-rays taken can help find a cancer or show damage caused by the tumor. But this test is not often used when kidney cancer is suspected.

Angiography

Like the IVP, this x-ray test uses a contrast dye. A small thin tube called a catheter is usually threaded up a large artery in your leg into the artery leading to your kidney (the renal artery). It can help outline the blood vessels feeding a kidney tumor, which in turn helps doctors plan surgery for some patients to remove the tumor. Angiography can be done as a part of the CT or MRI scan instead of as a separate test.

Chest x-ray

A chest x-ray can show if the cancer has spread to the lungs. The lungs are a common site of kidney cancer spread. This is very unlikely unless the cancer is very advanced.

Bone scan

A bone scan can help show if a cancer has spread to your bones. A slightly radioactive substance is put into a vein. It travels to the bones, where it can be seen by a special camera. By itself, a bone scan can't show the difference between cancer and problems like arthritis, so other tests may be needed.

Biopsy

Biopsies are not often used to diagnose kidney tumors. A surgeon can usually tell from imaging tests if an operation is needed. But a biopsy may be done if other tests have not shown for sure that there is a cancer.

There are 2 types of biopsy: fine needle and core needle. During the fine needle aspiration (FNA), a thin (fine) needle is placed through the skin and guided by CT or ultrasound into the area of concern. Then fluid or small pieces of tissue are removed from the kidney or from another place where the cancer may have spread.

The needle used in core biopsies is larger than that used in FNA. A small cylinder of tissue (about $^{1}/_{16}$- to $^{1}/_{8}$-inch in diameter and ½-inch long) is removed. In either type of biopsy, the sample is checked under the microscope to see if cancer cells are present.

For either type of biopsy, the skin where the needle is to be put in is first numbed with local anesthesia.

Fuhrman grade

An important feature of kidney cancer is the grade of the cancer. Grade refers to how much the cancer cells look like normal cells under the microscope. Kidney cancers are usually graded on a scale of 1 to 4. The lower the number, the more the cancer cells look like normal cells and the better the outlook for the patient. A grade 4 would have cancer cells that look very different from normal cells and the outlook for the patient would be worse.

Staging of kidney cancer

Staging is the process of finding out how far the cancer has spread. This is very important because your treatment and the outlook for your recovery depend, to a large extent, on the stage of your cancer.

Staging is based on the results of the physical exam, biopsies, and imaging tests (CT scan, chest x-ray, PET scan, etc.), which are described in the section, “How is kidney cancer found?”

There are actually 2 types of staging for kidney cancer. The *clinical stage* is your doctor’s best idea of the extent of your disease, based on the results of the physical exam, lab tests, and any imaging studies you have had. If you have surgery, your doctors can also find out the *pathologic stage*, which is based on the same factors as the clinical stage, plus what is found during surgery and how the removed tissue looks under a microscope. This means that if you have surgery the stage of your cancer might change – for example, if it has spread farther than was thought at first.

The AJCC staging system (sometimes also known as the TNM system) for kidney cancer uses Roman numerals from I through IV (1-4) to describe the extent of the disease. As a rule, the lower the number, the less the cancer has spread. A higher number, such as stage IV, means a more serious cancer. Ask your doctor to explain the stage of your cancer in a way you can understand.

Your doctor will take into account both the grade and stage of your cancer when recommending a treatment plan. If your doctor uses a staging system other than the one mentioned above, ask to have it explained in terms you can understand.

Survival rates for kidney cancer by TNM stage

Some people with cancer may want to know the survival rates for their type of cancer. Others may not find the numbers helpful, or may even not want to know them. If you decide that you don't want to know them, stop reading here and skip to the next section.

The 5-year survival rate refers to the percentage of patients who live at least 5 years after their cancer is found. Keep in mind that many of these patients live much longer than 5 years after their cancer is found and treated. And survival rates are based on patients whose cancer was found and treated more than 5 years ago. Better treatments now may mean that patients have a better outlook.

The numbers below come from the National Cancer Data Base and are based on patients whose cancer was found in the years 2001 and 2002. These are *observed* survival rates. They include people with kidney cancer who may have later died from other causes, such as heart disease. People with kidney cancer tend to be older and may have other serious health conditions. Therefore, the percentage of people surviving the cancer itself is likely to be higher.

Stage	**5-Year Survival Rate**
I	81%
II	74%
III	53%
IV	8%

While these numbers give an overall picture, every person is different. Statistics can't predict what will happen in your case. Talk with your cancer care team if you have questions about your own chances of a cure, or how long you might survive your cancer. They know your situation best.

How is kidney cancer treated?

This information represents the views of the doctors and nurses serving on the American Cancer Society's Cancer Information Database Editorial Board. These views are based on their interpretation of studies published in medical journals, as well as their own professional experience.

The treatment information in this document is not official policy of the 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.

About treatment

After the cancer is found and staged, your doctor will talk with you about different treatment plans. It is important to take time and think about your choices. One of the most important factors is the stage of your cancer. Other things to take into account include your overall health, the likely side effects of the treatment, the chances of curing the disease, helping you live longer, or relieving symptoms.

If you have kidney cancer, your treatment options may include:

- Surgery
- Ablation and other local therapies
- Active surveillance
- Radiation therapy
- Targeted therapy
- Immunotherapy (biologic therapy)
- Chemotherapy

You might want to get a second opinion. This may give you more information and help you feel more secure about the treatment plan you have chosen.

Surgery for kidney cancer

Surgery is the main treatment for renal cell cancer. The chances of surviving kidney cancer without surgery are small. Depending on the type and stage of your cancer, you might have one of the types of surgery below.

Radical nephrectomy

In this operation, the whole kidney, the attached adrenal gland, and some nearby fatty tissue are removed. Although the adrenal gland is usually removed, 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. Nearby lymph nodes are sometimes removed, too. This is called *regional lymphadenectomy*. Most people do fine with only one kidney.

If the tumor has grown from the kidney through the renal vein (the large vein leading away from the kidney) and into 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 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.

“Keyhole” surgery (laparoscopic nephrectomy)

In this surgery, the kidney tumors are removed through small incisions (cuts) in the skin instead of through one large incision. The surgeon can put special long, thin instruments in the cuts to see the kidney and do the surgery. The benefits include a shorter hospital stay, faster recovery, and less pain afterwards.

Partial nephrectomy

This is also called *nephron-sparing surgery*. The surgeon removes only the part of the kidney with the cancer. The rest is left in place. At first, this approach was only used when there was a reason not to remove the whole kidney. But this type of surgery is now the preferred treatment for patients with early stage kidney cancer. It is often done to remove single small tumors and is being done more in patients with larger tumors.

A partial nephrectomy may 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 are able to do this type of surgery. Some doctors can even do this surgery laparoscopically or using a robot. This is more common at major medical centers. But it is a difficult operation, and it should only be done by a surgeon with a great deal of skill and who has done the operation often.

Removing lymph nodes (lymph node dissection or regional lymphadenectomy)

This method involves removing nearby lymph nodes to see if they contain cancer. Some doctors do this along with the radical nephrectomy although not all doctors agree that it is always needed. Most doctors agree that the lymph nodes should be removed if they are enlarged based on imaging tests or how they look 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. This is something you should discuss with your doctor before surgery.

Removal of an adrenal gland

If the cancer is in the lower part of the kidney (away from the adrenal gland) and if imaging tests show the adrenal gland is not affected, it may not have to be removed. This is also something to talk about with your doctor before surgery.

Removal of metastases

Sometimes surgery is done to remove cancer that has spread. This can help relieve pain or other symptoms even though it does not usually help patients live longer. It is most often done if there are only a few tumors that can be removed easily. The lungs, bones, brain and liver are the most common sites of spread.

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 to remove them can help people live longer.

Risks of surgery

Surgery always involves some risks. Here are some possible risks of surgery for kidney cancer:

- Bleeding during or after surgery that may require blood transfusions
- Wound infection
- Damage to internal organs and blood vessels during surgery
- Unwanted air in the chest cavity
- Bulging of nearby internal organs into the incision (hernia)
- Failure of the remaining kidney

Other types of treatments for kidney cancer

While surgery is the main treatment for kidney cancers that can be removed, some people are too sick to have surgery. Sometimes other methods can be used to destroy kidney tumors. But there is much less information on how well these methods work over the long term and so they are not yet considered a standard treatment.

Cryotherapy (cryoablation)

This treatment uses extreme cold to destroy the tumor. A hollow probe (needle) is put into the tumor either through the skin or during laparoscopic surgery. Very cold gases are passed through the probe, creating an ice ball that kills the tumor.

Radiofrequency ablation (RFA)

This treatment uses high-energy radio waves to heat the tumor. A thin, needle-like probe is placed through the skin and moved until the end is in the tumor. Once it is in place, an electric current is passed through the probe, which heats the tumor and kills the cancer cells.

Arterial embolization

This is treatment to block the artery that feeds the kidney with the cancer. This method is not used very often, but it is sometimes used before surgery to kill some of the cancer cells and to reduce bleeding during the operation.

Active surveillance for kidney cancer

For some patients with small kidney tumors (those less than 3 cm, which is a little over an inch), one option may be to give no treatment at first and watch the tumor to see if it grows. If the tumors grow fast or get larger than a little over 1 ½ inches, they are removed. This approach can allow some patients to avoid surgery or other treatments.

Radiation therapy for kidney cancer

Radiation treatment uses high-energy rays (such as x-rays) or particles to kill cancer cells or shrink tumors. External radiation aims radiation from outside the body on the cancer. This type of treatment is sometimes used as the main treatment for kidney cancer in patients who cannot have surgery. It can also be used to ease symptoms such as pain, bleeding, or problems caused by the cancer spreading.

But kidney cancer does not respond well to radiation. For patients who can have surgery, it is not often used before or after the surgery because studies have shown that is doesn't help people live longer.

Radiation therapy is more often used to ease (palliate) symptoms of kidney cancer such as pain, bleeding, or problems caused by cancer spread (especially to the bones or brain). A special type of radiation treatment known as stereotactic radiosurgery can sometimes be used for single tumors that have spread to the brain. This treatment does not actually involve surgery.

Side effects of radiation can include mild skin changes that look like sunburn, nausea, diarrhea, or tiredness. Often these go away after a short while. Radiation can also make the side effects of chemotherapy worse. Radiation to the chest area can cause lung damage and lead to trouble breathing and shortness of breath. Side effects of radiation to the brain usually become most serious one or 2 years after treatment and can include headaches and trouble thinking.

Chemotherapy for kidney cancer

Chemotherapy (chemo) is the use of anti-cancer drugs that are put into a vein or given as a pill. These drugs enter the bloodstream and go throughout the body, making the treatment useful for cancers that have spread to distant organs. Kidney cancer does not usually respond well to chemo, so it is not a standard treatment for this disease. Chemo is only used for kidney cancer after targeted drugs and/or immunotherapy have already been tried.

Chemo can have some side effects. These side effects depend on the type of drug, how much you take, and how long you take it. Most of the side effects go away when treatment is over. Anyone who has problems with side effects should talk with their doctor or nurse. There are often ways to lessen them.

Targeted therapies for kidney cancer

As researchers have learned more about the gene changes in cells that cause cancer, they have been able develop newer drugs that target some of these changes. These targeted drugs work in a different way than standard chemotherapy drugs, and they have different side effects.

In the past few years a number of targeted drugs have been approved by the US Food and Drug Administration for use against advanced kidney cancer. Targeted therapies include drugs that stop the growth of the new blood vessels that feed cancers and drugs that stop other parts of cancer cell growth. They are often used as the first line of treatment for advanced kidney cancers. While they may shrink or slow the growth of the cancer, it's doesn't seem like any of these drugs can cure kidney cancer (make it go away and stay away).

To learn more about specific targeted therapy drugs for kidney cancer, please see our document *Kidney Cancer (Adult) Renal Cell Carcinoma.*

Biologic therapy (immunotherapy) for kidney cancer

The goal of biologic therapy is to boost the body's own immune system to help fight off or destroy cancer cells. Before targeted therapies, this was the most common first treatment for advanced kidney cancer, and it may still be helpful for some people. Because biologic therapy can be hard to give and can cause serious side effects, many doctors now save it for people who have cancers that don't respond to targeted therapies.

The main immunotherapy drugs used for kidney cancer are cytokines (proteins that "turn on" the immune system). For a small number of patients, cytokines can shrink the cancer to less than half its original size.

The side effects of immunotherapy can be severe and, rarely, fatal. For this reason, only doctors experienced in the use of cytokines should give this treatment to people with kidney cancer.

To learn more about specific biologic therapies, please see our document *Kidney Cancer (Adult) Renal Cell Carcinoma.*

Pain control for kidney cancer

Pain is a major concern for some people with advanced kidney cancer. Be sure to tell your doctor or nurse about any pain you are having. Unless they know about your pain, they can't help you.

For most people, treatment with morphine or other opioids (the strongest pain medicines) will work to control the pain. For the treatment to work best, the pain medicines must be taken on a regular schedule, not just when the pain gets bad. Some long-acting forms of morphine and other drugs need to be taken only once or twice a day.

In some cases, surgery or radiation may help relieve pain caused by cancer spreading to certain areas. This is called *palliative treatment*. In people whose cancer has spread to the bones, drugs called *bisphosphonates* may also be helpful. Sometimes experts in pain control can do special procedures such as a nerve block to lessen pain.

Clinical trials for kidney cancer

You may have had to make a lot of decisions since you've been told you have cancer. One of the most important decisions you will make is deciding which treatment is best for you. You may have heard about clinical trials being done for your type of cancer. Or maybe someone on your health care team has mentioned a clinical trial to you.

Clinical trials are carefully controlled research studies that are done with patients who volunteer for them. They are done to get a closer look at promising new treatments or procedures.

If you would like to take part in a clinical trial, you should start by asking your doctor if your clinic or hospital conducts clinical trials. You can also call our clinical trials matching service for a list of clinical trials that meet your medical needs. You can reach this service at 1-800-303-5691 or on our Web site at www.cancer.org/clinicaltrials. You can also get a list of current clinical trials by calling the National Cancer Institute's Cancer Information Service toll-free at 1-800-4-CANCER (1-800-422-6237) or by visiting the NCI clinical trials Web site at www.cancer.gov/clinicaltrials.

There are requirements you must meet to take part in any clinical trial. If you do qualify for a clinical trial, it is up to you whether or not to enter (enroll in) it.

Clinical trials are one way to get state-of-the art cancer treatment. They are the only way for doctors to learn better methods to treat cancer. Still, they are not right for everyone.

You can get a lot more information on clinical trials, in our document called *Clinical Trials: What You Need to Know*. You can read it on our Web site or call our toll-free number and have it sent to you.

Complementary and alternative therapies after kidney cancer

When you have cancer you are likely to hear about ways to treat your cancer or relieve symptoms that your doctor hasn’t mentioned. Everyone from friends and family to Internet groups and Web sites may offer ideas for what might help you. These methods can include vitamins, herbs, and special diets, or other methods such as acupuncture or massage, to name a few.

What are complementary and alternative therapies?

It can be confusing because not everyone uses these terms the same way, and they are used to refer to many different methods. We use complementary to refer to treatments that are used along with your regular medical care. Alternative treatments are used instead of a doctor’s medical treatment.

Complementary methods: Most complementary treatment methods are not offered as cures for cancer. Mainly, they are used to help you feel better. Some examples of methods that are used along with regular treatment are meditation to reduce stress, acupuncture to help relieve pain, or peppermint tea to relieve nausea. Some complementary methods are known to help, while others have not been tested. Some have been proven not to be helpful, and a few are even harmful.

Alternative treatments: Alternative treatments may be offered as cancer cures. These treatments have not been proven safe and effective in clinical trials. Some of these methods may be harmful, or have life-threatening side effects. But the biggest danger in most cases is that you may lose the chance to be helped by standard medical treatment. Delays or interruptions in your medical treatments may give the cancer more time to grow and make it less likely that treatment will help.

Finding out more

It is easy to see why people with cancer think about alternative methods. You want to do all you can to fight the cancer, and the idea of a treatment with few or no side effects sounds great. Sometimes medical treatments like chemotherapy can be hard to take, or they may no longer be working. But the truth is that most of these alternative methods have not been tested and proven to work in treating cancer.

As you think about your options, here are 3 important steps you can take:

- Look for “red flags” that suggest fraud. Does the method promise to cure all or most cancers? Are you told not to have regular medical treatments? Is the treatment a “secret” that requires you to visit certain providers or travel to another country?
- Talk to your doctor or nurse about any method you are thinking of using.
- Contact us at 1-800-227-2345 to learn more about complementary and alternative methods in general and to find out about the specific methods you are looking at.

The choice is yours

Decisions about how to treat or manage your cancer are always yours to make. If you want to use a non-standard treatment, learn all you can about the method and talk to your doctor about it. With good information and the support of your health care team, you may be able to safely use the methods that can help you while avoiding those that could be harmful.

What are some questions I can ask my doctor about kidney cancer?

As you cope with cancer and cancer treatment, we encourage you to have honest, open talks with your doctor. Feel free to ask any question that's on your mind, no matter how small it might seem. Here are some questions you might want to ask. Be sure to add your own questions as you think of them. Nurses, social workers, and other members of the treatment team may also be able to answer many of your questions.

- Would you please write down the exact kind of kidney cancer I have?

- Do you think my cancer spread?
- What is the stage of my cancer, and what does that mean in my case?
- What treatment choices do I have?
- What do you recommend and why?
- What is the goal of this treatment?
- What are the chances of the cancer coming back with the treatment you recommend?
- What are the risks or side effects of treatment?
- Based on what you've learned about my cancer, what is my long-term outlook?
- What should I do to be ready for treatment?
- How soon should I be treated?
- What kind of follow-up will I need after treatment?
- Are there any clinical trials I should think about?

Add your own questions below:

Moving on after treatment for kidney cancer

For some people with kidney cancer, treatment may remove or destroy the cancer. Completing treatment can be both stressful and exciting. You may be relieved to finish treatment, but find it hard not to worry about cancer coming back. (When cancer comes back after treatment, it is called *recurrence*.) This is a very common concern in people who have had cancer.

It may take a while before your fears lessen. But it may help to know that many people have learned to live with this uncertainty and are leading full lives. Our document, *Living With Uncertainty: The Fear of Cancer Recurrence* gives more details about this.

For other people, the cancer may never go away completely. These people may get regular treatments with targeted therapy drugs, chemotherapy, radiation, or other treatments to try to help keep the cancer in check. Learning to live with cancer that does

not go away can be hard and very stressful. It has its own type of uncertainty. Our document, *When Cancer Doesn't Go Away*, talks more about this.

Follow-up care

When treatment ends, your doctors will still want to watch you closely. It is very important to go to all of your scheduled visits. During these visits, your doctors will ask questions about any problems you may have. You might have exams and lab tests or x-rays and scans to look for signs of cancer or treatment side effects. Almost any cancer treatment can have side effects. Some can last for a few weeks to months, but others can last the rest of your life. This is the time for you to talk to your cancer care team about any changes or problems you notice and any questions or concerns you have.

For people whose kidney cancer has been removed by surgery, doctor visits (which include physical exams and blood tests) are usually done about every 6 months for the first 2 years after treatment, then yearly for the next several years. A CT scan is usually recommended about 4 to 6 months after surgery and may be done again later if there's reason to suspect the cancer may have returned. Patients who have a higher risk of their cancers coming back after surgery, such as cancer that had spread to lymph nodes, may be seen more often with CT scans done at least every 6 months for the first few years.

It is also important to keep health insurance. While you hope your cancer won't come back, it could happen. If it does, you don't want to have to worry about paying for treatment. Should your cancer come back, our document *When Your Cancer Comes Back: Cancer Recurrence* helps you manage and cope with this phase of your treatment.

Seeing a new doctor

At some point after your cancer is found and treated, you may find yourself in the office of a new doctor. It is important that you be able to give your new doctor the exact details of your diagnosis and treatment. Make sure you have this information handy and always keep copies for yourself:

- A copy of your pathology report from any biopsy or surgery
- If you had surgery, a copy of your operative report
- If you were in the hospital, a copy of the discharge summary that the doctor wrote when you were sent home from the hospital
- If you had radiation treatment, a summary of the type and dose of radiation and when and where it was given
- If you had chemotherapy (including biologic therapy or targeted therapy), a list of your drugs, drug doses, and when you took them

- Copies of your CTs, MRIs, or other imaging tests (these can often be placed on a DVD)

Lifestyle changes after kidney cancer

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.

Make healthier choices

For many people, finding out they have 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. Maybe you could cut down on the alcohol, or give up tobacco. Even things like keeping your stress level under control may help. Now is a good time to think about making changes that can have good 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, call us 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.

If treatment caused weight changes or eating or taste problems, do the best you can and keep in mind that these problems usually get better over time. You may find it helps to eat small portions every 2 to 3 hours until you feel better. You may also want to ask your cancer team about seeing a dietitian, an expert in nutrition who can give you ideas on how to deal with these treatment side effects.

One of the best things you can do after treatment is to put healthy eating habits into place. You may be surprised at the long-term benefits of some simple changes. Getting to and staying at a healthy weight, eating a healthy diet, and limiting your alcohol intake may lower your risk for a number of types of cancer, as well as having many other health benefits.

Rest, fatigue, and exercise

Feeling tired (fatigue) is a very common problem during and after cancer treatment. This is not a normal type of tiredness but a “bone-weary” exhaustion that doesn’t get better with rest. For some people, fatigue lasts a long time after treatment and can keep them from staying active. But exercise can actually help reduce fatigue and the sense of depression that sometimes comes with feeling so tired.

If you are very tired, though, you will need to balance activity with rest. It is OK to rest when you need to. To learn more about fatigue, please see our document, *Fatigue in People With Cancer* and *Anemia in People With Cancer*.

If you were very ill or weren't able to do much during treatment, it is normal that your fitness, staying power, and muscle strength declined. You need to find an exercise plan that fits your own needs. Talk with your health care team before starting. Get their input on your exercise plans. Then try to get an exercise buddy so that you're not doing it alone.

Exercise can improve your physical and emotional health.

- It improves your cardiovascular (heart and circulation) fitness.
- It makes your muscles stronger.
- It reduces fatigue.
- It can help lower anxiety and depression.
- It can help you feel generally happier.
- It can help you feel better about yourself.

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.

How does having kidney cancer affect your emotional health?

When treatment ends, you may find yourself overcome with many different emotions. This happens to a lot of people. You may have been going through so much during treatment that you could only focus on getting through each day. Now it may feel like a lot of other issues are catching up with you.

You may find yourself thinking about death and dying. Or maybe you’re more aware of the effect the cancer has on your family, friends, and career. Other issues may also cause concern. For instance, as you feel better and have fewer doctor visits, you will see your health care team less often and have more time on your hands. These changes can make some people anxious.

This is a good time to look for emotional and social support. You need people you can turn to. Support can come in many forms: family, friends, cancer support groups, church or spiritual groups, online support groups, or private counselors.

The cancer journey can feel very lonely. You don't need to go it alone. Your friends and family may feel shut out if you decide not include them. Let them in − and let in anyone else who you feel may help. If you aren't sure who can help, call your American Cancer Society at 1-800-227-2345 and we can put you in touch with a group or resource that may work for you.

If treatment for kidney cancer stops working

If cancer keeps growing or comes back after one kind of treatment, it could be that another treatment plan might still cure the cancer, or at least shrink it enough to help you live longer and feel better. But when a person has tried many different treatments and the cancer has not gotten any better, the cancer tends resist all treatment. At this time you may have to weigh the possible benefits of a new treatment against the downsides, like treatment side effects and clinic visits. Everyone has their own way of looking at this.

No matter what you decide to do, you need to feel as good as you can. Make sure you are asking for and getting treatment for any symptoms you might have, such as nausea or pain. This type of treatment is called *palliative care*.

Palliative care helps relieve symptoms, but is not meant to cure the disease. It can be given along with cancer treatment, or can even be cancer treatment. The difference is its purpose − the main purpose of palliative care is to improve the quality of your life, or help you feel as good as you can for as long as you can.

At some point you may want to think about hospice care. Most of the time it is given at home. Your cancer may be causing symptoms or problems that need to be treated. Hospice focuses on your comfort. You should know that having hospice care doesn't mean you can't have treatment for the problems caused by your cancer or other health issues. It just means that the purpose of your care is to help you live life as fully as possible and to feel as well as you can. You can learn more about this in our document *Hospice Care*.

Staying hopeful is important, too. Your hope for a cure may not be as bright, but there is still hope for good times with family and friends − times that are filled with joy and meaning. Pausing at this time in your cancer treatment gives you a chance to focus on the most important things in your life. Now is the time to do some things you've always wanted to do and to stop doing the things you no longer want to do. Though the cancer may be beyond your control, there are still choices you can make.

What's new in kidney cancer research?

There is always research going on in the area of kidney cancer. Scientists are looking for causes of the disease and ways to prevent it. They are also trying to find new drugs and looking at the best way to combine drugs already in use. A major area of research lies in finding better ways to choose the best treatment for each person. That is, finding factors about a person’s cancer that make it more likely to respond to a certain medicine.

Genetics

Scientists are studying several genes that may play a part in changing normal kidney cells into renal cell carcinoma. Doctors are also trying to figure out which treatments are likely to work best for certain types of kidney cancer. This information can also be used to develop new treatments.

New approaches to local treatment

Very intense, focused ultrasound is a fairly new treatment that is now being studied for use in kidney cancer. It involves aiming very focused ultrasound beams from outside the body to destroy the tumor.

Ablation with cryotherapy or radiofrequency ablation is sometimes used to treat small kidney cancers. Research is now being done to learn how useful these techniques are in the long term.

Targeted therapies

Because chemo drugs do not work very well against advanced kidney cancer, targeted therapies are usually the first-line option to treat kidney cancers that cannot be removed by surgery. Clinical trials are now under way to try to find out whether combining these drugs, either with each other or with other types of treatment, might be better than using them alone. Some new targeted therapies are being tested as well, with cediranib and linifanib showing promise.

Giving targeted therapy drugs before and after surgery is also being studied.

Immunotherapy

Kidney cancer is one of a handful of cancers that may respond to immunotherapy. Clinical trials of new immunotherapy methods are being tested. Basic research is now focused on getting a better understanding of the immune system, how to trigger it, and how it reacts to cancer.

Doctors are looking the use of cytokines to boost immune system cells that have been removed from the blood. Early results have shown promise, but more studies are needed.

Vaccines

Vaccines that boost the body's immune response to kidney cancer cells are being tested in clinical trials. Unlike vaccines against infections like measles or mumps, these vaccines are designed to help treat, not prevent, kidney cancer. One possible advantage of these types of treatments is that they seem to have very limited side effects. At this time, these vaccines are only being used in clinical trials.

Bone marrow or blood stem cell transplant

The amount of chemo that can be given is often limited by the damage it does to the bone marrow, where blood cells are made. To get around this problem, a bone marrow or blood stem cell transplant might be done.

Blood-forming stem cells are taken from the bone marrow or from the bloodstream of either the patient or a matched donor. The patient is then treated with powerful chemotherapy drugs either in high doses, or with lower doses (called a "mini" stem cell transplant). After treatment, the stem cells are given back to the patient as a blood transfusion. The transplanted stem cells return to the bone marrow and over time begin to make new blood cells.

Stem cells from a donor also become immune to the patient's tissues. This might help the patient to fight the cancer. This approach is under study and more research is needed before it will be used outside of clinical trials.

More information about kidney cancer

From your American Cancer Society

Here is more information you might find helpful. You also can order free copies of our documents from our toll-free number, 1-800-227-2345, or read them on our Web site, www.cancer.org.

Kidney Cancer (Adult) Renal Cell Carcinoma (also in Spanish)

After Diagnosis: A Guide for Patients and Families (also in Spanish)

Caring for the Person With Cancer at Home: A Guide for Patients and Families (also available in Spanish)

Clinical Trials: What You Need to Know

Immunotherapy

Living With Uncertainty: The Fear of Cancer Recurrence

Pain Control: A Guide for Those With Cancer and Their Loved Ones (also in Spanish)

Targeted Therapy

Understanding Radiation Therapy A Guide for Patients and Families (also in Spanish)

When Cancer Doesn't Go Away

When Your Cancer Comes Back: Cancer Recurrence

Your American Cancer Society also has books that you might find helpful. Call us at 1-800-227-2345 or visit our bookstore online at cancer.org/cancer/bookstore to find out about costs or to place an order.

National organizations and Web sites*

Along with the American Cancer Society, other sources of information and support include:

Urology Care Foundation
Toll-free number: 1-800-828-7866
Web site: www.urologyhealth.org

Kidney Cancer Association
For toll-free number, click phone icon at:
www.kidneycancer.org/about-us/contact-us
Web site: www.kidneycancer.org

National Cancer Institute
Toll-free number: 1-800-4-CANCER (1-800-422-6237)
Web site: www.cancer.gov

VHL (Von Hippel-Lindau) Family Alliance
Toll-free number: 1-800-767-4845
Telephone number 617-227-5667
Web site: www.vhl.org

**Inclusion on this list does not imply endorsement by the American Cancer Society.*

No matter who you are, we can help. Contact us anytime, day or night, for information and support. Call us at **1-800-227-2345** or visit www.cancer.org.

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For additional assistance please contact your American Cancer Society
1-800-227-2345 or www.cancer.org