Kidney Cancer (Adult) - Renal Cell Carcinoma Overview

This overview is based on the more detailed information in our document, *Kidney Cancer (Adult) Renal Cell Carcinoma*. You can get this document and other information by calling us at 1-800-227-2345 or you can read it on our website 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 when they are growing, normal cells divide faster. Once 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 normal cells can't 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.

Sometimes cancer cells spread to other parts of the body. There they begin to grow and form new tumors. This process is called *metastasis*.

No matter where a cancer spreads, it is named (and treated) based on the place where it started. For instance, breast cancer that has spread to the liver is still breast cancer, not liver cancer. Likewise, prostate cancer that has spread to the bones is still prostate cancer, not bone cancer.

Different types of cancer can behave very differently. They grow at different rates and respond to different treatments. This is why people with cancer need treatment that is aimed at their own kind of cancer.

Not all tumors are cancer. Tumors that aren't cancer are called *benign*. Benign tumors can cause problems – they can grow very large and press on healthy organs and tissues. But they can't 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.

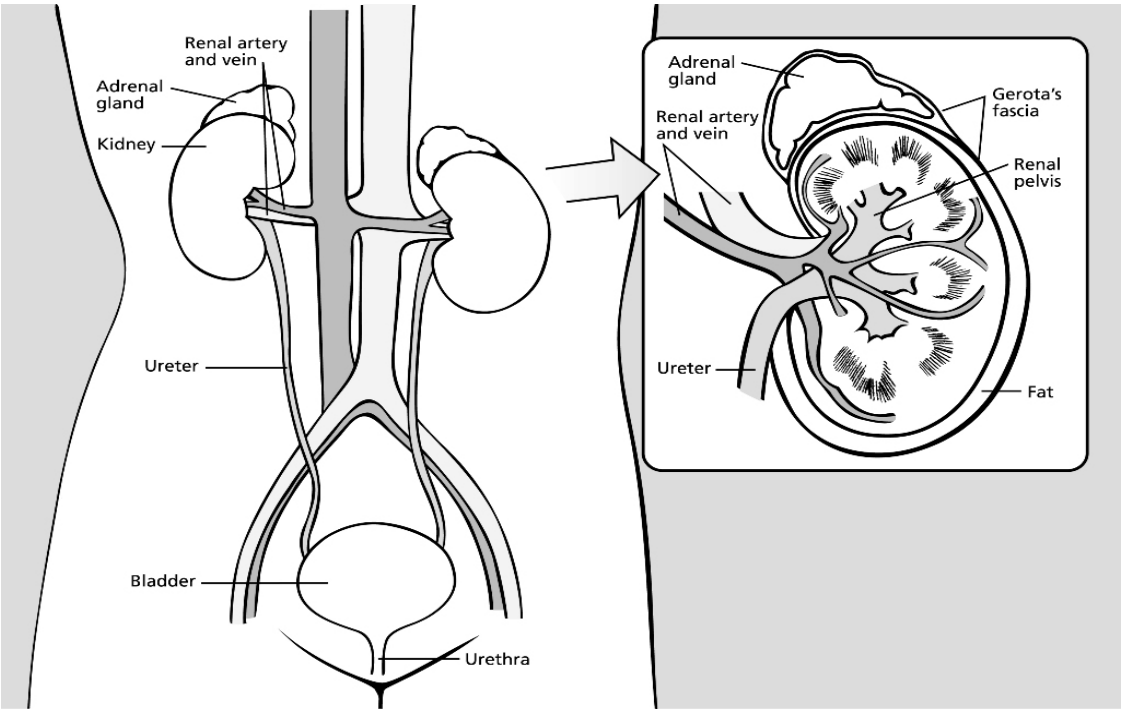
What is kidney cancer?

Kidney cancer is a cancer that starts in the kidneys. To understand kidney cancer, it helps to know about the normal kidneys and what they do.

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.

Small glands called *adrenal glands* sit above each of 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 leaves the kidneys through

long, thin tubes called *ureters*, which connect to the bladder. The urine is stored there until you urinate (pee). The kidneys also make hormones that help control blood pressure and tell the body to make more red blood cells.

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 *renal cell carcinoma* or RCC).

Like other cancers, RCC 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.

There are many subtypes of RCC, based mainly on how the cancer cells look under a microscope. Knowing the RCC subtype can affect treatment and can also help your doctor figure out if your cancer might be due to an inherited genetic syndrome.

- Clear cell RCC (the most common type)
- Papillary RCC (the second most common subtype)
- Chromophobe RCC
- Collecting duct RCC
- Other rare types of RCC

Other types of kidney cancer

Transitional cell carcinoma: About 5% to 10% of cancers in the kidney are transitional cell carcinomas (TCCs), also known as *urothelial carcinomas*. TCCs 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 ureters and bladder.

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

Wilms tumor: This type of cancer is almost always found in children and is very rare in adults. To learn more, see our document *Wilms Tumor*.

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

Benign (non-cancerous) kidney tumors

Some kidney tumors are benign (not cancer). They don't spread to other parts of the body, although they can still grow and cause problems.

- Renal adenoma (the most common type of benign kidney tumor)
- Oncocytoma
- Angiomyolipoma

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 2015 are:

- About 61,560 new cases of kidney cancer
- About 14,080 deaths from kidney cancer

Most people with this cancer are older. It is uncommon in people under age 45.

Kidney cancer is among the 10 most common cancers in both men and women. 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 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 have few or no known risk factors.

Lifestyle and job-related risk factors

Smoking: Smoking increases the risk of getting kidney cancer.

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

Job hazards: Exposure to certain chemicals on the job may increase the risk of kidney cancer. Some of these are cadmium (a type of metal), some herbicides, 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 kidney cancers 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 higher chance of getting the disease.

High blood pressure: The risk of kidney cancer is higher in people with high blood pressure.

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.

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.

Gender: Kidney cancer is found about twice as often in men as in women..

Race: African Americans and American Indians/Alaska Natives have slightly higher rates of kidney 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, you may be able to reduce your risk of kidney cancer by avoiding certain risk factors.

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 kidney 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 grow quite large without causing any pain or other problems.
- Because the kidneys are deep inside the body, small kidney tumors can’t be seen or felt during a physical exam.
- There are no good screening tests to look for kidney cancer in people who are not at increased risk.

Some tests can find some kidney cancers early, but none of these is recommended for screening in people at average 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 advanced.

Tests like ultrasound, CT scans, and MRI can sometimes find small kidney tumors, but these tests 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. 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's important to tell your doctor if any 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 to see if you have the condition.

Before being tested, 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

Early kidney cancers do not usually cause any signs or symptoms, but larger ones might. Possible 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
- Feeling tired
- Weight loss, if you are not trying to lose weight
- Fever that is not from an infection and that doesn't go away

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 can't 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 been found, lab tests can be done to get a sense of a person's overall health and to help tell if cancer has spread to other areas.

Urinalysis

This is likely to be one of the first tests done if the doctor thinks you might 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 for cancer cells (called *urine cytology*).

Blood tests

Complete blood count (CBC): This test measures the different cells in the blood, such as the red blood cells, the white blood cells, and the platelets. People with kidney cancer often have too few red blood cells (called *anemia*).

Blood counts are important to make sure a person is healthy enough for surgery.

Blood chemistry tests: These tests can show how well the kidneys and some other organs are working.

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 if treatment is working
- Look for signs of the cancer coming back

In many cases, imaging tests can 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 needed to be sure.

CT (computed tomography) scan

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.

This is one of the most useful tests for finding and looking at a tumor in your kidney. It can show the size, shape, and position of a tumor. It can also show if a cancer has spread to other parts of the body. If a kidney biopsy is needed, a CT scan can be used to guide a needle into the mass to take a sample.

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.

Before any pictures are taken, you may be asked to drink a liquid called oral contrast. You may also get an IV (intravenous) line through which a different kind of contrast dye is put in. Some people are allergic to the contrast. Be sure to tell the doctor if you have ever had a reaction to any contrast material used for x-rays.

MRI (magnetic resonance imaging) scan

MRI scans use strong magnets and radio waves instead of x-rays to make detailed pictures. 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.

MRI scans take longer than CT scans, often up to an hour. Also, you have to lie inside a narrow, tube-like machine, which upsets some people. Special, more open MRI machines can sometimes help with this if needed.

Ultrasound

Ultrasound uses sound waves to make pictures of your insides. This test can help show whether a kidney mass is solid or filled with fluid (kidney cancers are more likely to be solid). If a kidney biopsy is needed, ultrasound can be used to guide a needle into the mass to take a sample.

For this test, 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.

PET (positron emission tomography) scan

PET scans can be useful to see if the cancer has spread to lymph nodes. They can also be used when the doctor thinks the cancer has spread but doesn’t know where. But PET scans are not a standard part of the work-up for kidney cancers.

For this test, a slightly radioactive form of sugar is put into the bloodstream. Cancer cells take in large amounts of the sugar. A special camera is then used to find these deposits and turn them into pictures.

Some machines can do both a PET and CT scan at the same time.

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. The dye shows up on x-rays, which 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 and 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 to remove the tumor.

Angiography is often done as a part of the CT or MRI scan instead of as a separate x-ray 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, but this is very unlikely unless the cancer is advanced.

Bone scan

A bone scan can help show if a cancer has spread to your bones. PET scans can often show the spread of cancer to bones as well, so if you've had a PET scan you might not need a bone scan.

For this test, 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 cancers. A surgeon can usually tell from imaging tests if surgery is needed. But a biopsy may be done if other tests haven't shown for sure that there is a cancer.

There are 2 types of biopsies. For either type of biopsy, the skin where the biopsy needle is to be put in is numbed first. The needle is then guided into place using CT or ultrasound.

- **Fine needle aspiration (FNA):** For this biopsy, a thin (fine) needle is placed through the skin. Fluid or small pieces of tissue are then removed.

- **Core needle biopsy:** The needle used in core biopsies is larger than that used in FNA. A small cylinder of tissue is removed.

For either type of biopsy, the sample is checked under the microscope for cancer cells.

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.

Staging of kidney cancer

The stage of a cancer describes how far it has spread. Your treatment and the outlook for your recovery depend, to a large extent, on the stage of your cancer.

The stage 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 tests 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.

A staging system is a standard way for the cancer care team to describe the extent of the cancer. The most common staging system for kidney cancer is the AJCC staging system (sometimes also known as the TNM system). It uses 3 key pieces of information:

- **T** is based the size of the main **tumor** and whether it has grown into nearby areas.
- **N** describes the extent of spread to nearby lymph **nodes**.
- **M** tells whether the cancer has spread (**metastasized**) to other parts of the body.

The T, N, and M categories are combined to get an overall stage, using Roman numerals from I through IV (1-4). The lower the number, the less the cancer has spread. A higher number, such as stage IV, means a more advanced cancer.

Other staging systems can also be used for kidney cancer. If your doctor uses a staging system other than the one mentioned above, ask to have it explained in terms you can understand.

Along with the stage of your cancer, your doctor will take other factors into account when recommending a treatment plan, including the grade of the cancer (how it looks under a microscope), blood test results, and your overall health.

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 your treatment options. It's 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

Sometimes, more than one of type of treatment might be used.

It's important to discuss all of your options and their possible side effects with your doctors to help you choose the best fit for you. (See the section "What should I ask my doctor about kidney cancer?" for some questions to ask.) When time allows, getting a second opinion is often a good idea. It can give you more information and help you feel good about the treatment plan you choose.

Based on your treatment options, you might have different types of doctors on your treatment team. These could include:

- A urologist: a surgeon who treats diseases of the urinary system (and male reproductive system)
- A radiation oncologist: a doctor who treats cancer with radiation
- A medical oncologist: a doctor who treats cancer with medicines such as chemotherapy

Many other specialists might be part of your treatment team as well. See *Health Professionals Associated With Cancer Care* for more on this.

Surgery for kidney cancer

Surgery is the main treatment for most kidney cancers. The chances of surviving kidney cancer without surgery are small. Even people with advanced kidney cancers are often helped by surgery.

Depending on the stage and location 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. (Sometimes the adrenal gland can be left in place.) Nearby lymph nodes are sometimes removed, too. This is called *regional lymphadenectomy*. Most people do fine with only one kidney.

Laparoscopic ("keyhole") nephrectomy: In this surgery, the kidney is removed through small incisions (cuts) in the skin instead of through one large incision. The surgeon puts special long, thin instruments in the cuts to see the kidney and do the surgery. Another

way to do this surgery is for the surgeon to sit at a control panel near the operating table and move precise robotic arms to do the operation.

The main benefit of this type of surgery is that a large incision isn't needed to remove the kidney. This often results in a shorter hospital stay, faster recovery, and less pain afterwards. But either type of laparoscopic surgery requires a lot of skill and experience. If you're thinking about this approach, ask your doctor how many of these surgeries they have done.

Partial nephrectomy (nephron-sparing surgery)

In this operation, the surgeon removes only the part of the kidney with the cancer. The rest is left in place. This type of surgery is the preferred treatment for many people with early stage kidney cancer. It is often done to remove single small tumors and is being done more in patients with larger tumors.

This 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 kidney, or if the cancer has spread to the lymph nodes or distant organs.

Laparoscopic partial nephrectomy: Some doctors remove the part of the kidney laparoscopically or using robotic arms (as described above). But this is a difficult operation, and it should only be done by a surgeon with a lot of skill and experience.

Removal of metastases

Sometimes surgery is done to remove cancer that has spread to other parts of the body. This might be done to try to cure the cancer (along with removing the kidney tumor), or it might be done to help relieve pain or other symptoms from the cancer. It is most often done if there are only a few tumors that can be removed easily.

Risks and side effects of surgery

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

- Pain
- Bleeding during or after surgery that may require blood transfusions
- Blood clots, which can travel to the lungs
- Wound infection
- Damage to internal organs and blood vessels during surgery

- Unwanted air in the chest outside of the lungs
- Bulging of nearby internal organs into the incision (hernia)
- Leakage of urine into the belly (after partial nephrectomy)
- Failure of the remaining kidney

For more about surgery to treat cancer, see our document *Understanding Cancer Surgery: A Guide for Patients and Families*.

Other local 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, 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 tip of 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. A small catheter (tube) is placed in an artery in the inner thigh and is moved up until it reaches the artery going to the kidney. Material is then injected into the artery to block it. This method isn’t 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 people with small kidney tumors, one option may be to give no treatment at first and watch the tumor to see if it grows. If the tumor grows fast or gets larger, it is then removed (or treated another way).

This approach can let some people avoid surgery or other treatments. It's most often used in people who might have trouble with surgery or have other major health problems.

Radiation therapy for kidney cancer

Radiation therapy uses high-energy rays (such as x-rays) or particles to kill cancer cells or shrink tumors. It is sometimes used as the main treatment for kidney cancer in patients who can't have surgery, although other treatments might be tried first instead. Radiation can also be used to ease symptoms such as pain, bleeding, or problems caused by the cancer spreading.

Treatment is often given 5 days a week for several weeks. Each treatment is a lot like getting an x-ray, but the radiation is much stronger. The treatment itself is painless. Each treatment lasts only a few minutes, but the setup time – getting you into place for treatment – usually takes longer.

A special type of radiation treatment known as *stereotactic radiosurgery* can sometimes be used for single tumors in the brain or elsewhere. Very thin beams of radiation are aimed at the tumor from many different angles. This treatment does not actually involve surgery.

Side effects of radiation depend on where it's aimed and can include hair loss and mild skin changes (like sunburn) where the radiation passes through the skin, 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 can damage the lungs and might lead to 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.

For more about radiation therapy, see the "Radiation Therapy" section of our website or our document *Understanding Radiation Therapy: A Guide for Patients and Families*.

Targeted therapies for kidney cancer

As researchers have learned more about the changes inside cells that cause cancer, they have found newer drugs that target some of these changes. These targeted drugs are different from standard chemotherapy drugs. They often work better than standard chemo drugs for kidney cancer, and they have different side effects.

Many targeted drugs can be used to treat advanced kidney cancer. These drugs block the growth of the new blood vessels that nourish cancers, or they block important proteins in cancer cells that help them grow and survive. Some targeted drugs affect both of these.

These drugs are often used as the first treatments for 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.

To learn more about specific targeted drugs for kidney cancer, 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. Because biologic therapy can be hard to give and can cause serious side effects, many doctors now save it for people who have advanced kidney cancers that don't respond to targeted drugs.

Cytokines

The main immunotherapy drugs used for kidney cancer are cytokines (man-made versions of immune system proteins), such as interleukin-2 (IL-2) and interferon-alfa. These drugs can shrink kidney cancers in a small number of patients.

The side effects of these drugs can be severe and, rarely, fatal. For this reason, this treatment is only given by doctors experienced in their use, often in the hospital.

Immune checkpoint inhibitors

Cancer cells use immune system checkpoints in the body to help avoid being found and destroyed by the immune system. For example, they often have a protein called PD-L1 on their surface that helps them evade the immune system. Newer drugs that block this PD-L1 protein, or the PD-1 protein on immune cells, can help the immune system recognize the cancer cells and attack them. Some of these drugs have shown a lot of promise against advanced kidney cancers, usually after other treatments have been tried.

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

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 blood and go throughout the body, making the treatment useful for cancers that have spread to distant organs.

Kidney cancer doesn't usually respond well to chemo, so it's not a standard treatment for this disease. Chemo is only used for advanced kidney cancer after targeted drugs and/or immunotherapy have already been tried.

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

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. Common side effects can include:

- Hair loss
- Mouth sores
- Loss of appetite
- Nausea and vomiting
- Diarrhea or constipation
- Infections
- Easy bruising or bleeding
- Feeling tired

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.

For more about chemo, see the “Chemotherapy” section of our website, or our document *A Guide to Chemotherapy*.

Pain control for kidney cancer

Pain is a 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.

There are many types of pain medicine. For most people, these medicines will control the pain. For the treatment to work best, the pain medicines need to be taken on a 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 can 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.

To learn more about treating cancer pain, see the “Cancer-Related Pain” section of our website, or our document *Guide to Controlling Cancer Pain*.

Clinical trials for kidney cancer

You may have had to make a lot of decisions since you've been told you have kidney 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 kidney 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 learn more about promising new treatments or procedures.

Clinical trials are one way to get state-of-the art cancer treatment. Sometimes they may be the only way to get some newer treatments. They are also the only way for doctors to learn better ways to treat cancer. Still, they are 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. You can also call our clinical trials matching service for a list of studies that meet your needs. You can reach this service at 1-800-303-5691 or on our website 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 at 1-800-4-CANCER (1-800-422-6237) or by visiting the NCI clinical trials website at www.cancer.gov/clinicaltrials.

You'll need to meet some requirements 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.

You can get a lot more information in the "clinical trials" section of our website, or in our document *Clinical Trials: What You Need to Know*.

Complementary and alternative therapies after kidney cancer

When you have kidney 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 social media groups and websites 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?

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 might give the cancer more time to grow and make it less likely that treatment will help.

Finding out more

It's 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 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 or see the "Complementary and Alternative Medicine" section of our website 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 should I 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, 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. You can find out more about talking with your health care team in our document *Talking With Your Doctor*.

- Would you please write down the exact kind of kidney cancer I have?
- What is the stage of my cancer, and what does that mean in my case?
- Do I need other tests before we can decide on treatment?
- Do I need to see other doctors?
- How much experience do you have treating this type of cancer?
- What treatment choices do I have?
- What do you recommend and why?
- What is the goal of this treatment?
- Should I get a second opinion? Can you recommend a doctor or cancer center?
- How soon do I need to start 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 are the risks or side effects of treatment?
- How long will it take me to recover from treatment?
- What are the chances of my cancer coming back after treatment? What will we do if that happens?
- What kind of follow-up will I need after treatment?
- Are there any clinical trials I should think about?

No doubt you will have other questions. Be sure to write them down so that you remember to ask them during each visit with your cancer care team.

Moving on after treatment for kidney cancer

For some people with kidney cancer, treatment can 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. Some people may get regular treatments with targeted therapy 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's 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.

It's also very important to keep your 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.

Should your cancer come back, our document *When Your Cancer Comes Back: Cancer Recurrence* can help 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 seeing a new doctor. It's important to be able to give your new doctor the details of your diagnosis and treatment. Gathering these details soon after treatment may be easier than trying to get them at some point in the future. 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 stayed in the hospital, a copy of the discharge summary that the doctor wrote when you were sent home
- If you had radiation treatment, a summary of the type and dose of radiation and when and where it was given
- If you had targeted therapy, immunotherapy, or chemotherapy, 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 stored on a DVD, etc.)

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 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 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.

To learn more, see our document *Nutrition and Physical Activity During and After Cancer Treatment: Answers to Common Questions*.

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 often 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's OK to rest when you need to. To learn more about fatigue, please see our documents *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 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 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.

Can I lower my risk of kidney cancer coming back?

Most people want to know if there are lifestyle changes they can make to reduce their risk of cancer coming back. Unfortunately, for most cancers there isn't much 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.

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. 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 health effects that extend beyond your risk of kidney cancer or other cancers.

How might having kidney cancer affect your emotional health?

During and after treatment, you may find yourself overcome with many different emotions. This happens to a lot of people.

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, you might be stressed by financial concerns from your treatment. You might also see your health care team less often after treatment 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. You can also read our document *Distress in People with Cancer* or see the "Emotional Side Effects" section of our website for more information.

If treatment for kidney cancer stops working

If cancer keeps growing or comes back after one kind of treatment, 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 treatments and the cancer has not gotten any better, even newer treatments might not work. At this time you may have to weigh the possible benefits of trying a new treatment against the downsides, like treatment side effects and clinic visits. Everyone has their own way of looking at this.

Palliative care

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 goal 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.

Hospice care

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.

To learn more

You can learn more about the changes that occur when treatment stops working, and about planning ahead for yourself and your family, in our documents *Nearing the End of Life* and *Advance Directives*.

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 ways to treat it.

Genetics

Scientists are studying several genes that may play a part in changing normal kidney cells into kidney cancer. 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

High-intensity focused ultrasound (HIFU) 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 drugs

Because chemo drugs do not work very well against advanced kidney cancer, targeted drugs are usually the first-line option to treat kidney cancers that can't 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 drugs are being tested as well.

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

Immunotherapy

Kidney cancer is one the cancers most likely to 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.

Immune checkpoint inhibitors

Cancer cells use immune system checkpoints in the body to help avoid being found and destroyed by the immune system. For example, they often have a protein called PD-L1 on their surface that helps them evade the immune system. New drugs that block this PD-L1 protein, or the PD-1 protein on immune cells, can help the immune system recognize the cancer cells and attack them. Some of these drugs have shown a lot of promise against advanced kidney cancers, especially after other treatments have been tried.

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

In people with advanced kidney cancer, the person's own immune system is not controlling the cancer. Another approach to immunotherapy is to try to use someone else's immune system to attack the cancer cells giving a bone marrow or blood stem cell transplant.

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 to weaken their immune system. 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 immune cells.

Some early studies of this technique have been promising, finding that it may help shrink kidney cancers in some people. But it can also cause major side effects. 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 website, www.cancer.org.

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

Dealing with diagnosis and treatment

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

Talking With Your Doctor (also in Spanish)

Health Professionals Associated With Cancer Care

Nutrition for the Person With Cancer During Treatment: A Guide for Patients and Families (also in Spanish)

Coping With Cancer in Everyday Life (also in Spanish)

Distress in People With Cancer

Guide to Controlling Cancer Pain (also in Spanish)

Anxiety, Fear, and Depression

Family and caregiver concerns

Talking With Friends and Relatives About Your Cancer (also in Spanish)

Helping Children When a Family Member Has Cancer: Dealing With Diagnosis (also in Spanish)

What It Takes to Be a Caregiver

Insurance and financial issues

In Treatment: Financial Guidance for Cancer Survivors and Their Families (also in Spanish)

Health Insurance and Financial Assistance for the Cancer Patient (also in Spanish)

More on cancer treatments

Understanding Cancer Surgery: A Guide for Patients and Families (also in Spanish)

A Guide to Chemotherapy (also in Spanish)

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

Stem Cell Transplant (Peripheral Blood, Bone Marrow, and Cord Blood Transplants)

Clinical Trials: What You Need to Know

Cancer treatment side effects

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

Nausea and Vomiting

Anemia in People With Cancer

Fatigue in People With Cancer

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

National organizations and websites*

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

Urology Care Foundation
Toll-free number: 1-866-828-7866
Website: www.urologyhealth.org

> Information about kidney cancer and other cancers of the urological system. Some available in Spanish.

Kidney Cancer Association
For toll-free number, click phone icon at:
www.kidneycancer.org/about-us/contact-us
Nurse hotline: 1-503-215-7921
Website: www.kidneycancer.org

> Information, education, online and phone chats with health professionals, nurse hotline, and doctor locator service. Some online information available in Spanish, French, Portuguese, German, or Italian.

National Cancer Institute
Toll-free number: 1-800-422-6237 (1-800-4-CANCER) TTY: 1-800-332-8615
Website: www.cancer.gov

> Offers a wide variety of free, accurate, up-to-date information about many types of cancer to patients, their families, and the general public; has information about coping and family; and can also help people find clinical trials in their area.

National Kidney Foundation
Toll-free number: 1-855-653-2273 (1-855-NKF-CARES)
Website: www.kidney.org

> Information about kidney cancer and other urinary tract diseases, and organ donation. (Spanish materials are also available.)

VHL (Von Hippel-Lindau) Family Alliance
Toll-free number: 1-800-767-4845
Phone number: 1-617-277-5667
Website: www.vhl.org

> Information about being diagnosed with and living with von Hippel-Lindau disease for patients and caregivers; also resources and online discussions. Support groups available in some areas.

**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