

National Cancer Institute

What You Need
To Know About¹

Kidney Cancer

**U.S. DEPARTMENT OF
HEALTH AND HUMAN SERVICES**

National Institutes of Health

National Cancer Institute Services

This is only one of many free booklets for people with cancer.

You may want more information for yourself, your family, and your doctor.

NCI offers comprehensive research-based information for patients and their families, health professionals, cancer researchers, advocates, and the public.

- **Call** NCI's Cancer Information Service at **1-800-4-CANCER (1-800-422-6237)**
- **Visit** us at **<http://www.cancer.gov>** or **<http://www.cancer.gov/espanol>**
- **Chat** using **LiveHelp**, NCI's instant messaging service, at **<http://www.cancer.gov/livehelp>**
- **E-mail** us at **cancergovstaff@mail.nih.gov**
- **Order** publications at **<http://www.cancer.gov/publications>** or by calling **1-800-4-CANCER**
- **Get help** with quitting smoking at **1-877-44U-QUIT (1-877-448-7848)**

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About This Booklet

This National Cancer Institute (NCI) booklet is about *cancer** that starts in the *kidney*. Other names for this disease are *renal cancer* and *renal cell carcinoma*.

About 54,000 Americans are diagnosed with renal cell carcinoma each year. Most are over 55 years old.

This booklet is only about renal cell carcinoma. It's not about *transitional cell cancer* (TCC) of the kidney. People with TCC of the kidney have different treatment options than those with renal cell carcinoma. For the latest information about TCC, visit NCI's Web site at <http://www.cancer.gov/cancertopics/types/transitionalcell> or contact NCI's Cancer Information Service at **1-800-4-CANCER (1-800-422-6237)**. About 4,000 Americans are diagnosed with TCC of the kidney each year.

Also, this booklet is not about childhood kidney cancer. Treatment options are different for children. For the latest information about childhood kidney cancer, visit NCI's Web site at <http://www.cancer.gov/cancertopics/types/wilms> or contact NCI's Cancer Information Service. Hundreds of children are diagnosed with kidney cancer each year in the United States.

*Words in *italics* are in the Dictionary on page 24. The Dictionary explains these terms. It also shows how to pronounce them.

Learning about medical care for kidney cancer can help you take an active part in making choices about your care. This booklet tells about:

- Diagnosis and staging
- Treatment and follow-up care
- Taking part in research studies

This booklet has lists of questions that you may want to ask your doctor. Many people find it helpful to take a list of questions to a doctor visit. To help remember what your doctor says, you can take notes. You may also want to have a family member or friend go with you when you talk with the doctor—to take notes, ask questions, or just listen.

For the latest information about kidney cancer, visit NCI's Web site at <http://www.cancer.gov/cancertopics/types/kidney>.

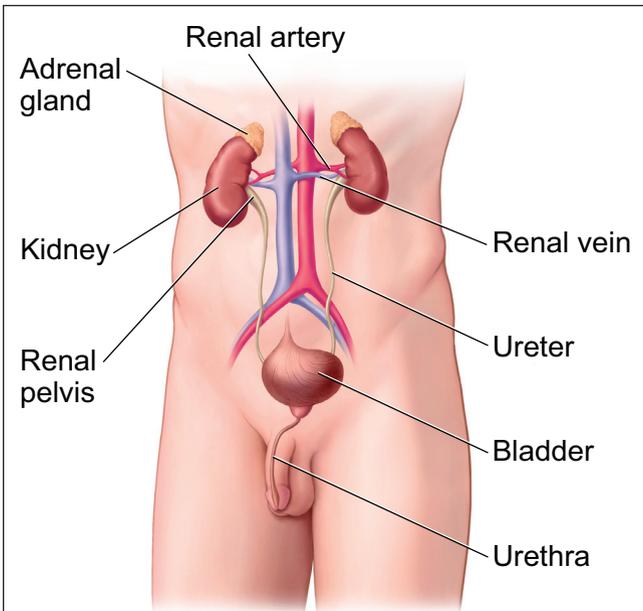
Also, NCI's Cancer Information Service can answer your questions about cancer. We can also send you NCI booklets and fact sheets. Call **1-800-4-CANCER (1-800-422-6237)**. Or chat using **LiveHelp**, NCI's instant messaging service, at <http://www.cancer.gov/livehelp>.

The Kidneys

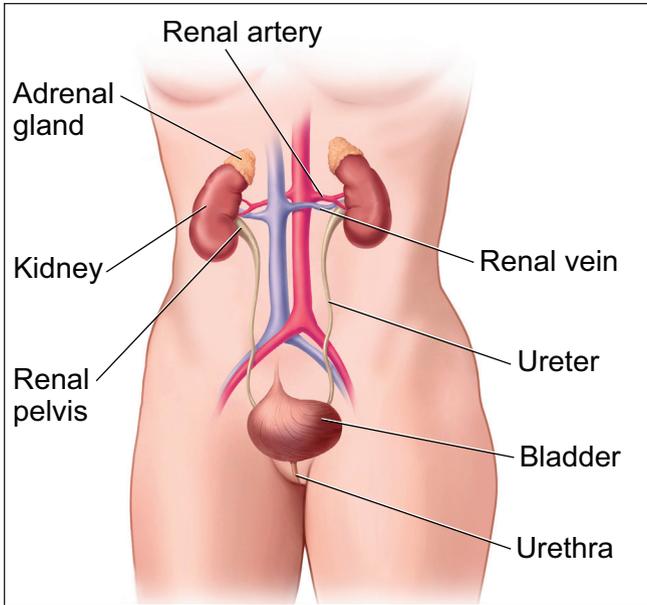
Your kidneys are a pair of *organs* in your *abdomen*. Each kidney is about the size of a fist.

Your kidneys are part of the *urinary tract*. They make *urine* by removing wastes and extra water from your blood.

Urine collects in a hollow space (*renal pelvis*) in the middle of each kidney. Urine passes from your renal pelvis into your bladder through a long tube called a *ureter*. Urine leaves your bladder through a shorter tube (the *urethra*).



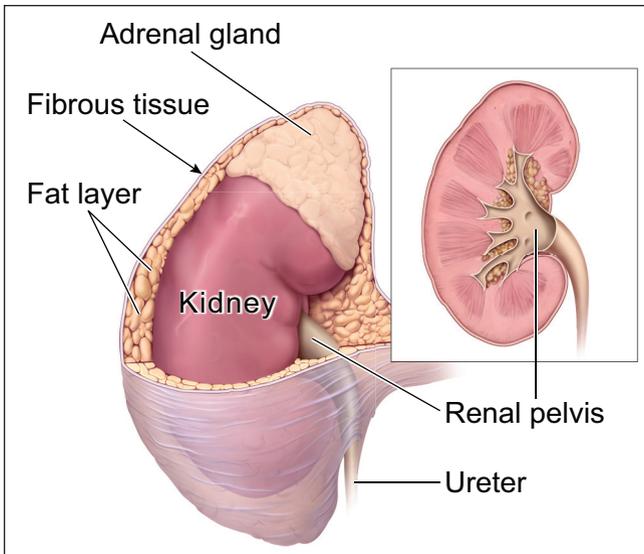
This picture shows the kidneys and nearby tissues in a man.



This picture shows the kidneys and nearby tissues in a woman.

Your kidneys also make substances to help control blood pressure and to make *red blood cells*.

Attached to the top of each kidney is an *adrenal gland*. A layer of fatty *tissue* and an outer layer of *fibrous* tissue surround the kidney and adrenal gland.



This picture shows the kidney and adrenal gland.

Cancer Cells

Cancer begins in *cells*, the building blocks that make up tissues. Tissues make up the kidneys and the other organs of the body.

Normal cells grow and divide to form new cells as the body needs them. When normal cells grow old or get damaged, they die, and new cells take their place.

Sometimes, this process goes wrong. New cells form when the body doesn't need them, and old or damaged cells don't die as they should. The buildup of extra cells often forms a mass of tissue called a growth or *tumor*.

Tumors in the kidney can be *benign* (not cancer) or *malignant* (cancer). Benign tumors are not as harmful as malignant tumors:

- **Benign tumors** (such as *cysts*):
 - are usually not a threat to life
 - can be treated or removed and usually don't grow back
 - don't invade the tissues around them
 - don't spread to other parts of the body
- **Malignant growths:**
 - may be a threat to life
 - usually can be removed but can grow back
 - can invade and damage nearby tissues and organs
 - can spread to other parts of the body

Kidney cancer cells can spread by breaking away from the kidney tumor. They can travel through *lymph vessels* to nearby *lymph nodes*. They can also spread through *blood vessels* to the lungs, bones, or liver. After spreading, kidney cancer cells may attach to other tissues and grow to form new tumors that may damage those tissues. See the Staging section on page 11 for information about kidney cancer that has spread.

Risk Factors

When you get a diagnosis of kidney cancer, it's natural to wonder what may have caused the disease. Doctors usually can't explain why one person gets kidney cancer and another doesn't.

However, we do know that people with certain *risk factors* may be more likely than others to develop kidney cancer. A risk factor is something that may increase the chance of getting a disease.

Studies have found the following risk factors for kidney cancer:

- **Smoking:** Smoking tobacco is an important risk factor for kidney cancer. People who smoke have a higher risk than nonsmokers. The risk is higher for those who smoke more cigarettes or for a long time.
- **Obesity:** Being obese increases the risk of kidney cancer.
- **High blood pressure:** Having high blood pressure may increase the risk of kidney cancer.
- **Family history of kidney cancer:** People with a family member who had kidney cancer have a slightly increased risk of the disease. Also, certain conditions that run in families can increase the risk of kidney cancer.
 - **Von Hippel-Lindau (VHL) syndrome:** VHL is a rare disease that runs in some families. It's caused by changes in the VHL *gene*. People with a changed VHL gene have an increased risk of kidney cancer. They may also have cysts or tumors in the eyes, brain, or other parts of the body. Family members of those with VHL can have a test to check for a changed VHL gene.

Many people who get kidney cancer have none of these risk factors, and many people who have known risk factors don't develop the disease.

How to Quit Tobacco

Quitting is important for anyone who uses tobacco. Quitting at any time is beneficial to your health.

For people who already have kidney cancer, quitting may reduce the chance of getting another type of cancer (such as lung, esophagus, or oral cancer), lung disease, or heart disease. Quitting may also help cancer treatments work better.

There are many ways to get help:

- Ask your doctor about medicine or nicotine replacement therapy. Your doctor can suggest a number of treatments that help people quit.
- Ask your doctor or dentist to help you find local programs or trained professionals who help people stop using tobacco.
- Call NCI's **Smoking Quitline** at **1-877-44U-QUIT (1-877-448-7848)** or instant message us through **LiveHelp** (<http://www.cancer.gov/livehelp>). We can tell you about:
 - Ways to quit smoking
 - Groups that help smokers who want to quit
 - NCI publications about quitting smoking
 - How to take part in a study of methods to help smokers quit
- Go online to **Smokefree.gov** (<http://www.smokefree.gov>), a Federal Government Web site. It offers a guide to quitting smoking and a list of other resources.

Symptoms

Common symptoms of kidney cancer include:

- Blood in your urine (which may make urine look rusty or darker red)
- Pain in your side that doesn't go away
- A lump or mass in your side or abdomen
- Weight loss for no known reason
- Fever
- Feeling very tired

These symptoms may be caused by kidney cancer or by other health problems, such as an *infection* or a kidney cyst. People with these symptoms should tell their doctor so that any problem can be diagnosed and treated as early as possible.

Diagnosis

If you have symptoms that suggest kidney cancer, your doctor will try to find out what's causing the problems.

You may have a physical exam. Also, you may have one or more of the following tests:

- **Urine tests:** The lab checks your urine for blood and other signs of disease.
- **Blood tests:** The lab checks your blood for several substances, such as *creatinine*. A high level of creatinine may mean the kidneys aren't doing their job.

- **Ultrasound:** An ultrasound device uses sound waves that can't be heard by humans. The sound waves make a pattern of echoes as they bounce off organs inside your abdomen. The echoes create a picture of your kidney and nearby tissues. The picture can show a kidney tumor.
- **CT scan:** An x-ray machine linked to a computer takes a series of detailed pictures of your abdomen. You may receive an injection of *contrast material* so your urinary tract and lymph nodes show up clearly in the pictures. The CT scan can show cancer in the kidneys, lymph nodes, or elsewhere in the abdomen.
- **MRI:** A large machine with a strong magnet linked to a computer is used to make detailed pictures of your urinary tract and lymph nodes. You may receive an injection of contrast material. MRI can show cancer in your kidneys, lymph nodes, or other tissues in the abdomen.
- **IVP:** You'll receive an injection of dye into a vein in your arm. The dye travels through the body and collects in your kidneys. The dye makes them show up on *x-rays*. A series of x-rays then tracks the dye as it moves through your kidneys to your ureters and bladder. The x-rays can show a kidney tumor or other problems. (IVP is not used as commonly as CT or MRI for the detection of kidney cancer.)
- **Biopsy:** The removal of tissue to look for cancer cells is a biopsy. In some cases, your doctor will do a biopsy to diagnose kidney cancer. Your doctor inserts a thin needle through your skin into the kidney to remove a small sample of tissue. Your doctor may use ultrasound or a CT scan to guide the needle. A *pathologist* uses a microscope to check for cancer cells in the tissue.

- **Surgery:** After surgery to remove part or all of a kidney tumor, a pathologist can make the final diagnosis by checking the tissue under a microscope for cancer cells.

Staging

If kidney cancer is diagnosed, your doctor needs to learn the extent (stage) of the disease to help you choose the best treatment. The stage is based on the size of the kidney tumor and whether the cancer has invaded nearby tissues or spread to other parts of the body.

Your doctor may order one or more tests:

- **Blood tests:** Your doctor can check for substances in your blood. Some people with kidney cancer have high levels of *calcium* or *LDH*. A blood test can also show how well your liver is working.
- **Chest x-ray:** An x-ray of the chest can show a tumor in your lung.
- **CT scan:** CT scans of your chest and abdomen can show cancer in your lymph nodes, lungs, or elsewhere.
- **MRI:** MRI can show cancer in your blood vessels, lymph nodes, or other tissues in the abdomen.

When cancer spreads from its original place to another part of the body, the new tumor has the same kind of abnormal cells and the same name as the primary (original) tumor. For example, if kidney cancer spreads to a lung, the cancer cells in the lung are actually kidney cancer cells. The disease is *metastatic* kidney cancer, not lung cancer. It's treated as kidney cancer, not as lung cancer. Doctors sometimes call the new tumor "distant" disease.

These are the stages of kidney cancer:

- **Stage I:** The tumor is no bigger than a tennis ball (almost 3 inches or about 7 centimeters). Cancer cells are found only in the kidney.
- **Stage II:** The tumor is bigger than a tennis ball. But cancer cells are found only in the kidney.
- **Stage III:** The tumor can be any size. It has spread to at least one nearby lymph node. Or it has grown through the kidney to reach nearby blood vessels.
- **Stage IV:** The tumor has grown through the layer of fatty tissue and the outer layer of fibrous tissue that surrounds the kidney. Or cancer cells have spread to nearby lymph nodes or to the lungs, liver, bones, or other tissues.

Treatment

Common treatment options for people with kidney cancer are surgery, *targeted therapy*, and *biological therapy*. You may receive more than one type of treatment.

The treatment that's right for you depends mainly on the following:

- The size of the tumor
- Whether the tumor has invaded tissues outside the kidney
- Whether the tumor has spread to other parts of the body
- Your age and general health

You may have a team of specialists to help plan your treatment. Your doctor may refer you to a specialist, or you may ask for a referral.

You may want to see a *urologist*, a *surgeon* who specializes in treating problems of the urinary tract. Other specialists who treat kidney cancer include *urologic oncologists* (surgeons who specialize in cancers of the urinary tract), *medical oncologists*, and *radiation oncologists*. Your health care team may also include an *oncology nurse* and a *registered dietitian*.

Your health care team can describe your treatment choices, the expected results of each, and the possible *side effects*. Because cancer therapy often damages healthy cells and tissues, side effects are common. Before treatment starts, ask your health care team about possible side effects and how treatment may change your normal activities. You and your health care team can work together to develop a treatment plan that meets your needs.

At any stage of disease, *supportive care* is available to control pain and other symptoms, to relieve the side effects of treatment, and to ease emotional concerns. Information about such care is available on NCI's Web site at <http://www.cancer.gov/cancertopics/coping>. For example, some people with kidney cancer may need to have *radiation therapy* to relieve pain or certain other problems. Radiation therapy uses high-energy rays to kill cancer cells.

Also, NCI's Cancer Information Service can answer your questions about supportive care. Call **1-800-4-CANCER (1-800-422-6237)**. Or chat using **LiveHelp**, NCI's instant messaging service, at <http://www.cancer.gov/livehelp>.

You may want to talk with your doctor about taking part in a *clinical trial*. Clinical trials are research studies testing new treatments. They are an important option for people with all stages of kidney cancer. See the Taking Part in Cancer Research section on page 23.

You may want to ask your doctor these questions before you begin treatment:

- How large is the tumor? What is the stage of the disease? Has the tumor grown outside the kidney or spread to other organs?
- What are my treatment choices? Which do you suggest for me? Why?
- What are the expected benefits of each kind of treatment?
- What can I do to prepare for treatment?
- Will I need to stay in the hospital? If so, for how long?
- What are the risks and possible side effects of each treatment? How can side effects be managed?
- What is the treatment likely to cost? Will my insurance cover it?
- How will treatment affect my normal activities?
- Would a research study (clinical trial) be a good choice for me?
- Can you recommend a doctor who could give me a second opinion about my treatment options?
- How often should I have checkups?

Surgery

Surgery is the most common treatment for people with kidney cancer. The type of surgery depends on the size and stage of the cancer, whether you have two kidneys, and whether cancer was found in both kidneys.

You and your surgeon can talk about the types of surgery and which may be right for you:

- **Removing all of the kidney** (*radical nephrectomy*): The surgeon removes the entire kidney along with the adrenal gland and some tissue around the kidney. Some lymph nodes in the area may also be removed.
- **Removing part of the kidney** (*partial nephrectomy*): The surgeon removes only the part of the kidney that contains the tumor. People with a kidney tumor that is smaller than a tennis ball may choose this type of surgery.

There are two approaches for removing the kidney. The surgeon may remove the tumor by making a large incision into your body (open surgery). Or the surgeon may remove the tumor by making small incisions (*laparoscopic surgery*). The surgeon sees inside your abdomen with a thin, lighted tube (a *laparoscope*) placed inside a small incision. Sometimes a robot is used. The surgeon uses handles below a computer display to control the robot's arms.

The surgeon may use other methods of destroying the cancer in the kidney. For people who have a tumor smaller than 4 centimeters and who can't have surgery to remove part of the kidney because of other health problems, the surgeon may suggest:

- ***Cryosurgery***: The surgeon inserts a tool through a small incision or directly through the skin into the tumor. The tool freezes and kills the kidney tumor.
- ***Radiofrequency ablation***: The surgeon inserts a special probe directly through the skin or through a small incision into the tumor. The probe contains tiny electrodes that kill the kidney cancer cells with heat.

It takes time to heal after surgery, and the time needed to recover is different for each person. It's common to feel weak or tired for a while.

Also, you may have pain or discomfort for the first few days. Medicine can help control your pain. Before surgery, you should discuss the plan for pain relief with your doctor or nurse. After surgery, your doctor can adjust the plan if you need more pain control.

Your health care team will watch you for signs of bleeding, infection, or other problems. They will keep track of how much fluid you take in and how much urine passes out of your body.

If one kidney is removed, the remaining kidney is usually able to do the work of both kidneys. However, if your remaining kidney isn't doing a good job cleaning your blood, you may need *dialysis*. Some people may need a *transplant* with a healthy kidney from a donor.

You may want to ask your doctor these questions before having surgery:

- What type of surgery do you suggest for me? Do you recommend surgery that is through a large incision? Or through small incisions with a laparoscope? Do you recommend surgery with a robot?
- Will lymph nodes and other tissues be removed? Why?
- How will I feel after surgery? If I have pain, how can it be controlled?
- How long will I be in the hospital?
- When will I be able to return to normal activities?
- What are the long-term effects of the surgery? Will I need dialysis?

Targeted Therapy

People with kidney cancer that has spread may receive a type of drug called targeted therapy. Many kinds of targeted therapy are used for kidney cancer. This treatment may shrink a kidney tumor or slow its growth.

Usually, the targeted therapy is taken by mouth. You may feel very tired while taking targeted therapy for kidney cancer. Other side effects may include diarrhea, nausea, vomiting, sores on the lips or in the mouth, and high blood pressure. You may want to read the NCI fact sheet *Targeted Cancer Therapies*.

Biological Therapy

People with kidney cancer that has spread may receive biological therapy. Biological therapy for kidney cancer is a treatment that may improve the body's natural defense (the *immune system* response) against cancer. The treatments used for kidney cancer can slow the growth of tumors or shrink them. The biological therapy is injected intravenously or under the skin. The treatment may be given at the hospital or a doctor's office.

Other drugs may be given at the same time to prevent side effects. The side effects differ with the biological therapy used, and from person to person. Biological therapy commonly causes a rash or swelling. You may feel very tired during treatment. The treatment may also cause a headache, muscle aches, a fever, or weakness.

You may find it helpful to read the NCI booklet *Biological Therapy*. You may also wish to read the NCI fact sheet *Biological Therapies for Cancer*.

You may want to ask your doctor these questions about targeted therapy or biological therapy:

- Why do I need this treatment?
- Which drug or drugs will I receive?
- How do the drugs work?
- When will treatment start? When will it end?
- How will I feel during treatment? What are the side effects? Are there any lasting side effects? What can I do about them?

Second Opinion

Before starting treatment, you may want a second opinion about your diagnosis, stage of cancer, and treatment plan. Some people worry that the doctor will be offended if they ask for a second opinion. Usually the opposite is true. Most doctors welcome a second opinion. And many health insurance companies will pay for a second opinion if you or your doctor requests it. Some companies require a second opinion.

If you get a second opinion, the second doctor may agree with your first doctor's diagnosis and treatment plan. Or the second doctor may suggest another approach. Either way, you have more information and perhaps a greater sense of control. You can feel more confident about the decisions you make, knowing that you've looked at all of your options.

It may take some time and effort to gather your medical records and see another doctor. In most cases, it's not a problem to take several weeks to get a second opinion. The delay in starting treatment usually will not make treatment less effective. To make sure, you should discuss this delay with your doctor.

There are many ways to find a doctor for a second opinion. You can ask your doctor, a local or state medical society, a nearby hospital, or a medical school for names of specialists.

Also, you can get information about treatment centers near you from NCI's Cancer Information Service. Call **1-800-4-CANCER (1-800-422-6237)**. Or chat using **LiveHelp**, NCI's instant messaging service, at <http://www.cancer.gov/livehelp>.

Other sources can be found in the NCI fact sheet *How To Find a Doctor or Treatment Facility If You Have Cancer*.



Nutrition

It's important for you to take very good care of yourself before, during, and after cancer treatment. Taking care of yourself includes eating well so that you get the right amount of calories to maintain a good weight. You also need enough protein to keep up your strength. Eating well may help you feel better and have more energy.

Sometimes, especially during or soon after treatment, you may not feel like eating. You may be uncomfortable or tired. You may find that foods don't taste as good as they used to. In addition, the side effects of some treatments (such as poor appetite, nausea, or vomiting) can make it hard to eat well.

Your doctor, a registered dietitian, or another health care provider can suggest ways to help you meet your nutrition needs. Also, the NCI booklet *Eating Hints* has many useful ideas and recipes.

Follow-up Care

You'll need regular checkups (such as every 6 months) after treatment for kidney cancer. Checkups help ensure that any changes in your health are noted and treated if needed.

Kidney cancer may come back after treatment. Your doctor will check for return of cancer. Checkups may include blood tests, a chest x-ray, CT scans, or an ultrasound.

NCI has publications to help answer questions about follow-up care and other concerns. You may find it helpful to read the NCI booklet *Facing Forward: Life After Cancer Treatment*. You may also want to read the NCI fact sheet *Follow-up Care After Cancer Treatment*.

Sources of Support

Learning that you have kidney cancer can change your life and the lives of those close to you. These changes can be hard to handle. It's normal for you, your family, and your friends to need help coping with the feelings that a diagnosis of cancer can bring.

Concerns about treatments and managing side effects, hospital stays, and medical bills are common. You may also worry about caring for your family, keeping your job, or continuing daily activities.

Here's where you can go for support:

- Doctors, nurses, and other members of your health care team can answer questions about treatment, working, or other activities.
- Social workers, counselors, or members of the clergy can be helpful if you want to talk about your feelings or concerns. Often, social workers can suggest resources for financial aid, transportation, home care, or emotional support.
- Support groups also can help. In these groups, patients or their family members meet with other patients or their families to share what they have learned about coping with cancer and the effects of treatment. Groups may offer support in person, over the telephone, or on the Internet. You may want to talk with a member of your health care team about finding a support group.
- NCI's Cancer Information Service can help you locate programs and services for people with cancer. Call **1-800-4-CANCER (1-800-422-6237)**. Or chat using **LiveHelp**, NCI's instant messaging service, at **<http://www.cancer.gov/livehelp>**.

For tips on coping, you may want to read the NCI booklet *Taking Time: Support for People With Cancer*.

Taking Part in Cancer Research

Doctors all over the world are conducting many types of clinical trials (research studies in which people volunteer to take part). Clinical trials are designed to find out whether new treatments are safe and effective.

Even if the people in a trial do not benefit directly from a treatment, they may still make an important contribution by helping doctors learn more about kidney cancer and how to control it. Although clinical trials may pose some risks, doctors do all they can to protect their patients.

Doctors are studying new targeted therapies and drug combinations for kidney cancer. If you're interested in being part of a clinical trial, talk with your doctor. You may want to read the NCI booklet *Taking Part in Cancer Treatment Research Studies*. It describes how treatment studies are carried out and explains their possible benefits and risks.

NCI's Web site includes a section on clinical trials at <http://www.cancer.gov/clinicaltrials>. It has general information about clinical trials as well as detailed information about specific ongoing studies of kidney cancer.

Also, NCI's Cancer Information Service can provide information about clinical trials. Call **1-800-4-CANCER (1-800-422-6237)**. Or chat using **LiveHelp**, NCI's instant messaging service, at <http://www.cancer.gov/livehelp>.

Dictionary

Definitions of thousands of terms are on NCI's Web site in NCI's Dictionary of Cancer Terms. You can access it at <http://www.cancer.gov/dictionary>.

Abdomen (AB-doh-men): The area of the body that contains the pancreas, stomach, intestines, liver, gallbladder, and other organs.

Adrenal gland (uh-DREE-nul): A small gland that makes steroid hormones, adrenaline, and noradrenaline. These hormones help control heart rate, blood pressure, and other important body functions. There are two adrenal glands, one on top of each kidney.

Benign (beh-NINE): Not cancerous. Benign tumors may grow larger but do not spread to other parts of the body. Also called nonmalignant.

Biological therapy (BY-oh-LAH-jih-kul THAYR-uh-pee): Treatment to boost or restore the ability of the immune system to fight cancer, infections, and other diseases. Also called immunotherapy.

Biopsy (BY-op-see): The removal of cells or tissues for examination by a pathologist. The pathologist may study the tissue under a microscope or perform other tests on the cells or tissue.

Blood vessel: A tube through which the blood circulates in the body. Blood vessels include a network of arteries, arterioles, capillaries, venules, and veins.

Calcium (KAL-see-um): A mineral needed for healthy teeth, bones, and other body tissues. It is the most common mineral in the body. A deposit of calcium in body tissues, such as breast tissue, may be a sign of disease.

Cancer (KAN-ser): A term for diseases in which abnormal cells divide without control and can invade nearby tissues. Cancer cells can also spread to other parts of the body through the blood and lymph systems.

Cell (sel): The individual unit that makes up the tissues of the body. All living things are made up of one or more cells.

Clinical trial (KLIH-nih-kul TRY-ul): A type of research study that tests how well new medical approaches work in people. These studies test new methods of screening, prevention, diagnosis, or treatment of a disease. Also called clinical study.

Contrast material: A dye or other substance that helps show abnormal areas inside the body. It is given by injection into a vein, by enema, or by mouth. Contrast material may be used with x-rays, CT scans, MRI, or other imaging tests.

Creatinine (cree-AT-ih-nin): A compound that is excreted from the body in urine. Creatinine levels are measured to monitor kidney function.

Cryosurgery (KRY-oh-SER-juh-ree): A procedure in which tissue is frozen to destroy abnormal cells. Liquid nitrogen or liquid carbon dioxide is used to freeze the tissue. Also called cryoablation and cryosurgical ablation.

CT scan: A series of detailed pictures of areas inside the body taken from different angles. The pictures are created by a computer linked to an x-ray machine. Also called CAT scan, computed tomography scan, computerized axial tomography scan, and computerized tomography.

Cyst (sist): A sac or capsule in the body. It may be filled with fluid or other material.

Dialysis (dye-AL-ih-sis): The process of filtering the blood when the kidneys are not able to cleanse it.

Fibrous: Containing or resembling fibers.

Gene: The functional and physical unit of heredity passed from parent to offspring. Genes are pieces of DNA, and most genes contain the information for making a specific protein.

Immune system (ih-MYOON SIS-tem): The complex group of organs and cells that defends the body against infections and other diseases.

Infection: Invasion and multiplication of germs in the body. Infections can occur in any part of the body and can spread throughout the body. The germs may be bacteria, viruses, yeast, or fungi. They can cause a fever and other problems, depending on where the infection occurs. When the body's natural defense system is strong, it can often fight the germs and prevent infection. Some cancer treatments can weaken the natural defense system.

IVP: A procedure in which x-ray images of the kidneys, ureters, and bladder are taken at regular times after a substance that shows up on x-rays is injected into a blood vessel. The substance outlines the kidneys, ureters, and bladder as it flows through the system and collects in the urine. IVP is usually done to look for a block in the flow of urine. Also called intravenous pyelography (IN-truh-VEE-nus PY-eh-LAH-gruh-fee).

Kidney: One of a pair of organs in the abdomen. Kidneys remove waste from the blood (as urine), make a substance that stimulates red blood cell production, and play a role in blood pressure regulation.

Laparoscope (LA-puh-ruh-SKOPE): A thin, tube-like instrument used to look at tissues and organs inside the abdomen. A laparoscope has a light and a lens for viewing and may have a tool to remove tissue.

Laparoscopic surgery (LA-puh-ruh-SKAH-pik SER-juh-ree): Surgery done with the aid of a laparoscope. A laparoscope is a thin, tube-like instrument with a light and a lens for viewing. It may also have a tool to remove tissue to be checked under a microscope for signs of disease.

LDH: One of a group of enzymes found in the blood and other body tissues, and involved in energy production in cells. An increased amount in the blood may be a sign of tissue damage and some types of cancer or other diseases. Also called lactate dehydrogenase (dee-hy-DRAH-jeh-nays) and lactic acid dehydrogenase.

Lymph node (limf node): A rounded mass of lymphatic tissue that is surrounded by a capsule of connective tissue. Lymph nodes filter lymph (lymphatic fluid), and they store lymphocytes (white blood cells). They are located along lymphatic vessels. Also called lymph gland.

Lymph vessel (limf): A thin tube that carries lymph (lymphatic fluid) and white blood cells through the lymphatic system. Also called lymphatic vessel.

Malignant (muh-LIG-nunt): Cancerous. Malignant tumors can invade and destroy nearby tissue and spread to other parts of the body.

Medical oncologist (MEH-dih-kul on-KAH-loh-jist): A doctor who specializes in diagnosing and treating cancer using chemotherapy, hormonal therapy, biological therapy, and targeted therapy. A medical oncologist often is the main health care provider for someone who has cancer. A medical oncologist also gives supportive care and may coordinate treatment given by other specialists.

Metastatic (meh-tuh-STA-tik): Having to do with metastasis, which is the spread of cancer from the place where it started to other places in the body.

MRI: A procedure in which radio waves and a powerful magnet linked to a computer are used to create detailed pictures of areas inside the body. These pictures can show the difference between normal and diseased tissue. MRI makes better images of organs and soft tissue than other scanning techniques, such as CT scan or x-ray. MRI is especially useful for imaging the brain, the spine, the soft tissue of joints, and the inside of bones. Also called magnetic resonance imaging.

Oncology nurse (on-KAH-loh-jee): A nurse who specializes in treating and caring for people who have cancer.

Organ: A part of the body that performs a specific function. For example, the heart is an organ.

Partial nephrectomy (PAR-shul neh-FREK-toh-mee): Surgery to remove part of one kidney or a kidney tumor, but not an entire kidney.

Pathologist (puh-THAH-loh-jist): A doctor who identifies diseases by studying cells and tissues under a microscope.

Radiation oncologist (RAY-dee-AY-shun on-KAH-loh-jist): A doctor who specializes in using radiation to treat cancer.

Radiation therapy (RAY-dee-AY-shun THAYR-uh-pee): The use of high-energy radiation from x-rays, gamma rays, neutrons, protons, and other sources to kill cancer cells and shrink tumors.

Radical nephrectomy (RA-dih-kul neh-FREK-toh-mee): Surgery to remove an entire kidney, nearby adrenal gland and lymph nodes, and other surrounding tissue.

Radiofrequency ablation (RAY-dee-oh-FREE-kwen-see uh-BLAY-shun): A procedure that uses radio waves to heat and destroy abnormal cells. The radio waves

travel through electrodes (small devices that carry electricity). Radiofrequency ablation may be used to treat cancer and other conditions.

Red blood cell: A cell that carries oxygen to all parts of the body.

Registered dietitian (dy-eh-TIH-shun): A health professional with special training in the use of diet and nutrition to keep the body healthy. A registered dietitian may help the medical team improve the nutritional health of a patient.

Renal cancer (REE-nul KAN-ser): The most common type of kidney cancer. It begins in the lining of the renal tubules in the kidney. The renal tubules filter the blood and produce urine. Also called hypernephroma, renal cell adenocarcinoma, and renal cell carcinoma.

Renal cell carcinoma (REE-nul sel KAR-sih-NOH-muh): The most common type of kidney cancer. It begins in the lining of the renal tubules in the kidney. The renal tubules filter the blood and produce urine. Also called hypernephroma, renal cell adenocarcinoma, and renal cancer.

Renal pelvis (REE-nul PEL-vus): The area at the center of the kidney. Urine collects here and is funneled into the ureter, the tube that connects the kidney to the bladder.

Risk factor: Something that increases the chance of developing a disease. Some examples of risk factors for cancer are age, a family history of certain cancers, use of tobacco products, being exposed to radiation or certain chemicals, infection with certain viruses or bacteria, and certain genetic changes.

Side effect: A problem that occurs when treatment affects healthy tissues or organs. Some common side effects of cancer treatment are fatigue, pain, nausea, vomiting, decreased blood cell counts, hair loss, and mouth sores.

Supportive care: Care given to improve the quality of life of patients who have a serious or life-threatening disease. The goal of supportive care is to prevent or treat as early as possible the symptoms of a disease, side effects caused by treatment of a disease, and psychological, social, and spiritual problems related to a disease or its treatment. Also called comfort care, palliative care, and symptom management.

Surgeon: A doctor who removes or repairs a part of the body by operating on the patient.

Surgery (SER-juh-ree): A procedure to remove or repair a part of the body or to find out whether disease is present. An operation.

Targeted therapy (TAR-geh-ted THAYR-uh-pee): A type of treatment that uses drugs or other substances, such as monoclonal antibodies, to identify and attack specific cancer cells. Targeted therapy may have fewer side effects than other types of cancer treatments.

Tissue (TISH-oo): A group or layer of cells that work together to perform a specific function.

Transitional cell cancer (tran-ZIH-shuh-nul sel KAN-ser): Cancer that forms in transitional cells in the lining of the bladder, ureter, or renal pelvis (the part of the kidney that collects, holds, and drains urine).

Transplant: A surgical procedure in which tissue or an organ is transferred from one area of a person's body to another area, or from one person (the donor) to another person (the recipient).

Tumor (TOO-mer): An abnormal mass of tissue that results when cells divide more than they should or do not die when they should. Tumors may be benign (not cancer), or malignant (cancer). Also called neoplasm.

Ultrasound (UL-truh-SOWND): A procedure in which high-energy sound waves are bounced off internal tissues or organs and make echoes. The echo patterns

are shown on the screen of an ultrasound machine, forming a picture of body tissues called a sonogram. Also called ultrasonography.

Ureter (YER-eh-ter): The tube that carries urine from the kidney to the bladder.

Urethra (yoo-REE-thruh): The tube through which urine leaves the body. It empties urine from the bladder.

Urinary tract (YOOR-in-air-ee): The organs of the body that produce and discharge urine. These include the kidneys, ureters, bladder, and urethra.

Urine (YOOR-in): Fluid containing water and waste products. Urine is made by the kidneys, stored in the bladder, and leaves the body through the urethra.

Urologic oncologist (YOOR-uh-LAH-jik on-KAH-loh-jist): A doctor who specializes in treating cancers of the urinary system.

Urologist (yoo-RAH-loh-jist): A doctor who specializes in diseases of the urinary organs in females and the urinary and sex organs in males.

Von Hippel-Lindau syndrome: A rare inherited disorder in which blood vessels grow abnormally in the eyes, brain, spinal cord, adrenal glands, or other parts of the body. People with von Hippel-Lindau syndrome have a higher risk of developing some types of cancer. Also called VHL syndrome.

X-ray: A type of high-energy radiation. In low doses, x-rays are used to diagnose diseases by making pictures of the inside of the body. In high doses, x-rays are used to treat cancer.

National Cancer Institute Publications

NCI provides publications about cancer, including the booklets and fact sheets mentioned in this booklet. Many are available in both English and Spanish.

You may read these publications online and print your own copy. Also, people in the United States and its territories may order NCI publications:

- **By telephone:** People in the United States and its territories may order these and other NCI publications by calling NCI's Cancer Information Service at **1-800-4-CANCER (1-800-422-6237)**.
- **On the Internet:** Many NCI publications may be viewed, downloaded, and ordered from **<http://www.cancer.gov/publications>**. This Web site also explains how people outside the United States can mail or fax their requests for NCI booklets.

Cancer Treatment and Supportive Care

- *How To Find a Doctor or Treatment Facility If You Have Cancer* (also in Spanish)
- *Targeted Cancer Therapies*
- *Biological Therapy*
- *Biological Therapies for Cancer*
- *Pain Control* (also in Spanish)
- *Eating Hints* (also in Spanish)

Coping with Cancer

- *Taking Time: Support for People with Cancer*

Life After Cancer Treatment

- *Facing Forward: Life After Cancer Treatment* (also in Spanish)
- *Follow-up Care After Cancer Treatment*
- *Facing Forward: Ways You Can Make a Difference in Cancer*

Advanced or Recurrent Cancer

- *Coping With Advanced Cancer*
- *When Cancer Returns*

Complementary Medicine

- *Thinking about Complementary & Alternative Medicine*

Caregivers

- *When Someone You Love Is Being Treated for Cancer: Support for Caregivers*
- *When Someone You Love Has Advanced Cancer: Support for Caregivers*
- *Facing Forward: When Someone You Love Has Completed Cancer Treatment*
- *Caring for the Caregiver: Support for Cancer Caregivers*

Quitting Smoking

- *Clearing the Air: Quit Smoking Today*

Research Studies

- *Taking Part in Cancer Treatment Research Studies*
- *Providing Your Tissue for Research: What You Need To Know*
- *Donating Tissue for Cancer Research: Biospecimens and Biorepositories*

The National Cancer Institute

The National Cancer Institute (NCI), part of the National Institutes of Health, is the Federal Government's principal agency for cancer research and training. NCI conducts and supports basic and clinical research to find better ways to prevent, diagnose, and treat cancer. The Institute also supports education and training for cancer research and treatment programs. In addition, NCI is responsible for communicating its research findings to the medical community and the public.

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