



What
You
Need
To
Know
About™

Kidney Cancer

U.S. DEPARTMENT OF HEALTH
AND HUMAN SERVICES
National Institutes of Health
National Cancer Institute

This booklet is about kidney cancer. The Cancer Information Service can help you learn more about this disease. The staff can talk with you in English or Spanish.

The number is 1-800-4-CANCER (1-800-422-6237). The number for deaf and hard of hearing callers with TTY equipment is 1-800-332-8615. The call is free.

Este folleto es acerca del cáncer de riñón. Llame al Servicio de Información sobre el Cáncer para saber más sobre esta enfermedad. Este servicio tiene personal que habla español.

El número a llamar es el 1-800-4-CANCER (1-800-422-6237). Personas con problemas de audición y que cuentan con equipo TTY pueden llamar al 1-800-332-8615. La llamada es gratis.

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What You Need To Know About™ Kidney Cancer

This National Cancer Institute (NCI) booklet has important information about *cancer** of the kidney. It discusses possible causes, symptoms, diagnosis, and treatment. It also has information to help patients cope with kidney cancer.

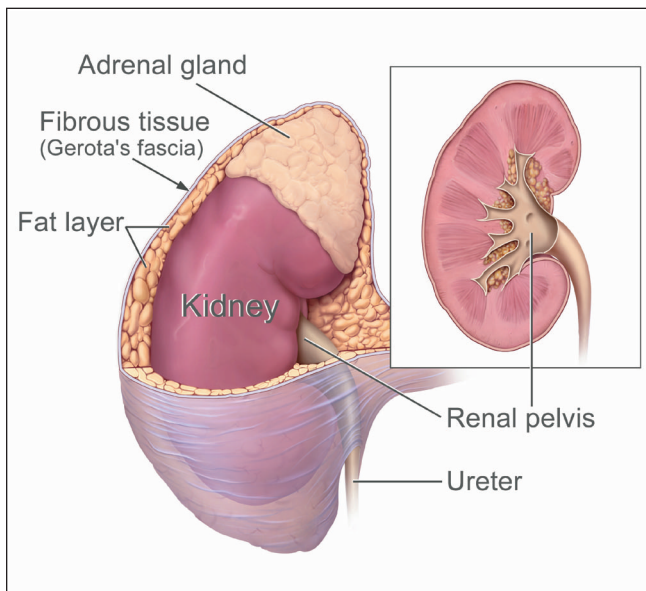
Scientists are studying kidney cancer to learn more about this disease. They are finding out more about its causes, and doctors also are exploring new ways to treat it. This research keeps increasing our knowledge about kidney cancer. The NCI provides the most up-to-date information over the telephone and on the Internet:

- **Telephone:** Information Specialists at NCI's Cancer Information Service at 1-800-4-CANCER can answer questions about cancer and can send materials published by NCI.
- **Internet:** People can ask questions online and get immediate help through *LiveHelp* on the Internet at <http://cancer.gov>. Many NCI booklets and fact sheets can be viewed at <http://cancer.gov/publications>. People in the United States and its territories may use this Web site to order publications. This Web site also explains how people outside the United States can mail or fax their requests for NCI publications.

*Words that may be new to readers appear in *italics*. The “Dictionary” section explains these terms. Some words in the “Dictionary” have a “sounds-like” spelling to show how to pronounce them.

The Kidneys

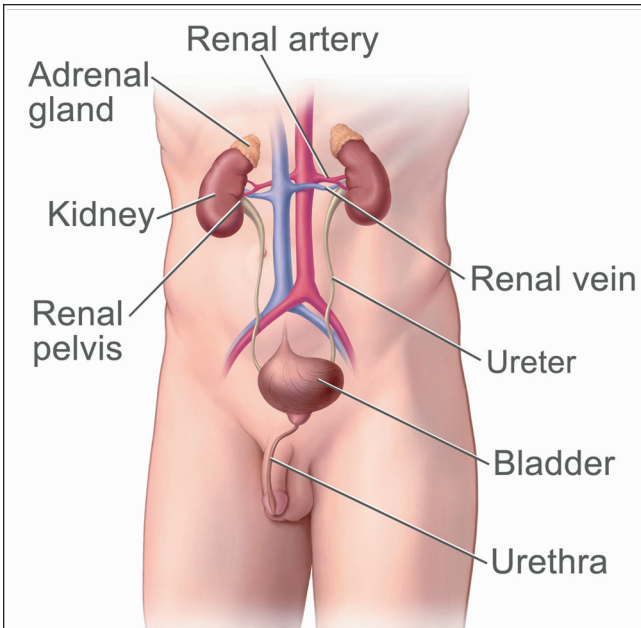
The *kidneys* are a pair of *organs* on either side of the spine in the lower *abdomen*. Each kidney is about the size of a fist. Attached to the top of each kidney is an *adrenal gland*. A mass of fatty *tissue* and an outer layer of *fibrous tissue* (*Gerota's fascia*) enclose the kidneys and adrenal glands.



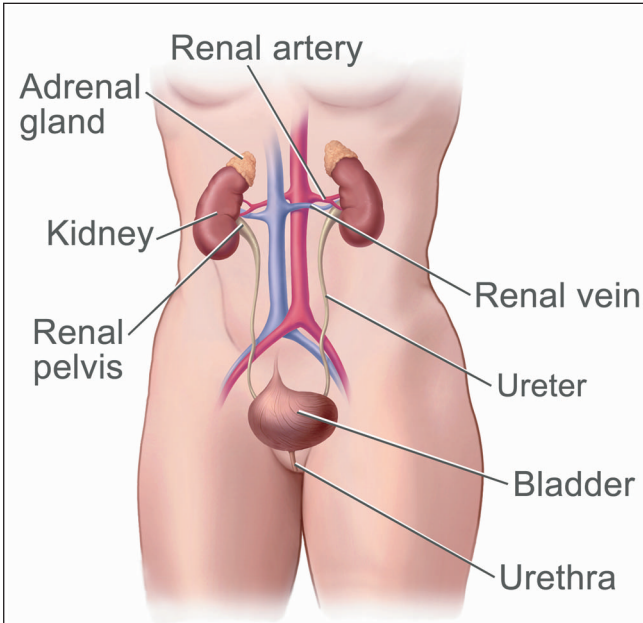
This picture shows the kidney and adrenal gland.

The kidneys are part of the *urinary tract*. They make *urine* by removing wastes and extra water from the *blood*. Urine collects in a hollow space (*renal pelvis*) in the middle of each kidney. It passes from the renal pelvis into the *bladder* through a tube called a *ureter*. Urine leaves the body through another tube (the *urethra*).

The kidneys also make substances that help control blood pressure and the production of *red blood cells*.



This picture shows the male urinary tract.



This picture shows the female urinary tract.

Understanding Cancer

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

Normally, cells grow and divide to form new cells as the body needs them. When cells grow old, they die, and new cells take their place.

Sometimes this orderly process goes wrong. New cells form when the body does not need them, and old cells do not die when they should. These extra cells can form a mass of tissue called a growth or *tumor*.

Tumors can be *benign* or *malignant*:

- **Benign tumors** are not cancer:
 - Benign tumors are rarely life threatening.
 - Usually, benign tumors can be removed, and they seldom grow back.
 - Cells from benign tumors do not invade tissues around them or spread to other parts of the body.
- **Malignant tumors** are cancer:
 - Malignant tumors are generally more serious than benign tumors. They may be life threatening.
 - Malignant tumors often can be removed, but they can grow back.
 - Cells from malignant tumors can invade and damage nearby tissues and organs. Also, cancer cells can break away from a malignant tumor and enter the bloodstream or *lymphatic system*. That is how cancer cells spread from the original cancer (*primary tumor*) to form new tumors in other organs. The spread of cancer is called *metastasis*.

Several types of cancer can start in the kidney. This booklet is about *renal cell cancer*, the most common type of kidney cancer in adults. This type is sometimes called renal *adenocarcinoma* or *hypernephroma*. Another type of cancer, *transitional cell carcinoma*, affects the renal pelvis. It is similar to bladder cancer and is often treated like bladder cancer. *Wilms' tumor* is the most common type of childhood kidney cancer. It is different from adult kidney cancer and requires different treatment. Information about transitional cell carcinoma and Wilms' tumor is available from the Cancer Information Service at 1-800-4-CANCER and at <http://cancer.gov>.

When kidney cancer spreads outside the kidney, cancer cells are often found in nearby *lymph nodes*. Kidney cancer also may spread to the lungs, bones, or liver. And it may spread from one kidney to the other.

When cancer spreads (metastasizes) 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 tumor. For example, if kidney cancer spreads to the lungs, the cancer cells in the lungs are actually kidney cancer cells. The disease is metastatic kidney cancer, not lung cancer. It is treated as kidney cancer, not lung cancer. Doctors sometimes call the new tumor metastatic or “distant” disease.

Kidney Cancer: Who’s at Risk?

Kidney cancer develops most often in people over 40, but no one knows the exact causes of this disease. Doctors can seldom explain why one person develops kidney cancer and another does not. However, it is clear that kidney cancer is not contagious. No one can “catch” the disease from another person.

Research has shown that people with certain *risk factors* are more likely than others to develop kidney cancer. A risk factor is anything that increases a person’s chance of developing a disease.

Studies have found the following risk factors for kidney cancer:

- **Smoking:** Cigarette smoking is a major risk factor. Cigarette smokers are twice as likely as nonsmokers to develop kidney cancer. Cigar smoking also may increase the risk of this disease.
- **Obesity:** People who are *obese* have an increased risk of kidney cancer.

- **High blood pressure:** High blood pressure increases the risk of kidney cancer.
- **Long-term dialysis:** Dialysis is a treatment for people whose kidneys do not work well. It removes wastes from the blood. Being on dialysis for many years is a risk factor for kidney cancer.
- **Von Hippel-Lindau (VHL) syndrome:** VHL is a rare disease that runs in some families. It is caused by changes in the VHL *gene*. An abnormal VHL gene increases the risk of kidney cancer. It also can cause *cysts* or tumors in the eyes, brain, and other parts of the body. Family members of those with this syndrome can have a test to check for the abnormal VHL gene. For people with the abnormal VHL gene, doctors may suggest ways to improve the detection of kidney cancer and other diseases before *symptoms* develop.
- **Occupation:** Some people have a higher risk of getting kidney cancer because they come in contact with certain chemicals or substances in their workplace. Coke oven workers in the iron and steel industry are at risk. Workers exposed to *asbestos* or *cadmium* also may be at risk.
- **Gender:** Males are more likely than females to be diagnosed with kidney cancer. Each year in the United States, about 20,000 men and 12,000 women learn they have kidney cancer.

Most people who have these risk factors do not get kidney cancer. On the other hand, most people who do get the disease have no known risk factors. People who think they may be at risk should discuss this concern with their doctor. The doctor may be able to suggest ways to reduce the risk and can plan an appropriate schedule for checkups.

Symptoms

Common symptoms of kidney cancer include:

- Blood in the urine (making the urine slightly rusty to deep red)
- Pain in the side that does not go away
- A lump or mass in the side or the abdomen
- Weight loss
- Fever
- Feeling very tired or having a general feeling of poor health

Most often, these symptoms do not mean cancer. An infection, a cyst, or another problem also can cause the same symptoms. A person with any of these symptoms should see a doctor so that any problem can be diagnosed and treated as early as possible.

Diagnosis

If a patient has symptoms that suggest kidney cancer, the doctor may perform one or more of the following procedures:

- **Physical exam:** The doctor checks general signs of health and tests for fever and high blood pressure. The doctor also feels the abdomen and side for tumors.
- **Urine tests:** Urine is checked for blood and other signs of disease.



- **Blood tests:** The lab checks the blood to see how well the kidneys are working. The lab may check the level of several substances, such as *creatinine*. A high level of creatinine may mean the kidneys are not doing their job.
- **Intravenous pyelogram (IVP):** The doctor injects dye into a vein in the arm. The dye travels through the body and collects in the kidneys. The dye makes them show up on *x-rays*. A series of *x-rays* then tracks the dye as it moves through the kidneys to the ureters and bladder. The *x-rays* can show a kidney tumor or other problems.

- **CT scan** (CAT scan): An x-ray machine linked to a computer takes a series of detailed pictures of the kidneys. The patient may receive an injection of dye so the kidneys show up clearly in the pictures. A CT scan can show a kidney tumor.
- **Ultrasound test:** The ultrasound device uses sound waves that people cannot hear. The waves bounce off the kidneys, and a computer uses the echoes to create a picture called a *sonogram*. A solid tumor or cyst shows up on a sonogram.
- **Biopsy:** A biopsy is the removal of tissue to look for cancer cells. The doctor inserts a thin needle through the skin into the kidney to remove a small amount of tissue. The doctor may use ultrasound or x-rays to guide the needle. A *pathologist* uses a microscope to look for cancer cells in the tissue.

People who need a biopsy may want to ask the doctor some of the following questions:

- Why do I need a biopsy?
- Will the biopsy be done in the hospital? How long will it take? Will I be awake? Will it hurt?
- How soon will I know the results?
- Are there any risks? What are the chances of infection or bleeding after the biopsy?
- If I do have cancer, who will talk with me about treatment? When?

Staging

To plan the best treatment, the doctor needs to know the *stage* (extent) of the disease. The stage is based on the size of the tumor, whether the cancer has spread and, if so, to what parts of the body.

Staging may involve *imaging* tests such as an ultrasound or a CT scan. The doctor also may use an *MRI*. For this test, a powerful magnet linked to a computer makes detailed pictures of organs and blood vessels.

Doctors describe kidney cancer by the following stages:

- **Stage I** is an early stage of kidney cancer. The tumor measures up to 2 3/4 inches (7 centimeters). It is no bigger than a tennis ball. The cancer cells are found only in the kidney.
- **Stage II** is also an early stage of kidney cancer, but the tumor measures more than 2 3/4 inches. The cancer cells are found only in the kidney.
- **Stage III** is one of the following:
 - The tumor does not extend beyond the kidney, but cancer cells have spread through the lymphatic system to one nearby lymph node; or
 - The tumor has invaded the adrenal gland or the layers of fat and fibrous tissue that surround the kidney, but cancer cells have not spread beyond the fibrous tissue. Cancer cells may be found in one nearby lymph node; or
 - The cancer cells have spread from the kidney to a nearby large blood vessel. Cancer cells may be found in one nearby lymph node.

- **Stage IV** is one of the following:
 - The tumor extends beyond the fibrous tissue that surrounds the kidney; or
 - Cancer cells are found in more than one nearby lymph node; or
 - The cancer has spread to other places in the body such as the lungs.

Recurrent cancer is cancer that has come back (recurred) after treatment. It may come back in the kidney or in another part of the body.

Treatment

Many people with kidney cancer want to take an active part in making decisions about their medical care. They want to learn all they can about their disease and their treatment choices. However, shock and stress after the diagnosis can make it hard to think of everything they want to ask the doctor. It often helps to make a list of questions before an appointment. To help remember what the doctor says, people may take notes or ask whether they may use a tape recorder. Some also want to have a family member or friend with them when they talk to the doctor—to take part in the discussion, to take notes, or just to listen.

The doctor may refer the patient to a specialist, or the patient may ask for a referral. Specialists who treat kidney cancer include doctors who specialize in diseases of the urinary system (*urologists*) and doctors who specialize in cancer (*medical oncologists* and *radiation oncologists*).

Getting a Second Opinion

Before starting treatment, a person with kidney cancer might want a second opinion about the diagnosis and the treatment plan. Some insurance companies require a second opinion; others may cover a second opinion if the patient or doctor requests it.

There are a number of ways to find a doctor for a second opinion:

- The patient's doctor may refer the patient to one or more specialists. At cancer centers, several specialists often work together as a team.
- The Cancer Information Service, at 1-800-4-CANCER, can tell callers about nearby treatment centers.



- A local or state medical society, a nearby hospital, or a medical school can usually provide the names of specialists.
- The American Board of Medical Specialties (ABMS) offers a list of doctors who have met specific education and training requirements and have passed a specialty examination. Their directory—the *Official ABMS Directory of Board Certified Medical Specialists*—lists doctors’ names along with their specialty and their educational background. The directory is available in most public libraries. Also, ABMS offers this information by telephone and on the Internet. The toll-free telephone number is 1-866-ASK-ABMS (1-866-275-2267). The Internet address is <http://www.abms.org>.
- The NCI provides a helpful fact sheet on how to find a doctor called “How To Find a Doctor or Treatment Facility If You Have Cancer.” It is available on the Internet at <http://cancer.gov/publications>.

Preparing for Treatment

Treatment depends mainly on the stage of disease and the patient’s general health and age. The doctor can describe treatment choices and discuss the expected results. The doctor and patient can work together to develop a treatment plan that fits the patient’s needs.

People do not need to ask all their questions or understand all the answers at once. They will have other chances to ask the doctor to explain things that are not clear and to ask for more information.

People may want to ask the doctor these questions before treatment begins:

- What is the stage of the disease? Has the cancer spread? If so, where?
- What are my treatment choices? Which do you recommend for me? Will I have more than one kind of treatment?
- What are the expected benefits of each kind of treatment? Will it cure or control the disease?
- What are the risks and possible *side effects* of each treatment? Will I be given anything to control side effects?
- How long will treatment last?
- Will I have to stay in the hospital?
- What is the treatment likely to cost? Is this treatment covered by my insurance plan?
- How will treatment affect my normal activities?
- How often should I have checkups?
- Would a *clinical trial* (research study) be appropriate for me?

Methods of Treatment

People with kidney cancer may have *surgery*, *arterial embolization*, *radiation therapy*, *biological therapy*, or *chemotherapy*. Some may have a combination of treatments.

At any stage of disease, people with kidney cancer may have treatment to control pain and other symptoms, to relieve the side effects of therapy, and to ease emotional and practical problems. This kind of treatment is called *supportive care*, *symptom management*, or *palliative care*. Information about supportive care is available on NCI's Web site at <http://cancer.gov> and from NCI's Cancer Information Service at 1-800-4-CANCER.

A patient may want to talk to the doctor about taking part in a clinical trial, a research study of new treatment methods. The section on "The Promise of Cancer Research" on **page 26** has more information about clinical trials.

Surgery

Surgery is the most common treatment for kidney cancer. It is a type of *local therapy*. It treats cancer in the kidney and the area close to the tumor.

An operation to remove the kidney is called a *nephrectomy*. There are several types of nephrectomies. The type depends mainly on the stage of the tumor. The doctor can explain each operation and discuss which is most suitable for the patient:

- **Radical nephrectomy:** Kidney cancer is usually treated with 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 also may be removed.
- **Simple nephrectomy:** The surgeon removes only the kidney. Some people with Stage I kidney cancer may have a simple nephrectomy.

- **Partial nephrectomy:** The surgeon removes only the part of the kidney that contains the tumor. This type of surgery may be used when the person has only one kidney, or when the cancer affects both kidneys. Also, a person with a small kidney tumor (less than 4 centimeters or 3/4 of an inch) may have this type of surgery.

People may want to ask the doctor these questions before having surgery:

- What kind of operation do you recommend for me?
- Do I need any lymph nodes removed? Why?
- What are the risks of surgery? Will I have any long-term effects? Will I need dialysis?
- Should I store some of my own blood in case I need a *transfusion*?
- How will I feel after the operation?
- How long will I need to stay in the hospital?
- When can I get back to my normal activities?
- How often will I need checkups?
- Would a clinical trial be appropriate for me?

Arterial Embolization

Arterial embolization is a type of local therapy that shrinks the tumor. Sometimes it is done before an operation to make surgery easier. When surgery is not possible, embolization may be used to help relieve the symptoms of kidney cancer.

The doctor inserts a narrow tube (*catheter*) into a blood vessel in the leg. The tube is passed up to the main blood vessel (*renal artery*) that supplies blood to the kidney. The doctor injects a substance into the blood vessel to block the flow of blood into the kidney. The blockage prevents the tumor from getting oxygen and other substances it needs to grow.

People may want to ask the doctor these questions before having arterial embolization:

- Why do I need this procedure?
- Will I have to stay in the hospital? How long?
- What are the risks and side effects?
- Would a clinical trial be appropriate for me?

Radiation Therapy

Radiation therapy (also called *radiotherapy*) is another type of local therapy. It uses high-energy rays to kill cancer cells. It affects cancer cells only in the treated area. A large machine directs radiation at the body. The patient has treatment at the hospital or clinic, 5 days a week for several weeks.

A small number of patients have radiation therapy before surgery to shrink the tumor. Some have it after surgery to kill cancer cells that may remain in the area. People who cannot have surgery may have radiation therapy to relieve pain and other problems caused by the cancer.

People may want to ask the doctor these questions before having radiation therapy:

- Why do I need this treatment?
- What are the risks and side effects of this treatment?
- Are there any long-term effects?
- When will the treatments begin? When will they end?
- How will I feel during therapy?
- What can I do to take care of myself during therapy?
- Can I continue my normal activities?
- How often will I need checkups?
- Would a clinical trial be appropriate for me?

Biological Therapy

Biological therapy is a type of *systemic therapy*. It uses substances that travel through the bloodstream, reaching and affecting cells all over the body. Biological therapy uses the body's natural ability (*immune system*) to fight cancer.

For patients with metastatic kidney cancer, the doctor may suggest interferon alpha or interleukin-2 (also called IL-2 or aldesleukin). The body normally produces these substances in small amounts in response to infections and other diseases. For cancer treatment, they are made in the laboratory in large amounts.

Chemotherapy

Chemotherapy is also a type of systemic therapy. Anticancer drugs enter the bloodstream and travel throughout the body. Although useful for many other cancers, anticancer drugs have shown limited use against kidney cancer. However, many doctors are studying new drugs and new combinations that may prove more helpful. The section on “The Promise of Cancer Research” on **page 26** has more information about these studies.

People may want to ask the doctor these questions before having biological therapy or chemotherapy:

- Why do I need this treatment?
- How does it work?
- What are the expected benefits of this treatment?
- What are the risks and possible side effects of treatment? What can I do about them?
- When will treatment start? When will it end?
- Will I need to stay in the hospital? How long?
- How will treatment affect my normal activities?
- Would a clinical trial be appropriate for me?

Side Effects of Cancer Treatment

Because treatment may damage healthy cells and tissues, unwanted side effects are common. These side effects depend mainly on the type and extent of the treatment. Side effects may not be the same for each person, and they may change from one treatment session to the next. Before treatment starts, the health care team will explain possible side effects and suggest ways to help the patient manage them.

The NCI provides helpful booklets about cancer treatments and coping with side effects, such as *Radiation Therapy and You*, *Chemotherapy and You*, and *Eating Hints for Cancer Patients*. See the sections “National Cancer Institute Information Resources” on **page 38** and “National Cancer Institute Booklets” on **page 39** for other sources of information about side effects.

Surgery

It takes time to heal after surgery, and the time needed to recover is different for each person. Patients are often uncomfortable during the first few days. However, medicine can usually control their pain. Before surgery, patients should discuss the plan for pain relief with the doctor or nurse. After surgery, the doctor can adjust the plan if more pain relief is needed.

It is common to feel tired or weak for a while. The health care team watches the patient for signs of kidney problems by monitoring the amount of fluid the patient takes in and the amount of urine produced. They also watch for signs of bleeding, infection, or other problems requiring immediate treatment. Lab tests help the health care team monitor for signs of problems.

If one kidney is removed, the remaining kidney generally is able to perform the work of both kidneys. However, if the remaining kidney is not working well or if both kidneys are removed, *dialysis* is needed to clean the blood. For a few patients, kidney *transplantation* may be an option. For this procedure, the transplant surgeon replaces the patient's kidney with a healthy kidney from a donor.

Arterial Embolization

After arterial embolization, some patients have back pain or develop a fever. Other side effects are nausea and vomiting. These problems soon go away.

Radiation Therapy

The side effects of radiation therapy depend mainly on the amount of radiation given and the part of the body that is treated. Patients are likely to become very tired during radiation therapy, especially in the later weeks of treatment. Resting is important, but doctors usually advise patients to try to stay as active as they can.

Radiation therapy to the kidney and nearby areas may cause nausea, vomiting, diarrhea, or urinary discomfort. Radiation therapy also may cause a decrease in the number of healthy white blood cells, which help protect the body against infection. In addition, the skin in the treated area may sometimes become red, dry, and tender. Although the side effects of radiation therapy can be distressing, the doctor can usually treat or control them.

Biological Therapy

Biological therapy may cause flu-like symptoms, such as chills, fever, muscle aches, weakness, loss of appetite, nausea, vomiting, and diarrhea. Patients also may get a skin rash. These problems can be severe, but they go away after treatment stops.

Chemotherapy

The side effects of chemotherapy depend mainly on the specific drugs and the amount received at one time. In general, anticancer drugs affect cells that divide rapidly, especially:

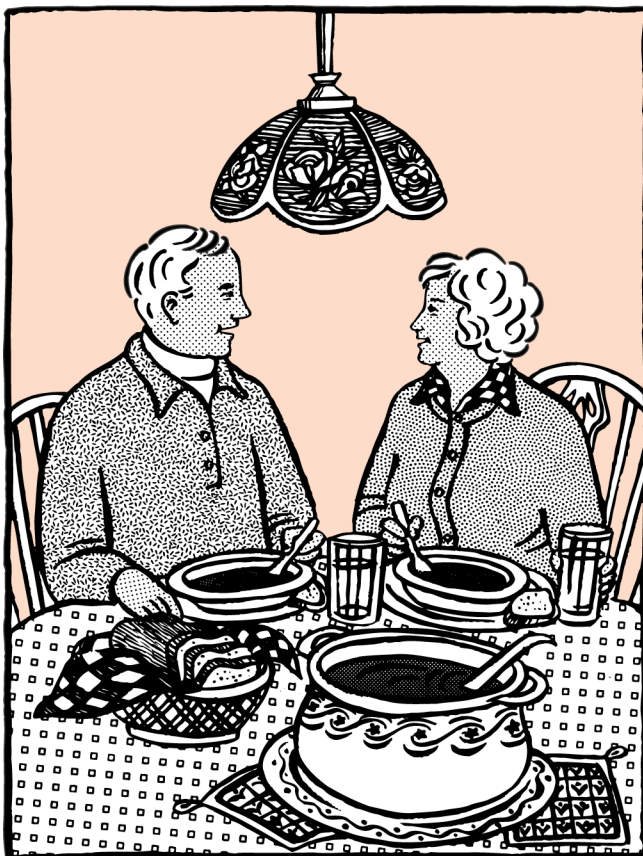
- **Blood cells:** These cells fight infection, help the blood to clot, and carry oxygen to all parts of the body. When drugs affect blood cells, patients are more likely to get infections, may bruise or bleed easily, and may feel very weak and tired.
- **Cells in hair roots:** Chemotherapy can cause hair loss. The hair grows back, but sometimes the new hair is somewhat different in color and texture.
- **Cells that line the digestive tract:** Chemotherapy can cause poor appetite, nausea and vomiting, diarrhea, or mouth and lip sores. Many of these side effects can be controlled with drugs.

Nutrition

Patients need to eat well during cancer therapy. They need enough calories to maintain a good weight and protein to keep up strength. Good nutrition often helps people with cancer feel better and have more energy.

But eating well can be difficult. Patients may not feel like eating if they are uncomfortable or tired. Also, the side effects of treatment, such as poor appetite, nausea, or vomiting, can be a problem. Some patients find that foods do not taste as good during cancer therapy.

The doctor, dietitian, or other health care provider can suggest ways to maintain a healthy diet. Patients and their families may want to read the National Cancer Institute booklet *Eating Hints for Cancer Patients*, which contains many useful ideas and recipes. The “National Cancer Institute Booklets” section on **page 39** tells how to get this publication.



Follow-up Care

Follow-up care after treatment for kidney cancer is important. Even when the cancer seems to have been completely removed or destroyed, the disease sometimes returns because cancer cells can remain in the body after treatment. The doctor monitors the recovery of the person treated for kidney cancer and checks for recurrence of cancer. Checkups help ensure that any changes in health are noted. The patient may have lab tests, chest x-rays, CT scans, or other tests.

The NCI has prepared a booklet for people who have completed their treatment to help answer questions about follow-up care and other concerns. *Facing Forward Series: Life After Cancer Treatment* provides tips for making the best use of medical visits. It describes how to talk to the doctor about creating a plan of action for recovery and future health.

Support for People with Kidney Cancer

Living with a serious disease such as kidney cancer is not easy. People with kidney cancer may worry about caring for their families, keeping their jobs, or continuing daily activities. Concerns about treatments and managing side effects, hospital stays, and medical bills are also common. Doctors, nurses, and other members of the health care team can answer questions about treatment, working, or other activities. Meeting with a social worker, counselor, or member of the clergy can be helpful to those who want to talk about their feelings or discuss their concerns. Often, a social worker 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 the disease and the effects of treatment. Groups may offer support in person, over the telephone, or on the Internet. Patients may want to talk with a member of their health care team about finding a support group.

The Cancer Information Service at 1-800-4-CANCER can provide information to help patients and their families locate programs, services, and publications.

The Promise of Cancer Research

Doctors all over the country are conducting many types of clinical trials. These are research studies in which people volunteer to take part. In clinical trials, doctors are testing new ways to treat kidney cancer. Research has already led to advances, and researchers continue to search for more effective approaches.

Patients who join these studies have the first chance to benefit from treatments that have shown promise in earlier research. They also make an important contribution to medical science by helping doctors learn more about the disease. Although clinical trials may pose some risks, researchers do all they can to protect their patients.

Researchers are studying surgery, biological therapy, chemotherapy, and combinations of these types of treatment. They also are combining chemotherapy with new treatments, like *stem cell transplantation*. A *stem cell* transplant allows a patient to be treated with high doses of drugs. The high doses destroy both cancer cells and normal blood cells in the bone marrow. Later, the patient receives healthy stem cells from a donor. New blood cells develop from the transplanted stem cells.

Other approaches also are under study. For example, researchers are studying cancer *vaccines* that help the immune system to find and attack kidney cancer cells.

Patients who are interested in being part of a clinical trial should talk with their doctor. They may want to read *Taking Part in Clinical Trials: What Cancer Patients Need To Know*. The NCI also offers an easy-to-read brochure called *If You Have Cancer...What You Should Know About Clinical Trials*. These NCI publications describe how research studies are carried out and explain their possible benefits and risks. NCI's Web site includes a section on clinical trials at http://cancer.gov/clinical_trials with general information about clinical trials and detailed information about specific studies. The Cancer Information Service at 1-800-4-CANCER or at **LiveHelp** at <http://cancer.gov> can answer questions and provide information about clinical trials.

 Dictionary

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

Adenocarcinoma (AD-in-o-kar-sin-O-ma): Cancer that begins in cells that line certain internal organs and that have glandular (secretory) properties.

Adrenal glands (ah-DREE-nal): A pair of small glands, one located on top of each kidney. They produce steroid hormones, adrenaline, and noradrenaline, which help control heart rate, blood pressure, and other important body functions.

Arterial embolization (ar-TEE-ree-al EM-bo-lih-ZAY-shun): The blocking of an artery by a clot of foreign material. This can be done as treatment to block the flow of blood to a tumor.

Asbestos (as-BES-tus): A natural material that is made of tiny fibers. Asbestos can cause several serious diseases, including cancer.

Benign (beh-NINE): Not cancerous. Benign tumors do not spread to tissues around them or to other parts of the body.

Biological therapy (by-o-LAHJ-i-kul): Treatment to stimulate or restore the ability of the immune system to fight infections and other diseases. Also used to lessen side effects that may be caused by some cancer treatments. Also known as immunotherapy, biotherapy, or biological response modifier (BRM) therapy.

Biopsy (BY-op-see): The removal of cells or tissues for examination under a microscope. When only a sample of tissue is removed, the procedure is called an incisional biopsy or core biopsy. When an entire lump

or suspicious area is removed, the procedure is called an excisional biopsy. When a sample of tissue or fluid is removed with a needle, the procedure is called a needle biopsy or fine-needle aspiration.

Bladder: The organ that stores urine.

Blood: A tissue with red blood cells, white blood cells, platelets, and other substances suspended in fluid called plasma. Blood takes oxygen and nutrients to the tissues, and carries away wastes.

Cadmium (KAD-mee-um): A metallic element that occurs naturally in tiny amounts in air, water, soil, and food. It is used to make batteries, pigments, plastics, alloys, and electroplate. At a high level, cadmium may cause certain cancers and other health problems.

Cancer: A term for diseases in which abnormal cells divide without control. Cancer cells can invade nearby tissues and can spread through the bloodstream and lymphatic system to other parts of the body.

Catheter (KATH-i-ter): A flexible tube used to deliver fluids into or withdraw fluids from the body.

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

Chemotherapy (kee-mo-THER-a-pee): Treatment with anticancer drugs.

Clinical trial: A type of research study that tests new methods of screening, prevention, diagnosis, or treatment of a disease. The study may be carried out in a clinic or other medical facility. Also called a clinical study.

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

CT scan: Computed tomography 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 computerized tomography and computerized axial tomography (CAT) scan.

Cyst (sist): A sac or capsule filled with fluid.

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

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.

Gerota's fascia (Ga-RO-tahz FAYSH-ee-uh): A fibrous envelope of tissue that surrounds the kidney. Also called renal fascia.

Hypernephroma (hye-per-nih-FRO-ma): Kidney cancer.

Imaging: Tests that produce pictures of areas inside the body.

Immune system (im-YOON): The complex group of organs and cells that defends the body against infections and other diseases.

Intravenous pyelogram (in-tra-VEE-nus PYE-el-o-gram): IVP. A series of x-rays of the kidneys, ureters, and bladder. The x-rays are taken after a dye is injected into a blood vessel. The dye is concentrated in the urine, which outlines the kidneys, ureters, and bladder on the x-rays.

Kidneys (KID-nee-z): A pair of organs in the abdomen. They remove waste from the blood (as urine), produce erythropoietin (a substance that stimulates red blood cell production), and play a role in blood pressure regulation.

Local therapy: Treatment that affects cells in the tumor and the area close to it.

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 a lymph gland.

Lymphatic system (lim-FAT-ik SIS-tem): The tissues and organs that produce, store, and carry white blood cells that fight infections and other diseases. This system includes the bone marrow, spleen, thymus, lymph nodes, and lymphatic vessels (a network of thin tubes that carry lymph and white blood cells). Lymphatic vessels branch, like blood vessels, into all the tissues of the body.

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

Medical oncologist (MED-I-kul on-KOL-o-jist): A doctor who specializes in diagnosing and treating cancer using chemotherapy, hormonal therapy, and biological therapy. A medical oncologist often is the main health care provider for someone who has cancer. A medical oncologist also may coordinate treatment provided by other specialists.

Metastasis (meh-TAS-ta-sis): The spread of cancer from one part of the body to another. A tumor formed from cells that have spread is called a “metastatic tumor” or a “metastasis.” The metastatic tumor contains cells that are like those in the original (primary) tumor. The plural form of metastasis is metastases (meh-TAS-ta-seez).

MRI: Magnetic resonance imaging (mag-NET-ik REZ-o-nans IM-a-jing). A procedure in which a magnet linked to a computer is used to create detailed pictures of areas inside the body. Also called nuclear magnetic resonance imaging (NMRI).

Nephrectomy (ni-FREK-tuh-mee): Surgery to remove a kidney. Radical nephrectomy removes the entire kidney, the adrenal gland, nearby lymph nodes, and other surrounding tissue. Simple nephrectomy removes only the kidney. Partial nephrectomy removes the tumor but not the entire kidney.

Obese: An abnormally high, unhealthy amount of body fat.

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

Palliative care (PAL-ee-yuh-tiv): Care that prevents or relieves the symptoms of disease or the side effects of treatment. Palliative care does not attempt to cure a disease but can improve a patient's quality of life. It attempts to meet the physical, emotional, spiritual, and practical needs of patients by helping to relieve pain, depression, or other problems. Also known as comfort care, supportive care, and symptom management.

Partial nephrectomy (ni-FREK-tuh-mee): Surgery to remove a tumor but not the entire kidney.

Pathologist (pa-THOL-o-jist): A doctor who identifies diseases by studying cells and tissues under a microscope.

Primary tumor: The original tumor.

Radiation oncologist (ray-dee-AY-shun on-KOL-o-jist): A doctor who specializes in using radiation to treat cancer.

Radiation therapy (ray-dee-AY-shun): The use of high-energy radiation from x-rays, gamma rays, neutrons, and other sources to kill cancer cells and shrink tumors. Radiation may come from a machine outside the body (external-beam radiation therapy) or from materials called radioisotopes. Radioisotopes produce radiation and can be placed in or near the tumor or in the area near cancer cells. This type of radiation treatment is called internal radiation therapy, implant radiation, interstitial radiation, or brachytherapy. Systemic radiation therapy uses a radioactive substance, such as a radiolabeled monoclonal antibody, that circulates throughout the body. Also called radiotherapy, irradiation, and x-ray therapy.

Radical nephrectomy (ni-FREK-tuh-mee): Surgery to remove the entire kidney, the adrenal gland, and other surrounding tissue. Sometimes nearby lymph nodes also are removed.

Radiotherapy (RAY-dee-o-THER-a-pee): The use of high-energy radiation from x-rays, gamma rays, neutrons, and other sources to kill cancer cells and shrink tumors. Radiation may come from a machine outside the body (external-beam radiation therapy), or it may come from radioactive material placed in the body near cancer cells (internal radiation therapy, implant radiation, or brachytherapy). Systemic radiation therapy uses a radioactive substance, such as a radiolabeled monoclonal antibody, that circulates throughout the body. Also called radiation therapy.

Recurrent cancer: Cancer that has returned after a period of time during which the cancer could not be detected. The cancer may return at the same site as the original (primary) tumor or in another location.

Red blood cell: RBC. A cell that carries oxygen to all parts of the body. Also called an erythrocyte.

Renal artery: The main blood vessel that supplies blood to the kidneys.

Renal cell cancer: Cancer that develops in the lining of the renal tubules, which filter the blood and produce urine.

Renal pelvis: 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: Anything that increases a person's chance of developing a disease. Some examples of risk factors for cancer include a family history of cancer, use of tobacco products, certain foods, being exposed to radiation or cancer-causing agents, and certain genetic changes.

Side effects: Problems that occur when treatment affects tissues or organs other than the ones meant to be affected by the treatment. Some common side effects of cancer treatment are fatigue, pain, nausea, vomiting, decreased blood cell counts, hair loss, and mouth sores.

Simple nephrectomy (ni-FREK-tuh-mee): Surgery that removes the entire kidney, but not nearby organs or tissues.

Sonogram (SON-o-gram): A computer picture of areas inside the body created when sound waves bounce off organs and other tissues. Also called ultrasonogram or ultrasound.

Stage: The extent of a cancer within the body. If the cancer has spread, the stage describes how far it has spread from the original site to other parts of the body.

Staging (STAY-jing): Performing exams and tests to learn the extent of the cancer within the body, especially whether the disease has spread from the original site to other parts of the body. It is important to know the stage of the disease in order to plan the best treatment.

Stem cell transplantation: A method of replacing immature blood-forming cells that were destroyed by cancer treatment. The stem cells are given to the person after treatment to help the bone marrow recover and continue producing healthy blood cells.

Stem cells: Cells from which other types of cells can develop.

Supportive care: Care that prevents or relieves the symptoms of disease or the side effects of treatment. Supportive care does not attempt to cure a disease but can improve a patient's quality of life. It attempts to meet the physical, emotional, spiritual, and practical needs of patients by helping to relieve pain, depression, or other problems. Also known as 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.

Symptom: An indication that a person has a condition or disease. Some examples of symptoms are headache, fever, fatigue, nausea, vomiting, and pain.

Symptom management: Care that prevents or relieves the symptoms of disease or the side effects of treatment. Symptom management does not attempt to cure a disease but can improve a patient's quality of life. It attempts to meet the physical, emotional, spiritual, and practical needs of patients by helping to relieve pain, depression, or other problems. Also known as palliative care, comfort care, and supportive care.

Systemic therapy (sis-TEM-ik THER-a-pee): Treatment using substances that travel through the bloodstream, reaching and affecting cells all over the body.

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

Transfusion (trans-FYOO-zhun): The infusion of components of blood or whole blood into the bloodstream. The blood may be donated from another person, or it may have been taken from the person earlier and stored until needed.

Transitional cell carcinoma: A type of cancer that develops in the lining of the bladder, ureter, or renal pelvis.

Transplantation: The replacement of tissue with tissue from the person's own body or from another person.

Tumor (TOO-mer): A new growth of tissue that results from abnormal cell division. Tumors perform no useful body function. They may be benign (not cancerous) or malignant (cancerous).

Ultrasound test: A test that bounces sound waves off tissues and internal organs and changes the echoes into sonograms (pictures).

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

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

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

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

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

Vaccine: A substance or group of substances meant to cause the immune system to respond to a tumor or to microorganisms, such as bacteria or viruses. A vaccine can help the body recognize and destroy cancer cells or microorganisms.

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.

Wilms' tumor: A kidney cancer that usually occurs in children younger than 5 years old.

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 Information Resources

You may want more information for yourself, your family, and your doctor. The following National Cancer Institute (NCI) services are available to help you.

Telephone

Cancer Information Service (CIS)

Provides accurate, up-to-date information on cancer to patients and their families, health professionals, and the general public. Information specialists translate the latest scientific information into understandable language and respond in English, Spanish, or on TTY equipment.

Toll-free: 1-800-4-CANCER (1-800-422-6237)

TTY 1-800-332-8615

(for deaf and hard of hearing callers)

Internet

<http://cancer.gov>

The NCI's Cancer.gov™ Web site provides information from numerous NCI sources. It offers current information on cancer prevention, screening, diagnosis, treatment, genetics, supportive care, and ongoing clinical trials. It also provides information about NCI's research programs and funding opportunities, cancer statistics, and the Institute itself. Cancer.gov can be accessed at **<http://cancer.gov>** on the Internet.

Cancer.gov also provides live, online assistance through **LiveHelp**. Information specialists are available Monday through Friday from 9:00 AM to 10:00 PM Eastern Time. **LiveHelp** is at <http://cancer.gov> on the Internet.

National Cancer Institute Booklets

National Cancer Institute (NCI) publications can be ordered by writing to the address below:

Publications Ordering Service
National Cancer Institute
Suite 3036A
6116 Executive Boulevard, MSC 8322
Bethesda, MD 20892-8322

Some NCI publications can be viewed, downloaded, and ordered from <http://cancer.gov/publications> on the Internet. In addition, people in the United States and its territories may order these and other NCI booklets by calling the Cancer Information Service at 1-800-4-CANCER.

Booklets About Cancer Treatment

- *Radiation Therapy and You: A Guide to Self-Help During Treatment*
- *Chemotherapy and You: A Guide to Self-Help During Treatment*
- *Helping Yourself During Chemotherapy: 4 Steps for Patients*
- *Eating Hints for Cancer Patients*
- *Understanding Cancer Pain*

- *Pain Control: A Guide for People with Cancer and Their Families*
- *Get Relief From Cancer Pain*
- *Taking Part in Clinical Trials: What Cancer Patients Need To Know*
- *La quimioterapia y usted: una guía de autoayuda durante el tratamiento del cáncer (Chemotherapy and You: A Guide to Self-Help During Treatment for Cancer)*
- *El dolor relacionado con el cáncer (Understanding Cancer Pain)*
- *La radioterapia y usted: una guía de autoayuda durante el tratamiento del cáncer (Radiation Therapy and You: A Guide to Self-Help During Treatment for Cancer)*
- *La participación en los estudios clínicos: lo que los pacientes de cáncer deben saber (Taking Part in Clinical Trials: What Cancer Patients Need To Know)*
- *Si tiene cáncer . . . lo que debería saber sobre estudios clínicos (If You Have Cancer . . . What You Should Know About Clinical Trials)*

Booklets About Living With Cancer

- *Advanced Cancer: Living Each Day*
- *Facing Forward Series: Life After Cancer Treatment*
- *Facing Forward Series: Ways You Can Make a Difference in Cancer*
- *Taking Time: Support for People With Cancer and the People Who Care About Them*
- *When Cancer Recurs: Meeting the Challenge*
- *Siga adelante: la vida después del tratamiento del cáncer (Facing Forward Series: Life After Cancer Treatment)*

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