



## What is Kidney Cancer?

**Kidney cancer** is a disease of the kidneys, the reddish-brown curving organs about the size of a small fist, located above the waist to either side of the spine. They are closer to the back of the body than to the front. In kidney cancer, cells grow unregulated by the signals that normally regulate cell growth and death, and form tumors.

Kidneys filter blood and remove impurities, excess minerals and salts, and surplus water. Every day, they process about 200 quarts of blood to generate two quarts of urine. These organs also produce hormones to help control blood pressure, red blood cell production, and other functions. Although people have two kidneys, each works independently. The human body can function with less than one complete kidney. With dialysis, a mechanized filtering process, it is possible to live without kidneys.

There are several types of kidney cancers:

**Renal cell carcinomas** comprise about 85% of kidney cancers. This cancer develops within the kidney's microscopic filtering systems, in the lining of tiny tubules.

**Transitional cell carcinoma** begins in the area of the kidney where urine collects before being funneled to the bladder. This type of kidney cancer is similar to bladder cancer and is treated like bladder cancer.

**Wilm's tumor**, found most often in children, is also treated differently from adult kidney cancer.

Knowing which kind of cell a tumor is composed of helps doctors plan treatment. In **kidney cancer**, there are four types, of which two are notable: "clear cell" is the kind found in 80% of kidney cancer, and "**sarcomatoid**" is the most aggressive type.

Surgery to remove a kidney tumor, or the kidney itself, provides a reasonable chance of cure if the cancer has not spread beyond the confines of the organ. If it has metastasized, kidney cancer is difficult to treat with traditional therapies. Since one percent of all kidney cancers spontaneously shrink or disappear, scientists have focused on the body's immune system as a useful tool to treat advanced kidney cancer.

## 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.

**Possible signs of renal cell cancer include blood in the urine and a lump in the abdomen.**

These and other symptoms may be caused by renal cell cancer or by other conditions. There may be no symptoms in the early stages. Symptoms may appear as the tumor grows. A doctor should be consulted if any of the following problems occur:

- Blood in the urine.
- A lump in the abdomen.
- A pain in the side that doesn't go away.
- Loss of appetite.

- Weight loss for no known reason.
- Anemia.

## What are the Symptoms of Kidney Cancer?

The most common symptom of kidney cancer is blood in the urine. In some cases, a person can actually see the blood. It may be present one day and not the next. Traces of blood may also be found in urinalysis, a urine test done as part of a regular medical checkup.

Another symptom of kidney cancer is a lump or mass that can be felt in the kidney area. The tumor may cause a dull ache or pain in the back or side. Less often, signs of a kidney tumor include high blood pressure or an abnormal number of red blood cells.

Symptoms may develop suddenly. However, as with other types of cancer, kidney cancer can cause a general feeling of poor health. People with this disease may feel tired, lose their appetite, and lose weight. Some have a fever that comes and goes. These symptoms may be caused by cancer or by other, less serious problems such as an infection or a fluid-filled cyst. A doctor is consulted for a definite diagnosis.

## Tests that Examine the Abdomen and Kidneys are Used to Detect (find) and Diagnose Renal Cell Cancer.

The following tests and procedures may be used:

- **Physical exam and history:** An exam of the body to check general signs of health, including checking for signs of disease, such as lumps or anything else that seems unusual. A history of the patient's health habits and past illnesses and treatments will also be taken.
- **Blood chemistry studies:** A procedure in which a blood sample is checked to measure the amounts of certain substances released into the blood by organs and tissues in the body. An unusual (higher or lower than normal) amount of a substance can be a sign of disease in the organ or tissue that produces it.
- **Urinalysis:** A test to check the color of urine and its contents, such as sugar, protein, blood, and bacteria.
- **Liver function test:** A procedure in which a sample of blood is checked to measure the amounts of enzymes released into it by the liver. An abnormal amount of an enzyme can be a sign that cancer has spread to the liver. Certain conditions that are not cancer may also increase liver enzyme levels.
- **Intravenous pyelogram (IVP):** A series of x-rays of the kidneys, ureters, and bladder to find out if cancer is present in these organs. A contrast dye is injected into a vein. As the contrast dye moves through the kidneys, ureters, and bladder, x-rays are taken to see if there are any blockages.
- **Ultrasound:** A procedure in which high-energy sound waves (ultrasound) are bounced off internal tissues or organs and make echoes. The echoes form a picture of body tissues called a sonogram.
- **CT scan (CAT scan):** A procedure that makes a series of detailed pictures of areas inside the body, taken from different angles. The pictures are made by a computer linked to an x-ray machine. A dye may be injected into a vein or swallowed to help the organs or tissues show up more clearly. This procedure is

also called computed tomography, computerized tomography, or computerized axial tomography.

- **MRI (magnetic resonance imaging):** A procedure that uses a magnet, radio waves, and a computer to make a series of detailed pictures of areas inside the body. This procedure is also called nuclear magnetic resonance imaging (NMRI).
- **Biopsy:** The removal of cells or tissues so they can be viewed under a microscope to check for signs of cancer. A thin needle is inserted into the tumor and a sample of tissue is withdrawn. A pathologist then views the tissue under a microscope to check for cancer cells.

## Factors affecting prognosis and treatment options.

The prognosis (chance of recovery) and treatment options depend on the following:

- The stage of the disease.
- The patient's age and general health.

As we well know, there are many kinds of cancer; unfortunately they all come about because of the out-of-control growth of abnormal cells.

## Healthy Cells vs. Cancer Cells

Healthy cells are like a cat. They need structure to determine the size of bones and shape of the body, tail and whiskers. The DNA in genes and chromosomes determine this. They need energy to play and prowl and sustain life. This is derived from chemicals in food. Cats need a system to deliver chemicals (food nutrients like amino acids, carbohydrates, fats, vitamins and minerals) to all parts of their body. These are the blood vessels. Growth factors take a kitten into a lazy old cat, all the while helping it to function normally.

The body and its cells are mostly made up of protein. The building blocks of proteins are substances called amino acids that in the form of enzymes and hormones literally control every chemical reaction within the cells. When these are modified, different messages are sent to a complex control system that can alter their function. There are twenty different kinds of amino acids that are essential to life. Twelve of these can be synthesized within the body however; eight must be supplied by the daily diet.

Structure	
Normal Cells	Cancer Cells
DNA in genes and chromosomes go about their business in a normal way.	Cancer cells develop a different DNA or gene structure or acquire abnormal numbers of chromosomes.
Cells divide in an orderly way to produce more cells only when the body needs them.	Cells continue to be created without control or order. If not needed, a mass of tissue is formed which is called a tumor.
Energy	
Normal Cells	Cancer Cells
Cells derive 70% of their energy from a system called the "Krebs Cycle."	Cells have a defective "Krebs Cycle" and derive little or no energy from it.

Cells derive only 20% of their energy from a system called "Glycolosis."	Cancer cells derive almost all their energy from "Glycolosis."
Cells derive most of their energy with the use of oxygen.	Cells derive most of their energy in the absence of oxygen.
Blood Vessels	
Normal Cells	Cancer Cells
Cells have a built-in blood vessel system.	Cells do not have a built-in blood vessel system. They require more of certain amino acids to grow.

Growth Factors	
Normal Cells	Cancer Cells
While similar to cancer cells, the amount of them is more in balance to produce a more normal level of activity.	These cells have over produced, require more chemicals (food) and are over active.
Functions	
Normal Cells	Cancer Cells
The enzymes and hormones go about business in a normal balanced manner.	The enzymes and hormones are either over active or under active.
Tumors are Different	
Benign	Malignant
Benign tumors are not cancerous. They do not invade nearby tissues nor spread to other parts of the body. They can be removed and are not a threat to life.	Malignant tumors are cancerous. They can invade and damage nearby tissues and organs and they can break away and enter the blood stream to form new tumors in other parts of the body. The spread of cancer is called metastasis.

**After renal cell cancer has been diagnosed, tests are done to find out if cancer cells have spread within the kidney or to other parts of the body.**

The process used to find out if cancer has spread within the kidney or to other parts of the body is called staging. The information gathered from the staging process determines the stage of the disease. It is important to know the stage in order to plan treatment. The following tests and procedures may be used in the staging process:

- **CT scan (CAT scan):** A procedure that makes a series of detailed pictures of areas inside the body, taken from different angles. The pictures are made by a computer linked to an x-ray machine. A dye may be injected into a vein or swallowed to help the organs or tissues show up more clearly. This procedure is also called computed tomography, computerized tomography, or computerized axial tomography.
- **MRI (magnetic resonance imaging):** A procedure that uses a magnet, radio waves, and a computer to make a series of detailed pictures of areas inside the body. This procedure is also called nuclear magnetic resonance imaging (NMRI).

- **Chest x-ray:** An x-ray of the organs and bones inside the chest. An x-ray is a type of energy beam that can go through the body and onto film, making a picture of areas inside the body.
- **Bone scan:** A procedure to check if there are rapidly dividing cells, such as cancer cells, in the bone. A very small amount of radioactive material is injected into a vein and travels through the bloodstream. The radioactive material collects in the bones and is detected by a scanner.

## The following stages are used for renal cell cancer:

### Stage I

In stage I, the tumor is no larger than 7 centimeters and is found in the kidney only.

#### Stage I Renal Cell Cancer

Standard treatment of stage I renal cell cancer may include the following:

- Surgery (radical nephrectomy, simple nephrectomy, or partial nephrectomy).
- Radiation therapy as palliative therapy to relieve symptoms in patients who cannot have surgery.
- Arterial embolization as palliative therapy.

### Stage II

In stage II, the tumor is larger than 7 centimeters and is found in the kidney only.

#### Stage II Renal Cell Cancer

Standard treatment of stage II renal cell cancer may include the following:

- Surgery (radical nephrectomy or partial nephrectomy).
- Surgery (nephrectomy), before or after radiation therapy.
- Radiation therapy as palliative therapy to relieve symptoms in patients who cannot have surgery.
- Arterial embolization as palliative therapy.

### Stage III

In stage III, cancer is found:

- in the kidney and in 1 nearby lymph node; or
- in an adrenal gland or in the layer of fatty tissue around the kidney, and may be found in 1 nearby lymph node; or
- in the main blood vessels of the kidney and may be found in 1 nearby lymph node.

#### Stage III Renal Cell Cancer

Standard treatment of stage III renal cell cancer may include the following:

- Surgery (radical nephrectomy). Blood vessels of the kidney and some lymph nodes may also be removed.
- Arterial embolization followed by surgery (radical nephrectomy).
- Radiation therapy as palliative therapy to relieve symptoms and improve the quality of life.
- Arterial embolization as palliative therapy.
- Surgery (nephrectomy) as palliative therapy.
- Radiation therapy before or after surgery (radical nephrectomy).

## Stage IV

In stage IV, cancer has spread:

- beyond the layer of fatty tissue around the kidney and may be found in 1 nearby lymph node; or
- to 2 or more nearby lymph nodes; or
- to other organs, such as the bowel, pancreas, or lungs, and may be found in nearby lymph nodes.

## Stage IV Renal Cell Cancer

Standard treatment of stage IV renal cell cancer may include the following:

- Biologic therapy.
- Radiation therapy as palliative therapy to relieve symptoms and improve the quality of life.
- Surgery (nephrectomy) as palliative therapy.
- Surgery (radical nephrectomy, with or without removal of cancer from other areas where it has spread).

## Different types of treatment for patients with renal cell cancer.

Different types of treatments are available for patients with renal cell cancer. Some treatments are standard (the currently used treatment), and some are being tested in clinical trials. Before starting treatment, patients may want to think about taking part in a clinical trial. A treatment clinical trial is a research study meant to help improve current treatments or obtain information on new treatments for patients with cancer. When clinical trials show that a new treatment is better than the standard treatment, the new treatment may become the standard treatment.

## Types of Standard Treatment are Used:

### 1. Surgery

Surgery to remove part or all of the kidney is often used to treat renal cell cancer. The following types of surgery may be used:

- **Partial nephrectomy**: A surgical procedure to remove the cancer within the kidney and some of the tissue around it. A partial nephrectomy may be done to

prevent loss of kidney function when the other kidney is damaged or has already been removed.

- **Simple nephrectomy:** A surgical procedure to remove the kidney only.
- **Radical nephrectomy:** A surgical procedure to remove the kidney, the adrenal gland, surrounding tissue, and, usually, nearby lymph nodes.

A person can live with part of 1 working kidney, but if both kidneys are removed or not working, the person will need dialysis (a procedure to clean the blood using a machine outside of the body) or a kidney transplant (replacement with a healthy donated kidney). A kidney transplant may be done when the disease is in the kidney only and a donated kidney can be found. If the patient has to wait for a donated kidney, other treatment is given as needed.

When surgery to remove the cancer is not possible, a treatment called arterial embolization may be used to shrink the tumor. A small incision is made and a catheter (thin tube) is inserted into the main blood vessel that flows to the kidney. Small pieces of a special gelatin sponge are injected through the catheter into the blood vessel. The sponges block the blood flow to the kidney and prevent the cancer cells from getting oxygen and other substances they need to grow.

Even if the doctor removes all the cancer that can be seen at the time of the surgery, some patients may be given chemotherapy or radiation therapy after surgery to kill any cancer cells that are left. Treatment given after the surgery, to increase the chances of a cure, is called adjuvant therapy.

## 2. Radiation therapy

Radiation therapy is a cancer treatment that uses high-energy x-rays or other types of radiation to kill cancer cells. There are 2 types of radiation therapy. External radiation therapy uses a machine outside the body to send radiation toward the cancer. Internal radiation therapy uses a radioactive substance sealed in needles, seeds, wires, or catheters that are placed directly into or near the cancer. The way the radiation therapy is given depends on the type and stage of the cancer being treated.

## 3. Chemotherapy

Chemotherapy is a cancer treatment that uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping the cells from dividing. When chemotherapy is taken by mouth or injected into a vein or muscle, the drugs enter the bloodstream and can reach cancer cells throughout the body (systemic chemotherapy). When chemotherapy is placed directly into the spinal column, an organ, or a body cavity such as the abdomen, the drugs mainly affect cancer cells in those areas (regional chemotherapy). The way the chemotherapy is given depends on the type and stage of the cancer being treated.

## What are the side effects of treatment for kidney cancer?

The methods used to treat kidney cancer are very powerful. It is hard to limit the effects of treatment so that only cancer cells are destroyed; healthy cells may also be damaged. That is why treatment often causes unpleasant side effects. Side effects depend on the

type of treatment and the part of the body being treated.

Nephrectomy is major surgery. For a few days after the operation, most patients need medicine to relieve pain. Discomfort may make it difficult to breathe deeply, and patients have to do special coughing and breathing exercises to keep their lungs clear. Patients may need IV (intravenous) feedings and fluids for several days before and after the operation. Nurses will keep track of the amount of fluid the patient takes in and the amount of urine produced. The remaining kidney takes over the work of the one that was removed.

Embolization can cause pain, fever, nausea, or vomiting. These problems are treated with medicine. Often, patients also require intravenous fluids.

During radiation therapy, the patient may become very tired as the treatment continues. Resting as much as possible is important. Skin reactions (redness or dryness) in the treated area are also common, and the skin should be protected from the sun. Good skin care is important at this time, but the patient should not use any lotion or cream on the skin without consulting the doctor. Radiation therapy can cause nausea, vomiting, and diarrhea. Usually, certain foods and medicines can ease these problems.

The side effects of hormone therapy are usually mild. Progesterone is the hormone most often used to treat kidney cancer. Drugs containing progesterone generally cause few side effects, though some patients may retain fluid and gain weight.

The side effects caused by biological therapies vary with the type of treatment. Often, these treatments cause flu-like symptoms such as chills, fever, muscle aches, weakness, loss of appetite, nausea, vomiting, and diarrhea. Sometimes, patients develop a rash with dry, itching skin. Patients often feel very tired after treatment. In addition, interleukin-2 can cause the patient to retain fluid. These problems can be severe, and most patients need to stay in the hospital during treatment.

Loss of appetite can be a serious problem for patients during their treatment for cancer. Patients who eat well may be better able to withstand the side effects of their treatment, so good nutrition is an important part of the treatment plan. Eating well means getting enough calories to prevent weight loss and having enough protein to regain strength and rebuild normal tissues. Many patients find that eating several small meals and snacks during the day works better than trying to have three large meals.

The side effects that patients have during cancer treatment vary for each person. They may be different from one treatment to the next. Attempts are made to plan therapy to minimize problems. Fortunately, most side effects are temporary. Doctors, nurses, and dietitians can explain the side effects of cancer treatment and can suggest ways to deal with them.

**Source: A.P. John Institute for Cancer Research**

**When considering any type of complementary cancer treatment or alternative cancer treatment, always consult with your physician first, as possible interactions could reduce your treatment protocol's efficacy.**