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Kidney Cancer

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The Kidney Cancer Association (KCA) is a 501c(3) non-profit organization focused on kidney cancer patients and their families. The KCA provides medical research for the cure and treatment of the disease, patient advocacy, physician education, and patient and caretaker education and support.

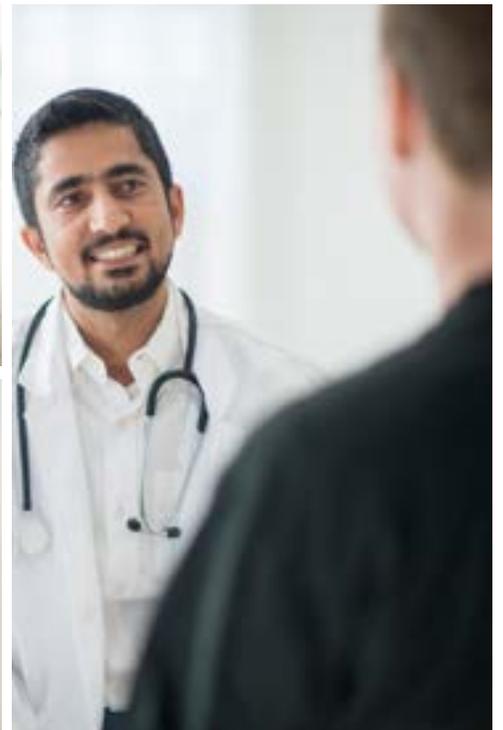
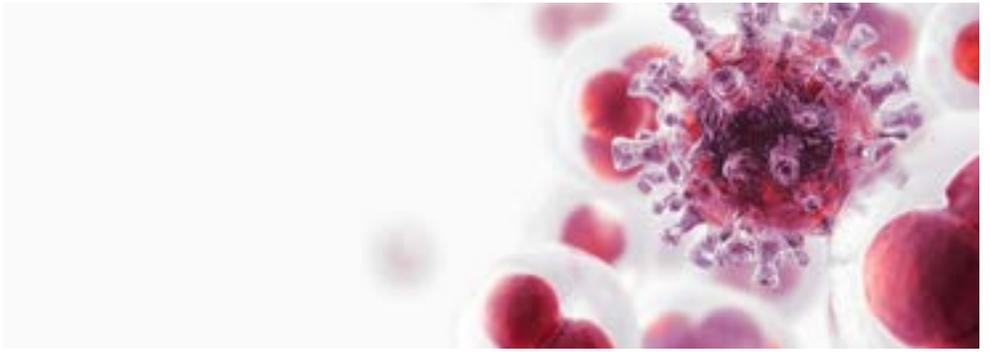
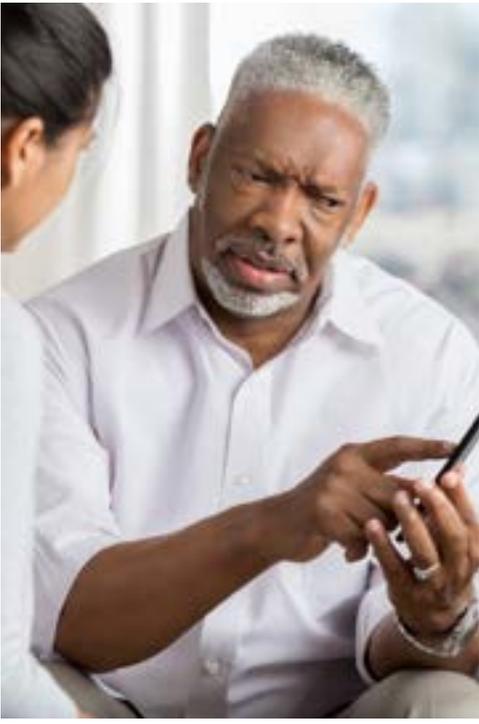
To learn more, visit www.kidneycancer.org.

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The Urology Care Foundation is the world's leading nonprofit urological health foundation – and the official foundation of the American Urological Association. As an organization who strongly believes in providing patients, caregivers and those impacted by kidney cancer educational tools and resources to make informed decisions about their health and treatment, we are pleased to endorse the NCCN Guidelines for Patients: Kidney Cancer.

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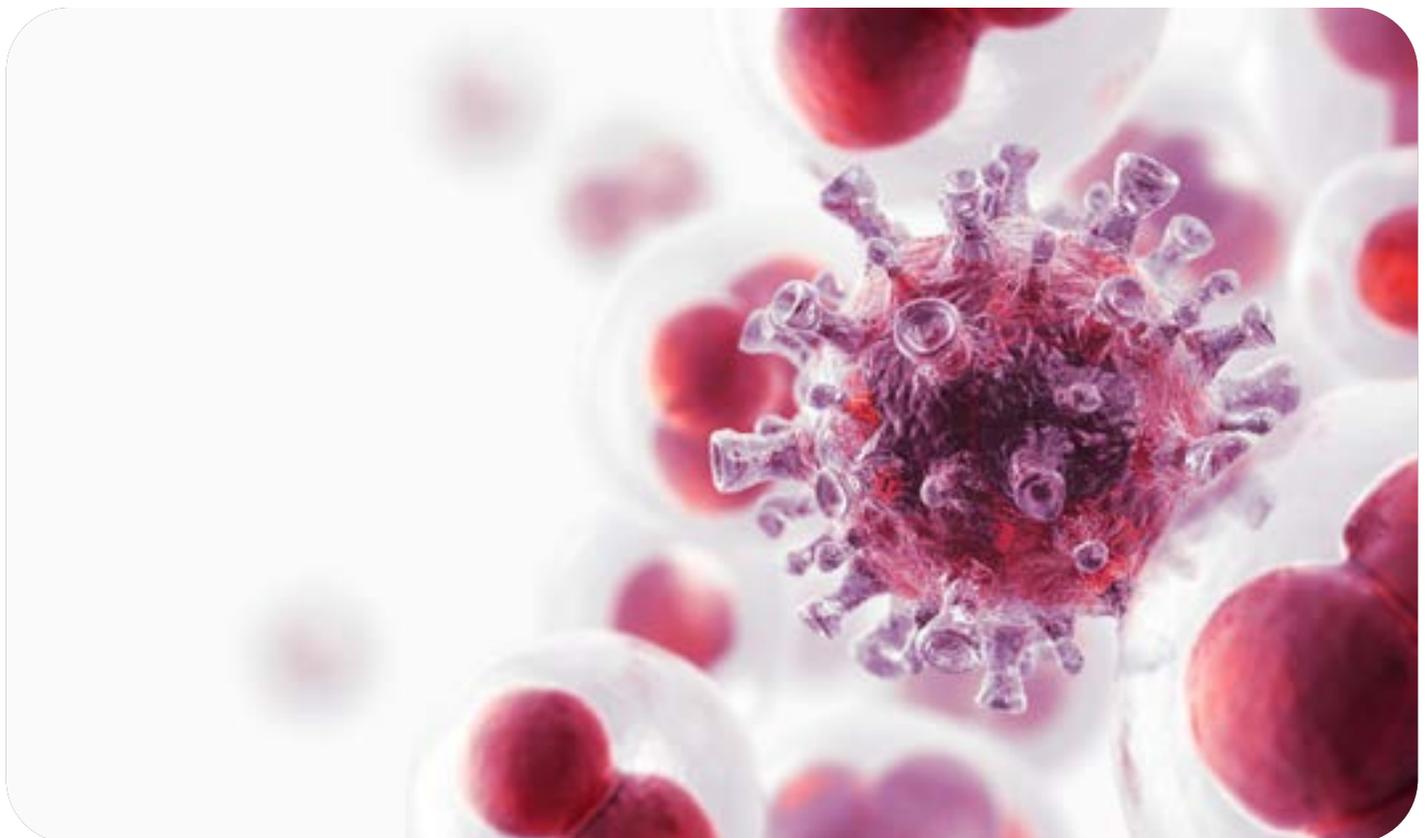
Contents

6	Kidney cancer basics
13	Testing for kidney cancer
21	Kidney cancer staging
27	Kidney cancer treatment
43	Treatment guide: Stage I
48	Treatment guide: Stage II
51	Treatment guide: Stage III
55	Treatment guide: Stage IV
63	Making treatment decisions
72	Words to know
77	NCCN Contributors
78	NCCN Cancer Centers
80	Index

1

Kidney cancer basics

- 7 The kidneys
- 9 Types of kidney cancer
- 11 How kidney cancer spreads
- 12 Review



Learning that you have cancer can feel overwhelming. Understanding the basics about kidney cancer will help you prepare and plan for treatment.

The kidneys

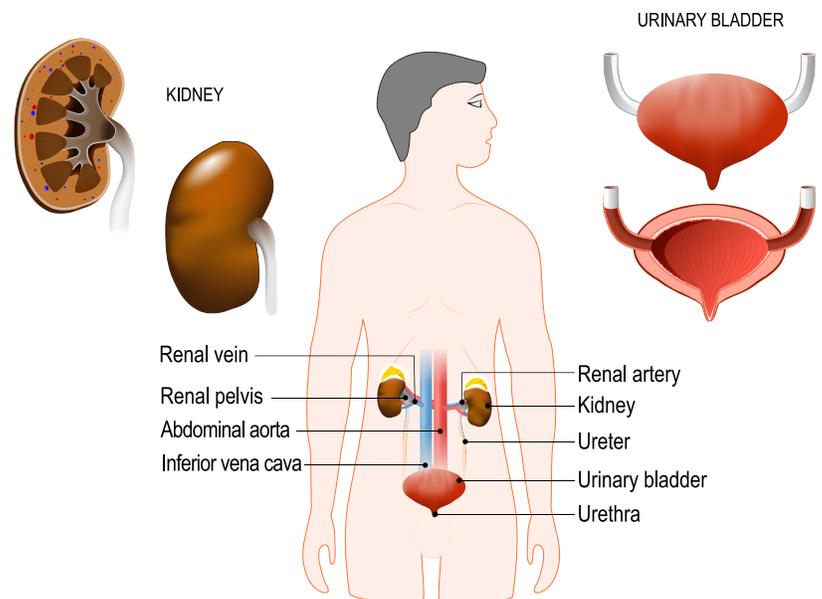
The kidneys are part of the urinary system, shown in **Figure 1**. The urinary system is a group of organs that remove waste from the body in the form of urine or pee. This system includes the kidneys, ureters, bladder, and urethra.

The kidneys are a pair of organs found behind the other organs in your abdomen. Each kidney is about the size of an adult's fist. The kidney is covered by a thin layer of tissue, like the skin of an apple. This layer of tissue is called the renal capsule. Renal refers to the kidney.

An adrenal gland sits on top of each kidney. The kidney and adrenal gland are surrounded by a layer of fat. Covering the fat is an outer layer of fibrous tissue called Gerota's fascia. Gerota's fascia is important. When kidney cancer grows into and beyond Gerota's fascia it becomes it is a sign of advanced kidney cancer. **See Figure 2.**

Figure 1
The kidneys and urinary system

The kidneys are a pair of organs in the abdomen. The kidneys are the main organs of the urinary system. They filter waste out of blood and make urine. The ureters, bladder, and urethra hold and transport urine before it is released from the body.



How the kidneys filter and clean blood

The kidneys perform many jobs to keep your body healthy. They make hormones that help control blood pressure. They also make hormones that tell the body to make more red blood cells. The main job of the kidneys is to filter blood to remove waste and extra water from the body. By filtering the blood, the kidneys also control and balance the levels of fluids and chemicals in your body.

The renal artery carries blood with waste into the kidney. **See Figure 3.** Blood then flows through tiny filtering tubes in the kidney called renal tubules. Blood is cleaned as it flows through the renal tubules. The renal tubules take waste and other substances out of the blood. These substances are made into urine.

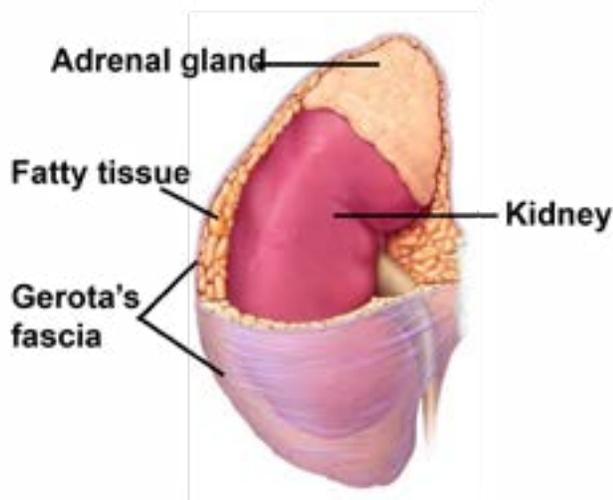
The clean, filtered blood flows out of the kidney through the renal vein. The renal vein merges with a larger vein called the vena cava. The vena cava takes clean blood back up to the heart.

Urine flows out of the renal tubules and collects in a hollow space in the middle of the kidney called the renal pelvis. Urine leaves the renal pelvis through a long tube called the ureter. The ureter carries urine to the bladder. The bladder holds urine until it is released from the body, when you urinate or pee. A shorter tube, called the urethra, takes urine from the bladder to outside the body.

Most people have two kidneys. But, each kidney works on its own and does not need the other to function. This means that the body can often work well with less than one complete kidney. Many people live full, healthy lives with only one kidney.

Figure 2 The kidney and adrenal gland

An adrenal gland sits on top of each kidney. The kidney and adrenal gland are surrounded by a layer of fatty tissue. Surrounding the fat is a layer of fibrous tissue called Gerota's fascia.



Derivative work of Kidney and Adrenal Gland by Alan Hoofring from NCI Visuals Online. Available at: <https://visualsonline.cancer.gov/details.cfm?imageid=4355>

Types of kidney cancer

Cancer is a disease that starts in the cells of your body. Most cancer is named after the cell from which it formed. Kidney cancer starts in the tissues of the kidneys.

Almost all kidney cancers are carcinomas. Carcinomas are cancers that start in cells that line the inner or outer surfaces of the body. In the kidneys, carcinomas most often start in the cells that line the renal tubules. This is called renal cell carcinoma (RCC). About 9 out of 10 kidney cancers are RCCs. **See Figure 4.** Because it is the most common type, RCC is often simply referred to as kidney cancer. RCC is the focus of this guideline.

There are 3 rare cancers that start in the urinary system, but do not act the same and are not treated the same as kidney cancer.

- Transitional cell carcinoma (TCC) - TCC starts in the cells that line the renal pelvis, where the ureters meet the kidneys. This is also called urothelial carcinomas or transitional cell cancer.
- Wilms tumor (nephroblastoma) - Wilms tumor is very rare and usually occurs in young children. Cancer cells are found in the kidney.
- Renal sarcoma - Renal sarcoma starts in the blood vessels or connective tissue of the kidney. (For information about sarcomas, read *NCCN Guidelines for Patients®: Soft Tissue Sarcoma*, available at www.nccn.org/patients.)

Figure 3 The kidneys filter blood to remove waste

Blood travels throughout the body in a network of tubes called blood vessels. Blood with waste and extra water enters the kidney through the renal artery. In the kidney, renal tubules remove excess water and other waste from the blood to make urine. Urine drips out of the renal tubules into the renal pelvis then leaves the kidney through the ureter. Clean, filtered blood leaves the kidney through the renal vein.

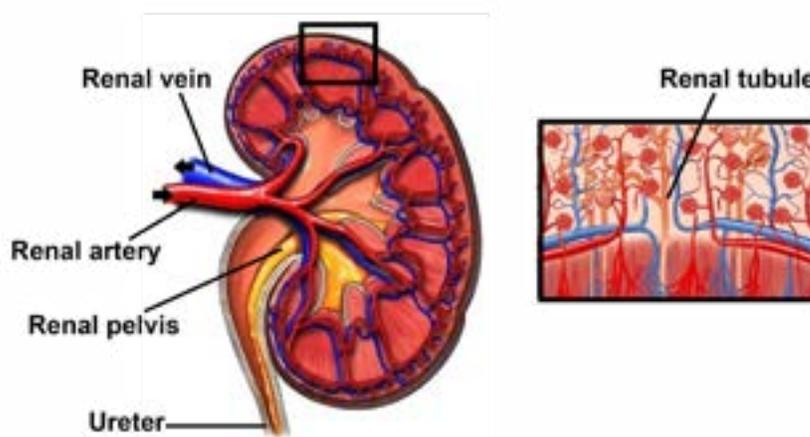


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Subtypes of renal cell carcinoma

Renal cell carcinoma (RCC) is the most common type of kidney cancer. RCC can be broken down into subtypes by looking at the cancer cells under a microscope. This is called histology. Tumor histology and other risk factors are an important part of choosing a treatment plan.

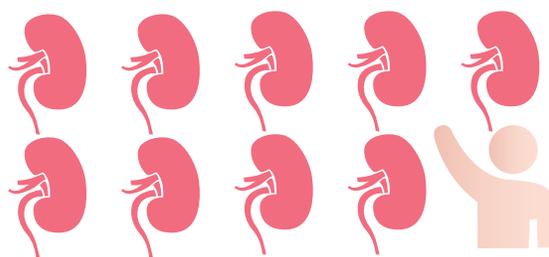
- **Clear cell RCC** is the most common subtype. Under a microscope, clear cells look very pale or clear. Also called ccRCC.
- **Non-clear cell RCC** (also called nccRCC).
 - **Papillary RCC** is the second most common subtype. This type of kidney cancer forms in cells that line the small tubes in the kidney that filter waste from the blood and make urine. Most papillary tumors look like long, thin finger-like growths under a microscope. Also called PRCC.

- **Chromophobe RCC** is the least common subtype. These cells are pale, but larger than clear cells, and look different.
- When the cancer cells don't look like any of the subtypes, it's called **unclassified RCC**. This is rare.

Figure 4 Common types of kidney cancer

RCC is the most common type of kidney cancer. About 9 out of 10 kidney cancers are RCCs.

Renal Cell Carcinoma (RCC)
About 9 out of 10 kidney cancers are RCCs.



How kidney cancer spreads

Kidney tumors are measured in centimeters (cm). A baseball is 7 cm, a golf ball is 4 cm, and a pea is 1 cm. **See Figure 5.** Your kidney is about the size of your fist or about 11 cm by 5 cm.

Tumors can grow in any part of the kidney and can grow into the renal vein and vena cava. **See Figure 6.** Treatment will be based on size and location of the tumor(s).

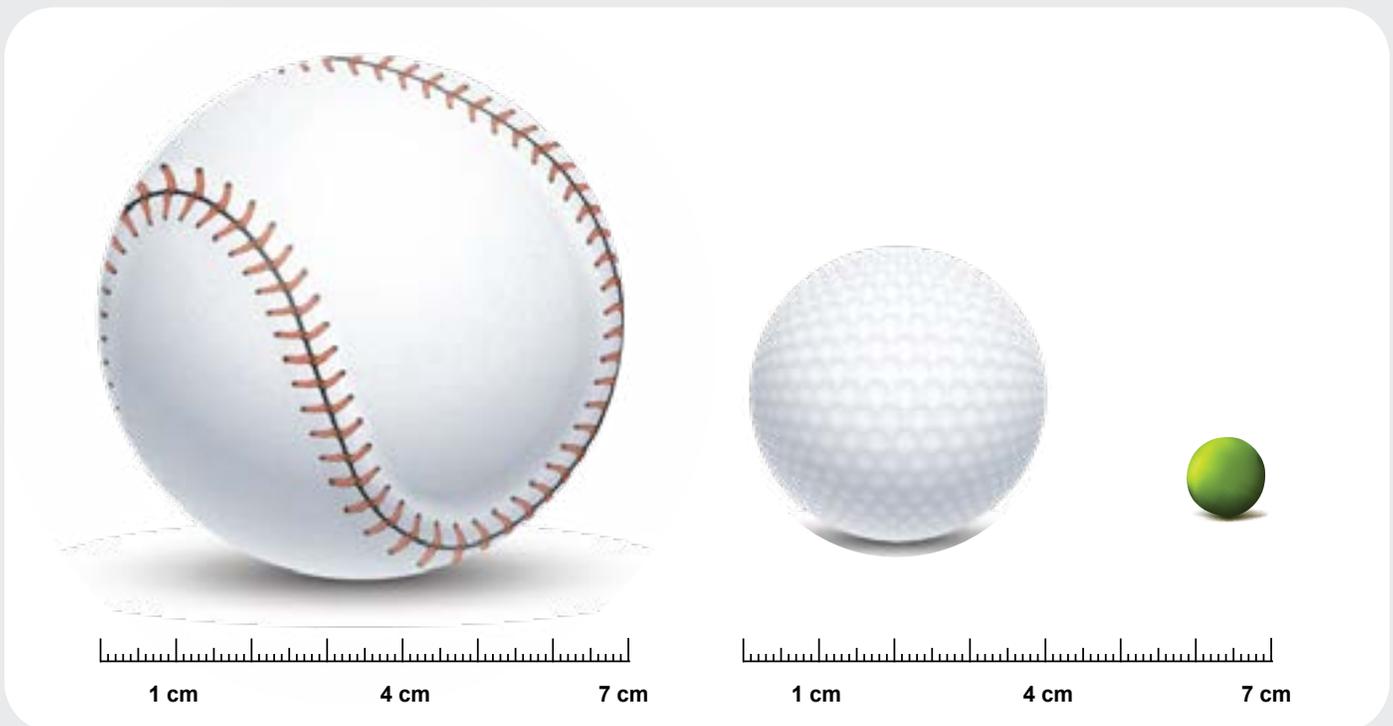
Kidney cancer can also spread to other parts of the body. Normal cells stay where they are in the body. Cancer cells can break away from where

they first formed (primary tumor) and travel to other parts of the body in a process called metastasis. In metastasis, cancer cells travel through your blood or lymph to form new tumors. The new tumors are called metastatic tumors or metastases.

Lymph is a clear fluid that gives cells water and food. It also contains white blood cells that help fight germs. Lymph travels throughout the body in a network of small tubes. These small tubes are called lymph vessels. Lymph nodes are small groups of special disease-fighting cells. Lymph nodes near the kidneys are called regional lymph nodes. Lymph nodes in other parts of the body are called distant lymph nodes.

Figure 5
Kidney tumors are measured in centimeters

A baseball is 7 cm, a golf ball is 4 cm, and a pea is 1 cm.



Your blood carries oxygen and nutrients throughout the body and removes waste. Cancer can spread through lymph or blood. When cancer cells settle into new places in the body, they can damage other tissues or organs.

- **Local metastasis** – Cancer that has spread to a nearby area close to the primary tumor. Kidney cancer can invade nearby tissues like surrounding fat, blood vessels, the adrenal gland, and Gerota's fascia.
- **Distant metastasis** – Cancer that has spread to distant parts of the body far from the primary site. Kidney cancer tends to spread to distant sites such as the lungs, lymph nodes, bones, liver, and the brain.

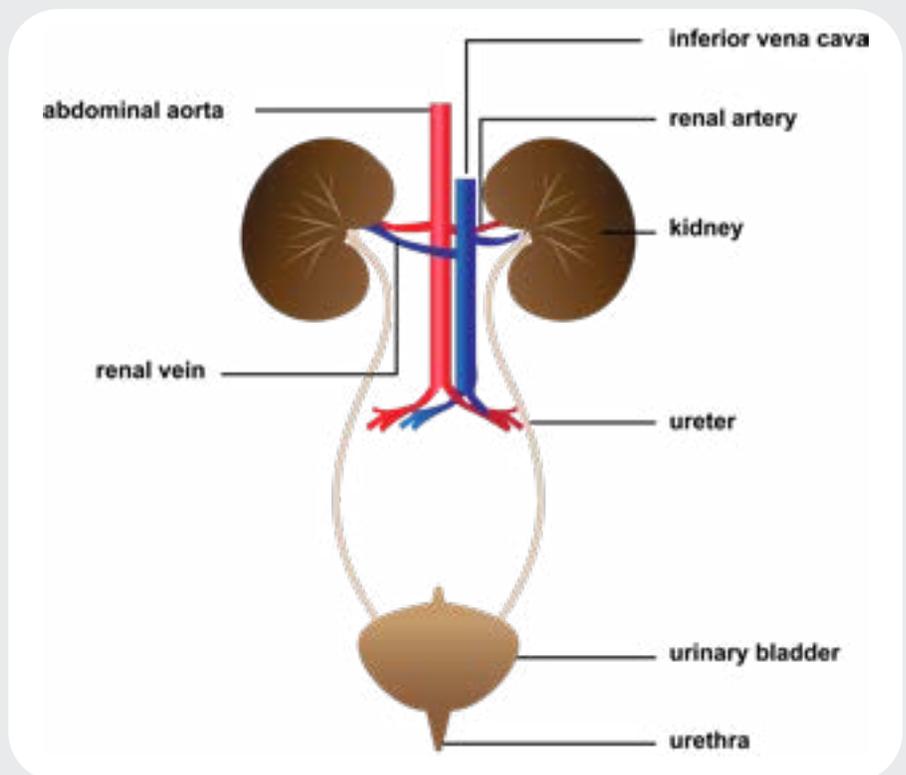
Cancer can travel to different parts of the body through your blood or lymph.

Review

- The kidneys filter blood to remove extra water and other waste the body doesn't need. Blood flows into the kidney through the renal artery and out through the renal vein.
- Renal tubules are tiny tubes in the kidneys that remove waste from blood and make urine.
- RCC is cancer that starts in cells that line the renal tubules. RCC is the most common type of kidney cancer. Clear cell RCC is the most common subtype of RCC.
- Treatments in this guide are divided into clear cell RCC and non-clear cell RCC.
- Cancer cells can spread to other body parts through blood or lymph causing metastases or other tumors.

Figure 6

Tumors can grow in any part of the kidney and grow into the renal vein and vena cava.



2

Testing for kidney cancer

14 General health tests

15 Imaging tests

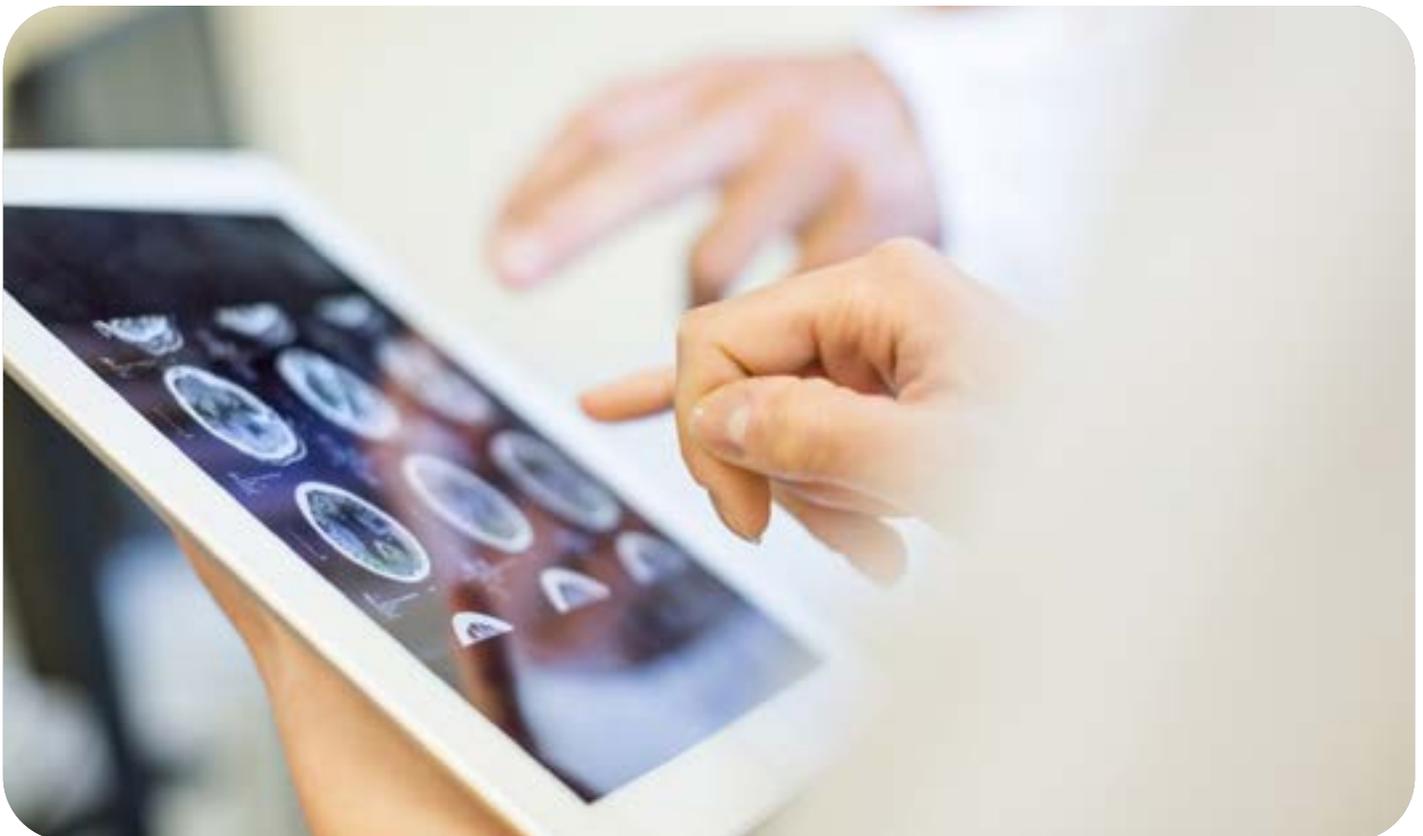
18 Blood tests

19 Tissue tests

19 Urine tests

20 Staging tests

20 Review



Most kidney cancers are found by chance during imaging tests for other health problems. Further testing is used to confirm (diagnose) kidney cancer. This chapter outlines tests used to diagnose and treat kidney cancer.

General health tests

Medical history

Before and after cancer treatment, your doctor will look at your medical history. A medical history is a record of your past and current medical problems and treatments. Your doctor will ask about all health issues and treatments you have had in your life. Be prepared to list any illness or injury and when it happened. Bring a list of old and new medicines. Tell your doctor about any symptoms you have. A medical history will help determine which cancer treatment is best for you.

Family history

Some cancers and other diseases can run in families. Your doctor will ask about the health history of family members who are blood relatives. This information is called a family history. You can ask family members about their health issues like heart disease, cancer, and diabetes, and at what age they were diagnosed.

Kidney cancer often occurs for unknown reasons. Some people have genetic health conditions that increase the risk for kidney cancer. Genetic means that it is passed down from parent to child through genes. Genes tell cells what to become and what to do.

One example is von Hippel-Lindau (VHL) disease or VHL syndrome. This disease is caused by an abnormal change (mutation) in the *VHL* gene. The *VHL* gene helps control cell growth, cell division, and other important cell functions. People with VHL disease have a higher chance of getting kidney cancer and other types of cancer.

Your health care provider might refer you for genetic testing to learn more about your cancer. A genetic counselor will speak to you about the results.

Physical exam

A physical exam is a study of your body. Doctors should perform a thorough physical exam along with a complete health history. A doctor will check your body for signs of disease.

A health care provider will:

- Check your temperature, blood pressure, pulse, and breathing rate
- Weigh you
- Listen to your lungs and heart
- Look in your eyes, ears, nose, and throat
- Feel and apply pressure to parts of your body to see if organs are of normal size, are soft or hard, or cause pain when touched. Tell your doctor if you feel pain.
- Feel for enlarged lymph nodes in your neck, underarm, and groin. Tell the doctor if you have felt any lumps or have any pain.

Your kidneys sit deep inside your abdomen and normally can't be felt during a physical exam. But, your doctor may be able to feel a kidney that is enlarged or has a large tumor.

Imaging tests

Imaging tests take pictures (images) of the inside of your body. These tests are useful in diagnosing cancer or other conditions. Doctors can see the primary tumor, or where the cancer started, and look for cancer in other parts of your body. Imaging tests are used to find and confirm (diagnose) kidney cancer. They are also used to assess the extent of the cancer and to help plan treatment.

A radiologist, who is an expert that looks at test images, will review your pictures and write a report. The radiologist will send this report to your doctor. Your doctor will discuss this report with you. Feel free to ask as many questions as you like.

CT scan

A computed tomography (CT) scan uses hundreds of x-rays and computer technology to take pictures from many angles to create real-looking images of the inside of your body. All of the pictures are combined to make one detailed picture. This type of scan is very good at showing kidney tumors.

Before the CT scan, you may be given contrast. A CT scan with contrast uses contrast materials to improve the pictures inside the body. Contrast materials are not dyes, but substances that help certain areas in the body stand out. Tell your doctors if you have had bad reactions to contrast in the past. This is important. Contrast might not be used if you have a serious allergy or if your kidneys aren't working well.

A CT scan of your abdomen and pelvis is recommended to check if there is a tumor in either one of your kidneys and if the kidney tumor has grown into the adrenal gland or nearby lymph nodes. The pictures can show the tumor size, shape, and location. A CT scan of your chest is used to check if cancer has spread to your lungs or chest area.

A CT scan machine is large and has a tunnel in the middle. **See Figure 7.** During the scan, you will need to lie face up on a table that moves through the tunnel. The scanner will rotate an x-ray beam around you to take pictures from many angles. You may hear buzzing, clicking, or whirring sounds during this time.

Figure 7
CT machine

A CT machine is large and has a tunnel in the middle. During the test, you will need to lie on a table that moves through the tunnel.



MRI scan

A magnetic resonance imaging (MRI) scan uses radio waves and powerful magnets to take pictures of the inside of the body. It does not use x-rays. An MRI scan is good at showing the spine and soft tissues like the kidneys and brain.

An MRI is used to check if kidney cancer has spread to major blood vessels like the renal vein or vena cava. MRI scans take better and clearer pictures of blood vessels than CT scans. An MRI of your brain may be used if you have symptoms that suggest the cancer has spread to your brain.

You may not be able to have a CT scan with contrast if you have an allergy to it or if your kidneys aren't working well. In such cases, an MRI scan of your abdomen may be used instead.

Contrast might be used for an MRI scan. MRI scans use a different kind of contrast than CT scans. Contrast might not be given if your kidney function is below a certain level. In people with very poor kidney function, MRI contrast can cause a rare, but serious condition called nephrogenic systemic sclerosis.

Getting an MRI scan is similar to getting a CT scan. But, MRI scans take longer to complete. The full exam often lasts an hour or more. For the scan, you will need to lie on a table that moves through a large tunnel in the scanning machine. The scan may cause your body to feel a bit warm. Some people feel stressed during an MRI. Anti-anxiety medicine, pain medicine, or relaxation techniques such as self-hypnosis may be helpful if you experience anxiety in confined spaces.

Ultrasound

An ultrasound is a test that uses sound waves to take pictures of the inside of the body. **See Figure 8.** This test can show if there is a mass in your kidneys. It can also show if the mass is solid or fluid-filled. Kidney cancer tumors are more likely to be solid.

Figure 8 Ultrasound

An ultrasound uses sound waves to make pictures of the inside of the body.



X-ray

An x-ray uses low-dose radiation to take one picture at a time of the inside of the body. A chest x-ray is used to see if cancer has spread to your lungs. X-rays are good at showing bones and some soft tissues like the lungs. Pictures from x-rays are not as detailed as those from some other imaging tests.

A chest x-ray might be ordered by your doctor as part of initial tests or during follow-up.

Ureteroscopy

Ureteroscopy uses a thin, tube-shaped tool called a scope that is inserted into your urethra to see inside the bladder and ureters. Ureteroscopy is not used for kidney cancer. This imaging test may be used if your doctor suspects urothelial carcinoma or bladder cancer.

Bone scan

A bone scan is an imaging test that can show if cancer has spread to your bones. This test is only used if you have certain symptoms such as bone pain or high levels of alkaline phosphatase (ALP) in your blood. These symptoms may signal that the cancer has spread to your bones.

A bone scan uses a radiotracer to make pictures of the inside of bones. A radiotracer is a substance that releases small amounts of radiation. Before the pictures are taken, the tracer will be injected into your vein. It will take about 3 hours for the tracer to enter your bones. A special camera will take pictures of the tracer in your bones. Areas of bone damage use more radiotracer than healthy bone and thus show up as bright spots on the picture.

Guide 1. Blood chemistry tests

Chemical	Why is it important?
Calcium	<ul style="list-style-type: none"> • Calcium is a mineral found mostly in bones. • High levels of calcium in your blood may be a sign that cancer has spread to your bones. • Abnormal levels of calcium may also be a sign that your kidneys aren't working well.
Creatinine	<ul style="list-style-type: none"> • Creatinine is waste from muscles. • High levels of creatinine in the blood may be a sign that the kidneys aren't working well.
Urea	<ul style="list-style-type: none"> • Urea is a waste product made by the liver. • High levels of urea in the blood may be a sign that the kidneys aren't working well. • If your kidneys are working well, it might be a sign you are not drinking enough fluids.
ALP	<ul style="list-style-type: none"> • ALP is a protein found in most tissues in the body, including the liver and bones. • High levels of ALP in your blood may be a sign that cancer has spread to your liver or bones.

Blood tests

Doctors test blood to look for signs of disease and assess your general health. These tests are not used to diagnose kidney cancer. But, abnormal results may signal there's a problem with your kidneys or other organs. Abnormal results may be caused by kidney cancer or other health conditions.

For a blood test, your doctor will insert a needle into a vein to remove a sample of blood. Blood is often removed from a vein in the arm. The needle may bruise your skin and you may feel dizzy afterward.

The blood sample will then be sent to a lab for testing. The blood tests used for kidney cancer should include a complete blood count (CBC) and blood chemistry tests.

Complete Blood Count

A complete blood count (CBC) measures the number of red blood cells, white blood cells, and platelets in your blood. It is one of the most common blood tests. Your doctor will want to know if you have enough red blood cells to carry oxygen throughout your body, white blood cells to fight infections, and platelets to control bleeding.

3 types of blood cells:

- White blood cells fight infection
- Red blood cells carry oxygen
- Platelets help with blood clotting

Your CBC numbers are compared to the normal range for those cells in a healthy person. Your blood count may be too low or too high because of kidney cancer or another health problem. Having a low number of red blood cells, called anemia, is common in people with kidney cancer.

Blood chemistry tests

Blood chemistry tests measure the levels of minerals, enzymes, and waste products found in your blood. These chemicals come from your liver, bones, and other organs and tissues. Your kidneys filter excess chemicals and waste out of your blood. Blood chemistry tests tell your doctor how your heart, liver, kidneys, and other organs are working.

Blood chemistry tests are given with other tests when kidney cancer is first found or suspected. They may also be given during and after cancer treatment to check treatment results. Abnormal levels of certain chemicals can be a sign that your kidneys aren't working well or may be a sign that cancer has spread to other parts of your body.

Some of the main chemicals your doctor will assess with the blood chemistry panel are described in [Guide 1](#).

You might also have liver function tests to assess the health of your liver. Your liver does many important jobs, such as remove toxins from your blood. Liver function tests measure chemicals that are made or processed by the liver. Levels that are too high or low may be a sign of liver damage or that cancer has spread. One such chemical is alkaline phosphatase (ALP). High levels of ALP may mean that the cancer has spread to the bone or liver. A bone scan might be performed if you have high levels of ALP.

Tissue tests

The removal of tissue or group of cells by a surgeon is called a biopsy. A biopsy looks for signs of cancer in your cells. Tissue samples removed during a biopsy or surgery will be sent to a pathologist. The pathologist will view the tissue sample under a microscope to learn more about the subtype of cancer in your body. It is important to know the subtype of kidney cancer in order to plan treatment and determine the course your cancer will take, called a prognosis.

For most cancers, a biopsy must be done to confirm cancer before starting cancer treatment. Kidney cancer is different. For many with kidney cancer, the primary treatment is surgery to remove the tumor. After the tumor is removed, it is tested.

Imaging tests are very good at showing if a kidney tumor is cancer. Doctors can often confirm kidney cancer based on the imaging test results. Thus, a biopsy of the tumor is rarely needed before starting treatment.

A biopsy may be done before treatment when:

- A tumor is very small and might not be treated with surgery. In this case, a biopsy may be done to confirm kidney cancer and to help guide the treatment plan.
- Doctors think a tumor might be transitional cell carcinoma (TCC). In this case, a biopsy may be done to confirm the cancer type.

Needle biopsy

For kidney cancer, a needle biopsy might be done. An external needle biopsy uses a thin needle that goes through the skin into the kidney tumor to remove fluid or tissue. A sample of tumor will be collected in the hollow center of the needle. It is also called a percutaneous biopsy.

Urine tests

Doctors order urine tests to look for signs of disease and assess your general health. Urine tests are not used to confirm (diagnose) kidney cancer. But, abnormal results may signal there's a problem with your kidneys or other organs. Abnormal results may be caused by kidney cancer or other health conditions.

For a urine test, you will be asked to fill a small container with urine. The urine sample will be sent to a lab for testing.

There are 2 types of urine tests that may be used for kidney cancer:

- Urinalysis
- Urine cytology

Urinalysis

Urinalysis is a test that checks the content of urine using a microscope and chemical tests. Doctors use this test to look for small amounts of blood or other abnormal substances in urine that can't be seen with the naked eye. Blood in urine may be caused by kidney cancer or other health problems.

Urine cytology

Urine cytology is a test in which urine is looked at under a microscope to check for cancer cells. Urine cytology is not used for kidney cancer. This test may be used if your doctor suspects bladder cancer.

Staging tests

For kidney cancer, staging tests are used to measure the size of the primary tumor, to see if and where the cancer has spread, and to look at the kidney and nearby tissue. Some staging tests are recommended for all patients when kidney cancer is first found. Other staging tests are only recommended if you have certain signs or symptoms. The staging tests used for kidney cancer are listed in [Guide 2](#).

Review

- Imaging tests are used to find and diagnosis kidney cancer.
- Blood and urine tests check for signs of disease.
- Biopsies are not usually done before surgery for kidney cancer.
- Staging tests are used to measure the size, to see if and where the cancer has spread, and to look at the kidney and nearby tissue.

Guide 2. Staging tests for kidney cancer

Important staging tests	Possible staging tests
<ul style="list-style-type: none"> • Abdominal CT with or without the pelvis or MRI • Chest x-ray 	<ul style="list-style-type: none"> • Brain MRI • Chest CT • Bone scan • Needle biopsy • Ureteroscopy • Urine cytology • Genetic testing
<p>Note: Imaging tests are done with contrast material, when possible</p>	

3

Kidney cancer staging

22 TNM scores

23 Kidney cancer stages

25 Your treatment team

26 Review



Cancer staging is how your doctors rate and describe the extent of cancer in your body. Doctors use cancer staging to plan which treatments are best for you. In this chapter you will learn more about the stages of kidney cancer.

TNM scores

The American Joint Committee on Cancer (AJCC) created a way to determine how much cancer is in your body and where it is located. Staging describes how serious your cancer is and your chances of survival. Staging is needed to make treatment decisions.

The TNM staging system is used for kidney cancer. In this system, the letters T, N, and M describe different areas of cancer growth. Based on cancer test results, your doctor will assign a score or number to each letter. These scores will be combined to assign the cancer a stage. A TNM example might look like this: T2N0M0. [See Guide 3.](#)

When finding out a stage for cancer, a doctor also looks at the tumor grade and tumor markers. The rating of how much cancer cells look like normal cells under a microscope is the tumor grade. This grade tells how quickly the cancer can grow or spread.

Once all of your tests are complete, the doctor will tell you the stage of your disease. [See Guide 4.](#) The stage describes the likely course your cancer will take called a prognosis. Together, you and your care team will decide the best treatment plan.

Letter stages

The T score refers to the size of the main (primary) tumor. A number follows this letter. The higher the number after the T, the larger the tumor or the more it has grown in nearby tissue. The N refers to the number of nearby lymph nodes that have cancer. The M refers to whether the cancer has spread to other parts of the body or metastasized.

Number stages

Number stages range from stage 1 to stage 4, with 4 being the most serious. Doctors write these stages as stage I, stage II, stage III, and stage IV.

Guide 3. TNM staging system for kidney cancer

Primary tumor (T)	Regional lymph nodes (N)	Distant metastasis (M)
	N0 There is no cancer in nearby lymph nodes	M0 Cancer has not spread to other parts of the body
T1, T2, T3, T4 Size and location of primary tumor in kidney	N1 There is cancer (metastasis) in nearby lymph nodes	M1 Cancer has spread to other parts of body (metastasized)

Kidney cancer stages

Guide 4 is an overview of kidney cancer stages I, II, III, and IV. Kidney cancers of the same stage tend to have a similar outcome (prognosis) and are treated in a similar way. In general, earlier cancer stages have better outcomes. Some people will do better than expected. Others will do worse. Other factors, such as your general health, are also very important.

Stage I kidney cancer T1, N0, M0

The tumor is found only in the kidney and is smaller than 7 cm (T1). Cancer has not spread to nearby lymph nodes (N0) or to other parts of the body (M0).

Guide 4. Kidney cancer stages

Stage	Primary tumor (T)	Regional lymph nodes (N)	Distant metastasis (M)
Stage I	T1 Tumor is 7 cm or smaller and found only in kidney	N0 There is no cancer in nearby lymph nodes	M0 Cancer has not spread to other parts of the body
Stage II	T2 Tumor is larger than 7 cm and found only in the kidney	N0	M0
Stage III	T1 or T2	N1 There is cancer (metastasis) in nearby lymph nodes	M0
	T3 Tumor has grown outside the kidney into major veins and tissues, but not into Gerota's fascia	N0 or N1	M0
Stage IV	T4 Tumor has grown beyond Gerota's fascia	Any N	M0
	Any T	Any N	M1 Cancer has spread to other parts of body (metastasized)

Stage II kidney cancer**T2, N0, M0**

The tumor is larger than 7 cm and is found only in the kidney (T2). Cancer has not spread to nearby lymph nodes (N0) or to other parts of the body (M0).

Stage III kidney cancer**T3, N1 or N0, M0**

The tumor has grown outside the kidney into nearby veins and tissues (T3). It has not grown into the adrenal gland or beyond Gerota's fascia. Cancer may or may not have spread to nearby lymph nodes (N1 or N0). Cancer has not spread to distant sites (M0).

T1 or T2, N1, M0

The tumor is found only in the kidney (T1 or T2), but cancer has spread (metastasized) to nearby

lymph nodes (N1). Cancer has not metastasized to distant sites (M0). The tumor has not grown into the adrenal gland or beyond Gerota's fascia.

Stage IV kidney cancer**T4, N1 or N0, M0**

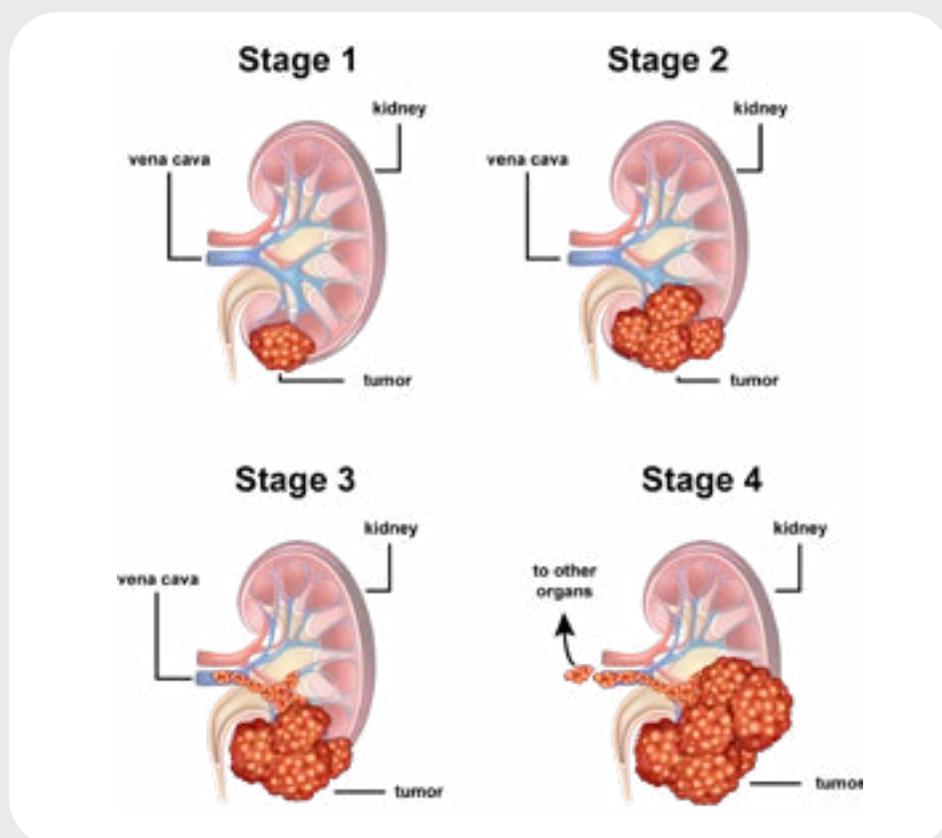
The tumor has grown beyond Gerota's fascia and maybe into the adrenal gland (T4). Cancer may or may not have spread to nearby lymph nodes (N1 or N0). Cancer has not metastasized to distant sites in the body (M0).

T1-T4, N1 or N0, M1

The tumor is of any size and may or may not extend beyond the kidney (T1-T4). Cancer may or may not have spread to nearby lymph nodes (N1 or N0). Cancer has metastasized to distant parts of the body (M1). **See Figure 10.**

Figure 10
Kidney cancer stages

Tumor size and location will differ from this example.



Your treatment team

Treating kidney cancer takes a team approach. Some members of your care team will be with you throughout cancer treatment, while others will only be there for parts of it. Get to know your care team and let them get to know you.

- **Your primary care doctor** handles medical care not related to your cancer. This person can help you express your feelings about treatments to your cancer care team.
- **A urologist** is an expert in diseases of the male and female urinary tract and the male reproductive organs.
- **A urologic oncologist** specializes in diagnosing and treating cancers of the male and female urinary tract and the male reproductive organs.
- **A medical oncologist** treats cancer in adults using chemotherapy, hormonal therapy, biological therapy, and targeted therapy with drugs. Often, this person will lead the overall treatment team and keep track of tests and exams done by other specialists.
- **Oncology nurses** provide your hands-on care, like giving chemotherapy, managing your care, answering questions, and helping you cope with side effects.

Depending on your diagnosis, your team might include:

- **An anesthesiologist** who gives anesthesia, a medicine so you do not feel pain during surgery or procedures
- **A diagnostic radiologist** who reads the results of x-rays and other imaging tests

- **A dietitian or nutritionist** who gives nutritional advice and helps you plan menus to meet your nutritional needs during cancer treatment
- **A pathologist** who reads tests and studies the cells, tissues, and organs removed during a biopsy or surgery
- **A radiation oncologist** who prescribes and plans radiation therapy to treat cancer
- **An interventional radiologist** who performs needle biopsies of tumors and sometimes performs ablative therapies
- **A surgical oncologist** who performs operations to remove cancer

You know your body better than anyone. Help other team members understand:

- How you feel
- What you need
- What is working and what is not

Keep a list of names and contact information for each member of your team. This will make it easier for you and anyone involved in your care to know who to contact with questions or concerns.

Get to know your
care team and let
them get to
know you.

Cancer treatment

There is no single treatment that is best for all patients. Although the specific therapies used during each stage will depend on your diagnosis, your treatment plan is likely to take you through several stages. There is often more than one treatment option, including clinical trials. Clinical trials study how well a treatment works and its safety.

The treatment that you and your doctors agree on should be reported in the treatment plan. It is also important to note the goal of treatment and the chance of a good treatment outcome. All known side effects should be listed and the time required to treat them should be noted.

Your treatment plan may change because of new information. You may change your mind about treatment. Tests may find new results. How well the treatment is working may change. Any of these changes may require a new treatment plan.

Review

- Cancer staging is how doctors rate and describe the extent of cancer in the body.
- Kidney cancer is grouped into stages to help plan treatment.
- Cancer stages are defined by the growth and spread of the tumor.
- Doctors use certain tests, called staging tests, to find out how much the cancer has grown and spread.
- Ask to have the names and contact information of your health care providers included in the treatment plan.

Helpful tips:

- ✓ Keep a list of contact information of all of your health care providers.
- ✓ Ask a caregiver to help you plan your appointments.
- ✓ Use a calendar or day planner to keep track of your upcoming tests and doctor's appointments.

4

Kidney cancer treatment

- 28 Surgery
- 31 Targeted therapy
- 35 Immunotherapy
- 38 Clinical trials
- 39 Active surveillance
- 39 Thermal ablation
- 40 Supportive care
- 42 Review



There is more than one treatment for kidney cancer. This chapter describes treatment options and what to expect. Discuss with your doctor which treatment might be best for you.

Surgery

Surgery is a form of local treatment. It is an operation or procedure to remove cancer from the body. Surgery is the primary or main treatment used to rid the body of kidney cancer. This is usually only one part of a treatment plan.

The treatment of kidney cancer often begins with surgery to remove the primary tumor in your kidney. The goal is to remove the cancer from your body. To do so, surgery might remove all or part of your kidney with the tumor, the nearby adrenal gland, lymph nodes, and other surrounding tissue.

There is more than one type of surgery for kidney cancer. The type and extent of surgery you will have depends on the tumor size, tumor location, and how much the cancer has spread. It is important to note that surgery is not an option for everyone. Talk with your doctor. Together, decide if surgery is an option for you.

Types of surgery

When you have kidney cancer, you might have surgery to remove part or all of a kidney. This is called a nephrectomy. In a simple nephrectomy, only the kidney is removed. A partial nephrectomy removes part of one kidney with the tumor, but not the entire kidney. In a radical nephrectomy, the entire kidney, nearby adrenal gland, lymph nodes, and surrounding tissue are removed.

There are 2 types of surgery used in partial and radical nephrectomies:

- Open surgery
- Minimally invasive surgery (laparoscopic or robotic surgery)

Open surgery

Open surgery removes tissue through one large surgical cut below your ribs. The cut may be made in your abdomen, side, or lower back. The large cut lets your doctor directly view and access the tumor in your kidney to remove it. Open surgery may take several hours or longer. After the surgery, you will need to stay in the hospital for several days or longer to recover. You may have some pain in your side for a few weeks or months after the surgery.

Minimally invasive surgery

Minimally invasive surgery uses a few small incisions or cuts instead of one large one. Small tools are inserted through each incision to perform the surgery. One of the tools, called a laparoscope, is a long tube with a video camera at the end. The camera lets your doctor see your kidney and other tissues inside your abdomen. Other tools are used to remove all or part of the kidney with the cancer. Laparoscopic surgery can also be done using robotic arms to control the surgical tools. This is called robot-assisted laparoscopic surgery.

Laparoscopic surgery may take a couple of hours or longer to perform. After the surgery, you will need to stay in the hospital, usually for about 1 to 2 days, to recover. Laparoscopic surgery often results in less pain, a shorter hospital stay, and shorter recovery time.

Surgery can be used to:

- cure the cancer by removing it all
- remove a section or debulk the tumor
- provide supportive care (relieve pain or discomfort)

Partial nephrectomy

A partial nephrectomy is surgery that removes the tumor with part of the kidney. The rest of your kidney and nearby tissue like the adrenal gland and lymph nodes are left in your body. It is also called nephron-sparing or kidney-sparing surgery since it saves (spares) as much of your kidney as possible. Your kidney can still work (function) even if part of it has been removed. This is a benefit of partial nephrectomy. If you have poor kidney function or are at risk for poor kidney function, this surgery might be an option. It might be an option if you have only one kidney, limited kidney function, or tumors in both kidneys. This surgery is used for other patients as well.

Partial nephrectomy is often used for treating kidney cancer when the tumor is small and only in the kidney. This surgery is the preferred treatment for very small tumors no more than 4 cm wide. It may also be used to treat small tumors up to 7 cm wide. A partial nephrectomy can be used to remove larger tumors, but location of the tumor in your kidney and your overall health are considered in any type of surgery. For most small tumors, a partial nephrectomy can remove all the cancer with good long-term results. But, the surgeon's skill and experience is a key factor.

Partial nephrectomy is a complex surgery. It is more technically difficult than surgery that removes the whole kidney. A partial nephrectomy should only be done by an expert surgeon who does this type of surgery often. Careful patient selection, based on factors such as the tumor size and location, is also important. This surgery should only be done when the entire tumor can be safely removed, leaving the healthy part of the kidney intact.

With any type of surgery, there are health risks and side effects. A side effect is an unhealthy or unpleasant condition caused by treatment. Some possible side effects of a partial nephrectomy include infections, bleeding, pain from the surgical cuts, and urine leaking from the kidney.

Radical nephrectomy

A radical nephrectomy is surgery that removes the tumor with the whole kidney and the fatty tissue around the kidney. This surgery may also remove the adrenal gland on top of the kidney and nearby lymph nodes. How much tissue is removed depends on the extent of the tumor.

Surgery to remove an adrenal gland is called an adrenalectomy. The attached adrenal gland may be removed if it looks abnormal on imaging tests. It may also be removed if the tumor is near the top part of the kidney where the adrenal gland sits.

Surgery to remove nearby lymph nodes is called a lymph node dissection. A lymph node dissection is not often done as part of a standard radical nephrectomy. Nearby lymph nodes may be removed if they look enlarged on imaging tests or during surgery.

If the tumor has grown into the renal vein and vena cava, then the veins may be cut open to remove all of the cancer. In rare cases, your heart may need to be stopped for a short time for surgery on the vena cava. While the heart is stopped, a heart-lung

machine is used to circulate blood in the body. This is a very difficult and complex procedure. It should only be done by a team of experts who have a lot of experience.

Radical nephrectomy is used to treat kidney cancer when the tumor is large or has invaded nearby tissue. There are many factors that go into deciding which type of surgery might be best for your cancer. Each case is different. Each person is different.

With any type of surgery, there are risks. Some possible side effects of a radical nephrectomy include infection, bleeding, pain, and reduced kidney function. Since the whole kidney is removed, there is an increased risk for chronic kidney disease. Chronic kidney disease means your remaining kidney can't filter blood the way it should. In chronic kidney disease, kidney function may slowly get worse over a long period of time.

Cytoreductive nephrectomy

A cytoreductive nephrectomy is surgery to remove the primary tumor when you have metastatic kidney cancer. Metastatic means the cancer has spread from where it first formed to other parts of your body. New tumors that formed far from the primary tumor are called metastases. Not all cancer can be removed from your body with surgery when there are many metastases. Removing some of the cancer metastases, along with the primary tumor, and part or all of your kidney, might help to reduce the amount of cancer in your body, called cancer burden.

A cytoreductive nephrectomy is used for treatment of metastatic renal cell carcinoma (mRCC). This is stage IV kidney cancer. Not all stage IV kidney cancer is metastatic. However, if you are a patient with newly diagnosed mRCC, a cytoreductive nephrectomy may be an option.

Patients with mRCC are assigned a level of risk: favorable, intermediate, or poor. A person with mRCC who has a favorable risk level has a better chance of recovery (prognosis) and survival than someone with a poor risk level. Cytoreductive surgery is an option depending on your risk group. It is often used to prolong life, to reduce pain, or to improve quality of life, but not as a cure. Some or all of your kidney might be removed along with the primary tumor in a cytoreductive nephrectomy.

The goal of cytoreductive surgery is to reduce cancer burden. This surgery may be used for patients who have many metastases and the primary tumor can be completely removed. Some patients may benefit from having a cytoreductive nephrectomy before treatment with drugs. Removing the primary tumor may improve how well other treatments work against the remaining cancer and metastases.

A cytoreductive nephrectomy is usually followed by a targeted therapy and/or immunotherapy.

Metastasectomy

A metastasectomy is different from a mastectomy (surgery to remove the breast). A metastasectomy is surgery to remove one or more metastases. This surgery may be used when the primary tumor can be completely removed and there is only one metastasis. Not all metastases can be removed by surgery. Location is a key factor. Metastasectomy works best for metastases in the brain, bone, or lung.

A metastasectomy may be done at the same time as surgery to remove the primary tumor. Or, it may be done during a separate operation. The amount of time needed for the surgery and recovery depends on many factors. Some factors include the size and location of the metastases.

Targeted therapy

Targeted therapy is a form of systemic treatment that works throughout your body. Targeted therapy is treatment with drugs that focus on or target a specific or unique feature of cancer cells. These drugs stop the action of molecules that help cancer cells grow. Targeted therapy is used to treat stage IV (with or without metastases) kidney cancer or cancer that has returned (relapsed). Stage IV kidney cancer is sometimes referred to as advanced RCC. Targeted therapy may have fewer side effects than other types of cancer treatment.

Targeted therapy drugs treat kidney cancer in different ways. Some target and block the signals that cause new blood vessels to form. Others block the signals that tell the kidney cancer cells to grow and make more cancer cells. Often, these drugs have more than one target. Targeted therapy drugs are named based on what they target. [See Guide 5.](#)

There are 2 types of targeted therapy:

- Those that affect the outside or surface of the cancer cell called monoclonal antibodies
- Those that affect the inside of the cancer cell called kinase inhibitors

There are 3 main targets of targeted therapy used in treating kidney cancer:

- **Angiogenesis inhibitors** target blood vessel growth by blocking vascular endothelial growth factor (VEGF)
- **Mammalian target of rapamycin (mTOR) kinase inhibitors** target cancer cell growth
- **Epidermal growth factor receptor (EGFR) inhibitors** target cancer cell growth

Did you know?

The terms “chemotherapy” and “systemic therapy” are often used interchangeably. This is because chemotherapy is the most common type of systemic therapy. However, newer treatments, like targeted therapy and immunotherapy, also affect the whole body but work differently than chemotherapy.

Guide 5. Targeted therapy used for treating kidney cancer

Generic name	Brand name	Type	Its target	Given as	Used for
Axitinib	Inlyta®	TKI	VEGF	A pill	Used for advanced RCC with pembrolizumab or alone with other treatments
Bevacizumab or biosimilar	Avastin®	mAb	VEGF	An infusion	Advanced clear cell and non-clear cell RCC alone or with other treatments
Cabozantinib	Cabometyx®	TKI	multi-kinase including VEGF	A pill	Advanced clear cell and non-clear cell RCC
Erlotinib	Tarceva®	TKI	EGFR	A pill	Advanced non-clear cell RCC
Everolimus	Afinitor®	mTOR kinase inhibitor	mTOR	A pill	Advanced clear cell and non-clear cell RCC
Lenvatinib	Lenvima™	TKI	multi-kinase including VEGF	A pill	Used with everolimus, for advanced clear cell and non-clear cell RCC
Pazopanib	Votrient	TKI	multi-kinase including VEGF	A pill	Advanced clear cell and non-clear cell RCC
Sorafenib	Nexavar	TKI	multi-kinase including VEGF	A pill	Advanced clear cell and non-clear cell RCC
Sunitinib	Sutent®	TKI	multi-kinase including VEGF	A pill	Advanced clear cell and non-clear cell RCC
Temsirolimus	Torisel®	mTOR kinase inhibitor	mTOR	An infusion	Advanced clear cell and non-clear cell RCC

Monoclonal antibodies

A monoclonal antibody (mAb) is a type of protein designed to attack cancer cells. There are many kinds of mAbs. They are made in a lab and can be used alone or to help carry drugs into cancer cells.

Bevacizumab

Bevacizumab is a type of mAb called an angiogenesis inhibitor. Angiogenesis is the growth of new blood vessels. An angiogenesis inhibitor blocks this growth. Like normal cells, cancer cells need the food and oxygen in blood to grow. Kidney cancer cells are very good at getting new blood vessels to grow into the tumor to “feed” it.

Cancer cells release high amounts of a protein called VEGF (said vej-eff). Bevacizumab stops VEGF from sending signals that tell new blood vessels to form. This slows or stops blood vessel growth and “starves” the tumor.

How is it given?

Bevacizumab is a liquid that is given by infusion. Infusion is a method of giving drugs slowly through a needle into a vein. It may be given alone or with other drugs. Under certain circumstances, bevacizumab or its biosimilar is used to treat advanced clear cell and non-clear cell RCC. A biosimilar is a drug that is very much like one that has been approved by the FDA. It must be used in the exact same way and at the same dose as the other drug.

Although bevacizumab targets tumor blood vessels, it can also affect normal blood vessels. This can result in side effects. A side effect is a problem caused by treatment.

Kinase inhibitors

Kinases move chemicals, called phosphates, from one molecule to another. By transferring phosphates, kinases send signals that tell cells to grow. Kinase inhibitors block these signals.

There are 2 types of kinase inhibitors used in kidney cancer treatment:

- Tyrosine kinase inhibitors (TKIs)
- Mammalian target of rapamycin (mTOR) kinase inhibitors

Tyrosine kinase inhibitors

Tyrosine kinase inhibitors (TKIs) block the signals that cause kidney cancer to grow and spread. Tyrosine kinases are proteins in cells that are important for many cell functions. This includes sending signals in cells for cell growth, survival, and death. TKIs do not rid the body of cancer. They stop cell growth.

There are many different types of tyrosine kinases. Each TKI works in a slightly different way.

- Some tyrosine kinases, such as VEGF, send signals that tell new blood vessels to grow into the tumor.
- Other tyrosine kinases, such as EGFR, send signals that tell cancer cells to grow and divide to make new cells.
- Some TKIs target and block more than one type of tyrosine kinase. These are called multi-kinase inhibitors. Many of the multi-kinase inhibitors also block VEGF.

Axitinib

Axitinib targets and blocks the signals that cause new blood vessels to grow into the tumor. By blocking these signals, axitinib “starves” the tumor. This may slow tumor growth or cause the tumor to shrink. Axitinib is a VEGF inhibitor. Cancer cells release high amounts of VEGF. Axitinib blocks VEGF.

How is it given?

- Axitinib is a pill that is swallowed. It may be given with pembrolizumab. Pembrolizumab is an mAb that blocks the action of programmed death receptor-1 (PD-1). This allows the immune system to attack cancer cells.

Your doctor might call it axi-pembro, for short. Together, they are given as a first-line treatment for advanced clear cell RCC. It might be used alone after another treatment that did not work.

Erlotinib

Erlotinib is a type of EGFR inhibitor. EGFR is a protein found on the surface of cells that causes cells to divide. Erlotinib blocks the signals from EGFR that tell cancer cells to grow. This slows or stops new cancer cells from being made.

How is it given?

- Erlotinib is given as a pill that is swallowed. Under certain circumstances, it is used to treat advanced non-clear cell RCC or other non-clear cell RCC subtypes. It might be used with bevacizumab or its biosimilar.

Sorafenib, sunitinib, pazopanib, cabozantinib, and lenvatinib

Sorafenib, sunitinib, pazopanib, cabozantinib, and lenvatinib are multi-kinase inhibitors. In kidney cancer, the main purpose of these drugs is to block the signals for blood vessel growth. Blocking these signals may slow or stop cancer growth and spread. It may also cause tumors to shrink.

How is it given?

- All of the TKIs listed above are a pill that is swallowed. Some are taken with other medicines.

Mammalian target of rapamycin kinase inhibitors

Mammalian target of rapamycin (mTOR) is a protein in cells that is important for cell growth and survival. mTOR moves chemicals, called phosphates, from one molecule to another. By transferring phosphates, mTOR sends signals that tell cells to grow and divide. An mTOR inhibitor blocks this signal.

Everolimus and temsirolimus

Everolimus and temsirolimus are a type of targeted therapy called mTOR kinase inhibitors that block mTOR from transferring the phosphate. This stops the cell from receiving signals to grow and divide. By blocking the action of mTOR, these drugs slow tumor growth.

How is it given?

- Everolimus comes as a pill that is swallowed. It may be given alone or with other drugs for the treatment of advanced clear cell and non-clear cell RCC.
- Temsirolimus is given by infusion. Some people have an allergic reaction to the temsirolimus infusion. Under certain circumstances, it is used to treat advanced clear cell and non-clear cell RCC.

Immunotherapy

The immune system is the body's natural defense against infection and disease. It is a complex network of cells, tissues, and organs. The immune system includes many chemicals and proteins. These chemicals and proteins are made naturally in your body.

Immunotherapy is a type of systemic treatment that increases the activity of your immune system. By doing so, it improves your body's ability to find and destroy cancer cells. Immunotherapy can be given alone or with other types of treatment. [See Guide 6](#). It is used to treat stage IV (with or without metastases) kidney cancer or cancer that has returned (relapsed). Stage IV kidney cancer is sometimes referred to as advanced RCC.

There are 2 types of immunotherapy used in treating kidney cancer:

- Cytokine therapy
- Monoclonal antibody therapy

Cytokine therapy

Cytokines are proteins made by our immune system. Some cytokines stimulate the immune system and others slow it down. Interleukin (IL) is a type of cytokine therapy. It is made in a lab and used in cancer treatment.

Interleukin-2

Interleukins help stimulate or boost the immune system, among other things. High-dose interleukin-2 (IL-2) is a drug used under certain circumstances for relapsed or stage IV clear cell RCC. Due to the serious risks, high-dose IL-2 is only used for certain patients who are healthy enough to handle the side effects. To consider this option, you must have good overall health. Your kidneys and other organs must also be working well.

How is it given?

- High-dose IL-2 is given as an infusion and used in certain cases. High-dose IL-2 should only be given at a center that has experience with this treatment. Since you will be watched very closely for side effects during the infusion, you will need to stay in the hospital for several days during treatment. Very high doses of IL-2 are used to treat kidney cancer. This can cause severe and sometimes life-threatening side effects. Supportive care will be needed during IL-2 treatment.

Monoclonal antibody therapy

A monoclonal antibody (mAb) is a type of protein designed to attack cancer cells.

There are 4 immunotherapy mAbs that are approved to treat kidney cancer:

- Pembrolizumab
- Nivolumab
- Ipilimumab
- Avelumab

Pembrolizumab

Pembrolizumab is type of mAb. You might hear your doctor call it pembro, for short. Pembrolizumab blocks the action of PD-1. By blocking PD-1, the immune system can then go after cancer cells. The goal is to stop or slow the growth of cancer.

How is it given?

- Pembrolizumab is an infusion. It is often given with axitinib.

Nivolumab

Nivolumab is a type of mAb. Nivolumab blocks the action of PD-1. By blocking PD-1, the immune system can then go after cancer cells. The goal is to stop or slow the growth of cancer.

How is it given?

- Nivolumab is an infusion. It is sometimes given with ipilimumab.

Ipilimumab

Ipilimumab is a type of mAb that targets CTLA-4 protein (cytotoxic T-lymphocyte-associated protein 4). By blocking CTLA-4, the immune system can then kill cancer cells.

How is it given?

- Ipilimumab is an infusion. It is sometimes given with nivolumab.

Avelumab

Avelumab is a type of mAb that might block the action of PD-L1 (programmed death-ligand 1), a protein found on some cancer cells. This might help the immune system attack cancer cells.

How is it given?

- Avelumab is an infusion given with axitinib.

Helpful hint

There's a trick to knowing what drugs are used for. Look at the last few letters of the drug generic name.

If it ends in - mab, it is an mAb.

If it ends in - tinib, it is a TKI.

If it ends in - limus, it is an mTOR.

Guide 6. Immunotherapy used for treating kidney cancer

Generic name	Brand name	Type	Target	Given as	Used for
Aldesleukin or Interleukin-2 (IL-2)	Proleukin®	cytokine	Immune system boost	An infusion	Only used in some cases
Avelumab	Bavencio®	mAb	PD-L1 blocking	An infusion	Used with axitinib for advanced clear cell RCC
Ipilimumab	Yervoy®	mAb	CTLA-4 blocking	An infusion	Used with nivolumab for advanced clear cell RCC
Nivolumab	Opdivo®	mAb	PD-1 blocking	An infusion	Used with ipilimumab or alone for advanced RCC after one prior angiogenesis inhibitor
Pembrolizumab	Keytruda®	mAb	PD-1 blocking	An infusion	Used with axitinib for advanced RCC

Clinical trials

Clinical trials study how safe and helpful tests and treatments are for people. Clinical trials find out how to prevent, diagnose, and treat a disease like cancer. Because of clinical trials, doctors find safe and helpful ways to improve your care and treatment of kidney cancer.

Clinical trials have 4 phases.

- **Phase I trials** aim to find the safest and best dose of a new drug. Another aim is to find the best way to give the drug with the fewest side effects. Phase 1 trials are usually offered when the standard of care options are no longer available.
- **Phase II trials** assess if a drug works for a specific type of cancer. The patient receives the standard of care drugs and they may or may not get the newer drug under study.
- **Phase III trials** compare a new drug to a standard treatment. The patient receives the standard of care drugs and they may or may not get the newer drug under study.
- **Phase IV trials** test drugs approved by the U.S. FDA (Food and Drug Administration) to learn more about side effects with long-term use.

To join a clinical trial, you must meet the conditions of the study. Patients in a clinical trial are often alike in terms of their cancer and general health. This helps ensure that any change is from the treatment and not because of differences between patients.

If you decide to join a clinical trial, you will need to review and sign a paper called an informed consent form. This form describes the study in detail, including the risks and benefits. Even after you sign a consent form, you can stop taking part in a clinical trial at any time.

Ask your treatment team if there is an open clinical trial that you can join. There may be clinical trials where you're getting treatment or at other treatment centers nearby. Discuss the risks and benefits of joining a clinical trial with your care team. Together, decide if a clinical trial is right for you.

- Enrollment in a clinical trial is the preferred treatment for stage III clear cell RCC.
- Enrollment in a clinical trial is the preferred treatment for stage IV or relapsed non-clear cell RCC.



Finding a clinical trial

Search the National Institutes of Health (NIH) database for clinical trials. It includes publicly and privately funded clinical trials, who to contact, and how to enroll. Look for an open clinical trial for your specific type of cancer. Go to ClinicalTrials.gov.

The National Cancer Institute's Cancer Information Service (CIS) provides up-to-date information on clinical trials. You can call, email, or chat live. Call 1.800.4.CANCER (800.422.6237) or go to cancer.gov.

Active surveillance

Active surveillance is a term used to describe a plan that closely watches your condition. During this time, you will have tests on a regular basis to look for changes such as tumor growth. You will not have any cancer treatment during active surveillance unless test results show your condition is getting worse.

Active surveillance may be used for patients with very small stage 1 tumors (smaller than 2 cm) that has not metastasized. It may be an option for older patients or those who have other health conditions. Cancer treatment has side effects and some patients may not be healthy enough for surgery or other treatments. Age and other health conditions increase the risk of severe side effects and complications. For these patients, the risks of cancer treatment may be more dangerous than the cancer.

During active surveillance, your doctor will plan a testing schedule for you. This may include imaging tests, such as a CT, MRI, and ultrasound. The tests and schedule will be based on a number of factors. Some factors include your age, health, personal wishes, and the size, appearance, and growth rate of the tumor.

Thermal ablation

Thermal ablation is a type of local treatment that uses extreme cold or extreme heat to destroy cancer cells. It can destroy small tumors with little harm to nearby tissue. Thermal ablation may be used in certain cases when surgery is not a good option. Surgery may not be a good option for patients who are older or have certain health conditions. Thermal ablation works best for very small tumors—smaller than 3 cm. It is an option for stage T1 treatment and for supportive care in stage IV or relapsed kidney cancer.

There are 2 types of thermal ablation used to destroy cancer cells:

- **Cryoablation** kills cancer cells by freezing them with a very cold substance.
- **Radiofrequency ablation** kills cancer cells by heating them with high-energy radio waves.

Both types of thermal ablation use a special needle, called a probe, which is inserted into the tumor. With cryoablation, a medical gas is passed through the probe to cause below-freezing temperatures. This freezes the tumor to destroy it. With radiofrequency ablation, the probe emits radio waves to heat the tumor and destroy it.

The probe can be inserted through the skin and guided into place with a CT scan, ultrasound, or other imaging tests. The probe can also be inserted and guided into place during laparoscopic surgery.

Imaging tests are also used to monitor the tumor during treatment to make sure the whole tumor is destroyed. The probe will be removed when treatment is done.

Supportive care

Supportive care (also known as palliative care) is health care that relieves your symptoms caused by cancer and improves your quality of life. It is not cancer treatment. It might include pain relief, emotional or spiritual support, financial aid, or family counseling. Don't be afraid to ask for it. Together, you and your care team will choose a supportive care plan.

Supportive care is given at any stage of cancer, but is often the main type of care when the cancer is advanced. Supportive care is recommended for all patients, during any stage of cancer and its treatment.

Best supportive care is used with other treatments for stage IV or relapsed kidney cancer to help relieve symptoms caused by cancer and side effects caused by treatment.

Treatments to relieve symptoms of stage IV or relapsed kidney cancer may include the following:

- Stereotactic body radiation therapy
- Thermal ablation
- Metastasectomy
- Cytoreductive nephrectomy

Stereotactic body radiation therapy

Stereotactic body radiation therapy (SBRT) uses high-energy radiation beams to treat cancers. It is not used as a primary treatment for kidney cancer. Instead, it may be used to relieve symptoms such as pain caused by kidney cancer metastases. It may be used to treat kidney cancer in patients who cannot have surgery as a primary treatment due to other health conditions. It may also be used to shrink tumors or to prevent recurrence.

SBRT uses a machine to aim radiation beams at tumors in the body. With this method you will receive

high-dose radiation for 1 to 5 treatments. SBRT is very precise which reduces the chance of damage to nearby tissues.

Bone health

When kidney cancer spreads to distant sites, it may spread to your bones. Your bones are at an increased risk for injury and disease when kidney cancer spreads to them. Such problems include bone fractures, bone pain, and squeezing (compression) of the spinal cord. High levels of calcium in the blood, called hypercalcemia, may also occur.

Medicine may be given to help relieve bone pain and reduce the risk of other bone problems. Some medicines work by slowing or stopping bone breakdown, while others help increase bone thickness. It is recommended that you take calcium and vitamin D with these bone health medicines.

Surgery

Even if all the cancer can't be removed, surgery may be used to help with symptoms caused by the cancer. This is called palliative surgery. Symptoms may be from the primary tumor or cancer that has spread to other body parts.

As a kidney tumor grows larger, it can cause severe symptoms such as pain and blood in the urine. Surgery to remove the kidney may be used to relieve these symptoms. This surgery is called a palliative nephrectomy or cytoreductive nephrectomy. A cytoreductive nephrectomy and/or metastasectomy (the removal of metastases) might be used to reduce cancer burden or the amount of cancer in your body. This, in turn, might help to relieve symptoms and improve quality of life.

Palliative surgery may be used to treat problems caused by cancer that has spread to your bones. Such problems may include bone pain, bone fractures, and spinal cord compression.

Survivorship care

A survivor is someone with a history of cancer. A person is a cancer survivor from time of diagnosis until end of life. When treatment leads to remission (or no evidence of disease), you will need follow-up or survivorship care. During survivorship care you will still have a care team. You may need support. Seek out support groups or ask for help from your care team.

A survivorship plan should spell out who you will be seeing to monitor your health, when you should be seeing them, and what they should be doing.

Advance care planning

Advance care planning is making decisions now about the type of treatment you would want if you become unable to speak for yourself. Advance care planning is for everyone, not just for those who are very sick. It is a way to ensure your wishes are understood and respected.

Advance care planning starts with an honest discussion with your doctor and/or family member or loved ones. Ask your doctor about your cancer prognosis and what to expect if your cancer progresses. Discuss the medicines or therapies that will give you the best quality of life. Include family and friends in your advance care planning. Make your wishes clear. It is important that everyone understands what you want.

There are many benefits to advance care planning. It is useful for:

- Knowing what to expect
- Making the most of your time
- Lowering the stress of caregivers
- Having your wishes followed
- Having a better quality of life

Getting good care

You don't have to know the exact details of your prognosis. Just having a general idea will help with planning. With this information, you can decide at what point you'd want to stop cancer treatment, if at all. You can also decide what treatments you would want for symptom relief, such as radiation therapy, surgery, or medicine. You can change your advance care plan at any time. It might be helpful to have this talk with your doctor and/or friends and family more than once during your treatment.

Hospice care

Hospice is a type of care designed to provide medical, psychological, and spiritual support to patients with incurable disease and the people who love them. Hospice care may be started because you want to stop cancer treatment, no other cancer treatment is available, or you may be too sick for cancer treatment. Hospice care allows you to have the best quality of life possible. Care is given all day, every day of the week. You can choose to have hospice care at home or at a hospice center. The goal is comfort. Many insurance plans will only cover hospice services when you have less than 6 months to live and/or cancer treatment aimed at a cure has stopped.

Some forms of treatment may still be covered if they are being prescribed to relieve pain or symptoms. Be sure to talk with your doctor and your insurance company to clear up these issues before making your decision.

The goal of hospice care is:

- To control symptoms
- To ease physical and emotional suffering
- To improve quality of life

Hospice doctors, nurses, social workers, and chaplains are experts in helping people work through the spiritual and emotional challenges of coping with death. Providing support for family members is a major part of the hospice approach to end-of-life care. Most programs offer counseling and support groups for family members, including grief support.

In addition to making plans about your end-of-life care, organizing your personal and financial affairs can lessen the burden on family and friends when you are gone. This leaves you free to focus on other things in the time you have left.

Supportive care

- ✓ Supportive care is given at any stage of cancer. Ask for it!

Supportive care relieves symptoms of cancer and side effects caused by its treatment.

Review

- Primary treatment is the main treatment used to rid the body of cancer. Surgery is often the primary treatment for kidney cancer.
- A partial nephrectomy is surgery that removes the tumor with part of the kidney.
- A radical nephrectomy removes the tumor with the whole kidney and the fatty tissue around the kidney. This surgery may also remove nearby tissues like the adrenal gland and lymph nodes.
- Targeted therapy is treatment with drugs that target a specific or unique feature of cancer cells.
- Immunotherapy is treatment with drugs that helps the immune system attack cancer cells.
- Targeted therapy and immunotherapy might be used alone or together to treat kidney cancer.
- A clinical trial is a type of research that studies a test or treatment to see how safe it is and how well it works. Sometimes, a clinical trial is the preferred treatment option.
- Supportive care is treatment given to relieve symptoms of cancer and side effects of cancer treatment. Supportive care should be offered and given during all stages of care.

5

Treatment guide: Stage I

44 Primary treatment

46 Adjuvant treatment

46 Follow-up tests

47 Review



This chapter will guide you through treatment options for stage I kidney cancer. Together, you and your doctor should choose a treatment plan that is best for you.

Primary treatment

Primary treatment is the main treatment used to rid the body of cancer. Surgery is the most common primary treatment for stage I kidney cancer. When possible, a partial nephrectomy or kidney-sparing surgery is the preferred option as the primary treatment for stage I kidney cancer. [Guide 7](#) shows the possible primary treatment options for stage I kidney cancer listed in order of preference.

Stage I is divided into two groups, based on the size of the tumor. T1a tumors are 4 cm or smaller. T1b tumors are more than 4 cm but not larger than 7 cm. Both T1a and T1b tumors are found only in the kidney. These tumors have not spread.

Stage I (T1a)

There are 4 primary treatment options for stage I (T1a).

1. **Partial nephrectomy** - A partial nephrectomy is surgery that only removes the part of the kidney with the tumor. In very small tumors, sometimes all the cancer can be removed without taking out the whole kidney. It is also called kidney-sparing surgery because it spares as much of the kidney as possible. A partial nephrectomy is the preferred treatment option for stage 1 (T1a). This is not always possible.

Guide 7. Treatment options for stage I kidney cancer

Stage	Tumor size		Primary treatments		Adjuvant treatments
Stage I <ul style="list-style-type: none"> • Tumor is 7 cm or smaller • Tumor is found only in kidney 	T1a 4 cm or smaller		Partial nephrectomy (preferred) or		Active surveillance
			Thermal ablation or		
			Active surveillance or		
			Radical nephrectomy		
	T1b 4.1 cm to 7 cm			Partial nephrectomy or	Active surveillance
				Radical nephrectomy or	
Active surveillance					

Surgery may not be a good treatment option for everyone. Your doctor will look at many factors to decide if you are healthy enough to have surgery. Such factors include your age, general health, other health problems, and how well your lungs, heart, and other organs are working. Based on these and other factors, your doctor may feel that surgery isn't a good option for you.

2. **Thermal ablation** - Thermal ablation uses extreme heat or extreme cold to destroy small tumors. This type of treatment causes very little damage to nearby tissues. It is much less invasive and has fewer side effects than surgery. However, long-term cure rates may be a little lower than with partial or radical nephrectomy.
3. **Active surveillance** - Active surveillance consists of testing on a regular basis to watch for tumor growth. Sometimes treatment can be delayed. This may be a good option if you are older, have other serious health conditions, or maybe the tumor is very small. Age and health issues are factors that increase the risk of problems, called complications, during and after surgery.
4. **Radical nephrectomy** – A radical nephrectomy is surgery that removes tumor and the whole kidney. This surgery may also remove the adrenal gland and nearby lymph nodes. How much tissue is removed depends on the extent of the tumor. When a partial nephrectomy can't be done, a radical nephrectomy is an option. Talk to your doctor if you have questions.

Stage I (T1b)

There are 3 primary treatment options for stage I (T1b).

1. **Partial nephrectomy** - A partial nephrectomy is surgery that removes the tumor with part of the kidney. In very small tumors, sometimes all the cancer can often be removed without taking out the whole kidney. This is also called kidney-sparing surgery because it spares as much of the kidney as possible. Partial nephrectomy might not be possible depending on the size and location of the tumor.
2. **Radical nephrectomy** – A radical nephrectomy is surgery that removes tumor with the whole kidney. This surgery may also remove the adrenal gland and nearby lymph nodes. How much tissue is removed depends on the extent of the tumor.
3. **Active surveillance** - Active surveillance consists of testing on a regular basis to watch for tumor growth. Sometimes treatment can be delayed. This may be a good option if you are older or have other serious health conditions. Age and health issues are factors that increase the risk of problems, called complications, during and after surgery. Talk to your doctor if you have questions.

Adjuvant treatment

After primary treatment, you will begin follow-up treatment called adjuvant treatment.

- ▶ Active surveillance is the recommended adjuvant therapy for stage I (T1a and T1b) kidney cancer. [See Guide 7.](#)

Follow-up testing is part of active surveillance. No single follow-up plan is right for all patients. Your care team will create a follow-plan that is right for you. If you are unsure why you are having a certain follow-up test, ask your health care provider.

Follow-up tests

[Guide 8](#) shows the follow-up tests that are recommended after treatment for stage I kidney cancer. Doctors use follow-up tests to monitor your health and to look for signs of cancer return or spread (metastasis) after treatment. The return of cancer after treatment is called a relapse or recurrence. Follow-up tests are also used to check your kidney function and watch for treatment side effects. Many of the tests used for diagnosis and staging are repeated during follow-up. You might not have all of the tests shown in [Guide 8](#).

Medical history check-ups and physical exams will tell your doctor about your general health. Blood tests will show if your organs, such as your liver and kidneys, are working well. Imaging tests of your abdomen are used to check for signs of

Guide 8. Recommended follow-up tests for stage I kidney cancer

During active surveillance	After thermal ablation	After partial or radical nephrectomy
<ul style="list-style-type: none"> • Medical history • Physical exam • Blood tests • Abdominal CT or MRI with contrast within 6 months of start of surveillance. After that, a CT or MRI or ultrasound at least every year. • Baseline chest x-ray or CT, then every year as needed • Biopsy (if needed) 	<ul style="list-style-type: none"> • Medical history • Physical exam • Blood tests • Abdominal CT or MRI 3 to 6 months after ablation. After that, a CT or MRI (preferred) or ultrasound every year for at least 5 years. • Chest x-ray or CT (if needed) • Biopsy (if needed) 	<ul style="list-style-type: none"> • Medical history • Physical exam • Blood tests • Baseline abdominal CT or MRI (preferred) or ultrasound within 3 to 12 months of surgery, then every year for 3 years or more. • Chest x-ray or CT every year (or more often) for at least 5 years

local recurrence. A local recurrence is when cancer comes back in or near the same place as the primary tumor. Imaging of your chest, brain, or bones might be used to check for distant metastases.

The type and timing of follow-up tests will be based on your risk factors for the return of RCC, other health conditions, how you feel, and what kind of surgery or treatments you had, among other things. Together, you and your health care provider will chose a follow-up plan.

Review

- ▶ Stage I kidney cancer is 7 cm or smaller and found only in the kidney.
- ▶ There are several primary treatment options for stage I kidney cancer. Talk with your doctor about the options recommended in this guide.
- ▶ Active surveillance is the recommended adjuvant therapy for stage I (T1a and T1b) kidney cancer.



The biggest advice I can give to someone who is newly diagnosed is to become your own health advocate. Do your research. Find the best cancer team for you. Ask questions. Find a support team. Encourage others. Accept help. Love with all of your heart.”

– Regan

Stage 3 Chromophobe RCC Survivor

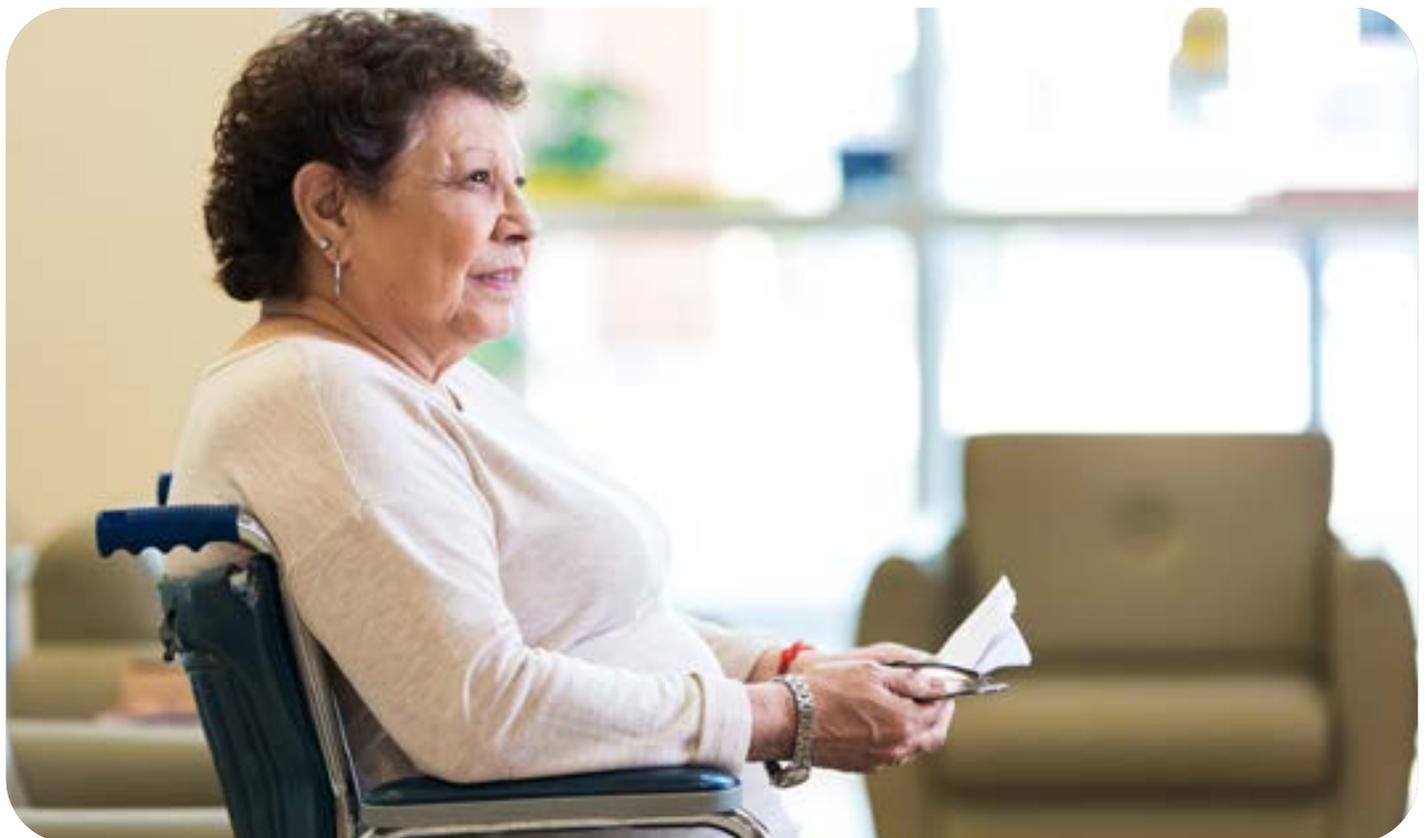
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Treatment guide: Stage II

49 Treatment

49 Follow-up tests

50 Review



This chapter will guide you through treatment options for stage II kidney cancer. Together, you and your doctor should choose a treatment plan that is best for you.

Treatment

Guide 9 shows the primary and adjuvant treatments recommended for patients with stage II kidney cancer. In stage II kidney cancer the tumor is larger than 7 cm and found only in the kidney.

Primary treatment

Primary treatment is the main treatment used to rid the body of cancer. A radical nephrectomy or partial nephrectomy is the recommended primary treatment for stage II kidney cancer. A radical nephrectomy is surgery that removes the tumor and your whole kidney. The attached adrenal gland, nearby lymph nodes, and other tissues may also be removed. A partial nephrectomy, also called kidney-sparing surgery, is surgery that removes the tumor and part of your kidney.

Adjuvant treatment

Adjuvant treatment is treatment that follows or comes after the primary treatment. A clinical trial or active surveillance are recommended adjuvant treatment options for stage II kidney cancer. Follow-up testing is part of active surveillance.

Follow-up tests

After your primary treatment of surgery, you will begin follow-up testing. Follow-up tests are used to monitor your health and to help direct adjuvant treatment. Doctors use follow-up tests to check how well your remaining kidney and other organs are working and to look for signs that cancer has returned or spread (metastasized) after treatment. The return of cancer after treatment is called a relapse or recurrence. Many of the tests used for diagnosis and staging are repeated during follow-up.

Guide 10 shows the follow-up tests that are recommended after treatment for stage II kidney cancer. No single follow-up plan is right for everyone. You might not have all of the tests listed. If you have questions about testing, ask your doctor.

Guide 9. Treatment options for stage II kidney cancer

Stage	Tumor size		Primary treatments		Adjuvant treatments
Stage II <ul style="list-style-type: none"> Tumor is larger than 7 cm Tumor is found only in the kidney 	T2a 7.1 cm to 10 cm		Radical nephrectomy or Partial nephrectomy		Clinical trial or Active surveillance
	T2b 10.1 cm or larger				

Medical history check-ups and physical exams will tell your doctor about your general health. You will also have blood tests and imaging. Monitoring the health of your kidneys is very important. Poor kidney function can increase the risk of other health problems. Abnormal results of blood chemistry tests may be a sign of organ damage. Abnormal results may also be a sign that the cancer has relapsed or metastasized.

Imaging tests of your abdomen are used to check for signs of local recurrence. With local recurrence, cancer returns in or near the same place as the primary tumor.

Imaging tests of your chest are important since the lungs are the most common site of distant recurrence. A chest CT will show if cancer has spread to your lungs.

Review

- In stage II kidney cancer, the tumor is larger than 7 cm and found only in the kidney.
- Depending on the tumor size and location, either a partial or radical nephrectomy will be the primary treatment for stage II kidney cancer.
- After surgery, clinical trial or active surveillance are the adjuvant treatment options for stage II kidney cancer.
- Follow-up tests look for the return or spread of cancer. It is important to have these tests.

Guide 10. Recommended follow-up tests for stage II kidney cancer

Every 3 to 6 months for 3 years	Every 6 months for 2 years	Overview
<ul style="list-style-type: none"> • Medical history • Physical exam • Chest CT (preferred) • Abdominal CT or MRI (preferred) 	<ul style="list-style-type: none"> • Blood tests 	Medical history and physical exam every 3 to 6 months for 3 years, then every year for 5 years.
		Blood tests every 6 months for 2 years, then once a year for up to 5 years.
		Baseline abdominal CT or MRI within 3 to 6 months. CT or MRI (preferred) 3 to 6 months for a least 3 years. After that, every year for up to 5 years.
		Baseline chest CT within 3 to 6 months. Chest CT (preferred) every 3 to 6 months for a least 3 years. After that, a chest CT every year for 2 years.
		Other imaging (if needed)

7

Treatment guide: Stage III

52 Treatment

53 Follow-up tests

54 Review



This chapter will guide you through treatment options for stage III kidney cancer. Together, you and your doctor should choose a treatment plan that is best for you.

Treatment

Guide 11 shows the primary and adjuvant treatment options for stage III kidney cancer. In stage III kidney cancer the tumor has grown into fatty tissue in or around the kidney, nearby veins, and/or nearby lymph nodes.

Primary treatment

Primary treatment is the main treatment used to rid the body of cancer. Primary treatment for stage III kidney cancer is a radical nephrectomy. A radical nephrectomy is surgery that removes the tumor and your whole kidney. The attached adrenal gland, nearby lymph nodes, and other tissues may also be removed. A partial nephrectomy is an option, but only in some cases. A partial nephrectomy, also called kidney-sparing surgery, is surgery that removes the tumor and part of your kidney. Ask your doctor about what it means to have a radical nephrectomy for your stage III kidney cancer.

Guide 11. Treatment options for stage III kidney cancer

Stage	Tumor size		Primary treatments		Adjuvant treatments
Stage III <ul style="list-style-type: none"> Tumor has grown outside the kidney into major veins and tissues Tumor is not found in adrenal gland or Gerota's fascia 	T3a Tumor has grown into renal vein, renal fat, or renal pelvis				Clinical trial (preferred for clear cell RCC) or
	T3b Tumor has grown into vena cava below the diaphragm	→	Radical nephrectomy or Partial nephrectomy, in some cases	→	Surveillance for clear cell RCC or
	T3c Tumor has grown into vena cava wall or into vena cava above the diaphragm				Surveillance for non-clear cell RCC

Adjuvant treatment

Adjuvant treatment is the treatment you receive after the primary treatment. It is what comes next after surgery, in this case. The goal of adjuvant therapy is to get rid of any cancers that were left behind after surgery. Adjuvant therapy is also used when the risk of cancer returning (recurrence) is felt to be high. A clinical trial is the preferred option for stage III clear cell RCC. Active surveillance is an option for both non-clear cell and clear cell RCC.

Follow-up tests

Follow-up tests are used to monitor your health and to help direct adjuvant treatment. Doctors use follow-up tests to check how well your remaining kidney and other organs are working and to look for signs that cancer has returned or spread (metastasis) after treatment. The return of cancer after treatment is called a relapse or recurrence. Many of the tests used for diagnosis and staging are repeated during follow-up.

[Guide 12](#) shows the follow-up tests that are recommended after treatment for stage III kidney cancer. No single follow-up plan is right for everyone. You might not have all of the tests listed. If you have questions about testing, ask your doctor.

Guide 12. Recommended follow-up tests for stage III kidney cancer

Every 3 to 6 months for 3 years	Every 6 months for 2 years	Overview
<ul style="list-style-type: none"> Medical history Physical exam Chest CT (preferred) Abdominal CT or MRI (preferred) 	<ul style="list-style-type: none"> Blood tests 	Medical history and physical exam every 3 to 6 months for 3 years, then every year for 5 years.
		Blood tests every 6 months for 2 years, then once a year for up to 5 years.
		Baseline abdominal CT or MRI within 3 to 6 months. CT or MRI (preferred) 3 to 6 months for a least 3 years. After that, every year for up to 5 years.
		Baseline chest CT within 3 to 6 months. Chest CT (preferred) every 3 to 6 months for a least 3 years. After that, a chest CT every year for 2 years.
		Other imaging (if needed)

Medical history check-ups and physical exams will tell your doctor about your general health. You will also have blood tests and imaging. Monitoring the health of your kidney is very important. Poor kidney function can increase the risk of other health problems. Abnormal results of blood chemistry tests may be a sign of organ damage. Abnormal results may also be a sign that the cancer has come back or spread to other parts of your body.

Imaging tests of your abdomen are used to check for signs of local recurrence. With local recurrence, cancer returns in or near the same place as the primary tumor.

Imaging tests of your chest are important since the lungs are the most common site of distant recurrence. A chest CT will show if cancer has spread to your lungs.

Review

- Primary treatment for stage III kidney cancer is surgery, usually a radical nephrectomy.
- Adjuvant treatment for stage III kidney cancer is based on if it is clear cell RCC or non-clear cell RCC. For clear cell RCC, a clinical trial is preferred.
- The goal of adjuvant therapy is to get rid of any cancers that were left behind after surgery or if the risk of recurrence is felt to be high.
- Follow-up testing for stage III kidney cancer is needed to check for disease progression or recurrence.

Order of treatments

Most people with kidney cancer will receive surgery as their primary treatment. Adjuvant treatment is usually targeted therapy and/or immunotherapy. Those with stage IV or relapsed kidney cancer will have other options. Talk to your doctor about your treatment plan and what it means for your stage and type of kidney cancer.



Primary treatment is the main treatment given to rid the body of cancer. It is usually surgery.



Adjuvant treatment is given after primary treatment to rid the body of any cancer cells left behind from surgery or when the risk of recurrence is felt to be high.

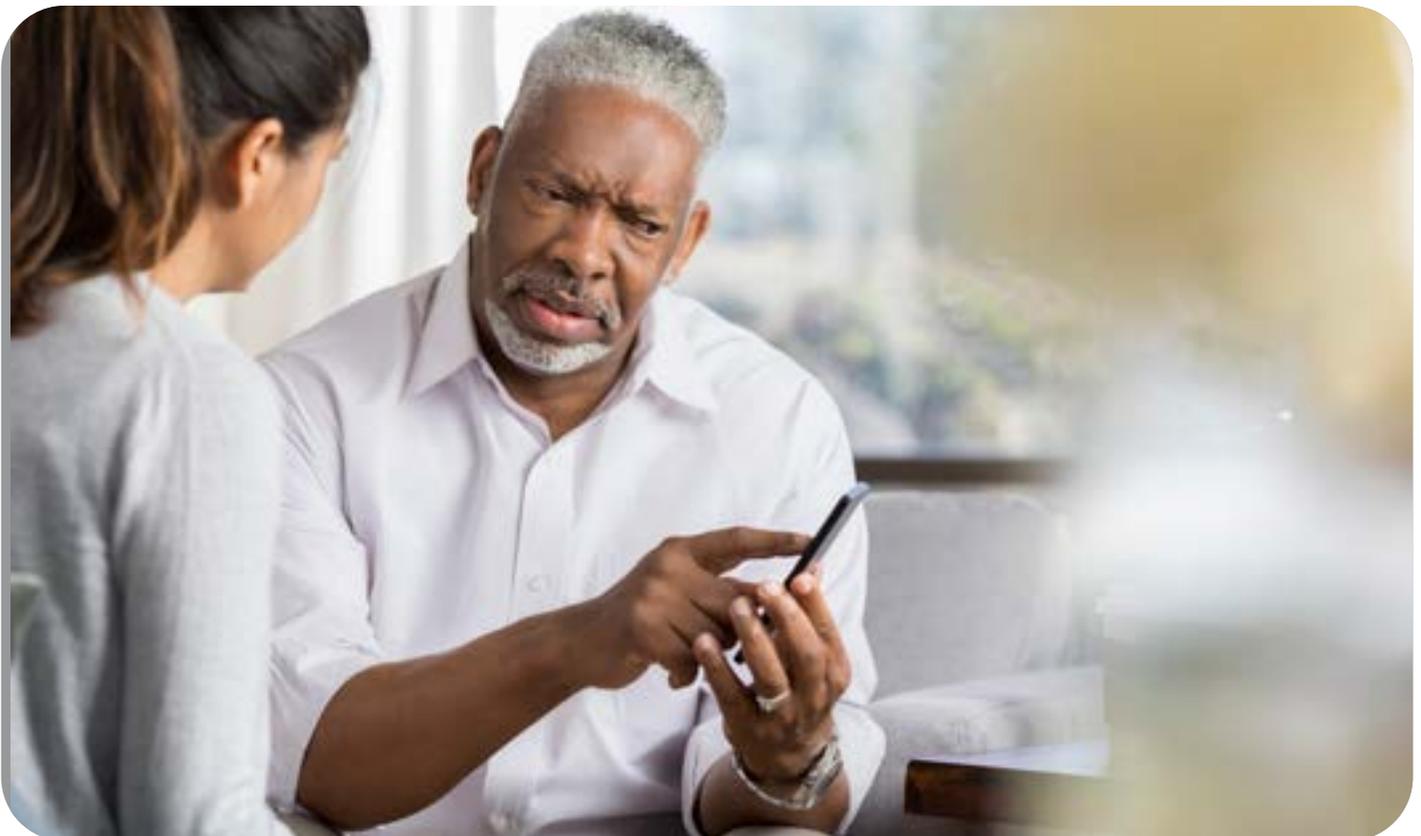
8

Treatment guide: Stage IV

56 Treatment

61 Follow-up tests

62 Review



This chapter will guide you through treatment options for stage IV and relapsed kidney cancer. Together, you and your doctor should choose a treatment plan that is best for you.

Not all stage IV kidney cancer is metastatic (mRCC). Stage IV kidney cancer that is not metastatic is called advanced RCC.

Treatment

Guide 13 shows the primary treatment options that are recommended for stage IV or relapsed kidney cancer. In stage IV kidney cancer the tumor has grown outside the kidney and Gerota's fascia, cancer has spread to a distant site, or both.

Primary treatment

Primary treatment is the main treatment used to rid the body of cancer. Surgery might not be an option. The size and location of the primary tumor and other tumors will factor into whether surgery is possible. If surgery is not possible, then a tissue sample, called a biopsy, will be taken and tested. Treatment will be based on if you have clear cell RCC or non-clear cell RCC. [See Guide 14.](#)

Your doctor will assess the size and location of the primary tumor to decide if it can be safely removed by surgery. If the entire primary tumor can't be removed by surgery, then systemic (drug) therapy is recommended. If there are metastases, options include: metastasectomy, SBRT, or thermal ablation.

Supportive care should be offered in all cases. If the entire primary tumor can be removed by surgery, then the primary treatment might be a cytoreductive nephrectomy or systemic therapy. Either way, a

Guide 13. Primary treatment options for stage IV or relapsed kidney cancer

Stage	Tumor size		Primary treatments		
Stage IV <ul style="list-style-type: none"> Tumor has grown beyond Gerota's fascia and into the adrenal gland 	<ul style="list-style-type: none"> Surgery is an option Consider a biopsy 	➔	Cytoreductive nephrectomy, in some cases or Systemic therapy (preferred in clear cell RCC with poor risk)	➔	Clear cell (see Guide 14) Non-clear cell (see Guide 14)
	<ul style="list-style-type: none"> Surgery is not an option Biopsy tumor 	➔	Clear cell (see Guide 14) Non-clear cell (see Guide 14)		

biopsy of your tumor will be taken and tested to see what subtype of RCC you have before further treatment.

Supportive care

Supportive care is recommended for all patients, during any stage of cancer and its treatment. Supportive care is treatment given to relieve the symptoms of cancer or side effects of cancer treatment. Best supportive care aims to improve quality of life and relieve any discomfort you may have.

Supportive care may include radiation therapy, surgery, drugs, or other treatments. Radiation therapy may be used to relieve pain from cancer that has spread to your bones or brain. Drugs that strengthen your bones may also help with pain and other problems caused by bone metastases.

Guide 14. Treatment options for clear cell and non-clear stage IV or relapsed kidney cancer

Subtype	Treatment options		If disease spreads
Clear cell	Clinical trial with best supportive care or		Clinical trial with best supportive care or Subsequent therapy (see Guide 16) with best supportive care
	First-line therapy (see Guide 15) with best supportive care or		
	Metastasectomy or SBRT or ablation with best supportive care		
Non-clear cell	Clinical trial (preferred) with best supportive care or		Clinical trial with best supportive care or Systemic therapy (see Guide 17) with best supportive care
	Systemic therapy (see Guide 17) with best supportive care or		
	Metastasectomy or SBRT or ablation with best supportive care		

First-line drug therapy for clear cell RCC

First-line therapy is the first attempt to get rid of (or control) the cancer in your body. Remember, the main or primary treatment for kidney cancer is usually surgery. Since surgery is not always possible in stage IV or relapsed kidney cancer, systemic drug therapy is used. Systemic therapy works throughout the body. Targeted therapy and immunotherapy are types of systemic therapy.

First-line therapy is the first drug or set of drugs used to treat cancer. Which option is best for you will depend on a number of factors. One key factor is the cell subtype. [See Guide 14](#). The most common subtype is clear cell RCC. Other subtypes are less common like non-clear cell RCC.

For clear cell RCC, there are several treatment options. If you are getting first-line systemic therapy for clear cell, then [Guide 15](#) shows the recommended targeted therapy and immunotherapy options for stage IV or relapsed kidney cancer. [Guide 16](#) shows what treatments would come next called subsequent therapy.

Both targeted therapy and immunotherapy are used in treating this stage of kidney cancer. More information about these therapies can be found in Chapter 4 of this guideline.

Health care providers use evidence-based research when choosing a treatment plan. They look at studies of cancer in people like you in order to choose a plan that has the best chance of cure and/or longest survival. A preferred treatment is one that has the best result. After preferred, there are other recommended options that have good results. Some treatments are useful only some cases.

Risk is a factor that plays a part in the type of treatment that is best for you. Patients are assigned a level of risk: favorable, intermediate, or poor. A person who as a favorable risk level has a better chance of recovery (prognosis) and survival than someone with a poor risk level. Your doctor will weigh the risks and benefits of each drug. There are risks with any treatment. Ask your doctor which option is best for you and why. Speak to your doctor about the possible side effects of treatment.

Guide 15. First-line therapy for clear cell stage IV or relapsed kidney cancer

Risk	Preferred	Other	Useful in some cases
Favorable	<ul style="list-style-type: none"> Axitinib + pembrolizumab Pazopanib Sunitinib 	<ul style="list-style-type: none"> Ipilimumab + nivolumab Cabozantinib Axitinib + avelumab 	<ul style="list-style-type: none"> Active surveillance Axitinib High-dose IL-2
Poor/ intermediate	<ul style="list-style-type: none"> Ipilimumab + nivolumab Axitinib + pembrolizumab Cabozantinib 	<ul style="list-style-type: none"> Pazopanib Sunitinib Axitinib + avelumab 	<ul style="list-style-type: none"> Axitinib High-dose IL-2 Temsirolimus

Preferred options for stage IV or relapsed clear cell RCC in favorable risk patients are:

- Axitinib + pembrolizumab (axi-pembro, for short)
- Pazopanib
- Sunitinib

Preferred options for stage IV or relapsed clear cell RCC in poor-/intermediate-risk patients are:

- Ipilimumab + nivolumab
- Axitinib + pembrolizumab
- Cabozantinib

Subsequent therapy for clear cell RCC

You may have more than one line of systemic drug treatment. Depending on the result of the first-line therapy, you might have other lines of treatment for kidney cancer. These other lines of treatment are called subsequent therapy. [Guide 16](#) shows the next treatments that are recommended for clear cell RCC that grew during or after first-line treatment. Which treatment is recommended next depends on the type of drug you received as first-line treatment. Some drugs may work better when taken after certain other drugs.

The preferred subsequent drug therapy options for clear cell RCC are:

- Cabozantinib
- Nivolumab
- Ipilimumab + nivolumab

Guide 16. Subsequent therapy for clear cell stage IV or relapsed kidney cancer

Preferred	Other	Useful in some cases
<ul style="list-style-type: none"> • Cabozantinib • Nivolumab • Ipilimumab + nivolumab 	<ul style="list-style-type: none"> • Axitinib • Lenvatinib + everolimus • Axitinib + pembrolizumab • Everolimus • Pazopanib • Sunitinib 	<ul style="list-style-type: none"> • Bevacizumab or similar • Sorafenib • High-dose IL-2 • Temsirolimus

Systemic therapy for non-clear cell RCC

Systemic therapy works throughout the body. Targeted therapy and immunotherapy are types of systemic therapy used to treat kidney cancer. [See Guide 17](#) for systemic therapy options for non-clear cell stage IV or relapsed kidney cancer.

Treatment within a clinical trial is an option for all patients. More research is needed to find the best treatment options for non-clear cell RCC. Thus, a clinical trial is one preferred option for patients with non-clear cell RCC.

The preferred systemic therapy options for non-clear cell RCC are:

- Clinical trial
- Sunitinib

Before making a treatment plan, your doctor will consider things specific to you. This may include how you responded to other treatment and how the cancer is behaving. It is helpful to ask questions about your treatment options and possible side effects.

Guide 17. Systemic therapy for non-clear cell stage IV or relapsed kidney cancer

Preferred	Other	Useful in some cases
<ul style="list-style-type: none"> • Clinical trial • Sunitinib 	<ul style="list-style-type: none"> • Cabozantinib • Everolimus 	<ul style="list-style-type: none"> • Axitinib • Bevacizumab or similar • Erlotinib • Lenvatinib + everolimus • Nivolumab • Pazopanib • Bevacizumab or similar + erlotinib for advance papillary RCC and other rare subtypes • Bevacizumab or similar + everolimus • Temsirolimus

Follow-up tests

Follow-up tests are used to monitor your health. Stage IV kidney cancer is usually treated with targeted therapy and/or immunotherapy. If you are being treated with drug therapy, doctors will use follow-up tests to see how well it is working and to look for side effects. Drug therapy can cause liver and other problems. You will be closely monitored.

No single follow-up plan is right for everyone. You might have tests more or less often depending on your health, treatment, and subtype of kidney cancer. Some of the recommended follow-up tests you might have can be found in [Guide 18](#). If you have questions about testing, ask your doctor.

Medical history check-ups and physical exams will tell your doctor about your general health. You will also have blood tests and imaging. A baseline test is a starting point to which future tests are compared. After the baseline test, ongoing imaging tests are used to show if the cancer grows or shrinks over time. Baseline imaging scans should be done before starting drug therapy. Follow-up imaging will be used to track drug therapy and disease progress.

Guide 18. Recommended follow-up tests for stage IV or relapsed kidney cancer

Every 6 to 16 weeks	Overview
<ul style="list-style-type: none"> • Medical history • Physical exam • Follow-up imaging 	<p>Medical history and physical exam every 6 to 16 weeks for those receiving targeted therapy and/or immunotherapy.</p>
	<p>Blood tests, as needed, depending on type of targeted therapy or immunotherapy used.</p>
	<p>Baseline CT or MRI of chest, abdomen, or pelvis before treatment with targeted therapy and/or immunotherapy. Follow-up imaging every 6 to 16 weeks as needed. Tests might be more or less often.</p>
	<p>If needed:</p> <ul style="list-style-type: none"> • Baseline CT or MRI of head • MRI of spine • Bone scan • Other imaging

Review

- Best supportive care should be offered with other treatments for stage IV or relapsed kidney cancer.
- Not all stage IV kidney cancer is metastatic (mRCC). Stage IV kidney cancer that is not metastatic is called advanced RCC.
- Treatment for stage IV or relapsed kidney cancer is based on whether it is clear cell RCC or non-clear cell RCC.
- Primary treatment for stage IV or relapsed kidney cancer is based on if surgery is possible. If surgery is not possible, you might start drug therapy or another treatment.
- A clinical trial or sunitinib are the preferred systemic therapies for stage IV or relapsed non-clear cell RCC.
- Follow-up testing will be every 6 to 16 weeks for stage IV or relapsed kidney cancer. You might have tests more or less often.



I was 26 weeks pregnant and had a persistent cough that brought me to the hospital. There, I learned I had metastatic kidney cancer that had metastasized to my right lung and brain. The care you first choose is so important. I just celebrated 4 years living with Stage 4 Kidney Cancer.”

– Joanne

Stage 4 Kidney Cancer Survivor



9

Making treatment decisions

- 64 It's your choice
- 64 Weighing your options
- 65 Review
- 65 Questions to ask your doctors
- 70 Websites



Choosing which cancer treatment is best for you can be difficult. It is important to ask questions and engage in shared decision-making with your doctor.

It's your choice

The role patients want in choosing their treatment differs. You may feel uneasy about making treatment decisions. This may be due to a high level of stress. It may be hard to hear or know what others are saying. Stress, pain, and drugs can limit your ability to make good decisions. You may feel uneasy because you don't know much about cancer. You've never heard the words used to describe cancer, tests, or treatments. Likewise, you may think that your judgment isn't any better than your doctors'.

Letting others decide which option is best may make you feel more at ease. However, whom do you want to make the decisions? You may rely on your doctors alone to make the right decisions. However, your doctors may not tell you which to choose if you have multiple good options. You can also have loved ones help. They can gather information, speak on your behalf, and share in decision-making with your doctors. Even if others decide which treatment you will receive, your treatment team may still ask that you sign a consent form.

On the other hand, you may want to take the lead or share in decision-making. In shared decision-making, you and your doctors share information, discuss the options, and agree on a treatment plan. Your doctors know the science behind your plan but you know your concerns and goals. By working together, you can decide on a plan that works best for you when it comes to your personal and health needs.

Weighing your options

Deciding which treatment option is best can be hard. Doctors from different fields of medicine may have different opinions on what is best for you. This can be very confusing. Your spouse or partner may disagree with what you want. This can be stressful. In some cases, one option hasn't been shown to work better than another, so science isn't helpful. Some ways to decide on treatment are discussed next.

Get a second opinion

Even if you like and trust your doctor, get a second opinion. You will want to have another doctor review your test results. He or she might suggest a different treatment plan.

Things you can do to prepare:

- ▶ Check with your insurance company about its rules on second opinions. You want to know about out-of-pocket costs for doctors who are not part of your insurance plan.
- ▶ Make plans to have copies of all your records sent to the doctor you will see for your second opinion. Do this well before your appointment. If you run into trouble having records sent, pick them up and bring them with you.

If the new doctor offers other advice, make an appointment with your first doctor to talk about the differences. Do whatever you need to feel confident about your diagnosis and treatment plan. Ask questions and take notes during doctor visits. Bring someone with you to appointments.

Get support

Support groups often include people at different stages of treatment. Some may be in the process of deciding while others may be finished with treatment. At support groups, you can ask questions and hear about the experiences of other people with kidney

cancer. If your hospital or community doesn't have support groups for people with kidney cancer, check out the websites listed in this book.

You can also reach out to a social worker or a mental health counselor. They can help you find ways to cope or refer you to support services. These services may also be available to your family, friends, and those with children, so they can connect and get support. Seek out supportive care services by asking your care team.

Review

- Shared decision-making is a process in which you and your doctors plan treatment together.
- Asking your doctors questions is vital to getting the information you need to make informed decisions.
- Getting a second opinion, attending support groups, and comparing benefits and risks may help you decide which treatment is best for you.

Questions to ask your doctors

You will likely meet with experts from different fields of medicine. It is helpful to talk with each person. Prepare questions before your visit. Ask questions if the information isn't clear. You can also get copies of your medical records. It may be helpful to have a family member or friend with you at these visits to listen carefully and take notes. A patient advocate or navigator might also be able to come. They can help you ask questions and remember what was said.

Possible questions to ask your doctors are on the following pages. Feel free to use these questions or come up with your own questions to ask your doctor and other members of your treatment team.

Questions to ask your doctors about treatments

1. What are my treatment options? What do you recommend and why? What are the risks/benefits?
2. How long do I have to decide about treatment?
3. If surgery is an option, which type of surgery do you recommend? How often do you perform this type of surgery?
4. Is laparoscopic surgery an option? Am I at risk for chronic kidney disease?
5. How will my age, general health, cancer stage, and other health conditions limit my treatment choices?
6. What can I do to prepare for treatment? Should I stop taking my medications? Should I store my blood in case I need a transfusion?
7. How much will the treatment cost? How can I find out how much my insurance company will cover?
8. What symptoms should I look for while being treated for kidney cancer?
9. What is the chance that the cancer will come back or spread?
10. Which supportive services and support groups do you recommend?

Websites

American Cancer Society

cancer.org/cancer/kidneycancer/index

Cancer Support Community

cancersupportcommunity.org/MainMenu/About-Cancer/Quality-of-Life

KCCure

<https://kccure.org/>

Kidney Cancer Association

kidneycancer.org/

Kidney Cancer Coalition

<https://kidneycan.org/>

International Kidney Cancer Coalition

<https://ikcc.org/>

**National Cancer Institute at the
National Institutes of Health**

cancer.gov/types/kidney

National Coalition for Cancer Survivorship

canceradvocacy.org/toolbox

National Kidney Foundation

kidney.org

NCCN

nccn.org/patients/resources/default.aspx

Radiological Society of North America

Find out how various x-ray, CT, MRI, ultrasound, radiation therapy, and other procedures are performed.

<https://www.radiologyinfo.org/>

Smart Patients

<https://www.smartpatients.com/>

Urology Care Foundation

urologyhealth.org/urologic-conditions/kidney-cancer



Words to know

active surveillance

Frequent and ongoing testing to watch for cancer growth without giving active treatment.

adrenal gland

A small organ on top of each kidney that makes hormones.

adrenalectomy

Surgery that removes the adrenal gland. The adrenal gland might be removed in a radical nephrectomy.

advance care planning

Making treatment decisions now about the type of treatment you would want to if you become unable to speak for yourself.

alkaline phosphatase (ALP)

A protein found in most tissues in the body.

allergic reaction

Symptoms caused when the body is trying to rid itself of invaders.

allergy

A condition in which the immune system has an abnormal reaction to something that is not harmful to most people.

angiogenesis

The growth of new blood vessels.

angiogenesis inhibitor

A drug that blocks the growth of new blood vessels that feed cancer cells.

baseline

A starting point to which future test results are compared.

best supportive care

Treatment to improve quality of life and relieve discomfort.

biopsy

Removal of small amounts of tissue from the body to be tested for disease.

biosimilar

A drug that is very much alike or the same as another drug that has been approved by the FDA.

blood chemistry panel

A test that measures the amounts of many different chemicals in a sample of blood.

blood chemistry test

A test that measures the amount of chemicals in the blood to check for signs of disease or organ damage.

blood vessel

A tube that carries blood throughout the body.

bone metastases

Cancer that has spread from the first (primary) tumor to the bone.

bone scan

An imaging test that uses radioactive material to check for cancer or damage in bones.

brain metastases

Cancer that has spread from the first (primary) tumor to the brain.

calcium

A mineral needed for healthy teeth, bones, and other body tissues.

cancer burden

The amount or extent of cancer in the body.

cancer stage

A rating of the growth and spread of cancer in the body.

cancer staging

The process of rating and describing the extent of cancer in the body.

carcinoma

Cancer that starts in cells that form the lining of organs and structures in the body.

chromophobe RCC

The third most common subtype of RCC (renal cell carcinoma) based on how the cancer cells look when viewed with a microscope.

clear cell RCC

The most common subtype of RCC (renal cell carcinoma) based on how the cancer cells look when viewed with a microscope.

clinical trial

Research on a test or treatment to assess its safety or how well it works.

collecting duct RCC

The fourth most common subtype of RCC (renal cell carcinoma) based on how the cancer cells look when viewed with a microscope.

complete blood count (CBC)

A test of the number of blood cells.

complication

A medical problem that happens during or after a procedure or treatment, or from a disease.

computed tomography (CT) scan

A test that uses x-rays from many angles to make a picture of the inside of the body.

contrast

A chemical put into your body to make clearer pictures during imaging tests.

creatinine

A waste product of muscles that is filtered out of blood into urine by the kidneys.

cytokines

Proteins made naturally in the body or in a lab that boost or activate the immune system.

cytokine therapy

Treatment with drugs that are cytokines—proteins made in a lab that boost or activate the immune system to fight cancer.

cytoreductive nephrectomy (CN)

Surgery to remove the primary tumor and the kidney when cancer that has spread to distant sites can't all be removed.

cytotoxic T-lymphocyte-associated protein 4 (CTLA-4)

An immune system protein.

distant recurrence

Cancer that has come back after treatment and is found in a part of the body far from the first (primary) tumor.

EGFR inhibitor

A drug that blocks the action of EGFR (epidermal growth factor receptor), a protein on the outside surface of a cell that sends signals inside the cell to grow.

epidermal growth factor receptor (EGFR)

A protein on the outside surface of a cell that sends signals inside the cell to grow.

first-line treatment

The first drug or set of drugs given to treat cancer.

follow-up test

Tests done after the start of treatment to check how well treatment is working.

general anesthesia

A controlled loss of wakefulness from drugs.

Gerota's fascia

The outer layer of fibrous tissue that surrounds the kidney.

IL-2

interleukin-2

imaging test

Tests that make pictures (images) of the inside of the body.

immune system

The body's natural defense against infection and disease.

immunotherapy

Treatment that activates or boosts the body's natural defense against disease (immune system) to fight cancer.

infusion

A method of giving drugs slowly through a needle into a vein.

interleukin (IL)

A type of immunotherapy.

kinase inhibitors

A type of targeted therapy.

laparoscopic surgery

Surgery that uses small tools and a laparoscope—a thin tube with a light and camera at the end—inserted through a few small cuts in the belly area.

liver function test

A blood test that measures chemicals that are made or processed by the liver to check how well the liver is working.

local recurrence

Cancer that has come back after treatment in or near the same place as the first (primary) tumor.

lymph

A clear fluid containing white blood cells that fight infection and disease.

lymph nodes

Small groups of special disease-fighting cells located throughout the body.

lymph vessels

Tubes that carry lymph—a clear fluid containing white blood cells that fight disease and infection—throughout the body and connect lymph nodes to one another.

magnetic resonance imaging (MRI) scan

A test that uses radio waves and powerful magnets to make pictures of the inside of the body.

medical oncologist

A doctor who's an expert in treating cancer with drugs.

metastasectomy

Surgery to remove tumors that formed far from the first site of cancer. Used to reduce cancer burden and to ease symptoms.

metastases

Tumors formed by cancer cells that have spread from the first tumor to other parts of the body.

metastasis

The spread of cancer cells from the first tumor to another body part.

metastatic

Containing cancer cells that have spread from the first tumor.

monoclonal antibody (mAb)

A type of immune system protein made in a lab that can attach to substances in the body such as cancer cells. Can be a type of immunotherapy and a type of targeted therapy.

Mammalian target of rapamycin (mTOR)

A protein in cells that sends chemical signals for cell growth and survival.

mTOR inhibitor

A drug that blocks the action of mTOR—a protein in cells that sends chemical signals for cell growth and survival. A type of targeted therapy.

NCCN®

National Comprehensive Cancer Network®

nephrectomy

Surgery that removes a kidney.

non-clear cell RCC

Subtypes of RCC (renal cell carcinoma) other than clear cell, based on how the cancer cells look when viewed with a microscope.

palliative care

Treatment for symptoms of a disease. Also sometimes called supportive care.

palliative nephrectomy

Surgery to remove the kidney to help relieve symptoms caused by cancer.

palliative surgery

Surgery that is used to relieve symptoms caused by the cancer.

papillary RCC

The second most common subtype of RCC (renal cell carcinoma) based on how the cancer cells look when viewed with a microscope.

partial nephrectomy

Surgery to remove a tumor with part of the kidney.

pathologist

A doctor who's an expert in testing cells and tissue to find disease.

programmed death-ligand 1 (PD-L1)

An immune system protein.

programmed death receptor-1 (PD-1)

An immune system protein.

primary treatment

The main treatment used to rid the body of cancer.

primary tumor

The first mass of cancer cells in the body.

prognosis

The likely or expected course and outcome of a disease.

radiation oncologist

A doctor who's an expert in treating cancer with radiation.

radiation therapy

Use of high-energy rays to destroy cancer cells.

radical nephrectomy

Surgery that removes a tumor with the whole kidney, the fatty tissue around the kidney, and possibly the attached adrenal gland and nearby lymph nodes.

radiologist

A doctor who's an expert in reading imaging tests—tests that make pictures of the inside of the body.

radiotracer

A substance that releases small amounts of energy (radiation) that is put into the body to make pictures clearer.

receptor

A protein inside or on the surface of cells to which substances can attach to cause a certain effect in the cell.

recurrence

The return of cancer after treatment. Also called a relapse.

relapse

The return of cancer after treatment. Also called a recurrence.

renal artery

The blood vessel that carries blood into the kidney.

renal cell carcinoma (RCC)

The most common type of kidney cancer. It starts in the cells that line the renal tubules—tiny tubes that filter blood and make urine.

renal pelvis

The space in the middle of the kidneys where urine collects before leaving the kidneys through long, thin tubes called ureters.

renal sarcoma

Cancer that starts in the blood vessels or connective tissue of the kidneys.

renal tubules

Tiny tubes in the kidneys that filter blood and make urine from the waste and extra water filtered out of blood.

renal vein

The blood vessel that carries clean blood out of the kidney.

staging

The process of rating and describing the extent of cancer in the body.

stereotactic body radiation therapy (SBRT)

Radiation therapy given in higher doses to smaller areas over 1 to 5 sessions of treatment.

subtype

Smaller groups that a type of cancer is divided into based on how the cancer cells look under a microscope.

supportive care

Treatment given to relieve the symptoms of a disease. Also called palliative care.

targeted therapy

Treatment with drugs that target a specific or unique feature of cancer cells.

thermal ablation

Treatment that destroys tumors using extreme heat or extreme cold.

tyrosine kinase inhibitor (TKI)

A type of targeted therapy.

transitional cell carcinoma (TCC)

Cancer that starts in the cells that line the renal pelvis—the middle part of the kidney where urine collects before leaving the kidney through a long tube called a ureter. TCC also arises in the ureter and in the bladder.

treatment plan

A written course of action through cancer treatment and beyond.

tumor

An abnormal mass formed by the overgrowth of cells.

tyrosine kinase

A type of protein in cells that is important for many cell functions, such as sending signals for cell growth and survival.

tyrosine kinase inhibitor (TKI)

A drug that blocks the action of tyrosine kinases—proteins in cells that send signals for cells to grow, divide, and survive.

ultrasound

A test that uses sound waves to take pictures of the inside of the body.

U.S. Food and Drug Administration (FDA)

A federal government agency that regulates drugs and food in the United States.

ureter

A long, thin tube that carries urine from the kidney to the bladder.

urethra

The tube that carries urine from the bladder to outside the body.

urinalysis

A test that assesses the content of urine using a microscope and chemical tests.

urinary system

The group of organs that removes waste from the body in the form of urine. It is made up of the kidneys, ureters, bladder, and urethra.

urine

A waste product created when the kidneys filter the blood. Also called pee.

urologist

A doctor who is an expert in treating diseases of the urinary system in men and women and sex organs in men.

vascular endothelial growth factor (VEGF)

A protein that binds to cells that form blood vessels, said vej-eff.

vein

A blood vessel that carries blood back to the heart from all parts of the body.

vena cava

The main, large vein that carries blood back to the heart.

von Hippel-Lindau (VHL)

VHL gene helps control cell growth, cell division, and other important cell functions.

white blood cell

A type of blood cell that helps fight infections in the body.

Wilms tumor

A rare type of cancer that starts in the kidneys and almost only occurs in young children.

x-ray

Uses of small amounts of radiation to make pictures of the inside of the body.

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For disclosures, visit www.nccn.org/about/disclosure.aspx.

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at the University of Pennsylvania
Philadelphia, Pennsylvania
800.789.7366
penmedicine.org/cancer

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Omaha, Nebraska
800.999.5465
nebraskamed.com/cancer

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Center and Cleveland Clinic Taussig
Cancer Institute
Cleveland, Ohio
800.641.2422 • UH Seidman Cancer Center
uhhospitals.org/seidman
866.223.8100 • CC Taussig Cancer Institute
my.clevelandclinic.org/services/cancer
216.844.8797 • Case CCC
case.edu/cancer

City of Hope National Medical Center
Los Angeles, California
800.826.4673
cityofhope.org

Dana-Farber/Brigham and
Women's Cancer Center
Massachusetts General Hospital
Cancer Center
Boston, Massachusetts
877.332.4294
dfbwc.org
massgeneral.org/cancer

Duke Cancer Institute
Durham, North Carolina
888.275.3853
dukecancerinstitute.org

Fox Chase Cancer Center
Philadelphia, Pennsylvania
888.369.2427
foxchase.org

Huntsman Cancer Institute
at the University of Utah
Salt Lake City, Utah
877.585.0303
huntsmancancer.org

Fred Hutchinson Cancer
Research Center/Seattle
Cancer Care Alliance
Seattle, Washington
206.288.7222 • seattlecca.org
206.667.5000 • fredhutch.org

The Sidney Kimmel Comprehensive
Cancer Center at Johns Hopkins
Baltimore, Maryland
410.955.8964
hopkinskimmelfcancercenter.org

Robert H. Lurie Comprehensive
Cancer Center of Northwestern
University
Chicago, Illinois
866.587.4322
cancer.northwestern.edu

Mayo Clinic Cancer Center
Phoenix/Scottsdale, Arizona
Jacksonville, Florida
Rochester, Minnesota
800.446.2279 • Arizona
904.953.0853 • Florida
507.538.3270 • Minnesota
www.mayoclinic.org/cancercenter

Memorial Sloan Kettering
Cancer Center
New York, New York
800.525.2225
mskcc.org

Moffitt Cancer Center
Tampa, Florida
800.456.3434
moffitt.org

The Ohio State University
Comprehensive Cancer Center -
James Cancer Hospital and
Solove Research Institute
Columbus, Ohio
800.293.5066
cancer.osu.edu

O'Neal Comprehensive
Cancer Center at UAB
Birmingham, Alabama
800.822.0933
uab.edu/onealcancercenter/

Roswell Park Comprehensive
Cancer Center
Buffalo, New York
877.275.7724
roswellpark.org

Siteman Cancer Center at Barnes-
Jewish Hospital and Washington
University School of Medicine
St. Louis, Missouri
800.600.3606
siteman.wustl.edu

St. Jude Children's
Research Hospital
The University of Tennessee
Health Science Center
Memphis, Tennessee
888.226.4343 • stjude.org
901.683.0055 • westclinic.com

Stanford Cancer Institute
Stanford, California
877.668.7535
cancer.stanford.edu

UC San Diego Moores Cancer Center
La Jolla, California
858.657.7000
cancer.ucsd.edu

UCSF Helen Diller Family
Comprehensive Cancer Center
San Francisco, California
800.689.8273
cancer.ucsf.edu

University of Colorado Cancer Center
Aurora, Colorado
720.848.0300
coloradocancercenter.org

University of Michigan
Rogel Cancer Center
Ann Arbor, Michigan
800.865.1125
mcancer.org

The University of Texas
MD Anderson Cancer Center
Houston, Texas
800.392.1611
mdanderson.org

University of Wisconsin
Carbone Cancer Center
Madison, Wisconsin
608.265.1700
uwhealth.org/cancer

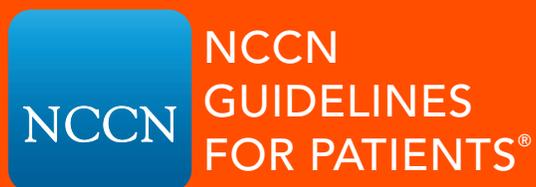
Vanderbilt-Ingram Cancer Center
Nashville, Tennessee
800.811.8480
vicc.org

Yale Cancer Center/
Smilow Cancer Hospital
New Haven, Connecticut
855.4.SMILOW
yalecancercenter.org

Index

- active surveillance** 39, 44–50, 53, 58
- adrenal gland** 7–8, 12, 15, 24, 28–29, 42, 45, 49, 52, 56
- adjuvant treatment** 44, 46, 49–54
- best supportive care** 40, 57, 62
- biopsy** 15, 19–20, 25, 46, 56
- blood test** 15, 46, 50, 53–54, 61
- cancer stage** 23–26
- carcinoma** 9–12, 17, 19–20, 30
- clear cell RCC** 10, 12, 20, 34–38, 52–59, 62
- clinical trial** 26, 38, 42, 49–50, 52–54, 57, 60, 62, 69
- computed tomography (CT)** 15–16, 20, 36–37, 39, 46, 50, 53–54, 61
- cytokine therapy** 35
- cytoreductive nephrectomy** 30, 40, 56
- first-line therapy** 57–59
- follow-up test** 46–50, 53–54, 61–62
- Gerota’s fascia** 7–8, 12, 23–24, 52, 56
- hospice** 42
- imaging test** 15, 17, 19–20, 25, 29, 39, 46, 50, 54, 61
- immunotherapy** 30–31, 35–37, 42, 58, 60–61
- magnetic resonance imaging (MRI)** 16, 20, 39, 46, 50, 53, 61
- metastasectomy** 30, 40, 56–57
- non-clear cell RCC** 10, 12, 32–34, 38, 52, 54, 56, 58, 60, 62
- partial nephrectomy** 28–29, 42, 44–45, 49, 52
- primary tumor** 11–12, 15, 20, 22–23, 28, 30, 40, 47, 50, 54, 56
- primary treatment** 19, 40, 43–47, 49–58, 62
- radiation therapy** 25, 40, 42, 57
- radical nephrectomy** 28–30, 42, 44–45, 49–50, 52, 54
- renal vein** 8–9, 11–12, 29, 52
- staging** 20, 22, 26, 46, 49, 53, 67
- subsequent therapy** 57–59
- supportive care** 29, 35, 39–40, 42, 57, 65
- surgery** 19–20, 25, 28–30, 39–40, 42, 44–47, 49–50, 52–58, 62, 68
- survivorship** 31, 41, 56, 60
- systemic therapy** 25, 30–34, 42, 54, 58, 60–61
- targeted therapy** 25, 30–32, 34, 42, 54, 58, 60–61
- thermal ablation** 39–40, 44–45, 56
- tissue test** 19
- urine test** 19–20
- vena cava** 8, 11–12, 16, 29, 52





Kidney Cancer

2020

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