National Comprehensive Cancer Network®

2026

NCCN Guidelines for Patients®

Cancer care recommendations from leading experts at the National Comprehensive Cancer Network® (NCCN®)

Kidney Cancer



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NCCN Guidelines for Patients®

The essential guide for people facing cancer.

Based on care recommendations from leading cancer experts.

Explains high-quality cancer care provided at state-of-the-art cancer centers.

Reviewed and revised every year.

Did you know that top cancer centers across the United States work together to improve cancer care? This alliance of leading cancer centers is called the National Comprehensive Cancer Network® (NCCN®).

Because cancer care is always evolving, NCCN develops and frequently updates evidence-based cancer care recommendations used by health care providers worldwide. These recommendations are known as the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®).

The NCCN Guidelines for Patients plainly explain these expert recommendations, so you can talk with your care team about the best care for you.

These NCCN Guidelines for Patients are based on the NCCN Guidelines® for Kidney Cancer, Version 1.2026 – July 24, 2025.

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Contents

4 Chapter 1
About kidney cancer

9 Chapter 2
Testing for kidney cancer

17 Chapter 3
Kidney cancer staging and types of RCC

25 Chapter 4
Types of treatment

41 Chapter 5
Stages 1, 2, and 3 kidney cancer

46 Chapter 6
Stage 4 kidney cancer and kidney cancer recurrence

53 Chapter 7
Hereditary RCC

62 Chapter 8
Other resources

66 Words to know

70 NCCN Contributors

71 NCCN Cancer Centers

73 Index

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1
About kidney cancer

5 What is kidney cancer?

6 What are the kidneys?

7 How do the kidneys work?

8 How is kidney cancer treated?

8 How can I get the best care?

Cancer that starts in the kidneys is called kidney cancer. The kidneys are a pair of organs found behind the other organs in your abdomen. They make hormones and filter blood to remove waste and extra water from the body. This chapter will discuss the kidneys and provide an overview of kidney cancer.

What is kidney cancer?

Kidney cancer starts in the tissues of the kidneys. Kidney cancers that start in the cells that line the renal tubules are called renal cell carcinoma (RCC). Renal refers to the kidney. About 9 out of 10 kidney cancers are RCCs. Because it's the most common type, RCC is often simply referred to as kidney cancer. RCC is the focus of this guide.

Most RCCs are a type called clear cell RCC. Another less common type of RCC is called non-clear cell RCC.

There are other, less common cancers that can arise in the kidney. While they can sometimes be confused with RCC, it's important to note that they are treated differently.

- **Urothelial carcinoma** starts in the urinary lining of the kidney or ureter. Although these tumors can be found up the ureter near the kidneys, they aren't kidney tumors. Since these tumors share many features with bladder cancer, they're usually treated as bladder cancer.
- **Wilms tumor (nephroblastoma)** usually occurs in young children. In Wilms tumor, cancer cells are found in the kidney.
- **Renal sarcoma** starts in the blood vessels or connective tissue of the kidney and is treated as soft tissue sarcoma.

How this guide can help you

Making decisions about cancer care is stressful. There's a lot to learn, and you don't know what the future holds.

Use this guide to get the information and support you need.

Patients, doctors, and other health care professionals trust the NCCN Guidelines for Patients. This guide uses clear, everyday language to explain current cancer care recommendations made by respected experts in the field. Their recommendations are based on the latest research and practices at leading cancer centers.

Your health is unique to you, so your cancer care should be, too. As you read this guide, you'll learn which treatments are likely to provide the best results for you. And you'll be better prepared to talk with your care team.

What are the kidneys?

The kidneys are part of the urinary system. 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 make hormones that help control blood pressure. They also make hormones that tell the body to make more red blood cells.

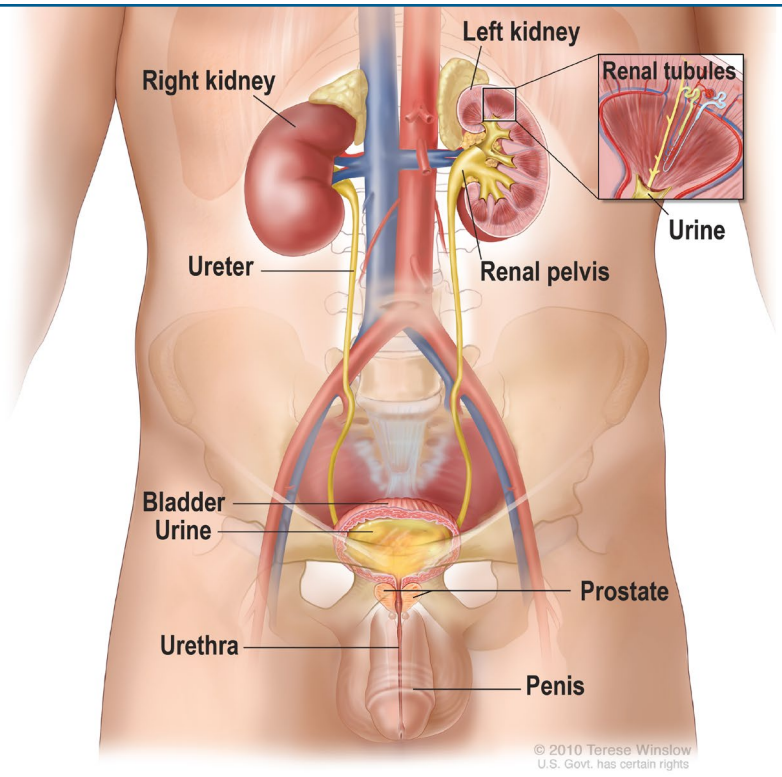
Most people have two kidneys. However, each kidney works on its own and does not need the other to function. This means that the body can often work well with less than one complete kidney. Many people live full, healthy lives with only one kidney.

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.

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. When kidney cancer grows into and beyond Gerota's fascia, it's a sign of advanced kidney cancer.

The kidneys and urinary system

The kidneys are the main organs of the urinary system. The ureters, bladder, and urethra hold and carry urine before it's released from the body.



How do the kidneys work?

The kidneys perform many jobs to keep your body healthy. Their main job is to filter your 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.

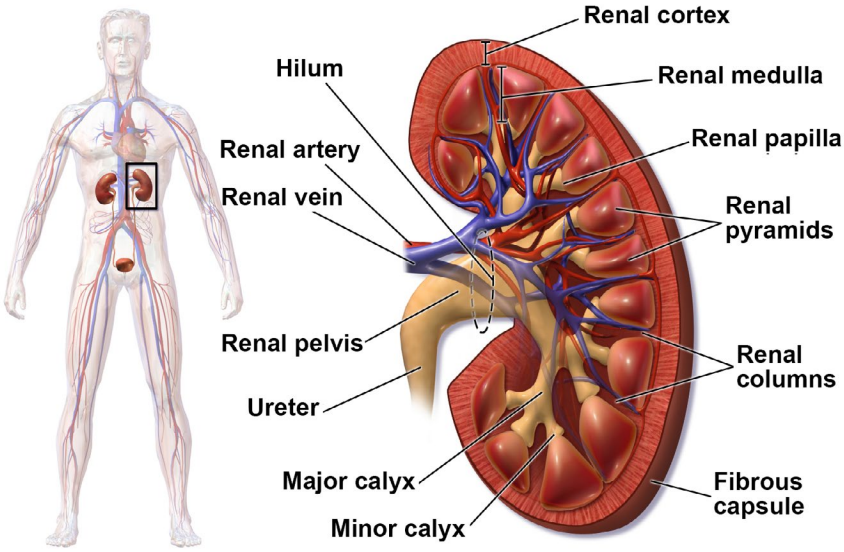
The renal artery carries blood with waste into the kidney. Blood then flows through tiny filtering tubes in the kidney called renal tubules. Blood is cleaned as it flows through the renal tubules. The renal tubules remove waste and other substances from the blood. These substances are made into urine.

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 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's released from the body when you urinate (or pee). A shorter tube, called the urethra, takes urine from the bladder to outside of the body.

The kidneys filter blood to remove waste

Blood enters the kidney through the renal artery. 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.



Almost all kidney cancers start in the cells that line the renal tubules. Tumors can grow in any part of the kidney and can grow into the renal vein and vena cava.

How is kidney cancer treated?

Most kidney tumors are found through imaging tests done for an unrelated issue. Sometimes, a biopsy may be needed to make a diagnosis. Kidney cancer treatment is based on the type of tumor cells, the tumor(s) size and location, and if cancer has spread to other areas in the body.

Treatment often starts with surgery to remove the tumor and part or all of the kidney. Drug (systemic) therapy might follow surgery.

This guide will discuss in greater detail how kidney cancer is diagnosed and treated. It will provide an overview of the types of tests and treatments and what to expect during testing and treatment. It will also provide information on inherited conditions that can increase the chance of developing kidney tumors and kidney cancer.

How can I get the best care?

Advocate for yourself. You have an important role to play in your care. Many people feel more satisfied when they actively take part in planning their cancer care.

The NCCN Guidelines for Patients will help you play a larger role in your care. Discuss the recommendations in this guide with your care team. Ask questions about your options and share your goals and concerns.

Don’t know what to ask? You’re not alone. That’s why we include suggested questions to ask at the end of chapters.

Keep reading to find the best care for you.

2
Testing for kidney cancer

10 General health tests

11 Blood and urine tests

12 Imaging tests

14 Biopsy

15 Biomarker testing

15 Genetic testing

16 Key points

16 Questions to ask

Most kidney cancers are found by chance during imaging tests for other health concerns. Further testing is used to confirm (diagnose) kidney cancer. This chapter presents an overview of possible tests you might receive and what to expect.

Test results from imaging studies and possibly a biopsy will be used to determine your treatment plan. This chapter provides a general overview of some of the tests you might have. Possible tests to plan treatment can be found in **Guide 1**.

General health tests

Some general health tests are described next.

Medical history

A medical history is a record of all health issues and treatments you've had in your life. It includes past surgeries and current health conditions. Bring a list of old and new medicines and any over-the-counter medicines, herbals, or supplements you take. Some supplements interact with and affect medicines that your care team may prescribe. Also, tell your care team about any symptoms you have.

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 family history.

Ask family members on both sides of your family about their health issues, like heart disease, cancer, and diabetes, and at what age they were diagnosed. It's important to know the specific type of cancer, where the cancer started, if it's in multiple locations, and if they had genetic testing.

It can also be helpful to know about other health issues that may seem unrelated, like skin problems or skin lesions that other family members may have.

Guide 1
Tests for treatment planning

Medical history and physical exam
Complete blood count with differential, comprehensive metabolic panel
Urinalysis
CT or MRI scan of abdomen with or without pelvis
Chest CT (preferred) or chest x-ray
As needed: bone scan, brain MRI, chest CT, core needle biopsy, or other tests
Possible genetic risk testing if multiple kidney masses, 46 years of age or under, or family history

Physical exam

During a physical exam, your health care team may:

- Check your temperature, blood pressure, pulse, and breathing rate
- Check your height and weight
- 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
- Feel for enlarged lymph nodes in your neck, underarm, and groin

Distress screening

Dealing with a cancer diagnosis can be stressful and may cause further distress. Distress is an unpleasant experience of a mental, physical, social, or spiritual nature. It can affect how you feel, think, and act. Distress might include feelings of sadness, fear, helplessness, worry, anger, and guilt. You may also experience depression, anxiety, and sleep issues. Your treatment team will screen your level of distress. This is part of your cancer care.

Performance status

Performance status is a rating of a person's general level of fitness and ability to perform daily tasks. It's one factor taken into consideration when choosing a treatment plan.

Blood and urine tests

Blood and urine tests check for signs of disease and how well organs are working. Blood tests require a sample of blood, which is removed through a needle placed into a vein in your arm. For a urine test, you'll be asked to fill a small container with urine (pee in a cup). Blood and urine samples are sent to a lab for testing.

Some possible blood and urine tests are described next.

Complete blood count and differential

A complete blood count measures the levels of red blood cells, white blood cells, and platelets in your blood. A differential counts the number of each type of white blood cell. It also checks if the counts are in balance with each other.

Comprehensive metabolic panel

A comprehensive metabolic panel measures substances in your blood. It provides important information about how well your kidneys and liver are working, among other things.

Urinalysis

A urinalysis detects and/or measures several substances in the urine using a microscope and chemical tests. Blood in urine (hematuria) may be caused by kidney cancer or other health problems. People with kidney cancer may have a normal urinalysis or have evidence of blood in the urine.

Urine cytology

In urine cytology, a sample of your urine is looked at under a microscope to check for cancer cells. This test may be used if your care team suspects urothelial cancer in the urinary tract or bladder.

Imaging tests

Imaging tests take pictures of the inside of your body. They show the primary tumor, or where the cancer started, and look for cancer in other parts of the body. A radiologist (a doctor who's an expert at interpreting imaging tests) will send a report of the imaging results to your care team.

The following information is in alphabetical order.

Bone scan

Kidney cancer can spread to bones. A bone scan uses a radiotracer to highlight areas of bone damage or loss. 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 can take a few hours for the tracer to enter your bones. However, the test itself is quick and painless.

A special camera will take pictures of the tracer in your bones as it moves over your body. Areas of damaged bone take up more radiotracer than healthy bone and show up as bright spots on the pictures. Bone damage can be caused by cancer, cancer treatment, previous injuries, or other health issues. This test may be used if you have bone pain, are at high risk for bone metastases, or if there are changes in certain test results. Bone scans might be used to monitor your treatment.

Contrast material

Contrast material is a substance used to improve the quality of imaging tests, such as CT and MRI scans. It's used to make the pictures clearer. It's important to know that the contrast used for CT scans is different from what is used for MRI scans. Not all imaging tests require contrast, but many do.

Contrast might be taken by mouth (oral) or given through a vein (intravenously or IV).

Tell your care team if you've had allergic reactions to contrast in the past. This is important. You might be given medicines to avoid the effects of those allergies. Contrast might not be used if you have a serious allergy or if your kidneys aren't working well.

CT scan

A CT or CAT scan uses x-rays and computer technology to take pictures of the inside of the body. It takes many x-rays of the same body part from different angles. You may have a CT scan of your head, neck, and chest to look for cancer. In most cases, contrast will be used.

"It started with a GI bleed. Because of the difficulty getting the bleed to stop, I had a CT scan done of my abdomen and that was how I learned that I had a large tumor on my right kidney."

MRI scan

An MRI scan uses radio waves and powerful magnets to take pictures of the inside of the body. It doesn't use x-rays, which means there's no radiation delivered to your body during the test. Because of the very strong magnets used in the MRI machine, tell the technologist if you have any metal or a pacemaker in your body. During the test, you'll likely be asked to hold your breath for 10 to 20 seconds as the technician collects the images.

MRI scans take longer to perform than CT scans. A closed MRI has a capsule-like design where the magnet surrounds you. The space is small and enclosed. An open MRI has a magnetic top and bottom, which allows for an opening on each end. Closed MRIs are more common than open MRIs, so if you have claustrophobia (a fear of enclosed spaces), be sure to tell your care team about it.

Ultrasound

An ultrasound uses high-energy sound waves to form pictures of the inside of the body. This is similar to a sonogram used for pregnancy. A wand-like probe (transducer) will be held on your bare skin and moved using gel. Ultrasound doesn't use x-rays, so it can be repeated as needed.

An ultrasound can show if there's a mass in your kidney and if the mass is solid or fluid filled. It can also help evaluate if the mass has blood flow. Kidney cancer tumors are more likely to be solid and have blood flow.

X-ray

An x-ray uses small doses of radiation to make pictures of the inside of the body. A chest x-ray is used to see if cancer has spread to the lungs. It might be referred to as a radiograph.

Kidney ultrasound

A kidney ultrasound uses high-energy sound waves to create detailed pictures of the kidneys.



Biopsy

Biopsy is the removal of a sample of tissue or group of cells for testing. It's an important part of an accurate diagnosis. Lab tests are done on the tumor after it's removed. A pathologist (a doctor who identifies diseases by studying cells and tissues) will examine the biopsy sample and make a diagnosis. This is called histology or histopathology. This can take a few days. Sometimes making the right diagnosis requires further testing.

For most cancers, a biopsy must be done to confirm cancer before treatment is started. However, for many people with a high suspicion of kidney cancer that appears to be contained in the kidney, treatment is surgery to remove the tumor. After the tumor is removed, it's tested (biopsied).

There are different types of biopsies that may be used for kidney cancer. Fine-needle aspiration, fine needle biopsy, and core needle biopsy use needles of different sizes to remove a sample of tumor. An ultrasound or CT scan might be used to guide a biopsy.

Biopsy of metastasis

Metastasis is the spread of cancer to an area of the body such as lung, bone, or brain. A biopsy of the metastasis may be needed to confirm the presence of cancer. If there's more than one metastasis, each site may be biopsied. The type of biopsy used depends on the location of the suspected metastasis and other factors.

"We thought my breast cancer had metastasized. But when I had a biopsy of the lesions, they discovered it was kidney cancer—primary kidney cancer."



Biomarker testing

A sample from a biopsy of your tumor may be tested to look for gene mutations, protein levels, or other molecular features. This is called biomarker testing, and it's more commonly done in people with advanced kidney cancer to choose the best treatment.

Tumor mutation testing

A sample of your tumor or blood may be used to see if the cancer cells have any specific DNA mutations. This is a different type of DNA testing than the genetic testing for mutations you may have inherited from your birth parents. In tumor mutation testing, only the tumor cells are tested and not the rest of your body. These tests are more commonly done in people with advanced kidney cancer.

Genetic testing

Depending on your family history or other features of your tumor, your health care team might refer you for hereditary genetic testing to learn more about your tumor. A genetic counselor or trained provider will discuss the results with you.

Genetic testing is done using blood or saliva (spitting into a cup or taking a cheek swab). The goal is to look for gene mutations inherited from your biological (birth) parents. These are called germline mutations. Some gene mutations can put you at risk for more than one type of tumor or cancer. You can pass these mutations on to your children. Other family members might also carry these mutations. Tell your care team if your family has a history of cancer.

Hereditary cancer predisposition syndromes

Some genetic (or inherited) syndromes may put someone at risk for developing certain tumors and cancers. A syndrome is a group of signs or symptoms that occur together and suggest the presence of or risk for a disease. A hereditary syndrome may also be found in blood (biological) relatives.

A genetic risk assessment will identify if you carry a genetic factor for tumors or cancer and if you may benefit from genetic testing, additional screening, or preventive interventions. Depending on the genetic risk assessment, you might undergo genetic testing and genetic counseling. Genetic testing checks to see if you have a hereditary syndrome that puts you at risk for developing kidney tumors and kidney cancer, along with possibly other cancers or medical issues.

- **Hereditary renal cell carcinoma (HRCC)** is kidney cancer caused by a hereditary syndrome. More information on HRCC can be found in *Chapter 7: Hereditary RCC.*

If you have a hereditary cause of RCC, it's important to see your doctor often, especially if you've already been diagnosed with RCC. People with confirmed hereditary causes of RCC will be monitored differently from those with sporadic RCC. You'll have regular testing to check for a new kidney tumor and may also need to follow up with other specialists depending on the type of hereditary RCC.

Key points

- Test results from imaging studies and possibly a biopsy will be used to determine your treatment plan.
- Blood and urine tests check for signs of disease and how well organs are working.
- Imaging tests take pictures of the inside of your body. Imaging tests are used to find and diagnose kidney cancer.
- A biopsy removes a sample of tissue or fluid for testing. Biopsies aren't always done before surgery for kidney cancer if the tumor appears to be contained in the kidney. The tumor is usually tested after it's removed.
- Some genetic (or hereditary) conditions can put you at risk for developing kidney tumors or kidney cancer. Hereditary renal cell carcinoma (HRCC) is kidney cancer caused by a hereditary syndrome.
- People who have HRCC should see their doctors often, especially if they have already been diagnosed with kidney cancer. Regular imaging tests, called screenings, will look for new kidney tumors.

Questions to ask

- What tests will I have? How often will I have these tests?
- Will my insurance pay for these tests? How can I get help with paying for tests and treatment?
- What tests will be done on the tumor and lymph nodes?
- Who will explain the test results to me?
- Do you recommend I have genetic testing and counseling for inherited cancer predisposition syndromes? Why or why not?

What's next?

Now that you've learned about the different types of tests you might receive, the next chapter will discuss how kidney cancer is staged. Staging is part of treatment planning.

3

Kidney cancer staging and types of RCC

18 How is kidney cancer staged?

19 How kidney cancer spreads

20 TNM scores

21 Kidney cancer stages

23 Types of RCC

24 Key points

24 Questions to ask

Cancer staging is used to guide treatment decisions. It describes the size and location of the tumor and if cancer has spread to lymph nodes, organs, or other parts of the body. This chapter explains kidney cancer stages and types of renal cell carcinoma (RCC).

How is kidney cancer staged?

A cancer stage is a way to describe the cancer at the time you are first diagnosed. Based on testing, your cancer will be assigned a stage. Staging helps to predict prognosis and is needed to make treatment decisions. A prognosis is the course your cancer will likely take.

Clinical (before surgery) staging is the rating given before any treatment as part of an initial diagnosis. In kidney cancer, it's based on imaging results. Pathological (after surgery) staging is based on information gained after surgery to remove all or part of the kidney and nearby lymph nodes. This gives a more accurate picture of how far the cancer has spread and is used to determine your treatment options after surgery.

The following information is gathered during kidney cancer staging:

- **The size of the tumor (T)**: How large is the tumor? Has it grown into nearby areas?
- **The spread to nearby lymph nodes (N)**: Has cancer spread to nearby lymph nodes? If so, how many? Where?
- **The spread (metastasis) to distant sites (M)**: Has cancer spread to distant organs, such as the lungs or liver?

Staging is based on a combination of information to reach a final numbered stage. Often, not all information is available at the initial evaluation. More information can be gathered as treatment begins.

"If I've learned anything, it's that no one will advocate for you the way you can advocate for yourself. You deserve time and attention from your care team. You deserve to be heard. I've also learned that people will surprise you. When I felt my loneliest, when I was at my lowest, people came out of the woodwork to support me. Some of them weren't the ones I expected. Some I barely knew. But they showed up, and that meant everything."

How kidney cancer spreads

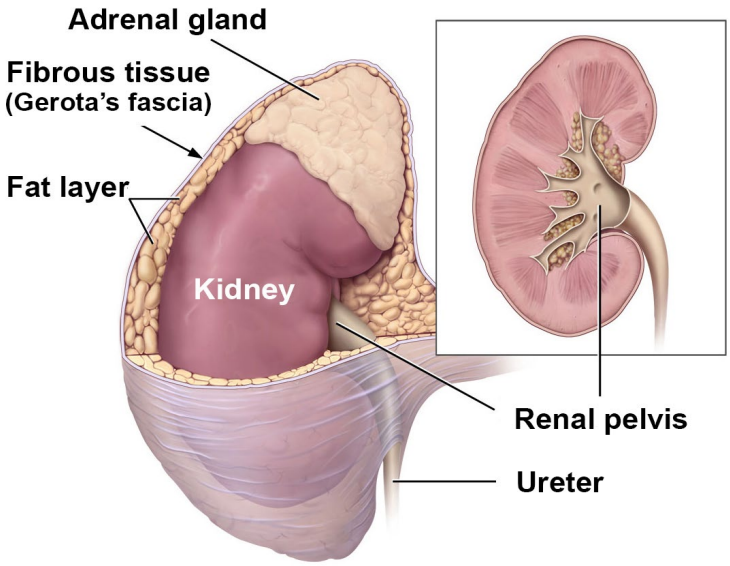
Tumors can start in any part of the kidney and can grow into the renal vein and vena cava. Kidney cancer can also spread to other parts of the body in a process called metastasis. In metastasis, cancer cells travel through blood or lymph to form new tumors outside of the kidney. The new tumors are called metastatic tumors or metastases.

- **Local spread** – In locally advanced disease, cancer has spread to a nearby area close to the primary (main) tumor. Kidney cancer can invade nearby tissues, like surrounding fat, blood vessels, lymph nodes, adrenal glands, and Gerota's fascia.
- **Distant metastasis** – In metastatic disease, cancer 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, and bones, and less frequently to the liver and brain. Having multiple tumors in one or both kidneys isn't considered metastasis, and these tumors are treated as separate primary tumors.

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



National Cancer Institute

TNM scores

The tumor, node, and metastasis (TNM) system is used to stage kidney cancer. In this system, the letters T, N, and M describe different areas of cancer growth. Based on test results, a score or number is assigned to each letter. The higher the number, the larger the tumor or the more the cancer has spread. These scores are combined to assign the cancer a stage. A TNM example might look like this: T1N0M0 or T1, N0, M0.

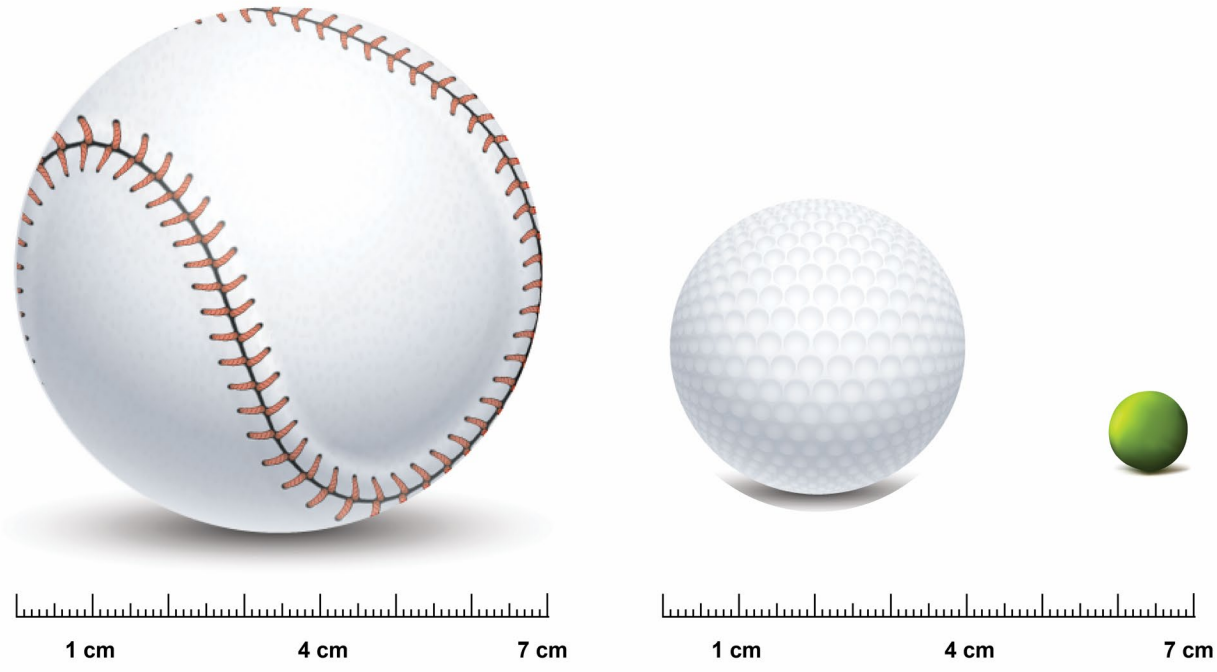
T = Tumor

T describes the depth and size of the main (primary) tumor and if the tumor has grown into nearby tissue. A tumor can grow outside of the kidney and into nearby structures.

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

- **T1** – Tumor is 7 cm or smaller and is limited to the kidney
- **T2** – Tumor is larger than 7 cm and is limited to the kidney
- **T3** – Tumor extends outside of the kidney into major veins and tissues but not into Gerota's fascia
- **T4** – Tumor invades beyond Gerota's fascia and might be in the adrenal gland

Kidney tumors are measured in centimeters (cm): For comparison, a baseball is 7 cm, a golf ball is 4 cm, and a pea is 1 cm.



N = Regional lymph node

There are hundreds of lymph nodes throughout your body. They work as filters to help fight infection and remove harmful things from your body. Regional lymph nodes are found near the kidney. Regional lymph nodes include renal hilar, caval, and aortic. Cancer found in a regional lymph node is called a lymph node metastasis. This is different from a distant metastasis, which is found far from the main tumor in the kidney.

The removal of lymph nodes is called lymph node or nodal dissection.

- **NX** – Regional lymph nodes cannot be assessed
- **N0** – No regional lymph node metastasis is found
- **N1** – Metastasis in regional lymph node(s) is found

M = Metastasis

Metastasis is cancer that has spread to distant parts of the body. The most common sites for metastasis are the bone, liver, lungs, brain, adrenal glands, and distant lymph nodes.

Kidney cancer stages

Numbered stages are based on TNM scores. Stages range from stage 1 to stage 4, with 4 being the most advanced. They might be written as stage I, stage II, stage III, and stage 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. Factors such as your general health are also very important. For kidney cancer stages, see **Guide 2**.

General stages for kidney cancer are described next.

Early-stage kidney cancer

In early-stage kidney cancer, the tumor is found only in the kidney.

- **Stage 1 (T1, N0, M0)** – The tumor is found only in the kidney and is smaller than 7 cm.
- **Stage 2 (T2, N0, M0)** – The tumor is larger than 7 cm and is found only in the kidney.

Guide 2
Kidney cancer stages

Stage 1	• T1, N0, M0
Stage 2	• T2, N0, M0
Stage 3	• T1 or T2, N1, M0 • T3, NX or N1 or N2, M0
Stage 4	• T4, Any N, M0 • Any T, Any N, M1

Locally advanced kidney cancer

In locally advanced kidney cancer, cancer is found in nearby lymph nodes.

- **Stage 3 (T1 or T2, N1, M0)** – The tumor is found only in the kidney, but cancer has spread (metastasized) to nearby lymph nodes.
- **Stage 3 (T3, NX or N0 or N1, M0)** – The tumor has grown outside of the kidney into nearby veins and tissues. It hasn't grown into the adrenal gland or beyond Gerota's fascia. Cancer may or may not be in nearby lymph nodes.

Advanced kidney cancer

In advanced kidney cancer, the tumor has grown outside of the kidney. Cancer is found in nearby lymph nodes but hasn't spread to distant sites.

- **Stage 4 (T4, Any N, M0)** – The tumor has grown beyond Gerota's fascia and maybe into the adrenal gland. Cancer is found in nearby lymph nodes.

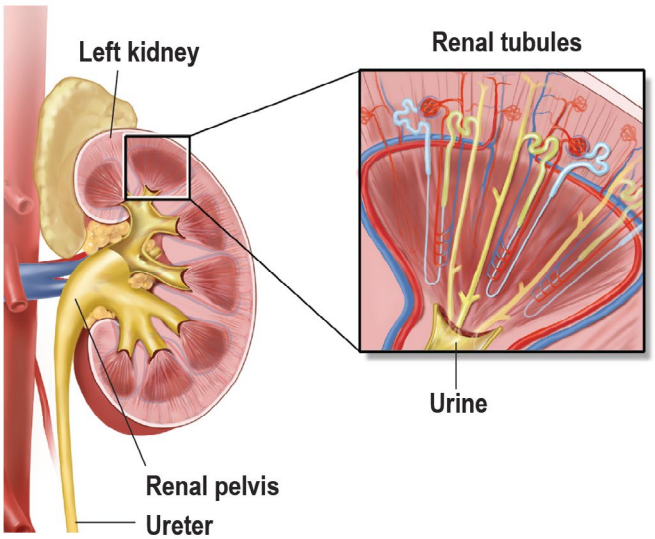
Metastatic kidney cancer

In metastatic kidney cancer, cancer has spread to distant sites in the body.

- **Stage 4 (Any T, Any N, M1)** – The tumor is any size and may or may not extend beyond the kidney. Cancer may or may not have spread to nearby lymph nodes but has metastasized to distant parts of the body.

Renal cell carcinoma

Most kidney cancers arise in cells that line the small tubes in the kidney called renal tubules.



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Types of RCC

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

Clear cell RCC

Clear cell RCC (ccRCC) is the most common subtype. It occurs in about 7 out of 10 people with RCC. Under a microscope, clear cells look very pale or clear.

Non-clear cell RCC

Non-clear cell RCC is also called nccRCC. There are several subtypes.

- **Papillary RCC (PRCC)** is the most common subtype of nccRCC. About 1 out of 10 people with RCC have PRCC. Under a microscope, most papillary tumors look like long, thin, finger-like growths.
- **Chromophobe RCC** cells are pale, are larger than clear cells, and look different.

Rare types of non-clear cell RCC

Other rare types of nccRCC include the following:

- **Renal medullary carcinoma (RC)** can be found in young people of African descent who carry the sickle cell trait, have sickle cell disease, or have other diseases that can cause sickling of the red blood cells.
- **Translocation RCC** can be found at all ages but tends to be diagnosed in children or younger adults. These tumors have unique fusions of genes that promote the cancer.
- **Unclassified RCC** describes cancer cells that don't look like any of the subtypes or more than one subtype is present.

Some other RCC types that have been defined recently include:

- Clear cell papillary renal cell tumor
- Fumarate hydratase-deficient RCC
- ELOC (formerly TCEB1)-mutated RCC

Sarcomatoid features

Almost any type of renal cell carcinoma can become sarcomatoid or have sarcomatoid features. This means that the cancer cells are spindled and look like the cells of a sarcoma (cancer of the connective tissues, such as muscles, nerves, fat, blood vessels, and fibrous tissue).

Sarcomatoid renal cancers occur in less than 1 out of 10 RCC tumors. But, when present, they tend to grow more quickly than other types of kidney cancer and are more likely to spread to other parts of the body. This makes them more difficult to treat.

Key points

- A cancer stage helps to predict the likely course your cancer will take, called a prognosis. A cancer stage describes the size and location of the tumor and how far the cancer has spread.
- Cancer staging and cancer subtype are used to make treatment decisions.
- In stage 1 kidney cancer, the tumor is 7 cm or smaller and found only in the kidney.
- In stage 2 kidney cancer, the tumor is larger than 7 cm and found only in the kidney.
- In stage 3 (T1 or T2) kidney cancer, the tumor hasn't grown outside of the kidney into nearby veins and tissues, but cancer has spread to nearby lymph nodes. In stage 3 (T3) kidney cancer, the tumor has grown outside of the kidney into nearby veins and tissues, and cancer may or may not have spread to nearby lymph nodes. It hasn't grown into the adrenal gland or beyond Gerota's fascia.
- Cancer that's confined to the kidney is called early-stage kidney cancer. When cancer is found in nearby lymph nodes, it's called locally advanced kidney cancer.
- In stage 4 kidney cancer, the tumor can be any size. It may have spread outside of the kidney. Stage 4 kidney cancer can be locally advanced or metastatic.

Questions to ask

- What stage is my kidney cancer? What does this mean?
- What does the cancer stage mean in terms of length of survival and quality of life?
- What size is the tumor(s)? Is there more than one tumor?
- Has the cancer spread to outside of the kidney to nearby lymph nodes, organs, or distant parts of the body?
- Based on the cancer stage, what treatment options do you recommend and why?

What's next?

The next chapter provides an overview of treatment options and what to expect from treatment.

4
Types of treatment

26 Your care team

27 Active surveillance

27 Ablation

27 Surgery

33 Radiation therapy

33 Systemic therapy

34 Targeted therapy

35 Immunotherapy

36 Clinical trials

37 Supportive care

38 Side effects

40 Key points

40 Questions to ask

This chapter presents an overview of the possible types of treatment and what to expect from treatment. Not everyone will receive the same treatment. Treatment options are based on many factors. Together, you and your care team will choose a treatment plan that's best for you.

Results from imaging studies and possibly a biopsy will be used to determine a treatment plan for your cancer stage. Treatment will be based on the size; known or suspected kidney cancer subtype, such as renal cell carcinoma; and location of the tumor(s).

Your care team

Treating cancer takes a team approach. Treatment decisions should involve a multidisciplinary team of health care and psychosocial care professionals from different backgrounds who have knowledge and experience in your type of cancer. This team is united in planning and implementing your treatment. Ask who will coordinate your care.

One or more of the following specialists might be involved in your kidney cancer care:

- **Oncologist** – a doctor who diagnoses and treats cancer. Types of oncologists include medical, radiation, and surgical oncologists.
- **Urologist** – a doctor who's an expert in diseases of the urinary system.
- **Urologic oncologist** – a doctor who specializes in diagnosing and treating cancers of the urinary tract. Other types of oncologists include medical, surgical, and radiation oncologists.
- **Nephrologist** – a doctor who's an expert in kidney diseases.

The next section starts with treatment options for smaller tumors, followed by information on surgery, radiation therapy, drug (systemic)

Standard of care is the best-known way to treat a particular disease based on past clinical trials. There may be more than one treatment that's considered standard of care. Ask your care team what treatment options are available and if a clinical trial might be right for you.



therapy, and clinical trials. The chapter ends with a discussion of possible side effects of treatment.

Active surveillance

Active surveillance closely monitors tumor growth. During this time, you'll have imaging tests on a regular basis. You won't have treatment. Treatment will start if the tumor grows. There may be other reasons to start treatment, such as pain, discomfort, or bleeding from the tumor. But these symptoms are rare for tumors small enough to be followed with active surveillance. Ask your care team what might trigger the need for treatment and how often you will have imaging tests.

Active surveillance may be an option for a tumor smaller than 2 cm that hasn't metastasized or in people with other serious health issues who may not be healthy enough for surgery or other treatments. Age and other health conditions increase the risk of severe side effects and complications from treatment.

Ablation

Ablation uses extreme cold, extreme heat, radio waves, microwaves, or chemicals to destroy cancer cells. It can destroy small tumors (typically 3 cm or less) and metastases with little harm to nearby tissues. Ablation might be used if you aren't healthy enough for surgery or strongly wish to avoid surgery.

A biopsy might be done before or at the time of ablation. It might take multiple treatments to destroy the tumor or metastasis.

Types of ablation used to treat a small kidney tumor or an isolated metastasis include:

- **Cryoablation, cryotherapy, or cryosurgery** kills cancer cells by freezing them with a very cold substance.
- **Radiofrequency ablation (RFA)** kills cancer cells by heating them with high-energy radio waves.
- **Microwave ablation** uses electromagnetic energy to kill cancer cells.

All types of ablation use a special needle, called a probe, which is inserted into the tumor, metastasis, or lesion. With cryotherapy, a medical gas is passed through the probe to cause below-freezing temperatures. This freezes the tumor to destroy it. With RFA, 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. It can also be inserted and guided into place during laparoscopic surgery.

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

Surgery

Surgery is an operation or procedure to remove cancer from the body. Surgery is often the main or primary treatment to remove the cancer from the kidney. But it's only one part of a treatment plan. Surgery can also provide supportive care by easing pain or discomfort. This is called palliative surgery.

When preparing for surgery, you should seek the opinion of an experienced surgeon. The surgeon should be an expert in performing your type of surgery. Hospitals that perform many surgeries often have better results. You can ask for a referral to a hospital or cancer center that has experience in treating your type of cancer.

Removal of the cancer through surgery can be accomplished in different ways depending on the specific circumstances, such as the size and location of the tumor and if there's cancer in any surrounding organs and tissues. Surgery is based on the safest and best way to remove the cancer. Types of surgery used to treat kidney cancer are described next.

Open surgery

Open surgery removes tissue through one large surgical cut. This approach lets your surgeon directly view and access the tumor in your kidney to remove it. Open surgery may take several hours or longer. After the surgery, you'll need to stay in the hospital to recover.

Minimally invasive surgery

Minimally invasive surgery (key-hole surgery) uses several small incisions. Small tools are inserted through each incision to perform the surgery. One of the tools, called a videoscope, is a long tube with a video camera at the end. The camera lets your surgeon see your kidney and other tissues near the tumor. Other tools are used to remove the tumor. Minimally invasive surgery, also called laparoscopic surgery, can also be done using robotic arms to control the surgical tools. This is called robot-assisted laparoscopic surgery.



If you smoke or vape, seek help to quit

Smoking or vaping nicotine greatly increases your chances of having side effects during and after surgery. Smoking and vaping can limit how well cancer treatment works and prevent wound healing. They also increase your chances of developing other cancers. Cannabis use might also affect the amount of anesthesia used during surgery.

Nicotine is the chemical in tobacco that makes you want to keep smoking and vaping. Nicotine withdrawal is challenging for most people who smoke or vape. The stress of having cancer may make it even harder to quit. If you smoke or vape, ask your care team about counseling and medicines to help you quit.

More information can be found in the *NCCN Guidelines for Patients: Quitting Smoking* at NCCN.org/patientguidelines and on the NCCN Patient Guides for Cancer app.

For online support, try these websites:

- SmokeFree.gov
- CDC.gov/tobacco

Tumor surgery

Removal of the tumor is called tumor resection. Imaging tests will be ordered to see if your cancer can be removed completely with surgery (resectable) or can't be removed completely with surgery (unresectable). Sometimes, imaging tests cannot clearly show one way or the other.

Partial nephrectomy

In a partial nephrectomy, the tumor and tissue immediately surrounding the tumor are removed, leaving behind a still-functioning kidney. The adrenal gland and lymph nodes are also left in your body.

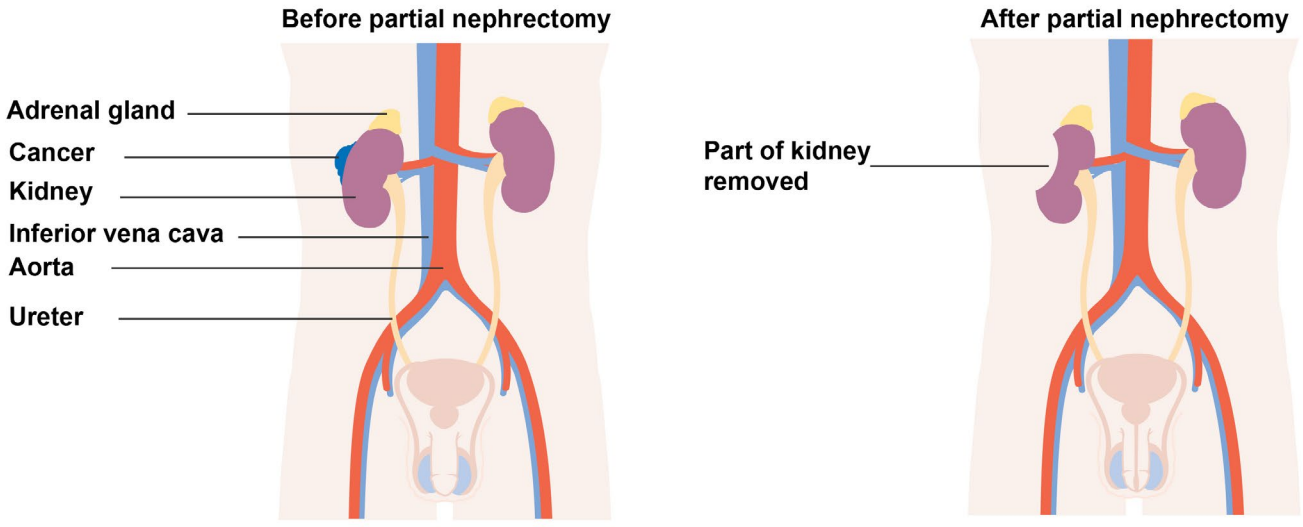
A partial nephrectomy might be referred to as nephron-sparing or kidney-sparing surgery since it saves (spares) as much of your kidney as possible. Your kidney can still function even if part of it has been removed. This is a benefit of partial nephrectomy. If you have poor kidney function or are at risk for poor kidney function, this surgery might be an option. Also, it might be an option if you have only one kidney, limited kidney function, or tumors in both kidneys.

A partial nephrectomy is often used for treating kidney cancer when the tumor is small and only in the kidney. For most small tumors, a partial nephrectomy can remove all of the cancer with good long-term results. A partial

Partial nephrectomy

In a partial nephrectomy, the tumor and tissue immediately surrounding the tumor are removed, leaving behind a still-functioning kidney.

https://commons.wikimedia.org/wiki/File:Diagram_showing_before_and_after_a_partial_nephrectomy_CRUK_102.svg



nephrectomy can be used to remove larger tumors, but the location of the tumor in your kidney and your overall health are considered in any type of surgery.

Partial nephrectomy is a complex surgery. It's 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.
- 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.

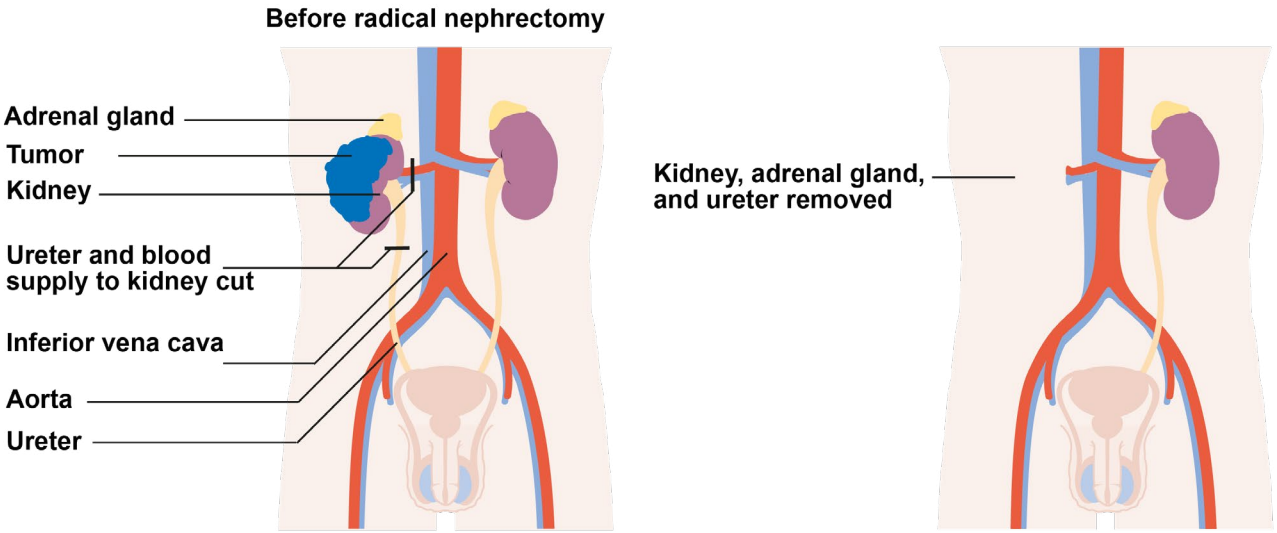
Radical nephrectomy

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 (found on top of the kidney) and nearby lymph nodes. How much tissue is removed depends on the extent of the tumor.

Radical nephrectomy

In a radical nephrectomy, the tumor with the entire kidney and the fatty tissue around the kidney are removed. This surgery may also remove the adrenal gland on top of the kidney and nearby lymph nodes.

https://commons.wikimedia.org/wiki/File:Diagram_showing_before_and_after_a_radical_nephrectomy_CRUK_104.svg



- **Adrenalectomy** removes an adrenal gland. 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 of the kidney where the adrenal gland sits.
- **Lymph node dissection** removes nearby lymph nodes. A lymph node dissection isn't 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.

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's an increased risk for chronic kidney disease (CKD). CKD means your remaining kidney can't filter blood the way it should. Kidney function may slowly get worse over a long period of time.

People with kidney cancer should seek treatment at experienced cancer centers.

Cytoreductive nephrectomy

Cytoreductive nephrectomy is surgery to remove the primary tumor when you have metastatic kidney cancer. Metastatic cancer has spread from where it first formed to other parts of your body.

Cytoreductive surgery is often used to prolong life, reduce pain, or improve quality of life, but it's not a cure. Some or all of your kidney might be removed along with the primary tumor in a cytoreductive nephrectomy. Removing the primary tumor may improve how well other treatments work against the remaining cancer and metastases.

Cytoreductive nephrectomy is usually followed by targeted therapy and/or immunotherapy. It can also be considered in unique cases when the metastases have responded to treatment and there's a large primary tumor. This is sometimes referred to as consolidative surgery. It may also be necessary to remove the tumor if it's causing health issues, such as blood in the urine or severe pain.

Cytoreductive surgery

Cytoreductive surgery reduces the amount of cancer in the body, called cancer burden. Sometimes, there are too many metastases in the body to remove them all with surgery. Removing some of the cancer metastases, along with the primary tumor and all or part of your kidney, might help to reduce cancer burden.

Metastasectomy

New tumors that formed far from the primary tumor are called metastases. 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's 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.

Treatment for oligometastases

Oligometastases are a type of metastasis in which cancer cells from the original (primary) tumor travel through the body and form a small number of new tumors (metastatic tumors) in other parts of the body. Treatment for oligometastases or oligometastatic disease includes metastasectomy, radiation therapy, or ablation.

"Cancer treatment is a process. Go easy on yourself and take things a day at a time. Do the things you enjoy. Make sure you rest, too."



Radiation therapy

Radiation therapy uses high-energy x-rays, photons, electrons, and other sources to kill cancer cells and shrink tumors. Radiation therapy may be used as an ablative therapy instead of surgery, or as supportive care or palliative care to help ease pain or discomfort caused by cancer.

Stereotactic body radiation therapy (SBRT) treats kidney cancer using a machine that aims radiation at the tumor. The goal is to kill or ablate the tumor or metastasis. SBRT can be done with either photons or protons. With this method, you will receive 1 to 5 treatments of high-dose radiation. SBRT is very precise, which reduces the chance of damage to nearby tissues.

Systemic therapy

Systemic therapy is drug therapy that works throughout the body. Types include targeted therapy, immunotherapy, and chemotherapy. Chemotherapy is very effective for other types of cancers but is rarely used in the treatment of kidney cancer. It might be an option for treatment of some rare forms of non-clear cell RCC.

Goals of systemic therapy may be curative or palliative and should be discussed before starting treatment. Your wishes about treatment are important. Make your wishes known.

All systemic treatments listed in this guide are recommended and appropriate. When helpful, NCCN experts also assign a level of preference to their recommendations for systemic therapies:

- **Preferred therapies** have the most evidence they may work better and may be safer than other therapies.

Guide 3
Systemic therapy examples (drugs listed in alphabetical order)

Targeted therapy examples	• Axitinib (Inlyta) • Belzutifan (Welireg) • Bevacizumab (Avastin) or Bevacizumab substitutes (biosimilars) • Cabozantinib (Cabometyx) • Erlotinib (Tarceva)	• Everolimus (Afinitor) • Lenvatinib (Lenvima) • Pazopanib (Votrient) • Sirolimus (Rapamune) • Sunitinib (Sutent) • Tivozanib (Fotivda)
Immunotherapy examples	• Avelumab (Bavencio) • Ipilimumab (Yervoy)	• Nivolumab (Opdivo) • Pembrolizumab (Keytruda)

- **Other recommended therapies** can provide effective results but may have less evidence, more side effects, or may not work quite as well as preferred therapies.
- **Therapies used in certain cases** work best for individuals with specific cancer features or health circumstances.

For a general list of systemic therapies, see **Guide 3**.

Targeted therapy

Targeted therapy focuses on specific or unique features of cancer cells. Targeted therapies seek out how cancer cells grow, divide, and move in the body. These drugs stop or inhibit the action of molecules that help cancer cells grow and/or survive. Targeted therapy is used to treat stage 4 kidney cancer (with or without metastases) or cancer that has returned (relapsed).

In kidney cancer, targeted therapy is used in the following ways:

- **Angiogenesis inhibitors** target blood vessel growth by blocking a protein called vascular endothelial growth factor (VEGF) or the receptors of this protein known as VEGFR).
- **HIF-2a inhibitors** interfere with a cancer cell's ability to sense oxygen and respond to low oxygen states (hypoxia).
- **mTOR kinase inhibitors** target cancer cell growth.

Angiogenesis inhibitors

Kidney cancer cells are very good at getting new blood vessels to grow into the tumor. Kidney cancer cells release high amounts of VEGF, which causes the growth of new blood vessels. An angiogenesis inhibitor blocks this growth.

Bevacizumab is an angiogenesis inhibitor. Bevacizumab stops VEGF from sending signals that tell new blood vessels to form. This slows or stops blood vessel growth and starves the tumor. Although bevacizumab targets tumor blood vessels, it can also affect normal blood vessels.

A biosimilar, or substitute, might be used in place of bevacizumab. A biosimilar is an almost identical version of a drug made by another company. It's used in the same way and at the same dose as bevacizumab. Ask your care team why one therapy might be chosen over another. The reason might be related to tumor mutations, cost, toxicity, or availability. Your wishes are also important.

HIF-2a inhibitors

Hypoxia-inducible factors (HIFs) sense and respond to low oxygen levels in normal and cancer cells. Belzutifan is a HIF-2α inhibitor that interferes with cancer cells' ability to adapt to low oxygen conditions.

mTOR kinase inhibitors

mTOR is a protein in cells that's important for cell growth and survival. It moves chemicals, called phosphates, from one molecule to another. By transferring phosphates, mTOR sends signals that tell cells, including cancer cells, to grow and divide. An mTOR inhibitor,

such as everolimus and sirolimus, blocks this signal and slows kidney tumor growth.

Tyrosine kinase inhibitors

Tyrosine kinase inhibitors (TKIs) block the signals that cause kidney cancer to grow and spread. There are many TKIs used to treat kidney cancer. Each TKI works in a slightly different way to block tumor growth. TKIs don't rid the body of cancer. They stop cell growth.

Many TKIs are angiogenesis inhibitors. Some block VEGF, VEGFR, or both.

Immunotherapy

The immune system has many on and off switches. Tumors take advantage of off switches. Immunotherapy can block these off switches, which helps turn the immune system back on.

Immunotherapy is used to treat stage 4 kidney cancer (with or without metastases) or cancer that has returned (relapsed). Sometimes, it's used after surgery to prevent the cancer from coming back.

Immune checkpoint inhibitors

Antibody therapy, or immune checkpoint inhibitors, are used to help the body fight cancer, infection, or other diseases. Antibodies are proteins made by the immune system that bind to specific markers on cells or tissues. Monoclonal antibodies (mAbs) are a type of antibody made in a lab.

There are 4 immunotherapy mAbs that are approved to treat kidney cancer. These include avelumab, ipilimumab, nivolumab, and pembrolizumab. All of these therapies block immune checkpoints and are referred to as immune checkpoint inhibitors.

For more information on checkpoint inhibitors and immunotherapy side effects, see *NCCN Guidelines for Patients: Immunotherapy Side Effects: Immune Checkpoint Inhibitors* at NCCN.org/patientguidelines and on the NCCN Patient Guides for Cancer app.



Clinical trials

You may also be able to receive treatment through a clinical trial. A clinical trial is a type of medical research study. After being developed and tested in a lab, potential new ways of treating cancer need to be studied in people.

If found to be safe and effective in a clinical trial, a drug, device, or treatment approach may be approved by the U.S. FDA.

Everyone with cancer should carefully consider all of the treatment options available for their cancer type, including standard treatments and clinical trials. Talk to your doctor about whether a clinical trial may make sense for you.

Phases

Most cancer clinical trials focus on treatment and are done in phases.

- **Phase 1** trials study the safety and side effects of an investigational drug or treatment approach.
- **Phase 2** trials study how well the drug or approach works against a specific type of cancer.
- **Phase 3** trials test the drug or approach against a standard treatment. If the results are good, it may be approved by the FDA.
- **Phase 4** trials study the safety and benefit of an FDA-approved treatment.



Finding a clinical trial

In the United States

NCCN Cancer Centers
NCCN.org/cancercenters

The National Cancer Institute (NCI)
cancer.gov/about-cancer/treatment/clinical-trials/search

Worldwide

The U.S. National Library of Medicine (NLM)
clinicaltrials.gov

Need help finding a clinical trial?

NCI's Cancer Information Service (CIS)
1.800.4.CANCER (1.800.422.6237)
cancer.gov/contact

Who can enroll?

It depends on the clinical trial's rules, called eligibility criteria. The rules may be about age, cancer type and stage, treatment history, or general health. They ensure that participants are alike in specific ways and that the trial is as safe as possible for the participants.

Informed consent

Clinical trials are managed by a research team. This group of experts will review the study with you in detail, including its purpose and the risks and benefits of joining. All of this information is also provided in an informed consent form. Read the form carefully and ask questions before signing it. Take time to discuss it with people you trust. Keep in mind that you can leave and seek treatment outside of the clinical trial at any time.

Will I get a placebo?

Placebos (inactive versions of real medicines) are almost never used alone in cancer clinical trials. It's common to receive either a placebo with a standard treatment, or a new drug with a standard treatment. You will be informed, verbally and in writing, if a placebo is part of a clinical trial before you enroll.

Are clinical trials free?

There's no fee to enroll in a clinical trial. The study sponsor pays for research-related costs, including the study drug. But you may need to pay for other services, like transportation or childcare, due to extra appointments. During the trial, you'll continue to receive standard cancer care. This care is often covered by insurance.

It's important to tell your care team about all side effects, including new or worsening symptoms, so they can be managed.

Supportive care

Supportive care is an important part of cancer care. The goal is to improve your quality of life during and after cancer treatment. Supportive care is for everyone with cancer and their families, not just for those at the end of life. It's also known as palliative care.

Supportive care includes a wide range of services. Supportive care prevents or manages the symptoms of cancer and the side effects of cancer treatment, like pain and cancer-related fatigue. It also addresses the mental, social, emotional, and spiritual concerns faced by people with cancer.

Supportive care provides help with additional needs, such as:

- Making treatment decisions
- Coordinating your care
- Paying for care
- Planning for advanced care and end of life

Read more about the types of support you may receive in *NCCN Guidelines for Patients: Palliative Care*, available at NCCN.org/patientguidelines and on the NCCN Patient Guides for Cancer app.

Side effects

Cancer treatment can cause unwanted health issues called side effects. Some side effects may be unpleasant. Others may be harmful to one's health. Side effects depend on many factors. These factors include the drug type and dose, length of treatment, and the person.

Some possible side effects of kidney cancer and its treatment are described next. They are listed in alphabetical order and not in order of importance.

Bone health

Kidney cancer may spread to your bones. This puts your bones at increased risk for injury and disease. 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.

You may receive medicine to relieve bone pain and manage low bone density. Some medicines work by slowing or stopping bone breakdown, while others help increase bone thickness. It's recommended that you take calcium and vitamin D with these bone health medicines. Talk to your care team before taking any over-the-counter supplements, vitamins, or medicines.

Bone metastases

Bone metastases might be treated with palliative radiation therapy. Medicine to support bone health and to prevent broken bones might also be given.

Distress

Depression, anxiety, and sleeping problems are common during cancer diagnosis and treatment. Talk to your care team and with those whom you feel most comfortable about how you are feeling. Support and counseling services are available.

Supportive care resources

More information on supportive care is available at NCCN.org/patientguidelines and on the NCCN Patient Guides for Cancer app.



Fatigue

Fatigue is a state of physical or mental tiredness that can feel like lack of energy, motivation, or stamina. Fatigue may be caused by cancer or it may be a side effect of treatment. Let your care team know how you are feeling and if fatigue is getting in the way of doing the things you enjoy. Eating a balanced diet, exercise, yoga, acupuncture, and massage therapy can help. You might be referred to a nutritionist or dietitian to help with fatigue.

Loss of appetite

Sometimes side effects from cancer or its treatment and the stress of having cancer might cause you to feel not hungry or sick to your stomach (nauseated). You might also have a sore mouth or difficulty swallowing.

Healthy eating is important during treatment. It includes eating a balanced diet, eating the right amount of food, and drinking enough fluids. A registered dietitian who is an expert in nutrition and food can help. Speak to your care team if you have trouble eating or maintaining weight.

Pain

Tell your care team about any pain or discomfort. You might meet with a palliative care specialist or with a pain specialist to manage pain. Some people may benefit from palliative radiation therapy or ablation therapy to help relieve pain caused by the tumor. During this treatment, a radiation beam is focused on the tumor.



Let us know what you think!

Please take a moment to complete an online survey about the NCCN Guidelines for Patients.
NCCN.org/patients/response

Key points

- A resectable tumor can be removed with surgery. An unresectable tumor can't be removed with surgery. Surgery is often the main or primary treatment for kidney cancer.
- Ablation is a type of treatment that uses extreme cold or heat, radio waves, microwaves, or chemicals to destroy cancer cells.
- Systemic (drug) therapy works throughout the body. It includes targeted therapy, immunotherapy, and chemotherapy. Chemotherapy is rarely used in the treatment of kidney cancer
- Radiation therapy uses high-energy x-rays, protons, photons, and other sources to kill cancer cells and shrink tumors.
- A clinical trial is a type of research that studies a treatment to see how safe it is and how well it works.
- Supportive care is health care that relieves symptoms caused by cancer or its treatment and improves quality of life.
- Cancer treatments can cause unwanted health issues called side effects. It's important for you to tell your care team about all of your side effects so they can be managed.

Questions to ask

- What is your experience treating kidney cancer?
- What treatment(s) do you recommend and why?
- How long will treatment last?
- What side effects can I expect from treatment?
- Is a clinical trial an option for me?

What's next?

Now that you've read about the different types of treatment and what to expect, the next chapter explains recommended treatment options for stages 1, 2, and 3 kidney cancer.

5

Stages 1, 2, and 3 kidney cancer

42 Stage 1 (T1a) kidney cancer

43 Stage 1 (T1b) kidney cancer

43 Stage 2 kidney cancer

44 Stage 3 kidney cancer

44 Follow-up care

44 After 5 years

45 Key points

45 Questions to ask

Kidney cancer confined to the kidney is usually treated with surgery. Depending on the cancer stage, active surveillance or ablation might be options. After treatment, you will have follow-up care.

Localized kidney cancer may be stage 1, 2, or 3. Localized kidney cancer is cancer that's found only in the kidney. Usually, localized kidney cancer is treated with surgery.

- **In a partial nephrectomy**, the tumor and tissue immediately surrounding the tumor are removed, leaving behind a still-functioning kidney.
- **In a radical nephrectomy**, the tumor with the whole kidney and the fatty tissue around the kidney are removed. The adrenal gland and nearby lymph nodes may also be removed.

Depending on the cancer stage, active surveillance, ablation, or radiation therapy might be an option. After treatment, you will have follow-up care. A follow-up plan will be based on your situation. Treatment options for stages 1, 2, and 3 can be found in **Guide 4**.

Stage 1 (T1a) kidney cancer

In stage 1 (T1a) cancer, the tumor is 4 cm or smaller and found only in the kidney. A partial nephrectomy is the preferred treatment option. Ablation, radiation therapy, and active surveillance are also options. A radical nephrectomy would be used only in some cases. After treatment with surgery, ablation, or radiation therapy, you will have tests to look for any new tumors or the return of cancer.

During active surveillance

People with tumors smaller than 2 cm are ideal candidates for active surveillance due to the low likelihood that the tumor will spread during observation. This may also be a good option for smaller tumors that are primarily cystic (fluid filled).

Active surveillance includes:

- Physical exam and health history every year
- Blood and urine tests, as needed
- Abdomen CT or MRI with and without contrast within 6 months of starting surveillance, then CT, MRI, or ultrasound at least every year
- A chest x-ray or CT every year as needed to look for lung metastases
- Other tests as needed based on symptoms, side effects, and other health concerns

Active surveillance is sometimes called watch and wait. You will likely start treatment if the tumor grows or changes.

Stage 1 (T1b) kidney cancer

In stage 1b cancer, the tumor is larger than 4 cm but not larger than 7 cm and found only in the kidney. Treatment options include a partial nephrectomy, radical nephrectomy, or radiation therapy. Active surveillance or ablation might be an option in certain cases. After treatment, you will enter surveillance.

Stage 2 kidney cancer

In stage 2 cancer, the tumor is larger than 7 cm and found only in the kidney. Treatment is a partial or radical nephrectomy. In some select patients, radiation therapy may also be an option. Treatment after surgery or radiation therapy might include surveillance or pembrolizumab.

Guide 4
Primary treatment options based on cancer stage (listed in order of preference)

Stage 1 (T1a)	• Partial nephrectomy (preferred) • Ablation • Stereotactic body radiation therapy • Active surveillance • Radical nephrectomy (in some cases)	→	Followed by surveillance
Stage 1 (T1b)	• Partial nephrectomy • Radical nephrectomy • Active surveillance (in some cases) • Ablation (in some cases) • Stereotactic body radiation therapy	→	Followed by surveillance
Stage 2	• Partial nephrectomy • Radical nephrectomy • Stereotactic body radiation therapy (in some cases)	→	Followed by • Surveillance • Pembrolizumab (for grade 4 clear cell tumors with or without sarcomatoid features)
Stage 3	• Radical nephrectomy • Partial nephrectomy, as needed	→	Followed by • If clear cell, then Pembrolizumab or surveillance • If non-clear cell, then surveillance or clinical trial

Stage 3 kidney cancer

In stage 3 kidney cancer, the tumor has grown outside of the kidney into nearby veins and tissues but has not grown into the adrenal gland or beyond Gerota's fascia. Cancer hasn't spread to distant sites. Stage 3 kidney cancer is treated with a radical nephrectomy. A partial nephrectomy or radiation therapy might be an option in certain cases. Treatment after surgery might include pembrolizumab, surveillance, or a clinical trial.

Follow-up care

After treatment, you will have follow-up care, also called surveillance. Follow-up care includes regular physical exams, health history, and blood, urine, and imaging tests. Other tests might be ordered if you have symptoms or as needed. People with hereditary RCC will likely need lifelong follow-up care. More information on hereditary RCC can be found in *Chapter 7: Hereditary RCC.*

After 5 years

Long-term follow-up care will include a physical exam and health history. Other tests, including imaging, blood, and urine tests, may be ordered if you have any symptoms. The goal of care is to monitor kidney function and watch for cancer return or metastatic disease.

Active surveillance happens before treatment.

Surveillance, or follow-up care, happens after treatment.

"You'll get through this! It may take a long time to heal, so be patient and do one day at a time. There are many resources and survivors that are available, just reach out when you're ready. I was not a group person, but I found the conversations, either as a group or one-on-one, extremely beneficial."

Key points

- In stage 1a cancer, the tumor is 4 cm or smaller and found only in the kidney.
- In stage 1b cancer, the tumor is larger than 4 cm but not larger than 7 cm and found only in the kidney.
- In stage 2 kidney cancer, the tumor is larger than 7 cm and found only in the kidney. In stage 2A, the tumor is 7 cm to 10 cm in diameter. In stage 2B, the tumor is larger than 10 cm.
- In stage 3 kidney cancer, the tumor has grown outside of the kidney into nearby veins and tissues but has not grown into the adrenal gland or beyond Gerota's fascia. Cancer has not spread to distant sites.
- For high-grade stage 2 RCC or stage 3 RCC, treatment after surgery will be given.
- Follow-up care will include a physical exam and health history, along with imaging, blood, and urine tests. The goal of follow-up care is to monitor kidney function and watch for cancer return or metastatic disease. People with hereditary RCC will likely need lifelong follow-up care.

Questions to ask

- What stage is my kidney cancer?
- What treatment do you recommend and why?
- How can I prepare for treatment?
- Will I have surgery? If so, what will be removed during surgery?
- How long will it take to me to recover from surgery?

What's next?

The next chapter explains recommended treatment options for stage 4 kidney cancer and kidney cancer that has returned or progressed.

6

Stage 4 kidney cancer and kidney cancer recurrence

47 Stage 4 kidney cancer

48 Kidney cancer recurrence

50 Follow-up care

50 Disease progression

52 Key points

52 Questions to ask

This chapter discusses treatment options for stage 4 kidney cancer and kidney cancer that has returned or progressed. In metastatic disease, kidney cancer has spread to distant sites in the body. Not all stage 4 kidney cancers are metastatic. Non-metastatic stage 4 kidney cancer is called advanced renal cell carcinoma.

Stage 4 kidney cancer

In stage 4 kidney cancer, the tumor has grown outside of the kidney and Gerota's fascia and/or has spread to a distant site. Kidney cancer that has spread to a distant site is called metastatic renal cell carcinoma (RCC). Not all stage 4 kidney cancers are metastatic. Non-metastatic stage 4 kidney cancer is called advanced RCC.

Treatment for stage 4 kidney cancer is based on your symptoms. If there are metastases, treatment will be based on the number and location of metastases. A biopsy might be taken of one or more of these metastases.

Surgery

If surgery is an option, then you might have a nephrectomy followed by pembrolizumab or surveillance. A clinical trial is an option for non-clear cell RCC.

For metastatic disease, you might have a cytoreductive nephrectomy. In a cytoreductive nephrectomy, all or part of the kidney with the tumor is removed. When there are many metastases, it isn't always possible to remove all emoving the primary tumor may improve how well other treatments work against the remaining cancer and metastases. A cytoreductive nephrectomy is usually followed by targeted therapy and/or immunotherapy. Systemic therapy options are the same as those used to treat kidney cancer recurrence found in the following sections.

"Just find joy and have good friends and family. Stay positive. Listen to other people's stories. Reach out to support groups. It's a journey and you just keep the faith and the hope—that's the most important part."



Treatment options are based on if your cancer is clear cell RCC or non-clear cell RCC.

Systemic therapy

If you didn't have surgery, then a sample of the tumor (biopsy) will be taken and tested to determine if your cancer is a clear cell or non-clear cell subtype. Subtype affects systemic therapy options, which can be found in the next section on *Kidney cancer recurrence.*

Kidney cancer recurrence

Recurrence or relapse is the return of cancer. Before starting treatment, a sample of your tumor (biopsy) will be tested to determine if the cancer is a clear cell or non-clear cell subtype. When kidney cancer cells form new tumors in other parts of the body, it's referred to as metastatic disease. A biopsy might be taken of one or more of these metastases.

Systemic therapy options are based on your risk factors, whether you have had any systemic therapy after surgery before, and your type of RCC. Prognostic risk factors help estimate the chance that cancer will return after treatment and length of survival. These risk factors include overall performance status (activity level), blood test results, and the time from primary surgery to metastatic disease.

- If a person with metastatic RCC has no risk factors, they are considered favorable risk.
- If a person has 1 to 2 risk factors, they are considered intermediate risk.
- People with 3 or more risk factors are considered poor risk.
- Treatment options for kidney cancer that has returned is explained next.

Clear cell RCC

Treatment options for clear cell RCC that has returned include:

- Clinical trial
- First-line systemic therapy
- For oligometastatic disease, metastasectomy, stereotactic body radiation therapy (SBRT), or ablation
- Metastasectomy with complete resection of disease, followed by adjuvant pembrolizumab within 1 year of a nephrectomy and best supportive care

First-line therapies are the initial systemic treatments given for metastatic RCC. Options are based on whether you have had any systemic therapy before and your overall health, including other medical conditions and prognostic risk factors. First line-systemic therapy options for clear cell RCC can be found in **Guide 5**.

Non-clear cell RCC

Treatment options for non-clear cell RCC that has returned include:

- Clinical trial (preferred)
- Systemic therapy
- For oligometastatic disease, metastasectomy, SBRT, or ablation
- Best supportive care

Best supportive care is used to relieve symptoms caused by cancer or cancer treatment and improve quality of life.

Guide 5
First-line systemic therapy options: Clear cell RCC

Preferred therapies	Favorable risk: • Axitinib plus Pembrolizumab • Cabozantinib plus Nivolumab • Ipilimumab plus Nivolumab • Lenvatinib plus Pembrolizumab	Intermediate or poor risk: • Axitinib plus Pembrolizumab • Cabozantinib plus Nivolumab • Ipilimumab plus Nivolumab • Lenvatinib plus Pembrolizumab • Cabozantinib
Other recommended therapies	Favorable risk: • Axitinib plus Avelumab • Pazopanib • Sunitinib • Cabozantinib	Intermediate or poor risk: • Axitinib plus Avelumab • Pazopanib • Sunitinib
Therapies used in certain cases	Favorable risk: • Active surveillance • Axitinib	Intermediate or poor risk: • Axitinib

First-line systemic therapy options for non-clear cell RCC can be found in **Guide 6**.

Follow-up care

After treatment for stage 4 kidney cancer or kidney cancer recurrence, you'll have follow-up care to monitor your health. Follow-up care will include blood and imaging tests. It'll be based on your treatment, side effects, health issues, symptoms, and subtype of kidney cancer.

First, you'll have a baseline imaging test. 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.

Disease progression

When cancer grows or spreads, it's called disease progression. When first-line systemic therapy doesn't stop the growth or spread of cancer, then more lines of therapy might be given. Treatment is based on the type of systemic therapy you had before and your overall health, including other medical conditions.

Treatment options for cancer that has progressed include:

- Clinical trial (preferred)
- Next-line systemic therapy
- For oligometastatic disease, metastasectomy, SBRT, or ablation
- Best supportive care

Guide 6
Systemic therapy options: Non-clear cell RCC

Preferred therapies	• Clinical trial • Cabozantinib	• Cabozantinib plus Nivolumab • Lenvatinib plus Pembrolizumab
Other recommended therapies	• Erlotinib plus Bevacizumab for some people with advanced papillary RCC, including hereditary leiomyomatosis and renal cell cancer (HLRCC)-associated RCC	• Everolimus, Lenvatinib • Nivolumab • Pembrolizumab • Sunitinib
Therapies used in certain cases	• Axitinib • Everolimus plus Bevacizumab	• Everolimus • Ipilimumab plus Nivolumab

Supportive care is 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. It may include surgery, systemic, 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.

Clear cell

Next-line or subsequent therapies are those given after first-line therapies. You will have a different drug therapy than before. Next-line systemic therapy options for clear cell RCC that has progressed can be found in **Guide 7**.

Non-clear cell

Next-line systemic therapy options for non-clear cell RCC that has progressed can be found in **Guide 6**.

Guide 7
Next-line systemic therapy options: Clear cell RCC

Recommended therapies	No prior immunotherapy: • Axitinib plus Pembrolizumab • Cabozantinib • Cabozantinib plus Nivolumab • Everolimus, Lenvatinib • Ipilimumab plus Nivolumab • Lenvatinib plus Pembrolizumab • Nivolumab	Prior immunotherapy: • Axitinib • Belzutifan • Cabozantinib • Everolimus, Lenvatinib • Tivozanib
Therapies used in certain cases	No prior immunotherapy: • Axitinib • Everolimus • Lenvatinib • Pazopanib • Sunitinib • Tivozanib • Belzutifan • Bevacizumab	Prior immunotherapy: • Everolimus • Ipilimumab plus Nivolumab • Lenvatinib • Pazopanib • Sunitinib • Axitinib plus Pembrolizumab • Bevacizumab • Cabozantinib plus Nivolumab • Lenvatinib plus Pembrolizumab

Key points

- In stage 4 kidney cancer, the tumor has grown outside of the kidney and Gerota's fascia and/or has spread to a distant site.
- Kidney cancer that has spread to a distant site is called metastatic RCC. Not all stage 4 kidney cancer is metastatic. Non-metastatic stage 4 kidney cancer is called advanced RCC.
- Treatment for stage 4 kidney cancer is based on your symptoms and clear cell or non-clear cell subtype. If there are metastases, treatment will be based on the number and location of metastases.
- Follow-up testing will look for kidney cancer recurrence or disease progression.
- Prognostic risk factors help estimate the risk of cancer recurrence and survival. These factors include overall performance status (activity level), blood test results, and the time from primary surgery to metastatic disease.
- Supportive care is 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. It may include radiation therapy, surgery, systemic therapy, or other treatments.

Questions to ask

- What treatment do you recommend and why?
- Does the treatment order matter?
- How long will treatment last?
- What can I expect from treatment?
- Is a clinical trial an option for me?

What's next?

In the next chapter, you'll learn about several inherited conditions that can put a person at increased risk for developing kidney cancer. Together, these conditions are called hereditary renal cell carcinoma.

7
Hereditary RCC

54 Overview of HRCC

56 Screening for HRCC

57 Treatment for HRCC

61 Key points

61 Questions to ask

Certain genetic conditions passed down from birth parent to child can increase risk for developing kidney cancer. Hereditary renal cell carcinoma (HRCC) is kidney cancer caused by a hereditary syndrome. Most people with confirmed HRCC are treated with kidney-sparing surgery. Other options might include ablation or systemic therapy depending on the type of HRCC.

Overview of HRCC

Kidney cancer often occurs for unknown reasons. Some people have genetic health conditions that increase the risk for developing kidney cancer. These conditions are called hereditary renal cell carcinoma (HRCC) syndromes and can be passed down from birth parent to child.

HRCC syndrome types include:

- Von Hippel-Lindau (VHL) disease
- Hereditary papillary renal carcinoma (HPRC)
- Birt-Hogg-Dubé syndrome (BHDS)
- Tuberous sclerosis complex (TSC)
- Hereditary leiomyomatosis and renal cell cancer (HLRCC)
- *BAP1* tumor predisposition syndrome (*BAP1*-TPDS)
- Hereditary paraganglioma/ pheochromocytoma (PGL/PCC) syndrome

“This journey has opened my eyes and changed the way I see life, strength, and community. If you’re in your own fight, know this—you don’t have to do it alone.”



HRCC is the result of mutations in DNA passed down from birth parent to child. People with HRCC have a higher risk for developing kidney cancer and possibly other cancers not related to the kidney. HRCC accounts for only a small portion of kidney cancer cases. People with hereditary RCC who were treated for kidney cancer will likely need lifelong follow-up care.

For more information on HRCC, see **Guide 8**.

Guide 8
Hereditary RCC syndrome types

Syndrome name	Gene mutation	RCC type
von Hippel-Lindau (VHL) disease	*VHL* gene	Clear cell
Hereditary papillary renal carcinoma (HPRC)	*MET* gene	Papillary
Birt-Hogg-Dubé syndrome (BHDS)	*FLCN* gene	Chromophobe, hybrid oncocytic tumors, clear cell, oncocytomas, angiomyolipomas, papillary RCC
Tuberous sclerosis complex (TSC)	*TSC1* and *TSC2* genes	Angiomyolipoma (and other PEComas), renal cysts, eosinophilic solid and cystic RCC, RCC with fibromyomatous stroma, eosinophilic vacuolated tumor, low-grade oncocytic tumor, clear cell
Hereditary leiomyomatosis and renal cell cancer (HLRCC)	*FH* gene	HLRCC-associated RCC or FH-deficient RCC
***BAP1* tumor predisposition syndrome (*BAP1*-TPDS)**	*BAP1* gene	Clear cell
Hereditary paraganglioma/ pheochromocytoma (PGL/PCC) syndrome	*SDHA*, *SDHB*, *SDHC*, and *SDHD* genes	SDH-deficient RCC

Screening for HRCC

Screening is a way to monitor people with HRCC for signs of kidney tumors and kidney cancer. Imaging tests (MRI or CT scan) of the kidneys will be done on a regular basis for people who have a confirmed diagnosis of HRCC but don't have kidney cancer. An MRI of the abdomen is preferred.

Specialists might be involved in screening depending on your type of HRCC. If tumors are found on imaging, you'll have imaging tests more often based on growth rate and size of the tumor(s). If you're planning a pregnancy, then you should consider kidney imaging scans before pregnancy.

Guide 9
Hereditary RCC screening time frames and possible specialists involved

Syndrome	Recommended screening	Other specialists involved
***BAP1*-TPDS**	Abdomen MRI (preferred) or CT every 2 years starting at age 30	• Neurosurgery • Ophthalmology • Audiology • Endocrinology • Endocrine surgery
BHDS	Abdomen MRI (preferred) or CT every 3 years starting at age 20	• Nephrology
HLRCC	Abdomen MRI (preferred) or CT every year starting at age 8 to 10	• Pulmonology • Dermatology
HPRC	Abdomen MRI (preferred) or CT every 1 to 2 years starting at age 30	• Neurology • Dermatology
PGL/PCC	Abdomen MRI (preferred) or CT every 2 years starting at age 12	• Gynecology • Dermatology
TSC	Abdomen MRI (preferred) or CT every 1 to 3 years starting at age 12	• Dermatology • Ophthalmology • Thoracic oncology
VHL disease	Abdomen MRI (preferred) or CT of kidneys, pancreas, and adrenals every 2 years starting at age 15	• Endocrine • Endocrine surgery

The recommended screening time frames based on age can be found in **Guide 9**.

Treatment for HRCC

Most people with confirmed HRCC who have kidney cancer are treated with kidney-sparing surgery (partial nephrectomy). Other options might include ablation or systemic therapy depending on the type of HRCC. If possible, seek treatment with a doctor or at a hospital that's experienced in your type of HRCC. After treatment, you will likely need lifelong follow-up care.

The following HRCC syndromes are listed in alphabetical order.

BAP1-TPDS

BAP1 tumor predisposition syndrome (*BAP1*-TPDS) is caused by mutations in the *BAP1* gene and is associated with increased risks for uveal (eye) and skin melanoma, mesothelioma, and RCC. People who have malignant early-stage tumors without aggressive feature should have surgery. A partial nephrectomy can be considered. For larger tumors and tumors with aggressive features (such as high grade or sarcomatoid), a radical nephrectomy should be considered.

Birt-Hogg-Dubé syndrome

Birt-Hogg-Dubé syndrome (BHDS) is associated with multiple non-cancerous (benign) skin tumors, lung cysts, and an increased risk of kidney lesions (cysts, benign tumors, and kidney cancer). When possible, a partial nephrectomy is the treatment of choice for kidney tumors. A person may have multiple tumors during their lifetime and, therefore, might have more than one surgery. This will be taken into consideration. Ablation may be an option if surgery isn't possible or is the best choice for your situation.

Hereditary leiomyomatosis and RCC

Hereditary leiomyomatosis and renal cell cancer (HLRCC) increases the risk for developing multiple smooth muscle tumors (leiomyomas) in the skin and uterus (fibroids), as well as an aggressive form of papillary kidney cancer. Since HLRCC tumors can be aggressive, surveillance isn't recommended once tumors become visible on scans. A total radical nephrectomy should be considered.

For systemic therapy focused on treating kidney tumors, see **Guide 10**.

Guide 10
Kidney-focused systemic therapy

HLRCC	Other recommended therapy • Erlotinib plus Bevacizumab
	Therapy used in certain cases • Cabozantinib plus Nivolumab
TSC	Preferred therapy • Everolimus
	Other recommended therapy • Sirolimus
VHL disease	Preferred therapy • Belzutifan
	Therapy used in certain cases • Pazopanib

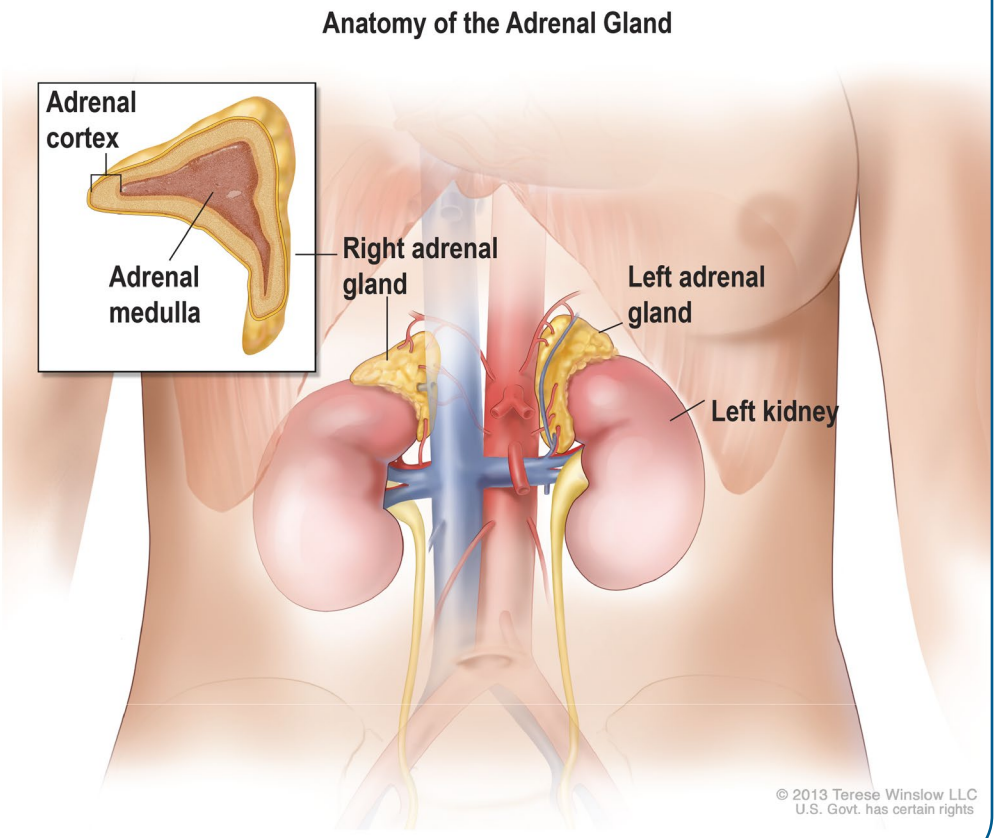
Hereditary papillary renal carcinoma

Hereditary papillary renal carcinoma (HPRC) increases the risk of a type of kidney cancer known as papillary type 1 kidney cancer.

Mutations in the MET gene cause abnormal cells to grow and spread in the body. People with HPRC have an increased risk of multiple kidney tumors in one or both kidneys. Currently, surgery is the primary treatment method when a tumor becomes larger than 3 cm. When possible, a partial nephrectomy is the treatment of choice. Ablation is also an option. A person may have multiple tumors during their lifetime and, therefore, might need more than one surgery. This will be taken into consideration when treatment is being planned.

Hereditary paraganglioma-pheochromocytoma syndromes

Pheochromocytomas are a type of paraganglioma that's confined to the adrenal gland, a small hormone-producing organ located on top of each kidney.



Hereditary paraganglioma/ pheochromocytoma syndrome

Hereditary paraganglioma-pheochromocytoma (PGL/PCC) syndrome is characterized by:

- **Paragangliomas** – tumors that arise from neuroendocrine tissues found along the spine from the base of the skull to the pelvis.
- **Pheochromocytomas** – a type of paraganglioma that's confined to the adrenal gland, a small hormone-producing organ located on top of each kidney.

Paragangliomas and pheochromocytomas can occur in individuals with other inherited disorders, such as von Hippel-Lindau syndrome.

People with malignant early-stage tumors without aggressive features should undergo surgery. A partial nephrectomy can be considered. For larger tumors and tumors with aggressive features (such as high grade or sarcomatoid), a radical nephrectomy should be considered.

Tuberous sclerosis complex

Tuberous sclerosis complex (TSC) is characterized by the growth of numerous non-cancerous (benign) tumors in many parts of the body. These tumors can occur in the skin, brain, kidneys, and other organs. Almost everyone with TSC has skin abnormalities. Kidney tumors are common in people with TSC. A partial nephrectomy is the treatment of choice for malignant (cancerous) kidney tumors, when possible. Ablation is also an option.

Renal angiomyolipoma is a benign lesion associated with TSC and is managed separately.

For systemic therapy focused on treating kidney tumors, see **Guide 10**.

Von Hippel-Lindau disease

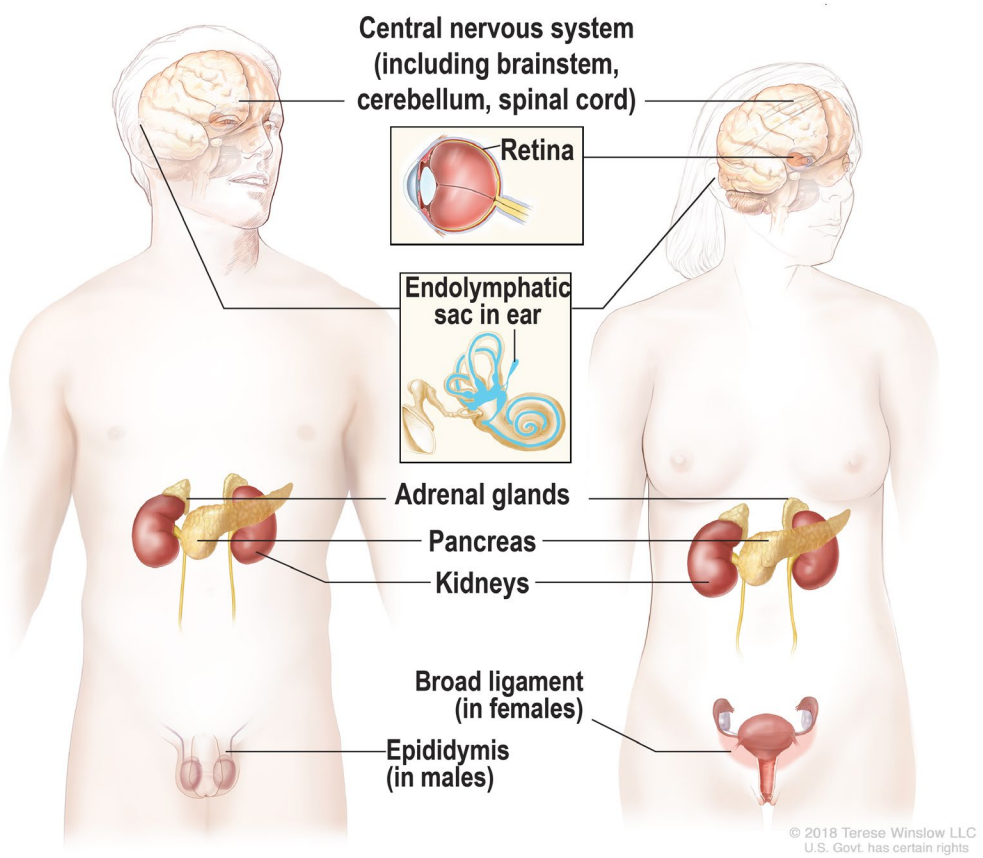
In von Hippel-Lindau (VHL) disease, a mutation in the *VHL* gene causes tumors and cysts to grow in certain areas of the body and increases the chance of developing kidney cancer and other cancers. The goal of treatment is to intervene at a time when there will be the most benefit and to limit the chance of developing metastatic kidney cancer. You should be referred to a hospital or cancer center with surgical expertise in complex partial nephrectomies and management of VHL disease.

Surgery has been the main treatment when a tumor approaches 3 cm in size. A person may have multiple tumors during their lifetime and, therefore, might have more than one surgery. This will be taken into consideration when planning treatment. Ablation may be an option if surgery isn't possible.

For systemic therapy focused on treating kidney tumors, see **Guide 10**.

Von Hippel-Lindau

In von Hippel-Lindau disease, a mutation in the *VHL* gene causes tumors and cysts to grow in certain areas of the body and increases the chance of developing kidney cancer.



Key points

- Kidney cancer related to an inherited syndrome is called hereditary renal cell carcinoma (HRCC). There are several conditions, called syndromes, that cause HRCC.
- HRCC is caused by mutations in specific genes. The mutations can cause kidney cancer and other cancers.
- Screening is a way to monitor people with HRCC for signs of kidney tumors and kidney cancer. Imaging tests will be done on a regular basis for people who have a confirmed diagnosis of HRCC but don't have kidney cancer.
- Seek treatment with a doctor or hospital that's experienced in your type of HRCC.
- Most people with confirmed HRCC are treated with kidney-sparing surgery (partial nephrectomy). Other options might include ablation or systemic therapy depending on the type of HRCC.
- After treatment, people with HRCC will likely need lifelong follow-up care.

Questions to ask

- Do I have an inherited condition that puts me at risk for developing kidney tumors or kidney cancer?
- If I have an inherited condition, should my close blood relatives see their doctor more often or have genetic testing?
- How often should I see my doctor to test for any changes in my condition? Should I see a kidney specialist (nephrologist) or another specialist?
- Who will manage my screening tests and remind me of these screenings?
- What other cancer prevention screenings do I need in addition to these screenings? Who will coordinate all the screenings?

What's next?

The next chapter provides information about resources and where you can get support.

8
Other resources

63 What else to know

63 What else to do

63 Where to get help

64 Questions to ask

Want to learn more? Here's how you can get additional help.

What else to know

This guide helps you know your options so you can make informed decisions and improve your cancer care. But it's not the only resource that you have.

Ask for as much information and help as you need. Many people are interested in learning more about:

- Finding an oncologist or surgeon who's an expert in kidney cancer
- Making treatment decisions
- The details of treatment and possible side effects
- Getting financial help
- Coping with cancer treatment and other health challenges

What else to do

Your health care center can help you with next steps. It often has on-site resources to help meet your needs and find answers to your questions. Health care centers can also inform you of resources in your community.

In addition to help from your providers, the resources listed in the next section provide support for many people like yourself.

Where to get help

Look through the list below and visit the provided websites to learn more about these organizations.

Cancer*Care*
Cancercare.org

Cancer Hope Network
cancerhopenetwork.org

GRACE
cancergrace.org

Imerman Angels
imermanangels.org

International Kidney Cancer Coalition
ikcc.org

KidneyCAN
kidneycan.org

Kidney Cancer Association
kidneycancer.org

My Faulty Gene
Myfaultygene.org

Triage Cancer
triagecancer.org

Questions to ask

- Who can I talk to about help with housing, food, and other basic needs?
- What help is available for transportation, childcare, and home care?
- What other services are available to me and my caregivers?
- How can I connect with others and build a support system?
- Who can I talk to if I don't feel safe at home, at work, or in my neighborhood?

When I was first diagnosed, I wanted to learn all I could so I could advocate for myself. Not everyone has experience treating kidney cancer. Just be sure to go to reputable sources for information."



We want your feedback!

Our goal is to provide helpful and easy-to-understand information on cancer. Take our survey to let us know what we got right and what we could do better.
NCCN.org/patients/feedback



Words to know

ablation
Treatment that uses extreme cold, extreme heat, radio waves, microwaves, or chemicals to destroy cancer cells.

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

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

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

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. Also called palliative care or supportive care.

biopsy
The removal of a sample of tissue for testing.

biosimilar
A drug that's very much like one that has been approved by the U.S. FDA. It must be used in the exact same way and at the same dose as the other drug.

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

cancer burden
The amount or extent of cancer in the body.

cancer stage
A rating of the growth and spread of cancer.

carcinoma
A cancer of cells that line the inner or outer surfaces of the body.

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

clinical stage (c)
Rating the extent of a tumor based on tests before treatment is started.

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

collecting duct RCC (cdRCC)
Subtype of renal cell carcinoma (RCC) based on how the cancer cells look when viewed with a microscope.

computed tomography (CT)
A test that combines many x-rays to make pictures of the inside of the body.

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

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

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

gene
Coded instructions in cells for making new cells and controlling how cells behave.

Gerota's fascia
The outer layer of fibrous tissue that surrounds the kidney.

hereditary
Passed down from biological parent to child through genes.

histology
The structure of cells, tissue, and organs as viewed under a microscope.

imaging test
A test that makes pictures (images) of the insides of the body.

immune system
The body's natural defense against infection and disease.

immunotherapy
A treatment with drugs that helps the body find and destroy cancer cells.

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.

lymph node
A small, bean-shaped structure that contains disease-fighting cells.

lymph node dissection
Surgery that removes some lymph nodes.

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

mammalian target of rapamycin (mTOR)
A protein in cells that sends chemical signals for cell growth and survival.

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

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

minimally invasive procedure
A procedure that uses small incisions or a tool placed into the opening of the body to reduce damage to body tissue.

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.

mTOR kinase 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.

mutation
An abnormal change.

nephrectomy
Surgery that removes a kidney.

non-clear cell RCC (nccRCC)
Subtypes of renal cell carcinoma (RCC) 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 called supportive care.

palliative nephrectomy
Surgery to remove the kidney to relieve symptoms caused by cancer.

palliative surgery
Surgery to relieve symptoms caused by the cancer.

papillary RCC (PRCC)
Most common type of non-clear cell RCC.

partial nephrectomy
Surgery to remove a tumor with part of the kidney.

pathological staging (p)
A rating of the extent of cancer given after examining tissue removed during surgery.

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 course and outcome of a disease based on tests.

progression
The growth or spread of cancer after being tested or treated.

radiation therapy (RT)
A treatment that uses high-energy rays.

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.

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

recurrence
The return of cancer after a cancer-free period. Also called 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 though 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.

resectable
Cancer that can be removed with surgery.

resection
Surgery to remove a tumor.

side effect
An unhealthy or unpleasant physical or emotional response to treatment.

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.

supportive care
Health care that includes symptom relief but not cancer treatment. Also called palliative care or best supportive care.

surveillance
Monitoring for the return of cancer.

systemic therapy
Drug treatment that works throughout the body.

targeted therapy
A drug treatment that targets and attacks specific cancer cells.

tumor
An abnormal mass of cells.

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

tyrosine kinase inhibitor (TKI)
A targeted therapy 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 insides of the body.

unresectable
Cancer that can't be removed by surgery.

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 of 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's made up of the kidneys, ureters, bladder, and urethra.

urologist
A doctor who is an expert in treating diseases of the urinary system in both sexes and sex organs in those assigned male at birth.

vascular endothelial growth factor (VEGF)
A protein that binds to cells that form blood vessels.

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

von Hippel-Lindau (VHL) disease
VHL gene helps control cell growth, cell division, and other important cell functions.

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Notes

Index

ablation 27

active surveillance 27, 42

adrenalectomy 31

adrenal gland 6, 19, 31, 58

***BAP1* tumor predisposition syndrome (*BAP1*-TPDS)** 57

biomarkers 15

biopsy 14

Birt-Hogg-Dubé syndrome (BHDS) 57

cancer stages 18–22, 42–44, 47

clear cell RCC 5, 23, 48–49, 51

clinical trials 36–37

cytoreductive nephrectomy 31

cytoreductive surgery 32

distress 11, 38

genetic testing 15

Gerota's fascia 6, 19

hereditary papillary renal carcinoma (HPRC) 58

hereditary paraganglioma/ pheochromocytoma (PGL/PCC) 58–59

hereditary leiomyomatosis and renal cell cancer (HLRCC) 57

hereditary renal cell carcinoma (HRCC) 15, 54–60

hereditary predisposition 15, 54–60

imaging tests 12–14

immunotherapy 33, 35, 51

kidney anatomy 6–7, 19, 22

kidney function 7

kidney-sparing surgery 29–30

lymph nodes 21–22

lymph node dissection 31

metastasectomy 32

metastasis 14, 19, 21–22, 32, 38

mutation 15, 55, 57–58, 60

nephrectomy 29–31, 42

non-clear cell RCC 5, 23, 49–51

oligometastases 32

papillary renal cell carcinoma (PRCC) 23, 57

partial nephrectomy 29–30, 42

performance status 11

radiation therapy 33

radical nephrectomy 30–31, 42

renal artery 7

renal cell carcinoma (RCC) 5, 23, 56

renal tubules 5, 7–8, 22

renal vein 7–8

sarcomatoid features 23

side effects 38–39

stereotactic body radiation therapy (SBRT) 33

supportive (palliative) care 37, 51

surgery 27–32, 47

surveillance (follow-up care) 44, 50

systemic therapy 33–35, 48–51

targeted therapy 33–35

TNM scores 20–21

tyrosine kinase inhibitor (TKI) 34

tuberous sclerosis complex (TSC) 59

tumor testing 15

urine tests 11–12

von Hippel-Lindau (VHL) disease 60



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