Kidney Cancer Early Detection, Diagnosis, and Staging

Know the signs and symptoms of kidney cancer. Find out how kidney cancer is tested for, diagnosed, and staged.

Detection and Diagnosis

Catching cancer early often allows for more treatment options. Some early cancers may have signs and symptoms that can be noticed, but that is not always the case.

- Can Kidney Cancer Be Found Early?
- Kidney Cancer Signs and Symptoms
- Tests for Kidney Cancer

Stages and Outlook (Prognosis)

After a cancer diagnosis, staging provides important information about the extent of cancer in the body and anticipated response to treatment.

- Kidney Cancer Stages
- Survival Rates for Kidney Cancer

Questions to Ask About Kidney Cancer

Here are some questions you can ask your cancer care team to help you better understand your cancer diagnosis and treatment options.

- Questions to Ask About Kidney Cancer
Can Kidney Cancer Be Found Early?

- For people at average risk of kidney cancer
- For people at increased risk of kidney cancer

Many kidney cancers are found fairly early, while they are still limited to the kidney, but others are found at a more advanced stage. There are a few reasons for this:

- These cancers can sometimes grow quite large without causing any pain or other problems.
- Because the kidneys are deep inside the body, small kidney tumors cannot be seen or felt during a physical exam.
- There are no recommended screening tests for kidney cancer in people who are not at increased risk. This is because no test has been shown to lower the overall risk of dying from kidney cancer.

For people at average risk of kidney cancer

Some tests can find some kidney cancers early, but none of these is recommended to screen for kidney cancer in people at average risk.

A routine urine test (urinalysis), which is sometimes part of a complete medical checkup, may find small amounts of blood in the urine of some people with early kidney cancer. But many things other than kidney cancer cause blood in the urine, including urinary tract infections, bladder infections, bladder cancer, and benign (non-cancerous) kidney conditions such as kidney stones. Sometimes people with kidney cancer do not have blood in their urine until the cancer is quite large and might have spread to other parts of the body.

Imaging tests such as computed tomography (CT) scans and magnetic resonance imaging (MRI) scans can often find small kidney cancers, but these tests are expensive. Ultrasound is less expensive and can also detect some early kidney cancers. One problem with these tests is that they can’t always tell benign tumors from small renal cell carcinomas.

Often, kidney cancers are found by accident during imaging tests for some other illness or symptom. These cancers usually are not causing pain or other symptoms when they
are found. The survival rate for these kidney cancers is very high because they are usually found at a very early stage.

**For people at increased risk of kidney cancer**

People who have certain *inherited conditions*\(^2\), such as von Hippel-Lindau disease, have a higher risk of kidney cancer. Doctors often recommend that these people get regular imaging tests such as CT, MRI, or ultrasound scans at younger ages, to look for kidney tumors. Kidney cancers that are found early with these tests can often be cured.

It is important to tell your doctor if any of your family members (blood relatives) has or had kidney cancer, especially at a younger age, or if they have been diagnosed with an inherited condition linked to this cancer, such as von Hippel-Lindau disease. Your doctor may recommend that you consider genetic counseling and testing to see if you have the condition.

Before having genetic tests, it’s important to talk with a genetic counselor so that you understand what the tests can and can’t tell you, and what any results would mean. Genetic tests look for the gene mutations that cause these conditions in your DNA. They are used to diagnose these inherited conditions, not kidney cancer itself. Your risk may be increased if you have one of these conditions, but it does not mean that you have (or definitely will get) kidney cancer. For more information on genetic testing, see [Genetics and Cancer\(^3\)](https://www.cancer.org/cancer/genetics-and-cancer.html).

Some doctors also recommend that people with kidney diseases treated by long-term dialysis or those who have had radiation to their kidney in the past have regular tests to look for kidney cancer.

**Hyperlinks**


**References**

Correa AF, Lane BR, Rini BI, Uzzo RG. Ch 66 - Cancer of the kidney. In: DeVita VT,
Early kidney cancers usually do not cause any signs or symptoms, but larger ones might. Some possible signs and symptoms of kidney cancer include:

- Blood in the urine (hematuria)
- Low back pain on one side (not caused by injury)
- A mass (lump) on the side or lower back
- Fatigue¹ (tiredness)
- Loss of appetite²
- Weight loss³ not caused by dieting
- Fever that is not caused by an infection and that doesn’t go away
- Anemia⁴ (low red blood cell counts)

These signs and symptoms can be caused by kidney cancer (or another type of cancer), but more often they are caused by other, benign, diseases. For example, blood in the urine is most often caused by a bladder or urinary tract infection or a kidney stone. Still, if you have any of these symptoms, see a doctor so that the cause can be found and treated, if needed.
Hyperlinks


References


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Tests for Kidney Cancer

- Medical history and physical exam
- Blood tests
- Urinalysis (urine testing)
- Imaging tests to look for kidney cancer
Kidney biopsy

Kidney cancer might be found because of signs or symptoms a person is having, or it might be found because of lab tests or imaging tests a person is getting for another reason. The actual diagnosis of kidney cancer is made by looking at a sample of kidney cells in the lab or sometimes by how the kidney looks on an imaging test. If you think you have possible signs or symptoms of kidney cancer, see your doctor.

Medical history and physical exam

If you have any signs or symptoms that suggest you might have kidney cancer, your doctor will want to take your complete medical history to check for risk factors and to learn more about your symptoms.

A physical exam can provide information about signs of kidney cancer and other health problems. For example, the doctor may be able to feel an abnormal mass (lump) when they examine your abdomen (belly).

If symptoms or the results of the physical exam suggest you might have kidney cancer, more tests will probably be done. These might include lab tests, imaging tests, or biopsies of the kidney.

Blood tests

Lab tests cannot show for sure if a person has kidney cancer, but they can sometimes give the first hint that there may be a kidney problem. If cancer has already been diagnosed, they are also done to get a sense of a person’s overall health and to help tell if the cancer might have spread to other areas. They also can help show if a person is healthy enough to have an operation.

Special tests are done on a urine sample to look for small amounts of blood and other substances not seen with the naked eye. About half of all patients with renal cell cancer will have blood in their urine. If the patient has transitional cell carcinoma (in the renal pelvis, the ureter, or the bladder), sometimes a special test of the urine sample (called urine cytology) will show actual cancer cells in the urine.

Complete blood count (CBC): This is a test that measures the number of different cells in the blood. This test result is often abnormal in people with kidney cancer. Anemia (having too few red blood cells) is very common. Less often, a person may have too many red blood cells (called polycythemia) because the kidney cancer cells make a
hormone (erythropoietin) that causes the bone marrow to make more red blood cells. Blood counts are also important to make sure a person is healthy enough for surgery.2

Blood chemistry tests: These tests are usually done in people who might have kidney cancer, because the cancer can affect the levels of certain chemicals in the blood. For example, high levels of liver enzymes are sometimes found. High blood calcium levels may be found which might lead to more imaging tests. Blood chemistry tests also measure kidney function, which is especially important if certain imaging tests or if surgery is planned.

**Urinalysis (urine testing)**

This test of your urine may be done if your doctor suspects a kidney problem.

**Imaging tests to look for kidney cancer**

Imaging tests use x-rays, magnetic fields, sound waves, or radioactive substances to create pictures of the inside of your body. Imaging tests are done for a number of reasons, such as:

- To look at suspicious areas that might be cancer
- To learn how far cancer might have spread
- To help determine if treatment is working
- To look for possible signs of cancer coming back after treatment

Unlike most other cancers, doctors can often diagnose kidney cancer with fair certainty based on imaging tests without doing a biopsy (removing a sample of the tumor). Some patients, however, may need a biopsy.

**Computed tomography (CT) scan**

The CT scan3 uses x-rays to make detailed cross-sectional images of your body. It can provide precise information about the size, shape, and location of a tumor. It is also useful in checking to see if a cancer has spread to nearby lymph nodes or to organs and tissues outside the kidney.

CT-guided needle biopsy: If a kidney biopsy is needed, this test can also be used to guide a biopsy needle into the mass (lump) to get a sample to check for cancer.

When a CT is done to look at the kidneys, an IV (intravenous) contrast dye is often
needed to make certain areas stand out better on the scan. This CT contrast can damage the kidneys. This happens more often in patients whose kidneys are not working well in the first place. Because of this, your kidney function will be checked with a blood test before you get IV contrast.

**Magnetic resonance imaging (MRI) scan**

**MRI scans** may be done when a person can’t have the CT contrast dye because they have an allergy to it or they don’t have good kidney function. MRI scans may also be done if there’s a chance that the cancer has grown into major blood vessels in the abdomen (like the inferior vena cava), because they provide a better picture of blood vessels than CT scans. Finally, they may be used to look at abnormal areas in the brain and spinal cord that might be due to cancer spread.

**Ultrasound**

**Ultrasound** can help find a kidney mass and show if it is solid or filled with fluid (kidney tumors are more likely to be solid). Different ultrasound patterns can also help doctors tell the difference between some types of benign and malignant kidney tumors.

If a kidney biopsy is needed, this test can also be used to guide a biopsy needle into the mass to take a sample.

**Angiography**

Angiography is an x-ray test that looks at blood vessels. In traditional angiography, a contrast dye is injected into the renal artery, and the dye outlines the blood vessels. X-rays are taken to identify and map the blood vessels that feed a kidney tumor.

This test can help in planning surgery for some patients. Angiography can also help diagnose renal cancers since the blood vessels usually have a special appearance with this test.

Nowadays, angiography is done as a part of a CT or MRI scan, instead of as a separate x-ray test. This means less contrast dye is used, which is helpful since the dye can damage kidney function.

**Chest x-ray**

**Anx-ray** may be done after kidney cancer has been diagnosed to see if cancer has spread to the lungs. More often though, a CT chest is done because it can see
abnormal areas better.

**Bone scan**

A bone scan can help show if a cancer has spread to your bones. A small amount of low-level radioactive material is injected into the blood and collects mainly in abnormal areas of bone. It might be done if there is reason to think the cancer might have spread to the bones such as bone pain or blood test results showing an increased calcium level.

**Kidney biopsy**

Unlike with most other types of cancer, biopsies are sometimes not needed to diagnose kidney tumors. In certain cases, imaging tests can provide enough information for a surgeon to decide if an operation is needed. The diagnosis is then confirmed when part of the kidney that was removed is looked at in the lab.

A biopsy might be done to get a small sample of tissue from an area that may be cancer when the imaging tests are not clear enough to permit surgery. Biopsy may also be done to confirm cancer if a person might not be treated with surgery, such as with small tumors that will be watched and not treated, or when other treatments are being considered.

Fine needle aspiration (FNA) and needle core biopsy are 2 types of kidney biopsies that may be done.

In cases where the doctors think kidney cancer might have spread to other sites, they may take a biopsy of the metastatic site instead of the kidney.

**Biopsy results**

The biopsy samples are sent to a lab, where they are looked at by a pathologist, a doctor who specializes in diagnosing diseases with lab tests. If kidney cancer is found, an important feature that is evaluated is the grade, specifically called the Fuhrman grade.

The Fuhrman grade is found by looking at kidney cancer cells in the lab. Many doctors use it to describe how quickly the cancer is likely to grow and spread. The grade is based on how closely the cancer cells look like those of normal kidney cells. Renal cell cancers are usually graded on a scale of 1 through 4. Grade 1 renal cell cancers have cells that look a lot like normal kidney cells. These cancers usually grow and spread
slowly and tend to have a good prognosis (outlook). At the other extreme, grade 4 renal cell cancer looks quite different from normal kidney cells. These cancers tend to have a worse prognosis.

**Hyperlinks**


**References**


National Cancer Institute. Physician Data Query (PDQ). Renal Cell Cancer Treatment –
Kidney Cancer Stages

- How is stage determined?
- Prognostic systems

After someone is diagnosed with kidney cancer, doctors will try to figure out whether it has spread, and if so, how far. This process is called staging. The stage of a cancer describes how much cancer is in the body. It helps determine how serious the cancer is and how best to treat it. Doctors also use a cancer's stage when talking about survival statistics.

The stages of kidney cancer range from I (1) through IV (4). As a rule, the lower the number, the less the cancer has spread. A higher number, such as stage IV, means cancer has spread more. And within a stage, an earlier letter (or number) means a lower stage. Although each person's cancer experience is unique, cancers with similar stages tend to have a similar outlook and are often treated in much the same way.

How is stage determined?

The staging system most often used for kidney cancer is the American Joint Committee on Cancer (AJCC) TNM system. The TNM system is based on 3 key pieces of information:

- The size and extent of the main tumor (T): How large is the tumor? Has it has grown into nearby areas?
- The spread to nearby lymph nodes (N): Has the cancer spread to nearby lymph nodes?
- The spread (metastasis) to distant sites (M): Has the cancer spread to other organs such as the bones, brain, or lungs?

Numbers or letters after T, N, and M provide more details about each of these factors. Higher numbers mean the cancer is more advanced. Once a person’s T, N, and M categories have been determined, this information is combined in a process called **stage grouping** to assign an overall stage. To learn more, see Cancer Staging\(^1\).

The system described below is the most recent version of the AJCC system, effective as of January 2018.

Kidney cancer is typically given a **clinical stage** based on the results of a physical exam, biopsy, and imaging tests (described in Tests for Kidney Cancer). If surgery is done, the **pathologic stage** (also called the **surgical stage**) is determined by examining tissue removed during the operation.

Kidney cancer staging can be complex. If you have any questions about your stage, please ask your doctor to explain it to you in a way you understand.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Stage grouping</th>
<th>Stage description*</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>T1 N0 M0</td>
<td>The tumor is 7 cm across or smaller and is only in the kidney (T1). There is no spread to lymph nodes (N0) or distant organs (M0).</td>
</tr>
<tr>
<td>II</td>
<td>T2 N0 M0</td>
<td>The tumor is larger than 7 cm across but is still only in the kidney (T2). There is no spread to lymph nodes (N0) or distant organs (M0).</td>
</tr>
<tr>
<td>III</td>
<td>T3 N0 M0</td>
<td>The tumor is growing into a major vein (like the renal vein or the vena cava) or into tissue around the kidney, but it is not growing into the adrenal gland or beyond Gerota’s fascia (T3). There is no spread to lymph nodes (N0) or distant organs (M0).</td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td>The main tumor can be any size and may be outside the kidney, but it has not spread beyond Gerota’s fascia. The cancer has</td>
</tr>
</tbody>
</table>

1. American Cancer Society, Cancer Facts 
**Prognostic systems**

The stage of the cancer is important, but other factors should be considered when determining prognosis (outcome) and treatment of people with Stage IV (metastatic) renal cell carcinoma. The two systems that are commonly used are the Memorial Sloan Kettering Cancer Center (MSKCC) criteria and the International Metastatic Renal Cell Carcinoma Database Consortium (IMDC) criteria.

These two systems use 5 or 6 factors which, when combined, put people into low-, intermediate-, and high-risk groups.

The MSKCC system includes:

- High blood lactate dehydrogenase (LDH) level
- High blood calcium level
- Anemia (low red blood cell count)
- Less than a year from diagnosis to the need for systemic treatment (targeted therapy, immunotherapy, or chemotherapy)
• Poor performance status (a measure of how well a person can do normal daily activities)

The IMDC system includes:

• High white blood cell count (neutrophils)
• High platelet cell count
• High blood calcium level
• Anemia (low red blood cell count)
• Less than a year from diagnosis to the need for systemic treatment (targeted therapy, immunotherapy, or chemotherapy)
• Poor performance status (a measure of how well a person can do normal daily activities)

For each system, people with:

• None of the above factors are considered to be low-risk and have a good prognosis
• 1 or 2 factors are considered to be intermediate-risk and have an intermediate prognosis
• 3 or more of these factors are considered to be high-risk, have a poor prognosis, and may be less likely to benefit from certain treatments.

Hyperlinks


References


Survival rates for Kidney Cancer

Survival rates can give you an idea of what percentage of people with the same type and stage of cancer are still alive a certain amount of time (usually 5 years) after they were diagnosed. They can’t tell you how long you will live, but they may help give you a better understanding of how likely it is that your treatment will be successful.

Keep in mind that survival rates are estimates and are often based on previous outcomes of large numbers of people who had a specific cancer, but they can’t predict what will happen in any particular person’s case. These statistics can be confusing and may lead you to have more questions. Ask your doctor how these numbers might apply to you.

What is a 5-year relative survival rate?

A relative survival rate compares people with the same type and stage of kidney cancer to people in the overall population. For example, if the 5-year relative survival rate for a specific stage of kidney cancer is 80%, it means that people who have that cancer are, on average, about 80% as likely as people who don’t have that cancer to live for at least 5 years after being diagnosed.

Where do these numbers come from?

The American Cancer Society relies on information from the Surveillance, Epidemiology, and End Results (SEER) database, maintained by the National Cancer
Institute (NCI), to provide survival statistics for different types of cancer.

The SEER database tracks 5-year relative survival rates for kidney cancer in the United States, based on how far the cancer has spread. The SEER database, however, does not group cancers by AJCC TNM stages (stage 1, stage 2, stage 3, etc.). Instead, it groups cancers into localized, regional, and distant stages:

- **Localized**: There is no sign that the cancer has spread outside of the kidney.
- **Regional**: The cancer has spread outside the kidney to nearby structures or lymph nodes.
- **Distant**: Includes cancers that have spread to distant parts of the body such as the lungs, brain, or bones.

### 5-year relative survival rates for kidney cancer

Based on people diagnosed with cancers of the kidney (or renal pelvis) between 2012 and 2018.

<table>
<thead>
<tr>
<th>SEER* stage</th>
<th>5-year relative survival rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Localized</td>
<td>93%</td>
</tr>
<tr>
<td>Regional</td>
<td>72%</td>
</tr>
<tr>
<td>Distant</td>
<td>15%</td>
</tr>
<tr>
<td>All SEER stages combined</td>
<td>77%</td>
</tr>
</tbody>
</table>

*SEER = Surveillance, Epidemiology, and End Results

### Understanding the numbers

- **People now being diagnosed with kidney cancer may have a better outlook than these numbers show.** Treatments improve over time, and these numbers are based on people who were diagnosed and treated at least 5 years earlier.
- **These numbers apply only to the stage of the cancer when it is first diagnosed.** They do not apply later on if the cancer grows, spreads, or comes back after treatment.
- **These numbers don’t take everything into account.** Survival rates are grouped based on how far the cancer has spread, but your age, overall health, how well the
When you're told you have kidney cancer

- What type of kidney cancer do I have?
- Where is the cancer located?
- Has the cancer spread beyond where it started?
• What is the **stage** of the cancer, and what does that mean for me?
• Will I need other **tests** before we can decide on treatment?
• Do I need to see any other doctors or health professionals?
• If I’m concerned about the costs and insurance coverage for my diagnosis and treatment, who can help me?

**When deciding on a treatment plan**

• What are my **treatment options**\(^1\)?
• What do you recommend and why?
• How much experience do you have treating this type of cancer?
• Should I get a **second opinion**\(^2\)? How do I do that? Can you recommend someone?
• What would the goal of treatment be?
• How quickly do we need to decide on treatment? What should I do to be ready for treatment?
• How long will treatment last? What will it be like? Where will it be done?
• What risks or side effects are there to the treatments you suggest? Are there things I can do to reduce the side effects?
• How might treatment affect my daily activities? Can I still work full time?
• What are the chances the cancer will recur (come back) with these treatment plans?
• What will we do if the treatment doesn’t work or if the cancer recurs?
• What if I have trouble getting to and from my treatments because of transportation problems?
• If I have stage 4 kidney cancer, what is my risk group and what does that mean for me?

**During treatment**

Once treatment begins, you’ll need to know what to expect and what to look for. Not all of these questions may apply to you, but asking the ones that do may be helpful.

• How will we know if the treatment is working?
• Is there anything I can do to help manage **side effects**\(^3\)?
• What symptoms or side effects should I tell you about right away?
• How can I reach you on nights, holidays, or weekends?
• Do I need to change what I eat during treatment?
• Are there any limits on what I can do?
• Can I exercise during treatment? If so, what kind of exercise should I do, and how often?
• If I start to feel overwhelmed, depressed, or distressed, can you suggest a mental health professional I can see?
• What if I need some social support during treatment because my family lives far away?

After treatment

• Do I need a special diet after treatment?
• Are there any limits on what I can do?
• What other symptoms should I watch for?
• What kind of exercise should I do now?
• What type of follow-up will I need after treatment?
• How often will I need to have follow-up exams and imaging tests?
• Will I need any blood tests?
• How will we know if the cancer has come back? What should I watch for?

Along with these sample questions, be sure to write down some of your own. For instance, you might want more information about recovery times so you can plan your work or activity schedule. You might also want to ask about clinical trials for which you may qualify.

Keep in mind that doctors are not the only ones who can provide you with information. Other health care professionals, such as nurses and social workers, may have the answers to some of your questions. You can find more information about communicating with your health care team in The Doctor-Patient Relationship.

Hyperlinks


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