Kidney Cancer Treatment

If you've been diagnosed with kidney cancer, your cancer care team will discuss your treatment options with you. It's important to weigh the benefits of each treatment option against its possible risks and side effects. For some people with early-stage cancers, it's important to discuss if treatment is needed at all, since active surveillance can sometimes be a good option.

Local treatments

Local therapies treat the tumor but don't affect the rest of the body. They are more likely to be useful for earlier stage (less advanced) cancers, although they might also be used in some other situations.

- Surgery for Kidney Cancer
- Ablation and Other Local Therapy for Kidney Cancer
- Active Surveillance for Kidney Cancer
- Radiation Therapy for Kidney Cancer

Systemic treatments

Kidney cancer can also be treated by giving medicines by mouth or directly into the bloodstream. These are called **systemic therapies** because they can reach cancer cells almost anywhere in the body. These treatments can be helpful for more advanced kidney cancers, although they might also be used to help treat some earlier stage cancers. Different types of drugs might be used.

- Targeted Drug Therapy for Kidney Cancer
- Immunotherapy for Kidney Cancer
- Chemotherapy for Kidney Cancer

Common treatment approaches

Depending on the stage of the cancer and other factors, different types of treatment may be combined at the same time or used one after another. Some treatments can also be used as palliative treatment. Palliative treatment is meant to relieve symptoms, such as pain, but it is not expected to cure the cancer.

- Treatment of Kidney Cancer by Stage

Who treats kidney cancer?

Doctors on your cancer treatment team might include:

- A **urologist:** a doctor and surgeon who specializes in treating diseases of the urinary system (and male reproductive system)
- A **radiation oncologist:** a doctor who treats cancer with radiation therapy
- A **medical oncologist:** a doctor who treats cancer with medicines such as chemotherapy, targeted therapy, or immunotherapy
- **a nephrologist:** a doctor who treats diseases of the kidney

You might have many other specialists on your treatment team as well, including physician assistants (PAs), nurse practitioners (NPs), nurses, psychologists, nutritionists, 1ssistan ag /8 team 0162m /a1u1Tm 0 0 0als ssysfe(PAond a. q BT 1 0 0 45 RG 0.75 w 2

you can still get supportive care to help with pain or other symptoms. Communicating with your cancer care team is important so you understand your diagnosis, what treatment is recommended, and ways to maintain or improve your quality of life.

Different types of programs and support services may be helpful, and they can be an important part of your care. These might include nursing or social work services, financial aid, nutritional advice, rehab, or spiritual help.

The American Cancer Society also has programs and services - including rides to treatment, lodging, and more - to help you get through treatment. Call our Cancer Knowledge Hub at 1-800-227-2345 and speak with one of our caring, trained cancer helpline specialists. Or, if you prefer, you can use our chat feature on cancer.org to connect with one of our specialists.

- Palliative Care
- Programs & Services

Choosing to stop treatment or choosing no treatment at all

For some people, when treatments have been tried and are no longer controlling the cancer, it could be time to weigh the benefits and risks of continuing to try new treatments. Whether or not you continue treatment, there are still things you can do to help maintain or improve your quality of life.

Some people, especially if the cancer is advanced, might not want to be treated at all. There are many reasons you might decide not to get cancer treatment, but it’s important to talk to your doctors as you make that decision. Remember that even if you choose not to treat the cancer, you can still get supportive care to help with pain or other symptoms.

- If Cancer Treatments Stop Working

The treatment information given here is not official policy of the American Cancer Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor. Your doctor may have reasons for suggesting a treatment plan different from these general treatment options. Don't hesitate to ask your cancer care team any questions you may have about your treatment options.

Surgery for Kidney Cancer

Surgery is often part of the main treatment for kidney cancer. Sometimes it might be the only treatment that's needed, especially for cancers that are still only in the kidney.

Types of surgery for kidney cancer

Depending on the stage and location of the cancer and other factors, different types of surgery might be done.

For tumors in the kidney, surgery might be done to remove the entire kidney

This operation is done through a single, long incision in the skin to reach the kidney.

The surgeon can make the incision in several places. The most common places are the middle of the abdomen (belly), under the ribs on the same side as the cancer, or in the back, just behind the kidney. Each approach has its benefits in treating cancers of different sizes and in different parts of the kidney.

If the tumor has grown from the kidney through the renal vein (the vein leading away from the kidney) and into the inferior vena cava (the large vein that carries blood from the lower part of the body back up to the heart), the heart may need to be stopped for a short time in order to remove the tumor. The patient is put on cardiopulmonary bypass (a heart-lung machine) that circulates their blood while bypassing their heart. If you need this, a heart surgeon will work with your urologist during your operation.

Laparoscopic nephrectomy and robotic-assisted laparoscopic nephrectomy

These operations are done through several small incisions instead of one large one. If a radical nephrectomy is needed, many doctors and patients now prefer to use these methods when they can be done.

Laparoscopic nephrectomy: For this approach, the surgeon inserts special long, thin instruments through the small incisions to remove the kidney. One of the instruments is a laparoscope, which is a long tube with a small video camera on the end. This lets the surgeon see inside the abdomen. Usually, one of the incisions has to be made longer toward the end of the operation to remove the kidney (although it’s not as long as the incision for an open radical nephrectomy).

Robotic-assisted laparoscopic nephrectomy: In this approach, the surgeon sits at a panel near the operating table and controls robotic arms with long, thin surgical instruments on the ends. The robotic system lets the surgeon move the instruments more easily and with more precision than during standard laparoscopic surgery.

Both types of laparoscopic surgery are complex and take time for surgeons to learn. If you are considering either type of laparoscopic surgery, be sure to find a surgeon with a lot of experience.

In experienced hands, either type of laparoscopic nephrectomy is about as effective as an open radical nephrectomy. The main benefits of these approaches are that they usually result in a shorter hospital stay, a faster recovery time, and less pain after surgery. However, the laparoscopic approach may not be a good option for larger tumors or for tumors that have grown into the renal vein or spread to lymph nodes around the kidney.

Partial nephrectomy (nephron-sparing surgery)

In a partial nephrectomy, the surgeon removes only the part of the kidney that contains the cancer, leaving the rest of the kidney in place. The benefit of this approach is that the person keeps more kidney function. Studies have shown the long-term results from partial nephrectomy are about the same as when the whole kidney is removed.

For people with early-stage kidney cancer, a partial nephrectomy might be a good option if:

- The kidney tumor is smaller – usually less than about 10 centimeters (about 4 inches) across, and it isn't in the central part of the kidney.

These operations are done through several small incisions instead of one large one.

Laparoscopic partial nephrectomy: For this approach, the surgeon inserts special long, thin instruments through the small incisions to remove the kidney. One of the instruments is a laparoscope, which is a long tube with a small video camera on the end that lets the surgeon see inside the abdomen.

Robotic-assisted laparoscopic partial nephrectomy: In this approach, the surgeon sits at a panel near the operating table and controls robotic arms with long, thin surgical instruments on the ends. The surgeon can move the instruments more easily and with more precision than during standard laparoscopic surgery.

Done by an experienced surgeon, either type of laparoscopic partial nephrectomy is about as effective as an open partial nephrectomy. The main benefits of these approaches are that they usually result in a shorter hospital stay, a faster recovery time, and less pain after surgery.

However, both types of laparoscopic partial nephrectomy are complicated operations, and the laparoscopic approach may not be a good option for more complex kidney tumors.

It also takes time for surgeons to learn how to do these operations. If you are considering either type of laparoscopic surgery, be sure to find a surgeon with experience.

Lymphadenectomy (lymph node removal)

In this procedure, the surgeon removes nearby lymph nodes to see if they contain cancer. Some lymph nodes near the kidney are often removed as part of a radical nephrectomy.tha 1 0a l S eiG rgw2 12 Tf 0 0 0 r249. du83 gs (In this procedure, tof lapA g 1 0 xadishr

Removal of metastases

In some people with kidney cancer, the cancer has already spread (metastasized) to other parts of the body by the time it's found. The most common sites of spread are the lungs, lymph nodes, bones, and liver. For some people, surgery to remove these tumors may still be helpful.

Attempting a surgical cure

If the cancer has spread to very few spots outside the kidney that can all be removed safely, surgery to remove these tumors may lead to long-term survival in some people.

The metastasis may be removed at the same time as a radical nephrectomy or later if the cancer recurs[4] (comes back).

Surgery to relieve symptoms (palliative surgery)

If other treatments are no longer helpful, surgery might be done to help relieve pain or other symptoms caused by tumors, although this type of surgery isn't intended to cure the cancer.

Risks and side effects of surgery

The short-term risks of any type of surgery include reactions to anesthesia, bleeding (which might require blood transfusions), blood clots, and infections. Most people will have at least some pain after the operation, which can usually be helped with pain medicines, if needed.

Other possible risks of surgery include:

- Damage to organs and blood vessels (such as the spleen, pancreas, aorta, vena cava, or large or small bowel) during surgery
- Pneumothorax (unwanted air in the chest space around the lungs)
- Incisional hernia (bulging of internal organs near the surgical incision due to problems with wound healing)
- Leakage of urine into the abdomen (after partial nephrectomy)
- Kidney failure (if the remaining kidney fails to function well)

Ask your doctor what to expect after surgery. You might want to ask about your

recovery time, if there are any limits on what you can do, common side effects to watch out for, and when you should contact someone on your cancer care team if you're having problems.

More information about Surgery

For more general information about surgery as a treatment for cancer, see Cancer Surgery[5].

To learn about some of the side effects listed here and how to manage them, see Managing Cancer-related Side Effects[6].

Hyperlinks

1. www.cancer.org/cancer/types/kidney-cancer/causes-risks-prevention/risk-factors.html
2. www.cancer.org/cancer/types/kidney-cancer/detection-diagnosis-staging/how-diagnosed.html
3. www.cancer.org/cancer/types/kidney-cancer/detection-diagnosis-staging/staging.html
4. www.cancer.org/cancer/survivorship/long-term-health-concerns/recurrence.html
5. www.cancer.org/cancer/managing-cancer/treatment-types/surgery.html
6. www.cancer.org/cancer/managing-cancer/side-effects.html

National Cancer Institute. Renal Cell Cancer Treatment (PDQ®)–Health Professional Version. 2023. Accessed at https://www.cancer.gov/types/kidney/hp/kidney-treatment-pdq on December 11, 2023.

National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology: Kidney Cancer. V1.2024. Accessed at https://www.nccn.org/professionals/physician_gls/pdf/kidney.pdf on December 11, 2023.

Rathmell WK, Rumble RB, Van Veldhuizen PJ, et al. Management of metastatic clear cell renal cell carcinoma: ASCO Guideline. J Clin Oncol. 2022;40(25):2957-2995.

Richie JP. Definitive surgical management of renal cell carcinoma. UpToDate. 2023. Accessed at https://www.uptodate.com/contents/definitive-surgical-management-of-renal-cell-carcinoma on December 11, 2023.

Richie JP, Choueiri TK. Role of surgery in patients with metastatic renal cell carcinoma. UpToDate. 2023. Accessed at https://www.uptodate.com/contents/role-of-surgery-in-patients-with-metastatic-renal-cell-carcinoma on December 11, 2023.

Last Revised: May 1, 2024

Ablation and Other Local Therapy for Kidney Cancer

Whenever possible, surgery is the main treatment for kidney cancer that can be removed. But for some people, such as those who aren't healthy enough for surgery, other treatments can sometimes be used to destroy (ablate) the kidney tumor.

These methods are usually only considered for small kidney tumors (typically no larger than 4 cm or about 1½ inches across).

These treatments might be helpful for some people, although there is much less data on how well they work over time than there is for surgery.

- Cryotherapy (cryoablation)
- Radiofrequency ablation (RFA)
- Other local treatments

kidney (or possibly in other parts of the body). These approaches haven't been around as long as cryotherapy or RFA, so there's less long-term data on them at this point. Still, they might be options for some people.

Microwave ablation

For this treatment, imaging tests are used to guide a needle-like probe (antenna) into the tumor. Electromagnetic microwaves are then created at the tip of the probe to heat to destroy the tumor.

Stereotactic ablative body radiotherapy (SABR)

Also known as **stereotactic body radiation therapy (SBRT)**, this is a type of advanced radiation therapy. Imaging tests are used to guide thin beams of radiation at the tumor from many different angles. SABR can usually be given over the course of a few treatments.

To learn more, see Radiation Therapy for Kidney Cancer.

Irreversible electroporation

For this treatment, imaging tests are used to guide long needles (electrodes) into place around the tumor. The needles are then used to create a strong electrical field within the tumor. This causes holes (pores) to form in the walls of the cancer cells, leading to their death.

This approach doesn't use heat or cold to destroy the cells, and it might prove to be useful in areas where it's important to protect vital structures like nearby blood vessels. But many doctors feel that more research is needed to show it is safe and effective.

Hyperlinks

1. www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/ultrasound-for-cancer.html
2. www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/ct-scan-for-cancer.html
3. www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/mri-for-cancer.html

References

Campbell S, Uzzo RG, Allaf ME, et al. Renal Mass and Localized Renal Cancer: AUA Guideline*. J Urol*. 2017; 198:520-529. Doi: 10.1016/j.juro.2017.04.100. Epub 2017 May 4.

Hines A, Goldberg SN. Radiofrequency ablation, cryoablation, and other ablative techniques for renal cell carcinoma. UpToDate. 2023. Accessed at https://www.uptodate.com/contents/radiofrequency-ablation-cryoablation-and-other-ablative-techniques-for-renal-cell-carcinoma on December 12, 2023.

McNamara MA, Zhang T, Harrison MR, George DJ. Ch 79 – Cancer of the kidney. In: Niederhuber JE, Armitage JO, Doroshow JH, Kastan MB, Tepper JE, eds. *Abeloff's Clinical Oncology*. 6th ed. Philadelphia, Pa: Elsevier: 2020.

National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology: Kidney Cancer. V1.2024. Accessed at https://www.nccn.org/professionals/physician_gls/pdf/kidney.pdf on December 12, 2023.

Last Revised: May 1, 2024

Active Surveillance for Kidney Cancer

Not all kidney tumors need to be treated right away. Some small kidney tumors turn out to be benign (not cancer). And even many small kidney cancers tend to grow slowly, without spreading.

One option for some people with small kidney tumors may be to watch the tumor carefully to see if it grows, without treating it right away. This is usually done with regular imaging tests[1] (ultrasound, CT or MRI scans) of the abdomen (belly). Blood tests and imaging tests of the chest might be done at times as well. If the tumor starts growing quickly or shows other worrisome signs, it can then be removed with surgery or treated another way.

Sometimes, the tumor might be biopsied to help determine if it is cancer or not. This could help determine if surveillance is a reasonable option, or if the tumor needs to be

treated.

Active surveillance might be a good choice for people who are older or who have other serious health problems, as it can allow them to avoid the risks of treatments such as surgery or ablation.

If a biopsy[2] hasn't been done, watching the tumor closely for a while can also give the doctor a better idea of whether it is likely to be cancer, based on how fast it is growing.

Hyperlinks

1. www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests.html
2. www.cancer.org/cancer/diagnosis-staging/tests/biopsy-and-cytology-tests.html

References

Campbell S, Uzzo RG, Allaf ME, et al. Renal Mass and Localized Renal Cancer: AUA Guideline. *J Urol*. 2017; 198:520-529.

McNamara MA, Zhang T, Harrison MR, George DJ. Ch 79 - Cancer of the kidney. In: Niederhuber JE, Armitage JO, Doroshow JH, Kastan MB, Tepper JE, eds. *Abeloff's Clinical Oncology*. 6th ed. Philadelphia, Pa: Elsevier: 2020.

National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology: Kidney Cancer. V1.2024. Accessed at https://www.nccn.org/professionals/physician_gls/pdf/kidney.pdf on December 13, 2023.

Pierorazio PM, Campbell SC. Diagnostic approach, differential diagnosis, and management of a small renal mass. UpToDate. 2023. Accessed at https://www.uptodate.com/contents/diagnostic-approach-differential-diagnosis-and-treatment-of-a-small-renal-mass on December 13, 2023.

Last Revised: May 1, 2024

Radiation Therapy for Kidney Cancer

Radiation therapy uses high-energy rays or particles to kill cancer cells.

When is radiation therapy used for kidney cancer?

Radiation therapy isn't usually the first treatment for kidney cancer. But it might be an option if:

- The cancer is still only in the kidney, but a person isn't healthy enough for (or doesn't want to have) surgeryor has only one kidney. Sometimes other ablative treatments might be tried before radiation.
- The cancer has spread, but there are no more than a few tumors in other parts of the body. Radiation might be an option to try to destroy these tumors, although other treatments, such as surgery or other ablative techniques, might be options as well.
- The cancer returns after treatment, especially if it has spread more widely. In this situation, radiation might be an option to help relieve (palliate) symptoms caused by tumors in some parts of the body, such as the brain or bones. This type of treatment is known as **palliative radiation therapy**.

How is radiation therapy given?

When radiation therapy is used to treat kidney cancer, a special machine is used to create and focus beams of radiation at the tumor. This type of treatment is known as external beam radiation therapy (EBRT)[1].

Each treatment is much like getting an x-ray, although the radiation dose is stronger. The treatment itself is painless and typically lasts only a few minutes, although the setup time — getting you into place for treatment — takes longer.

When treating a tumor in the kidney or a small area of cancer spread (such as a single

tumor in a lung), radiation is usually given as **stereotactic body radiation therapy (SBRT)**, also known as **stereotactic ablative body radiotherapy (SABR)**.

For this advanced type of EBRT, imaging tests are used to guide the delivery of thin beams of radiation to a precise area, such as a kidney tumor, from many different angles. Large doses of radiation can be given in each dose, so the entire course of treatment can often be given in just a few days.

SBRT is often known by the names of the machines that deliver the radiation, such as Gamma Knife, X-Knife, CyberKnife, or Clinac.

Possible side effects of radiation therapy

Side effects[2] of radiation therapy might include:

- Skin changes (similar to sunburn) and hair loss where the radiation passes through the skin
- Nausea or diarrhea (when radiation is aimed at the abdomen)
- Feeling tired

Other side effects are also possible, depending on where the radiation is aimed.

Most side effects go away shortly after treatment is finished, but some might last longer.

Radiation may also make side effects from some other treatments worse.

If you're getting radiation, ask a member of your cancer care team what side effects to expect.

More information about radiation therapy

To learn more about how radiation is used to treat cancer, see Radiation Therapy[3].

To learn about some of the side effects listed here and how to manage them, see Managing Cancer-related Side Effects[4].

Hyperlinks

1. www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/x-rays-and-other-radiographic-tests.html
2. www.cancer.org/cancer/managing-cancer/treatment-types/radiation/effects-on-different-parts-of-body.html
3. www.cancer.org/cancer/managing-cancer/treatment-types/radiation.html
4. www.cancer.org/cancer/managing-cancer/side-effects.html

References

[5]Atkins MB. Overview of the treatment of renal cell carcinoma. UpToDate. 2023. Accessed at https://www.uptodate.com/contents/overview-of-the-treatment-of-renal-cell-carcinoma on December 13, 2023.

Correa RJM, Louie AV, Staehler M, et al. Stereotactic radiotherapy as a treatment option for renal tumors in the solitary kidney: A multicenter analysis from the IROCK. *J Urol*. 2019;201:1097-1104.

National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology: Kidney Cancer. V1.2024. Accessed at https://www.nccn.org/professionals/physician_gls/pdf/kidney.pdf on December 13, 2023.

Last Revised: May 1, 2024

Targeted Drug Therapy for Kidney Cancer

As researchers have learned more about the gene and protein changes inside cells that cause them to become cancer cells, they have developed drugs that target some of these changes. These targeted drugs are different from standard chemotherapy (chemo) drugs. They tend to work better against kidney cancer than standard chemo drugs, and they often have different side effects.

When are targeted drugs used for kidney cancer?

Treating advanced kidney cancer

Targeted drugs are used mainly to treat advanced kidney cancer. One of these drugs is typically part of the first treatment for advanced cancers, often along with an immunotherapy drug.

Many different targeted drugs can be used to treat kidney cancer. If one doesn't work, another can be tried. It's not yet clear if one sequence of drugs is better than another. Studies are being done to help answer this.

Adjuvant therapy after surgery

The targeted drug sunitinib (Sutent) might also be an option as an **adjuvant treatment** after surgery to remove the kidney, to help lower the risk that the cancer will come back.

Targeted drugs used to treat kidney cancer

Most of the targeted drugs used to treat kidney cancer work by blocking proteins called **tyrosine kinases** inside cancer cells that normally help them grow, or that help them create new blood vessels that feed the tumor. Drugs that target these types of proteins are known as **tyrosine kinase inhibitors**, or **TKIs**.

Drugs that target tumor blood vessel growth (angiogenesis)

Sunitinib (Sutent)

Sunitinib acts by blocking both angiogenesis and several tyrosine kinases in cancer cells that are important for their growth and survival.

This drug is a pill taken daily, typically for 4 weeks on and 2 weeks off. Some doctors might recommend taking it 2 weeks on and 1 week off to reduce side effects.

Sunitinib can be used in people with advanced kidney cancer. It might also be an option

after surgery in people with a high risk of their cancer returning, to help lower the risk that the cancer will come back, although an immunotherapy drug such as pembrolizumab (Keytruda) is more likely to be used in this situation instead.

The most common **side effects of sunitinib** are:

- Nausea
- Diarrhea
- Changes in skin or hair color
- Mouth sores
- Weakness
- Low white and red blood cell counts

Other possible effects include feeling tired, high blood pressure, heart problems, bleeding, hand-foot syndrome, and low thyroid hormone levels.

Pazopanib (Votrient)

Pazopanib blocks several tyrosine kinases involved in cancer cell growth, as well as the formation of new blood vessels in the tumor. This drug is a pill, typically taken once a day.

Common **side effects of pazopanib** include:

- High blood pressure
- Nausea
- Diarrhea
- Headaches
- Low blood cell counts
- Hair color change

It can cause abnormal liver function test results, but it rarely leads to severe liver damage that could be life threatening. Problems with bleeding, clotting, and wound healing can occur, as well.

In rare cases it can also cause a problem with the heart rhythm or even heart failure. If you are taking this drug, your doctor will monitor your heart with EKGs as well as check your blood tests for liver or other problems.

Cabozantinib (Cabometyx)

Cabozantinib blocks several tyrosine kinases that help cancer cells grow and survive, as well as some that help form new blood vessels in the tumor.

This drug can be used to treat advanced kidney cancer, either by itself or along with the immunotherapy drug nivolumab (Opdivo). It is taken as a pill, typically once a day.

Common **side effects of cabozantinib** include:

- Diarrhea
- Fatigue (feeling tired)
- Nausea and vomiting
- Poor appetite and weight loss
- High blood pressure
- Hand-foot syndrome
- Constipation

Less common but more serious side effects can include serious bleeding, blood clots, very high blood pressure, severe diarrhea, and holes forming in the intestines.

Lenvatinib (Lenvima)

Lenvatinib is a tyrosine kinase inhibitor that helps block new blood vessels from forming in the tumor, as well as targeting some of the proteins in cancer cells that normally help them grow.

This drug can be used along with the immunotherapy drug pembrolizumab in people with advanced kidney cancer. It can also be used with the targeted drug everolimus (see below). Lenvatinib is a capsule typically taken once a day.

Common **side effects of lenvatinib** include:

- Diarrhea
- Fatigue
- Joint or muscle pain
- Loss of appetite
- Nausea and vomiting
- Mouth sores
- Weight loss

- High blood pressure
- Swelling in the arms or legs

Less common but more serious side effects can include serious bleeding, blood clots, very high blood pressure, severe diarrhea, holes forming in the intestines, and kidney, liver, or heart failure.

Bevacizumab (Avastin)

Bevacizumab works by slowing the growth of new blood vessels. It can be used to treat advanced kidney cancer, either alone or along with another drug. It is most often used after other drug treatments have been tried.

It is given by infusion into a vein (IV), typically once every 2 weeks.

More common **side effects of bevacizumab** include:

- High blood pressure
- Feeling tired
- Headaches

Less common but possibly serious side effects include bleeding, blood clots, holes forming in the intestines, heart problems, and slow wound healing.

Axitinib (Inlyta)

Axitinib blocks several tyrosine kinases that help form new blood vessels in the tumor.

This drug can be used alone or with certain immunotherapy drugs, like pembrolizumab or avelumab, as a treatment for people with advanced kidney cancer. Axitinib is a pill, typically taken twice a day.

Common **side effects of axitinib** include:

- High blood pressure
- Fatigue (feeling tired)
- Nausea and vomiting
- Diarrhea
- Poor appetite

- Weight loss
- Voice changes
- Hand-foot syndrome
- Constipation
- Changes in liver and thyroid function (which can be seen on lab tests)

A small number of people develop blood pressure high enough to be life-threatening. This drug can also cause problems with bleeding, clotting, and wound healing.

Tivozanib (Fotivda)

Tivozanib blocks several tyrosine kinases involved in cancer cell growth and the formation of new blood vessels in the tumor.

This drug can be used in people with advanced kidney cancer.

Tivozanib is a pill, typically taken daily for 3 weeks followed by 1 week off. This cycle is then repeated for as long as the drug is still helpful.

Common **side effects of tivozanib** include:

- High blood pressure
- Diarrhea
- Nausea
- Poor appetite
- Cough
- Mouth sores
- Feeling tired
- Voice changes

Less common but more serious side effects can include heart problems, life threatening high blood pressure, blood clots, bleeding, poor wound healing, abnormal thyroid tests, and damage to the kidney.

Belzutifan (Welireg)

Belzutifan is a *HIF inhibitor*. It blocks a protein called hypoxia-inducible factor 2 alpha (HIF-2a), which is involved in both cancer cell growth and new blood vessel formation in tumors.

Belzutifan can be used:

In people with von Hippel-Lindau (VHL) disease[1] who have kidney cancer and don't need surgery right away.

- In people with advanced kidney cancer that has already been treated with a different targeted drug and with an immune checkpoint inhibitor (a type of immunotherapy drug).

This drug is taken as pills, typically once a day.

Common **side effects of belzutifan** include:

- Low red blood cell counts (anemia)
- Feeling tired and/or dizzy
- Nausea
- Headache
- Increased blood sugar levels
- Changes in lab tests showing the drug might be affecting the kidneys

Less common but more serious side effects can include very low red blood cell counts (severe anemia, which might require blood transfusions), and low oxygen levels in the body, for which you might need oxygen therapy or even be admitted to the hospital.

Drugs that target the mTOR protein

Temsirolimus (Torisel)

Temsirolimus works by blocking a protein known as **mTOR**, which normally helps cells grow and divide.

This drug can be used to treat advanced kidney cancers. It is usually used after other drug treatments have been tried. Temsirolimus is given by intravenous (IV) infusion, typically once a week.

The most common **side effects of temsirolimus** include:

- Skin rash
- Weakness

- Mouth sores
- Nausea
- Loss of appetite
- Fluid buildup in the face or legs
- Increases in blood sugar and cholesterol levels

Rarely, it can cause more serious side effects.

Everolimus (Afinitor)

Everolimus also blocks the mTOR protein.

This drug can be used to treat advanced kidney cancers. It can be used by itself or along with the targeted drug lenvatinib (see above), typically after at least one other drug treatment has been tried.

Everolimus is taken as a pill, typically once a day.

Common **side effects of everolimus** include

- Mouth sores
- An increased risk of infections
- Nausea
- Loss of appetite
- Diarrhea
- Skin rash
- Feeling tired or weak
- Fluid buildup (usually in the legs)
- Increases in blood sugar and cholesterol levels

A less common but serious side effect is lung damage, which can cause shortness of breath or other problems.

More information about targeted therapy

To learn more about how targeted drugs are used to treat cancer, see Targeted Cancer Therapy[2].

To learn about some of the side effects listed here and how to manage them,

see Managing Cancer-related Side Effects[3].

Hyperlinks

1. www.cancer.org/cancer/types/kidney-cancer/causes-risks-prevention/risk-factors.html
2. www.cancer.org/cancer/managing-cancer/treatment-types/targeted-therapy.html
3. www.cancer.org/cancer/managing-cancer/side-effects.html

References

Atkins MB. Overview of the treatment of renal cell carcinoma. UpToDate. 2023. Accessed at https://www.uptodate.com/contents/overview-of-the-treatment-of-renal-cell-carcinoma on December 15, 2023.

Choueiri TK, Pal SK. The treatment of advanced non-clear cell renal carcinoma. UpToDate. 2023. Accessed at https://www.uptodate.com/contents/the-treatment-of-advanced-non-clear-cell-renal-carcinoma on December 15, 2023.

McNamara MA, Zhang T, ,K302745 RG 0.75 w 100.34 622.42 15, 2023.

Immunotherapy for Kidney Cancer

Immunotherapy is the use of medicines to boost a person's own immune system to recognize and destroy cancer cells more effectively. Different types of immunotherapy can be used to treat kidney cancer.

Immune checkpoint inhibitors

An important part of the immune system is its ability to keep itself from attacking normal cells in the body. To do this, itits .2 19iC12pz Tmoteinect own immus (ce, which actmal)Tj 0 g 1 0 0 1 7

These drugs are given by infusion into a vein (IV), typically once every 2 to 6 weeks, depending on the drug.

Possible side effects of PD-1 and PD-L1 inhibitors

The most common side effects of these drugs include:

- Fatigue (feeling tired)
- Cough
- Nausea
- Itching

- Skin rash
- Itching

This drug can also have more serious side effects - see below.

Possible serious side effects of all checkpoint inhibitors

Serious side effects aren't common with these drugs, but they are possible.

Infusion reactions: Some people might have an infusion reaction while getting one of these drugs. This is like an allergic reaction, and can include fever, chills, flushing of the face, rash, itchy skin, feeling dizzy, wheezing, and trouble breathing. It's important to tell your doctor or nurse right away if you have any of these symptoms while getting this drug.

Autoimmune reactions: These drugs work by removing one of the safeguards on the body's immune system. Sometimes the immune system starts attacking other parts of the body, which can cause serious or even life-threatening problems in the lungs, intestines, liver, hormone-making glands (like the thyroid), kidneys, or other organs.

It's very important to report any new side effects during or after treatment to your health care team right away. If serious side effects do occur, you may need to stop treatment and take high doses of corticosteroids to suppress your immune system.

Cytokines

Cytokines are small proteins in the body that boost the immune system. Man-made versions of cytokines, such as interleukin-2 (IL-2), [1]might sometimes be used to treat kidney cancer in very specific cases. They can shrink kidney cancers in a small percentage of people.

Interleukin-2 (IL-2)

In the past, IL-2 was often used as a first-line treatment for advanced kidney cancer, and it may still be helpful for some people. But the newer immune checkpoint inhibitors (see above) and targeted drugs are more likely to be helpful.

IL-2 is given by infusion through a vein (IV). Giving high doses of IL-2 seems to offer the best chance of shrinking the cancer, but this can cause serious side effects, so it is not used in people who are in poor overall health.

Side effects of IL-2 can include flu-like symptoms, such as fever, chills, aches, severe tiredness, drowsiness, and low blood cell counts. In high doses, IL-2 can cause fluid to build up in the body so that the person swells up and can feel very sick.

Because these side effects can be severe, high-dose IL-2 is only given in the hospital at certain centers that are experienced with giving this type of treatment.

More information about immunotherapy

To learn more about how drugs that work on the immune system are used to treat cancer, see Cancer Immunotherapy[2].

To learn about some of the side effects listed here and how to manage them, see Managing Cancer-related Side Effects[3].

Hyperlinks

1. www.cancer.org/cancer/managing-cancer/treatment-types/immunotherapy.html
2. www.cancer.org/cancer/managing-cancer/side-effects.html

References

Atkins MB. Overview of the treatment of renal cell carcinoma. UpToDate. 2023. Accessed at https://www.uptodate.com/contents/overview-of-the-treatment-of-renal-cell-carcinoma on December 15, 2023.

Choueiri TK, Pal SK. The treatment of advanced non-clear cell renal carcinoma. UpToDate. 2023. Accessed at https://www.uptodate.com/contents/the-treatment-of-advanced-non-clear-cell-renal-carcinoma on December 15, 2023.

McNamara MA, Zhang T, Harrison MR, George DJ. Ch 79 - Cancer of the kidney. In: Niederhuber JE, Armitage JO, Doroshow JH, Kastan MB, Tepper JE, eds. *Abeloff's Clinical Oncology*. 6th ed. Philadelphia, Pa: Elsevier: 2020.

National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology: Kidney Cancer. V1.2024. Accessed at https://www.nccn.org/professionals/physician_gls/pdf/kidney.pdf on December 15, 2023.

Rathmell WK, Rumble RB, Van Veldhuizen PJ, et al. Management of metastatic clear cell renal cell carcinoma: *ASCO Guideline*. J Clin Oncol. 2022;40(25):2957-2995.

Last Revised: May 1, 2024

Chemotherapy for Kidney Cancer

Chemotherapy (chemo) uses anti-cancer drugs that are given into a vein (IV) or taken by mouth (as pills). These drugs enter your bloodstream and reach nearly all areas of the body, which makes this treatment potentially useful for cancer that has spread (metastasized) to organs beyond the kidney.

When is chemotherapy used for kidney cancer?

The most common types of kidney cancer[1] (renal cell carcinoma, or RCC), such as clear cell RCC, typically don't respond well to chemo, so it's not usually part of the treatment for these cancers. Targeted drugs and immunotherapy are the most common treatments for most advanced kidney cancers.

However, chemo can be helpful for some less common types of RCC, including collecting duct RCC and renal medullary carcinoma. Usually, a platinum drug (cisplatin or carboplatin) is combined with either gemcitabine or paclitaxel to treat these cancers. These drugs are given by infusion into a vein (IV).

Doctors give chemotherapy in cycles, with each period of treatment followed by a rest period to allow the body time to recover. Chemo cycles generally last a few weeks.

Possible side effects of chemotherapy

Chemo drugs can also affect other cells in the body, which can lead to certain side effects.

The side effects of chemo[2] depend on the which drugs are given, the doses used, and the length of treatment. Possible side effects of chemo can include:

- Hair loss
- Mouth sores
- Loss of appetite
- Nausea and vomiting
- Diarrhea or constipation
- Increased chance of infections (due to low white blood cell counts)
- Easy bruising or bleeding (due to low blood platelet counts)
- Fatigue (feeling tired due to low red blood cell counts)

These side effects usually go away after treatment is finished. There are often ways to prevent or lessen them. For example, medicine can be given to help prevent or reduce nausea and vomiting.

Some chemo drugs can also cause other side effects. For example, drugs like cisplatin, carboplatin, and paclitaxel can damage nerves. This can sometimes lead to symptoms (mainly in the hands and feet) such as pain, burning or tingling, sensitivity to cold or heat, or weakness. This is called **peripheral neuropathy**.

Ask your health care team about the side effects your chemo drugs may cause.

More information about chemotherapy

For more general information about how chemotherapy is used to treat cancer, see Chemotherapy[3].

To learn about some of the side effects listed here and how to manage them, see Managing Cancer-related Side Effects[4].

Hyperlinks

1. www.cancer.org/cancer/types/kidney-cancer/about/what-is-kidney-cancer.html
2. www.cancer.org/cancer/managing-cancer/treatment-types/chemotherapy/chemotherapy-side-effects.html
3. www.cancer.org/cancer/managing-cancer/treatment-types/chemotherapy.html
4. www.cancer.org/cancer/managing-cancer/side-effects.html

References

Choueiri TK, Pal SK. The treatment of advanced non-clear cell renal carcinoma. UpToDate. 2023. Accessed at https://www.uptodate.com/contents/the-treatment-of-advanced-non-clear-cell-renal-carcinoma on December 15, 2023.

McNamara MA, Zhang T, Harrison MR, George DJ. Ch 79 - Cancer of the kidney. In: Niederhuber JE, Armitage JO, Doroshow JH, Kastan MB, Tepper JE, eds. *Abeloff's Clinical Oncology*. 6th ed. Philadelphia, Pa: Elsevier: 2020.

National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology: Kidney Cancer. V1.2024. Accessed at https://www.nccn.org/professionals/physician_gls/pdf/kidney.pdf on December 15, 2023.

Last Revised: May 1, 2024

Treatment of Kidney Cancer by Stage

The type of treatment(s) your doctors recommend will depend mainly on the stage[1] of the kidney cancer and on your overall health and decisions. Other factors, such as type and grade of the cancer, might also affect your treatment options.

This section sums up the options usually considered for each stage of renal cell

carcinoma (RCC), the most common type of kidney cancer.

- Treating stage I or II kidney cancer
- Treating stage III kidney cancer
- Treating stage IV kidney cancer
- Treating recurrent kidney cancer

Treating stage I or II kidney cancer

Stage I and II cancers are still only in the kidney.

Active surveillance

Some small (stage I) cancers might not need to be treated right away. Small tumors often grow slowly, and some might never cause serious problems. Because of this, active surveillance might be an option for some people with small kidney tumors. With this approach, the tumor is watched closely with regular imaging tests (such as CT scans or ultrasounds) and possibly other tests, and it's only treated if it grows or starts to show other concerning signs.

Surgery

If treatment is needed, these cancers are usually removed with surgery when possible.

- **Partial nephrectomy** (removing the part of the kidney containing the cancer) is often the treatment of choice for smaller tumors. This is especially true for people have reduced kidney function (or who might have it in the future).
- **Radical nephrectomy** (removing the entire kidney) is often favored if the tumor is larger, if it's in the central part of the kidney, or if there's more than one tumor in the kidney.

Some lymph nodes near the kidney are often removed as well. More lymph nodes might need to be removed if any of them look enlarged on imaging tests, or if there's a higher risk that the cancer might spread to the nodes.

Most often, no further treatment is needed after surgery.

If, after surgery, the cancer cells are found to have troubling features when evaluated in the lab (such as being very high grade), one option might be to get **adjuvant**

(additional) treatment to help lower the risk of the cancer coming back. Most often this is with the immunotherapy drug pembrolizumab (Keytruda), which is given for about a year.

Other treatment options

For people who aren't healthy enough to have surgery or who don't want surgery, other local treatments such as cryotherapy or radiofrequency ablation (RFA) can sometimes be used to destroy (ablate) the kidney tumor. Radiation therapy (particularly stereotactic body radiation therapy, or SBRT) may be another option. Although these types of treatments can have outcomes similar to surgery as far as the chances of the cancer spreading to other parts of the body, some studies show the cancer might be more likely to come back in the same area.

Treating stage III kidney cancer

Stage III cancers have grown into nearby large veins or tissues around the kidney, and/or they have spread to nearby lymph nodes.

Surgery

Surgery is typically the main treatment for these cancers. Most often, this is a **radical**

an option for otherwise healthy people in a low-risk group[3]. Surgery is then followed by drug treatments (immunotherapy and or targeted drugs) for most people.
- Giving drug treatments (immunotherapy and/or targeted drugs) first. This is likely to be preferred for most people, even if it looks like the cancer in the kidney can be removed. For some people, if the cancer shrinks a lot with this treatment, surgery, ablative treatments, or radiation therapy might be options to try to remove or destroy any remaining tumors.

If the kidney tumor isn't removable

If the kidney tumor can't be removed, the first treatment is usually with medicines such

Treating recurrent kidney cancer

Cancer is called **recurrent** when it comes back after treatment. Recurrence can be local (near the area of the original tumor), or it may be in distant parts of the body.

Treatment of kidney cancer that comes back (recurs) after initial treatment depends on where it recurs and what treatments have been used, as well as a person's health and wishes for further treatment.

Local recurrence

For cancers that recur near the area of the original kidney tumor after surgery, further surgery orother localized treatments or radiation might be options. Even if not all of the cancer can be removed or destroyed, these treatments might still help relieve symptoms in some people. Other treatment options will most likely includeimmunotherapy and/ortargeted therapy drugs. Clinical trials[8] of new treatments are an option as well.

Distant recurrence

Kidney cancer that recurs in distant parts of the body is treated like stage IV cancer (see above). Your options will depend on where the cancer is; if it's thought to be removable or not; which, if any, drugs you received as part of your first treatment (and how long ago you got them); and on your overall health and preferences.

For cancers that continue to grow or spread during treatment with immunotherapy or targeted therapy drugs, different drugs still might be helpful. Recurrent cancers can sometimes be hard to treat, so you might also want to ask your doctor about clinical trials.

For some people with recurrent kidney cancer, palliative treatments may be the best option. These treatments are intended to help control the cancer and relieve any symptoms it is causing. Options might include radiation therapy, ablative treatments, or even some type of surgery, if a person is healthy enough. Controlling symptoms such as pain is also an important part of treatment at any stage of the disease.

For more information, see Understanding Recurrence[9].

Hyperlinks

1. www.cancer.org/cancer/types/kidney-cancer/detection-diagnosis-staging/staging.html
2. www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests.html
3. www.cancer.org/cancer/types/kidney-cancer/detection-diagnosis-staging/staging.html
4. www.cancer.org/cancer/managing-cancer/palliative-care.html
5. www.cancer.org/cancer/managing-cancer/advanced-cancer.html
6. www.cancer.org/cancer/managing-cancer/side-effects/pain.html
7. www.cancer.org/cancer/managing-cancer/making-treatment-decisions/clinical-trials.html
8. www.cancer.org/cancer/managing-cancer/making-treatment-decisions/clinical-trials.html
9. www.cancer.org/cancer/survivorship/long-term-health-concerns/recurrence.html

References

Atkins MB. Overview of the treatment of renal cell carcinoma. UpToDate. 2023. Accessed at https://www.uptodate.com/contents/overview-of-the-treatment-of-renal-cell-carcinoma on December 13, 2023.

Choueiri TK, Pal SK. The treatment of advanced non-clear cell renal carcinoma. UpToDate. 2023. Accessed at https://www.uptodate.com/contents/the-treatment-of-advanced-non-clear-cell-renal-carcinoma on December 15, 2023.

McNamara MA, Zhang T, Harrison MR, George DJ. Ch 79 - Cancer of the kidney. In: Niederhuber JE, Armitage JO, Doroshow JH, Kastan MB, Tepper JE, eds. *Abeloff's Clinical Oncology*. 6th ed. Philadelphia, Pa: Elsevier: 2020.

Mejean A, Thezenas S, Chevreau C, et al. Cytoreductive nephrectomy (CN) in metastatic renal cancer (mRCC): Update on Carmena trial with focus on intermediate IMDC-risk population. *J Clin Oncol*. 2019; 37_suppl, abstr 4508.

National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology: Kidney Cancer. V1.2024. Accessed at https://www.nccn.org/professionals/physician_gls/pdf/kidney.pdf on December 15, 2023.

Pierorazio PM, Campbell SC. Diagnostic approach, differential diagnosis, and management of a small renal mass. UpToDate. 2023. Accessed

at https://www.uptodate.com/contents/diagnostic-approach-differential-diagnosis-and-treatment-of-a-small-renal-mass on December 15, 2023.

Rathmell WK, Rumble RB, Van Veldhuizen PJ, et al. Management of metastatic clear cell renal cell carcinoma: ASCO Guideline. *J Clin Oncol*. 2022;40(25):2957-2995.

Richie JP, Choueiri TK. Role of surgery in patients with metastatic renal cell carcinoma. UpToDate. 2023. Accessed at https://www.uptodate.com/contents/role-of-surgery-in-patients-with-metastatic-renal-cell-carcinoma on December 15, 2023.

Last Revised: May 1, 2024

Written by

The American Cancer Society medical and editorial content team (https://www.cancer.org/cancer/acs-medical-content-and-news-staff.html)

Our team is made up of doctors and oncology certified nurses with deep knowledge of cancer care as well as editors and translators with extensive experience in medical writing.