Patient

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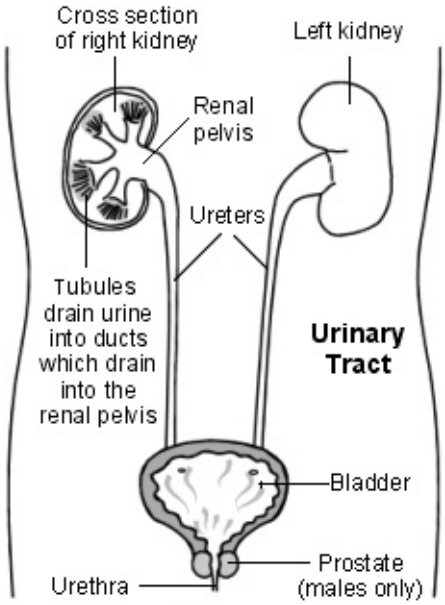
Kidney Cancer

Most cases of kidney cancer develop in people over the age of 60 although it sometimes affects younger people. The most common early symptom is blood in the urine. If kidney cancer is diagnosed at an early stage, there is a good chance of a cure. In general, the more advanced the cancer (the more it has grown and spread), the less chance that treatment will be curative. However, treatment can often slow the progress of the cancer.

What are the kidneys?

The two kidneys lie to the sides of the upper part of the tummy (abdomen), behind the intestines, and either side of the spine. Each kidney is about the size of a large orange, but bean-shaped.



A large renal artery takes blood to each kidney. The artery divides into many tiny blood vessels (capillaries) throughout the kidney. Tiny structures in the kidneys, called nephrons, filter the blood contained in the capillaries. Water and waste materials which filter through the walls of the capillaries into the nephrons form urine.

Urine passes along thin channels (tubules) which are part of each nephron, into larger channels (ducts) which drain the urine into the inner part of the kidney (the renal pelvis).

Urine passes down a tube called a ureter which goes from each kidney to the bladder.

Urine is stored in the bladder until it is passed out through the urethra when we go to the toilet.

The cleaned (filtered) blood from each kidney collects into a large renal vein which takes the blood back towards the heart.

Some specialised cells in the kidneys also make some hormones, including:

- Renin - which helps to regulate blood pressure.
- Erythropoietin - which helps to stimulate the bone marrow to make red blood cells.
- Calcitriol - which helps to regulate the calcium level in the blood.

Although it is normal to have two kidneys, we can live perfectly well with just one healthy kidney.

What is cancer?

Cancer is a disease of the cells in the body. The body is made up from millions of tiny cells. There are many different types of cell in the body, and there are many different types of cancer which arise from different types of cell. What all types of cancer have in common is that the cancer cells are abnormal and multiply out of control. A cancerous (malignant) tumour is a lump or growth of tissue made up from cancer cells which continue to multiply. Malignant tumours invade into nearby tissues and organs, which can cause damage.

Malignant tumours may also spread to other parts of the body. This happens if some cells break off from the first (primary) tumour and are carried in the bloodstream or lymph channels to other parts of the body. These small groups of cells may then multiply to form secondary tumours (metastases) in one or more parts of the body. These secondary tumours may then grow, invade and damage nearby tissues, and spread again.

Some cancers are more serious than others; some are more easily treated than others; some have a better outlook (prognosis) than others.

So, cancer is not just one condition. In each case it is important to know exactly what type of cancer has developed, how large it has become, and whether it has spread. This will enable you to get reliable information on treatment options and outlook. See separate leaflet called Cancer - What are Cancer and Tumours? for further details about cancer in general.

What is kidney cancer?

There are several types of kidney cancer, but most cases are renal cell cancer. This is sometimes called renal adenocarcinoma or renal cell carcinoma or hypernephroma.

Renal cell cancer

This type of cancer develops from a cell in a kidney tubule, which becomes cancerous. The cancer grows and forms into a tumour within the kidney. As the tumour grows:

- The affected kidney tends to become larger. In time the tumour may grow through the wall of the kidney and invade nearby tissues and organs, such as the muscles around the spine, the liver, the nearby large blood vessels, etc.
- Some cells may break off into the lymph channels or bloodstream. The cancer may then spread to nearby lymph nodes or to other areas of the body (metastasise).

Renal cell cancers can be divided into several subtypes by looking at certain features of the cells under a microscope. For example, most are clear cell renal cell cancers, but some other types occur such as sarcomatoid, or granular renal cell cancers. Knowing the subtype of the cancer can be important, as some respond to treatment better than others.

Other types of kidney cancer

Some rare types of cancer arise from other types of cell within the kidney. For example:

- Transitional cell (urothelial) cancers are cancers which arise from transitional cells. These are cells which line the renal pelvis, ureters and bladder. Transitional cell cancer is common in the bladder, but in some cases it develops in the renal pelvis.
- Wilms' tumour and clear cell sarcoma of the kidney are types of kidney cancer which develop only in children.

The rest of this leaflet only discusses renal cell cancer.

What causes kidney cancer (renal cell cancer)?

A cancerous tumour starts from one abnormal cell. The exact reason why a cell becomes cancerous is unclear. It is thought that something damages or alters certain genes in the cell. This makes the cell abnormal and multiply out of control. See separate leaflet called What Causes Cancer? for more details.

In the UK, around 8,700 people are diagnosed with kidney cancer each year. Many people develop kidney cancer for no apparent reason. However, certain risk factors increase the chance that kidney cancer may develop. These include:

- Age. Most cases develop in people over the age of 60. It is uncommon in people aged under 50. It is also more common in men.
- Smoking. About a third of kidney cancers are thought to be caused by smoking. Some of the chemicals from tobacco get into the body and are passed out in urine. These chemicals in the urine can be damaging (carcinogenic) to kidney tubule cells.
- Other chemical carcinogens. Some workplace chemicals have been linked to an increased risk of kidney cancer. For example, asbestos, cadmium and some organic solvents.
- Obesity. Obesity is an established risk factor for kidney cancer. About a quarter of kidney cancer cases are due to being overweight.
- Kidney dialysis. People on long-term dialysis have an increased risk.
- High blood pressure (hypertension). There is a greater risk in people who have high blood pressure.
- Genetic factors may play a role in some cases. (A faulty gene which runs in some families may sometimes trigger kidney cancer. Also, people with some rare genetic disorders have a higher risk of developing kidney cancer. For example, von Hippel-Lindau syndrome, Birt-Hogg-Dubé syndrome and tuberous sclerosis.)

What are the symptoms of kidney cancer?

Many people with kidney cancer have no symptoms at first, especially when the cancer is small. As the cancer develops, the following may occur.

Blood in urine

In many cases, the first symptom is to pass blood in the urine (haematuria), which is usually painless. The blood in the urine may come and go as the tumour bleeds from time to time. (There are many causes of blood in the urine apart from cancer, such as bladder or kidney infections, inflammation of the kidney, kidney stones, etc. You should always report this symptom to your doctor, even if it goes, to clarify the cause of the bleeding.)

Other symptoms

Various other symptoms may occur, typically as the tumour becomes larger, and include:

- Pain or discomfort in the side or back of the abdomen (loin pain).
- High temperatures (fevers) and sweats.
- A swelling in the area over a kidney.
- Anaemia, which can cause tiredness. You may also look pale.
- Some renal cell tumours produce abnormal amounts of certain hormones. This can lead to problems such as:
    - A high blood calcium level which can cause various symptoms, such as increased thirst, feeling sick, tiredness, and constipation.
    - Too many red blood cells being made (polycythaemia).
    - High blood pressure.

As the cancer becomes larger you may feel generally unwell and lose weight. If the cancer spreads to other parts of the body, various other symptoms can develop.

How is kidney cancer diagnosed and assessed?

A doctor may suspect that you have kidney cancer from the symptoms and signs listed above, and then arrange tests to confirm the diagnosis. However, in developed countries, about half of kidney cancers are diagnosed before any symptoms develop. They are usually seen by chance when a scan or other investigation is done for another reason.

Tests to confirm the diagnosis

An ultrasound scan of the kidney can usually detect a kidney cancer. This is often one of the first tests done if your doctor suspects that you may have kidney cancer. An ultrasound scan is a safe and painless test which uses sound waves to create images of organs and structures inside your body. See separate leaflet called Ultrasound Scan for more details. A more sophisticated scan called a computed tomography (CT) scan may be used if there is doubt about the diagnosis.

Assessing the extent and spread

If you are found to have a kidney cancer, then other tests are likely to be advised. These may include one or more of: a CT scan or magnetic resonance imaging (MRI) scan of the abdomen and chest, a chest X-ray, blood tests, and sometimes other tests. (See separate leaflets called CT Scan, MRI Scan, X-ray Test, and Routine Kidney Function Blood Test for more details.) This assessment is called staging of the cancer.

The aim of staging is to find out:

- How much the tumour in the kidney has grown, and whether it has grown to the edge, or through the outer part of the kidney.
- Whether the cancer has spread to local lymph glands (nodes).
- Whether the cancer has spread to other areas of the body (metastasised).

Finding out the stage of the cancer helps doctors to advise on the best treatment options. It also gives a reasonable indication of outlook (prognosis). See separate leaflet called Staging and Grading Cancer for more details.

What are the treatments for kidney cancer (renal cell cancer)?

Treatment options which may be considered include surgery, radiotherapy, arterial embolisation and immunotherapy. (In general, chemotherapy does not work as well for renal cell cancer as for some other types of cancer. Therefore, it is not often used as a treatment.) The treatment advised for each case depends on various factors, such as the stage of the cancer (how large the cancer is and whether it has spread), the exact subtype or grade of the cancer, and your general health.

You should have a full discussion with a specialist who knows your case. They will be able to give the pros and cons, likely success rate, possible side-effects, and other details about the various possible treatment options for your type of cancer.

You should also discuss with your specialist the aims of treatment. For example:

- In some cases, the treatment aims to cure the cancer. Some kidney cancers can be cured, particularly if they are treated in the early stages of the disease. (Doctors tend to use the word remission rather than the word cured. Remission means there is no evidence of cancer following treatment. If you are in remission, you may be cured. However, in some cases a cancer returns months or years later. This is why doctors are sometimes reluctant to use the word cured.)
- In some cases, the treatment aims to control the cancer. If a cure is not realistic, with treatment it is often possible to limit the growth or spread of the cancer so that it progresses less rapidly. This may keep you free of symptoms for some time.
- In some cases, treatment aims to ease symptoms. For example, if a cancer is advanced then you may require treatments such as painkillers or other treatments to help keep you free of pain or other symptoms. Some treatments may be used to reduce the size of a cancer, which may ease symptoms such as pain.

Surgery

An operation to remove some (or sometimes all) of the affected kidney is the most common treatment. This is usually done as an open operation but it can also be done as a keyhole operation for some cases. If the cancer is at an early stage and not spread then surgery alone may be curative. If the cancer has spread to other parts of the body, surgery to remove the affected kidney may still be advised, often in addition to other treatments.

In some cases, surgery is done to remove a secondary kidney tumour which has spread to another part of the body. For example, some secondary tumours which develop in the liver or lung can be removed.

Radiotherapy

Radiotherapy is a treatment which uses high-energy beams of radiation which are focused on cancerous tissue. This kills cancer cells, or stops cancer cells from multiplying. See separate leaflet called Radiotherapy for more details. Radiotherapy may be advised in addition to surgery, which aims to kill any cancerous cells which may have been left behind following an operation.

Instead of surgery, radiotherapy may be used to treat the primary cancer if your general health is poor. It is also commonly used to treat kidney cancer which has spread to other sites, such as secondary tumours which develop in a bone or the brain.

Arterial embolisation

This may be used instead of surgery (for example, if you are not well enough for surgery). The aim of this treatment is to block off the blood vessel (artery) which is supplying a kidney tumour with blood. To do this, a catheter is inserted into a blood vessel in the groin. (A catheter is a long thin, flexible, hollow tube.) Using X-ray pictures for guidance, the catheter is pushed up into the blood vessel in the affected kidney. When it is in the correct place, a substance is injected down the catheter into the blood vessel to block the blood vessel. The tumour is then deprived of its blood supply and so dies.

Immunotherapy (sometimes called biological therapy)

This treatment uses medicines to stimulate the immune system to attack cancerous cells. Two medicines are commonly used to treat kidney cancer - interferon and aldesleukin (sometimes called interleukin 2).

Other immune therapies, such as using vaccines to stimulate your immune system to fight cancer cells and using monoclonal antibodies to attack cancer cells, are being investigated as possible new treatments for kidney cancer.

Recently, new targeted treatments have been introduced including sunitinib, sorafenib, pazopanib and temsirolimus. They are types of medicines called multikinase inhibitors which interfere with the growth of cancer cells. They also work by slowing the growth of new blood vessels within the tumour. They can shrink the cancer or slow its growth.

Other treatments

Using local anaesthetic with sedation or a general anaesthetic, radiofrequency (using electrodes inserted through the skin) or cryotherapy (using probes inserted through the skin or in a laparoscope) may be used as an option in the treatment of kidney cancer. Radiofrequency is delivered via an electrode to destroy the tumour tissue in the target area. Cryotherapy involves using a coolant at subfreezing temperatures to create an ice ball around the probe's tip, which then destroys surrounding tissue. Irreversible electroporation uses electricity to damage cancer cells. These treatments may only be available at specialist centres where the doctors are trained to do them.

What is the outlook (prognosis)?

The outlook is best in those who are diagnosed when the cancer is confined within a kidney, has not spread, and who are otherwise in general good health. Surgical removal of an affected kidney in this situation gives a good chance of cure. However, many people with kidney cancer are diagnosed when the cancer has already spread. In this situation a cure is less likely. However, treatment can often slow down the progression of the cancer.

The response to treatment can also vary from case to case. This may be partly related to the exact subtype or grade of the cancer. Some kidney cancers, even some which are advanced and have spread, respond much better to immunotherapy than others.

The treatment of cancer is a developing area of medicine. New treatments continue to be developed and the information on outlook above is very general. The specialist who knows your case can give more accurate information about your particular outlook, and how well your type and stage of cancer is likely to respond to treatment.

See patient.info/selfhelp.asp for a list of support groups for cancer patients.

Further help & information

Kidney Cancer UK

Secure Hold Business Centre, Studley Road, Redditch, Worc, B98 7LG

Tel: 0844 870 7054

Web: www.kcuk.org

Cancer Research UK

Angel Building, 407 St John Street, London, EC1V 4AD

Tel: (Nurse team) 0808 800 4040, (Switchboard) 020 7242 0200

Web: www.cancerresearchuk.org

Macmillan Cancer Support

89 Albert Embankment, London, SE1 7UQ

Tel: (Support Line) 0808 808 00 00

Web: www.macmillan.org.uk

Further reading & references

- Guidelines on Renal Cell Carcinoma, European Association of Urology (Mar 2013)
- Laparoscopic cryotherapy for renal cancer, NICE Interventional Procedure Guideline (August 2011)
- Sunitinib for the first-line treatment of advanced and/or metastatic renal cell carcinoma, NICE Technology Appraisal Guidance (March 2009)
- Bevacizumab (first-line), sorafenib (first- and second-line), sunitinib (second-line) and temsirolimus (first-line) for the treatment of advanced and/or metastatic renal cell carcinoma; NICE Technology Appraisal Guidelines (August 2009)
- Percutaneous radiofrequency ablation of renal cancer, NICE Interventional Procedure Guideline (July 2010)
- Pazopanib for the first line treatment of metastatic renal cell carcinoma, NICE Technology Appraisal Guideline (February 2011)
- Everolimus for the second-line treatment of advanced renal cell carcinoma, NICE Technology Appraisal Guideline (April 2011)
- Percutaneous cryotherapy for renal tumours, NICE Interventional Procedure Guideline (July 2011)
- Coppin C, Le L, Porzsolt F, et al; Targeted therapy for advanced renal cell carcinoma. Cochrane Database Syst Rev. 2008 Apr 16;(2):CD006017.
- Rini BI, Campbell SC, Escudier B; Renal cell carcinoma. Lancet. 2009 Mar 28;373(9669):1119-32. Epub 2009 Mar 5.

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