The Urinary Tract

The main parts of the urinary tract consist of the bladder, kidneys, renal pelvis and the ureter. Information on cancer of the bladder is dealt with in a separate factsheet. The following information is split into two sections. The first section consists of information for cancer of the kidney. The second section consists of information for the renal pelvis and ureter. The statistics on pages 6 and 7 relate to urinary tract excluding bladder.

What are the kidneys?

The two kidneys lie to the sides of the upper abdomen (the loins), 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 renal pelvis (the inner part of the kidney).

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 specialized 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 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 spread to other areas of the body (metastasise).

Renal cell cancers can be divided into several ‘sub-types’ 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 sub-type 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.
**Causes of kidney cancer**

Most kidney cancers are not inherited. Only 4% of cases of kidney cancer can be attributed to a family history of the disease. The exact cause is unknown, but some things are thought to increase the risk, such as:

- smoking,
- obesity,
- poor diet,
- high blood pressure,
- some types of kidney disease (including use of kidney dialysis),
- taking anti-inflammatory drugs (NSAIDs) and other mild painkillers, and
- exposure to chemicals at work, such as asbestos, lead and cadmium.

Kidney cancer is most common in men aged over 60 years. Some cases of cancer in the kidney occur as a result of tumours spreading from another site. These cases are called secondary kidney cancer.

**What are the symptoms of kidney cancer?**

**Blood in urine**

You may have no symptoms at first when the tumour is small. 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').
- Fever (high temperatures) and sweats.
- A swelling in the area over a kidney.
- Anaemia, which can cause tiredness.
- 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?**

**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).

Intravenous urography is a special x-ray test which is sometimes used to detect a kidney cancer. The urinary tract does not show up well on ordinary x-ray pictures. However, with intravenous urography a contrast dye is injected into a vein ('intravenous' injection). The dye travels in the bloodstream, concentrates in the kidneys, and is passed out into the ureters with urine made by the kidneys. The dye blocks x-rays so the structure of the kidneys, ureters and bladder shows up clearly as white on x-ray pictures.

**Assessing the extent and spread**

If you are found to have a kidney cancer then further tests may be advised to assess if the cancer has spread. For example, a CT scan, an MRI scan, a chest x-ray, blood tests, or other tests. 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).
What are the treatment options 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 kidney 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 sub-type 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 all (or sometimes part) of the affected kidney is the most common treatment. 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 focussed on cancerous tissue. This kills cancer cells, or stops cancer cells from multiplying. Radiotherapy may be advised in addition to surgery which aims to kill any cancerous cells which may have been left behind following an operation. It may be used to treat the primary cancer instead of surgery if your general health is poor. Radiotherapy 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 right place a substance is injected down the catheter into the blood vessel to block the blood vessel. The tumour is then deprived of it's blood supply and so dies.

Immunotherapy (sometimes called biological therapy)

This treatment uses drugs to stimulate the immune system to attack cancerous cells. Two drugs 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.

Source: www.patient.co.uk
Benefits and disadvantages of treatment

Many people are frightened at the thought of having cancer treatments, particularly because of the potential side effects that can occur. Some people ask what would happen if they do not have any treatment.

Although many of the treatments can cause side effects, these can often be well controlled with medicines. Treatment can be given for different reasons and the potential benefits will vary depending upon the individual situation.

Early-stage kidney cancer

In people with early-stage kidney cancer, surgery is often done with the aim of curing the cancer. Occasionally additional treatments are given to help reduce the risks of it coming back.

Advanced-stage kidney cancer

If the cancer is at a more advanced stage, treatment may only be able to control it, leading to an improvement in symptoms and a better quality of life. However, for some people the treatment will have no effect upon the cancer and they will get the side effects without any of the benefit.

The staging and grading of kidney cancer

Staging

The stage of a cancer is a term used to describe its size and whether it has spread beyond its original site. Knowing the extent of the cancer and the grade (see below) helps the doctors to decide on the most appropriate treatment.

Generally, kidney cancer is divided into four stages, from small and localised (stage one) to spread into surrounding structures (stages two or three) or other parts of the body (stage four). If the cancer has spread to distant parts of the body this is known as secondary cancer (or metastatic cancer).

A commonly used staging system for cancer of the kidney is described below:

- **Stage 1** The tumour is found only within the kidney and is less than 7cm in size. It has not spread to nearby tissues, lymph nodes or other organs.
- **Stage 2** The tumour is larger than 7cm in size, but has not spread beyond the outer layer (capsule) of the kidney.
- **Stage 3** The tumour has begun to spread outside the kidney. It may have spread into the main blood vessels that are close to the kidney (the renal vein or the inferior vena cava); the lymph nodes around the kidney; or into the fat that surrounds the kidney. The adrenal gland, which is on top of the kidney, may also be affected.
- **Stage 4** The tumour has spread to or nearby organs, such as the bowel or to parts of the body further away from the kidney, such as the lungs or the brain.

Grading

Grading refers to the appearance of the cancer cells under the microscope. The grade gives an idea of how quickly the cancer may develop. Grading systems usually use three grades: grade 1 (low-grade), grade 2 (moderate-grade) and grade 3 (high-grade). Low-grade means that the cancer cells look very like the normal cells of the kidney. They are usually slow-growing and are less likely to spread. In high-grade tumours the cells look very abnormal. They are likely to grow more quickly and are more likely to spread.

What is the prognosis (outlook)?

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 sub-type 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.
The symptoms of cancer of the ureter and renal pelvis may include any of the following:

Cancer of the ureter and renal pelvis

Cancers affecting the ureter and renal pelvis are rare. Approximately 400 people are diagnosed with this type of cancer in the UK each year. Cancer of the ureter and renal pelvis tends to affect more men than women, and is rare under the age of 65.

The main type of cancer affecting the ureter and renal pelvis is called transitional cell carcinoma (TCC). This type of cancer develops in cells, known as transitional cells, which form the lining of the bladder, ureters and renal pelvis. Usually only one ureter or renal pelvis is affected.

Very rarely, other types of cancer can start in the ureter or renal pelvis. These include some types of lymphoma (a cancer that starts from the cells of the lymphatic system) and sarcoma (a cancer that develops from the supporting tissues of the body, such as muscle or cartilage).

Cancer that starts in the ureter or renal pelvis is known as primary cancer. When cancer spreads from another part of the body to the ureter it is known as secondary or metastatic cancer in the ureter or renal pelvis.

Source: www.cancerbacup.org.uk

Causes

The exact causes of cancer of the ureter and renal pelvis is unknown. It is thought that smoking may increase the risk of developing these types of cancer. There may also be a slightly increased risk in people who have been exposed to certain chemicals used in dye factories and chemical industries.

Cancer of the ureter and renal pelvis, like other cancers, is not infectious and so cannot be passed on to other people. It is not caused by an inherited faulty gene, so other members of your family are not likely to develop it.

Source: www.cancerbacup.org.uk

Signs and symptoms

The symptoms of cancer of the ureter and renal pelvis may include any of the following:

- blood in the urine (haematuria)
- passing blood clots in the urine
- unexplained weight loss
- having to pass urine frequently
- pain when passing urine
- back pain or cramps
- fatigue (tiredness and lack of energy)
- anaemia (if you have been passing blood in the urine for some time), but this is rare.

Sometimes the ureter may become blocked, either by cancer cells or by a blood clot. If this happens, the above symptoms may develop more quickly and may be more severe, often accompanied by a high temperature. This is known as a ureteric obstruction.

The above symptoms may be caused by a number of conditions other than cancer of the ureter or renal pelvis. Symptoms which are severe, get worse, or that last for a few weeks, should always be checked by your doctor.

Source: www.cancerbacup.org.uk

How it is diagnosed

Your GP will examine you and organise a series of urine and blood tests. The urine sample will be sent to a laboratory to be checked under a microscope for any cancer cells. Samples of blood will also be taken to check your general health, the number of cells in your blood (blood count), and to see how well your kidneys and liver are working.

Your GP will refer you to a urologist (a doctor who specialises in diseases of the urinary system) if further tests are needed. These tests will help to make the diagnosis and, if cancer is found, to check how far, if at all, the disease has spread.

Cystoscopy and biopsy

A small, flexible, fibre-optic telescope (cystoscope) is passed up the urethra to enable the doctor to look at the bladder. The doctor can also extend the tip of the cystoscope up into the ureter: this procedure, known as ureteroscopy, can be done under a local or a general anaesthetic. In most cases it is done under a local anaesthetic because this is the quickest and simplest way.
How It is diagnosed continued...

If any abnormality that could be a cancer is seen, it has to be examined while you are under a general anaesthetic. The doctor will then take a sample of abnormal cells, and these are examined in a laboratory under a microscope by a pathologist (biopsy).

Intravenous urogram or pyelogram (IVU or IVP)
This test shows up abnormalities in the urinary system. It is done in the hospital x-ray department and takes about an hour. A dye is injected into a vein, usually in the arm, that travels through the bloodstream to the kidneys. The doctor can watch the passage of dye on an x-ray screen and pick up any abnormalities.

The dye will probably make you feel hot and flushed for a few minutes, but this feeling gradually disappears. You may feel some discomfort in your abdomen, but this will only be temporary. You should be able to go home as soon as the test is over.

Ultrasound scan
Sound waves are used to build up a picture of the inside of your body. You may have scans of your bladder and pelvis. The scan will be done in the hospital scanning department. Before your test, you will be asked to drink plenty of fluid so that your bladder is full and a clear picture can be seen.

Once you are lying comfortably on your back, a special gel is spread over your abdomen. A small device, like a microphone, is rubbed over the area. The echoes are converted into a picture by a computer. This is a completely painless procedure and takes about 15–20 minutes. Once the scan is over, you will be allowed to empty your bladder.

Retrograde pyelography
This is a special x-ray which involves inserting a catheter into the ureter at the time of ureteroscopy. Dye is then passed up the catheter to highlight the ureter and renal pelvis.

Further tests
If a cancer is found, you may be referred for other tests to find the size of the cancer and whether or not it has spread beyond the ureter or renal pelvis. These may include either of the following:

CT (computerised tomography) scan
A number of x-ray pictures are taken of the pelvic and abdominal area and fed into a computer to give a detailed picture of the inside of the body. You will be given a special liquid to drink a few hours before your test, and again in the x-ray department. This liquid shows up on x-ray and ensures that a clear picture is obtained. Once you are lying comfortably on the couch, the scan can be taken. The scan itself is painless, but it will mean you have to lie still for up to 10–15 minutes. Most people are able to go home as soon as their scan is over.

MRI (magnetic resonance imaging) scan
This test is similar to a CT scan, but uses magnetism instead of x-rays to build up cross-sectional pictures of your body. During the test, you will be asked to lie very still on a couch inside a long tube for about 30 minutes. It can be slightly uncomfortable and some people feel claustrophobic during the scan. It is also very noisy, but you will be given earplugs or headphones to wear.

The combination of tests will help the specialist to find out the stage and grade of the cancer. This will help the doctors to decide on the most appropriate treatment for you.

Treatment
Treatment will depend on a number of factors, including your age, general health and the position, type, stage and grade of the cancer. Surgery is the most common treatment for cancer of the ureter and renal pelvis. The extent of surgery will depend on many factors, such as the stage and the grade of the cancer.

After surgery, sometimes further treatment will be recommended, such as radiotherapy or chemotherapy. This is known as adjuvant treatment. The aim of adjuvant treatment is to get rid of any remaining cancer cells and to reduce the chance of the cancer coming back. The effectiveness of adjuvant treatment for cancer of the ureter and renal pelvis is unknown.

If surgery is not possible, other treatments may be more appropriate. These may include chemotherapy or radiotherapy. The aim of these treatments is to reduce the size of the tumour and help control symptoms.

Surgery
Nephro-ureterectomy means the removal of the kidney, ureter and top part of the bladder. Sometimes the surrounding lymph glands, fat and tissue may also be removed.

Segmental ureterectomy resection is the removal of the affected part of the ureter. The remaining parts are then rejoined. This procedure is usually only possible if the tumour is small, low-grade and contained within the ureter.

Ureteronecystectomy (or reimplantation) is the removal of the lower part of the ureter, and sometimes a small part of the bladder. The remaining part of the ureter is then connected to the bladder. This is usually done if the tumour is only in the lower part of the ureter.

Occasionally, a tumour may affect just the surface of the ureter. The cancer may be removed either by laser treatment or electrosurgery. These two surgical treatments are in the early stages of development.

Laser therapy - A ureteroscope is passed through the bladder and into the ureter. A narrow beam of intense laser is then passed through the tube to destroy the tumour.

Electrosurgery - An electric current is used to remove the cancer. The tumour and surrounding area can be burned away.

Radiotherapy
Radiotherapy treats cancer by using high-energy rays, which destroy the cancer cells and shrink the tumour while doing as little harm as possible to normal cells.

Chemotherapy
Chemotherapy is the use of anti-cancer (cytotoxic) drugs to destroy the cancer cells. They work by disrupting the growth and division of cancer cells. The chemotherapy may be given directly into the vein (intravenously).

Source: www.cancerbacup.org.uk
Summary

Incidence figures follow a slight increase over the period of time studied, 1992-2006. There were approximately 370 registrations per annum overall with 231 of those being for males. The change in EASR for incidence has increased for males by 1.7% over the period and by 2.8% for females. The increase is statistically significant at the 1% level for both sexes.

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<td>Mortality Incidence Rate (1992-2006)</td>
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* Significant at 5% level  
** Significant at 1% level

Number of incident cases and age-specific rates, 1992-2006

Prevalence Statistics (at 31st December 2006) in Wales

Males

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Females

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## URINARY TRACT CANCER FACTSHEET

### Trends in Incidence 1992-2006

#### Males

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#### Crude Rate
- Females: 14.15
- Males: 13.97

#### EASR
- Females: 12.49
- Males: 12.37

#### WASR
- Females: 8.79
- Males: 8.63

#### Total
- Females: 120
- Males: 103

#### Crude Rate
- Females: 8.08
- Males: 6.92

#### EASR
- Females: 5.78
- Males: 4.96

#### WASR
- Females: 4.12
- Males: 3.71