In most cases kidney cancer is asymptomatic, which means that there are no clear symptoms to indicate it. Most kidney tumours are found during a routine ultrasound or a similar imaging procedure for other conditions such as back pain.

Because there are several types of kidney tumours, the doctor does a series of tests to better understand your specific situation. These tests include a medical history and scans. Sometimes a family history is also taken. A CT scan or MRI scan will reveal the size of the tumour and if it has invaded local veins, lymph nodes, or surrounding organs. This is important to determine further treatment. The doctor may also perform a physical examination and take blood and urine for testing.

With the results of your scan, the urologist can define the stage of the disease. By analysing tumour tissue, received either during surgery or biopsy, the pathologist determines the subtype of the tumour and whether or not it is an aggressive form. Together, the stage, subtype, and aggressiveness of the tumour form the classification.

Classification of the kidney tumour is used to estimate your individual prognosis. Based on this individual prognosis your doctor will discuss the best treatment pathway for you.

In some cases you may need additional tests to check your kidney function. This is important if you only have one kidney or if you are at risk of kidney failure because you have diabetes, high blood pressure, chronic infections, or a kidney disease.

**Symptoms at diagnosis**

While kidney cancer is generally asymptomatic, about 1 in 10 people do experience symptoms like
pain in the side of the body or blood in the urine. This could be a sign that the disease has advanced. Some people can also experience so-called paraneoplastic syndromes. These are reactions the body can have to any type of cancer and may include high blood pressure, weight loss, fever, anaemia, muscle mass loss, and loss of appetite. Syndromes more commonly associated with kidney cancer include changes in liver enzymes and blood platelets. These changes are usually discovered during tests and normally do not cause any symptoms.

Bone pain or a persistent cough could be signs that the cancer has spread through the body. This is known as metastatic disease.

**Diagnostic tools**

Imaging is important for the diagnosis and classification of kidney tumours. Most common imaging techniques are ultrasound, CT scans, and MRI. In some cases a biopsy is done to get more insight into the specific characteristics of the tumour.

**Contrast-enhanced scan**

After a tumour is detected, the doctor first needs to know whether it is malignant. A contrast-enhanced ultrasound, CT, or MRI scan of the abdomen and pelvis provides information about this. CT and MRI scans also show:

- The location and size of the tumour
- Whether or not you have enlarged lymph nodes
- Whether or not the tumour has spread to neighbouring organs, such as the adrenal gland, liver, spleen or pancreas
- Whether the urinary tract is affected by the tumour

For a contrast-enhanced scan, a contrast medium is administered through an IV, usually in your arm. The contrast medium highlights your veins and arteries by giving them a different colour in the pictures taken during the scan. This type of scan allows the radiologist to analyse the tumour. The results will guide the treatment you receive.

If you are allergic to contrast medium, you will receive an MRI or CT scan without contrast-enhancement.

If your doctor thinks the cancer may have spread to the lungs, you will get further tests, like a CT scan. You may need a bone or brain scan if you have symptoms such as bone pain or epileptic seizures. These scans are done to see whether the cancer has spread to bones or the brain.

**Terms your doctors may use**

- **Benign tumour**: a non-cancerous growth which will not spread to other organs.
- **Malignant tumour**: a cancerous growth which either grows continuously or in spurts. Malignant tumours can metastasize, which means they spread throughout the body.
- **Metastatic disease**: when a tumour has spread to other organs or lymph nodes.
- **Renal**: related to the kidney.
Renal tumour biopsy

During a renal tumour biopsy, one or more samples of tumour tissue are taken. First you receive local anaesthesia. Then the doctor inserts a needle through your skin and uses ultrasound or CT imaging to locate the tumour. The tissue samples are analysed by the pathologist in order to help determine future treatment.

Renal biopsy is not standard procedure in the diagnosis of kidney cancer. You may need a biopsy in case:

- The results of your scan are not clear enough
- You have a small tumour which could be treated with active surveillance
- You have a small tumour which could be treated with radiofrequency ablation or cryotherapy

Biopsies may cause blood in the urine. In rare cases they can cause more severe bleeding. A renal tumour biopsy is generally a harmless procedure.

Classification

Kidney tumours are classified according to their stage, subtype, and the grade of aggressiveness of the tumour cells. These three elements are the basis for your possible treatment pathway.

Staging system

Tumour stage indicates how advanced the tumour is and whether or not there are metastases in the lymph nodes or other organs.

Kidney tumour stage is based on the Tumour Node Metastasis (TNM) classification. The urologist looks at the size and invasiveness of the tumour (T) and determines how advanced it is, based on 4 stages. Whether any lymph nodes are affected (N) or if the cancer has spread to any other parts of your body (M) is also checked. If kidney tumours metastasize they generally spread to the lungs, or to the bones or brain. Figures 1 to 5 illustrate the different stages.

Fig. 1: A stage I kidney tumour is a tumour up to 7 cm, limited to the kidney. Fig. 2: Stage II tumours are still limited to the kidney, but are larger than 7 cm.
Fig. 3: Stage III tumours have spread into the renal vein, the fatty tissue next to the kidney (perirenal fat), or the vena cava.

Fig. 4: Stage IV tumours have spread further outside of the kidney, beyond the renal fascia and into the adrenal gland. Sometimes, one or more lymph nodes are enlarged in this stage.

Fig. 5: Metastatic kidney cancer can spread to the lungs, bones, or brain.
**Tumour subtype**

Next to staging, the subtype of kidney tumours is important. The subtype is determined by a pathologist and the procedure is known as histopathological analysis. The specialist examines the tumour tissue either taken during a biopsy or after it has been removed during surgery. Renal biopsy is not a standard procedure in the diagnosis of kidney cancer. In most cases the subtype of your tumour will not be known until after you have surgery.

There are various subtypes of kidney tumours. Most kidney tumours are renal cell carcinomas (about 80-85%). Of these, the most common subtype is clear cell renal cell carcinoma (80%), 10% are papillary renal cell carcinomas, and 5% chromophobe renal cell carcinomas. The remaining 5% of renal cell carcinomas include collecting duct renal cell carcinoma (or Duct-Bellini-Carcinoma) and a variety of uncommon and hereditary carcinomas.

If you are diagnosed with a rare kidney tumour your doctor will give you detailed information about different treatment possibilities. These may differ from therapy for the more common kidney cancer subtypes. Treatment options are discussed by a multidisciplinary team of doctors, to find the best approach for you (See: The medical team).

**Benign tumours**

Some tumours in the kidney are non-cancerous. These are known as benign kidney tumours. The most common benign tumours of the kidney are oncocytomas and angiomyolipomas.

Oncocytomas are generally diagnosed after histopathological analysis, because scans cannot always identify them clearly. The most common treatment options for these tumours are partial nephrectomy and active surveillance. Read more about these treatment options in the section Localized Kidney Cancer.

An angiomyolipomas (AML) is a benign tumour. It is 4 times more likely to occur in women. It is generally diagnosed after ultrasound, CT or MRI scans, or if the tumour bleeds and causes symptoms. Although AML is a benign tumour, the risk of spontaneous bleeding in the kidney increases if it continues to grow. Surgery to remove the tumour is recommended if:

- You have a large AML (a tumour larger than 4 cm)
- You are a woman under the age of 45
- The tumour causes symptoms
- It is difficult for you to visit your doctor in case of emergency, because you live far away from a hospital or you have limited mobility.

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**The medical team**

**Urologist:** a urologist specializes in health and diseases of the urinary tract.

**Oncologist:** an oncologist specializes in all types of cancer.

**Onco-urologist:** an onco-urologist specializes in urological cancers of, for instance, the bladder, kidney, prostate, or testicles.

**Pathologist:** a pathologist studies tissue, blood, or urine to understand the specific characteristics of diseases. In cancer treatment, the pathologist helps with the classification of tumours.

**Radiologist** radiologist specializes in imaging techniques and analyses ultrasound, CT, MRI, or other scans done to diagnose or monitor a tumour.
Generally, an AML is removed with partial nephrectomy but in some cases it may be necessary to remove the whole kidney. Radical nephrectomy is recommended in case of severe bleeding of the tumour.

Renal cysts
Some masses in the kidney are not tumours but renal cysts. These are sacs filled with fluid located on the kidney and are easily recognized on a CT scan. Cysts can be malignant. If this is the case they need to be removed by surgery.

Grading system
The third component of the classification is an evaluation of how aggressive the tumour cells are. The Fuhrman nuclear grade is the most commonly used system to determine this. The pathologist classifies your tumour in 1 of 4 grades.

Individual prognosis
After diagnosis and classification, your doctor will discuss different treatment and follow-up options with you. The recommended treatment pathway is based on the TNM staging, the Fuhrman grade, and the subtype of the tumour. Your individual prognosis can also be estimated after classification. However, keep in mind that this is a prediction which does not take into account any unexpected developments.