

## Lung cancer – bronchial carcinoma

### What is lung cancer – also known as bronchial carcinoma?

Lung cancer, also known as pulmonary carcinoma or bronchial carcinoma, may develop in any of the sections of the lung. The majority of tumours in the lung develop from the cells of the mucous membrane lining the bronchi. Changes commonly occur in the mucous membrane at an early stage and these can be recognised as precancerous lesions.

More than 50 per cent of tumours develop in the upper sections of the lobes of the lungs. This area is subject to greater ventilation when breathing and hence also has greater exposure to damaging substances.

There are various different types of lung cancer:

“**Small-cell lung cancer**” is particularly malignant. It grows very fast and quickly spreads to other parts of the body.

“**Non-small-cell lung cancers**”, these include the forms known as squamous cell carcinoma, adenocarcinoma and large cell carcinoma, grow more slowly.

Only histological examination of the cancer tissue can provide information about the type of tumour.

### What are the causes and risks for the development of lung cancer or bronchial carcinoma?

Ninety per cent of cases can be attributed to smoking.

**Various criteria are decisive for the risk involved:**

- The number of cigarettes
- The number of years of smoking
- The concentration of pollutants in the cigarettes
- The time at which the patient started smoking

The risk of lung cancer drops when you stop smoking. After ten years, an ex-smoker has about the same risk of developing lung cancer as a non-smoker.

The risk of developing lung cancer also increases as a result of passive smoking.

There is also a variety of other substances that are inhaled at the workplace or as a result of a high pollutant load in the air. Diet, infections and possibly genetic factors may also play a role in the development of lung cancer.

### What role does lifestyle play in lung cancer or bronchial carcinoma?

Ninety per cent of all cases of lung cancer can be attributed to smoking. Cigarette smoke contains a large number of carcinogenic substances (substances that can cause cancer). The risk of developing lung cancer also increases significantly with increasing numbers of cigarettes smoked each day and with the length of time the individual has smoked. This means that if you smoke 25 cigarettes a day the probability of developing lung cancer is 25 times higher than for non-smokers.

### How is lung cancer or bronchial carcinoma diagnosed?

The earlier lung cancer is discovered, the better the chances of recovery. At the start of its growth, lung cancer only causes symptoms in rare cases. This is why very small lung cancers are almost always only discovered accidentally, in x-ray examinations, for example.

**The following symptoms may occur and should be assessed by a doctor:**

- A cough that lasts for several weeks and does not go away but becomes worse or changes suddenly
- Hoarseness
- Bronchitis or a “cold” that does not improve despite treatment with antibiotics
- Breathlessness
- Constant chest pain
- Phlegm, either with or without blood
- Swelling of the neck and face
- Loss of appetite or major weight loss, general loss of strength
- Paralysis or severe pain, episodes of fever

If lung cancer is suspected, the doctor will arrange the necessary investigations to clarify whether a tumour is actually involved. If this is the case, the type of tumour and the stage of the disease will be ascertained.

**The basic investigations if lung cancer is suspected include:**

- Laboratory tests of the blood and the bronchial mucus
- X-rays
- Bronchoscopy

**Bronchoscopy**

Imaging of the bronchi is one of the standard investigation methods in the event of suspected lung cancer. A bronchoscope, an optical instrument, is used to detect abnormal cells in the lung.

Additional examinations will follow if lung cancer is confirmed. They show how far the tumour has spread, whether lymph nodes are involved and whether secondary cancers have developed (metastasis) in other parts of the body.

**These examination methods include:**

- Computed tomography (CT)
- Magnetic resonance imaging tomography (MRI)
- Ultrasound examination (sonography)
- Skeletal scintigraphy (=bone scintigraphy or bone scan)
- Mediastinoscopy
- Positron emission tomography (PET)
- Endobronchial ultrasound (EBUS)
- Pulmonary function test

**Skeletal scintigraphy (bone scintigraphy)**

Skeletal scintigraphy reveals whether the cancer has already involved the bones. A small amount of a radioactive substance that accumulates in diseased bone in particular is injected into the bloodstream. A camera makes the radioactivity visible.

**Positron emission tomography (PET)**

In positron emission tomography, radioactively labelled sugar is injected into the bloodstream and its metabolism is displayed in image form. Tumours and metastasis usually exhibit higher levels of metabolism than healthy tissue and thus stand out from healthy tissue in the images.

**Mediastinoscopy**

Lung cancers often spread via the lymphatic system. The lymph nodes of the mediastinum, the area between the two lobes of the lungs, are particularly often involved. Mediastinoscopy may be useful if the choice of treatment depends on information that is as reliable as possible about the state of these lymph nodes.

**Endobronchial ultrasound (EBUS)**

This procedure combines bronchoscopy with ultrasound. An ultrasound probe is fitted at the end of the bronchoscope used and can make the lymph nodes in the mediastinum visible and take samples from them.

## **Pulmonary function test**

A pulmonary function test provides information about the functional status of the lungs.

## **How is lung cancer or bronchial carcinoma treated?**

The type of treatment is decisively linked to the type of lung cancer involved (non small cell or small cell) and the extent to which the disease has already advanced at the time of diagnosis.

### **The following therapy options are available:**

- Surgery
- Radiotherapy
- Chemotherapy

It depends on the type of tumour and the stage of the disease which procedure is selected. The various therapies are also combined if this seems useful.

In chemotherapy, “cell poisons” known as cytostatic agents are used to block cell growth. As cancer cells divide particularly fast, they react more sensitively to cytostatic agents than healthy cells.

### **Surgery**

If the tumour has not exceeded a certain size and has not yet developed any distant metastasis, surgery is always attempted. The aim is to remove completely the cancer tissue as well as the surrounding lymph nodes that may be affected by cancer cells. Surgery plays an important role, particularly in cases of non small cell lung cancer. However, in a few cases it may also be useful for small cell lung cancer if the tumour is still small and only the adjacent lymph nodes are involved.

### **Radiotherapy**

Radiation is applied externally to the area of the tumour. Radiotherapy causes the destruction of cancer cells. In non small cell lung cancer, radiotherapy may be used if the tumour is already so large that it can no longer be completely removed by surgery alone. Radiotherapy is normally combined with chemotherapy.

### **Chemotherapy**

Chemotherapy involves the use of medicines, known as cytostatic agents, that stop cell growth. They act primarily against fast-growing cells and thus against cancer cells. Several chemotherapeutic drugs are available for the treatment of lung cancer and are selected in accordance with individual circumstances.

## **Additional information: lung cancer or bronchial carcinoma – classification of tumour type and tumour stage**

Lung cancer is referred to in terms of different stages (stages of development) depending on the spread of the tumour. Precise classification is a prerequisite for being able to initiate the correct therapy. Classification is made on the basis of specific standards, for which three aspects are principally decisive:

- The size and spread of the Tumour (T)
- The involvement of the lymph Nodes (N)
- The presence of Metastasis (M)

The term “TNM classification” is therefore also used and this is an internationally applicable system. The numbers after the letters provide more accurate information as to the spread of the tumour (T1-4), the number and position of lymph nodes involved (N0-3) and the presence or absence of distant metastasis (M0 and M1). If, for example, the doctor writes “T1 N0 M0” in a patient’s notes, it means that the tumour involved in this case is small with no lymph node involvement or metastasis and has not yet grown into the main bronchus.

## **TNM classification of lung cancer**

### **The following descriptions are available for T (Tumour):**

- T1 = the primary tumour is less than 2 cm (T1a) or between 2 and 3 cm (T1b) in size, the main bronchus is not involved.
- T2 = the primary tumour is larger than 3 cm and smaller than 5 cm (T2a) or between 5 and 7 cm (T2b) in size or is growing into the main bronchus on the same side.
- T3 = the primary tumour is larger than 7 cm and/or involves the chest wall, diaphragm, pulmonary or costal pleura or a main bronchus. The primary tumour has developed satellite lesions in the same lobe of the lung.
- T4 = the tumour involves neighbouring structures, such as the area between the two lungs (mediastinum), heart, blood vessels, windpipe or vertebrae. The primary tumour has developed satellite lesions in other lobes situated on the same side.

### **The descriptions for N (Nodes) are as follows:**

- N0 = the lymph nodes are not involved.
- N1 = the tumour involves neighbouring lymph nodes on the same side.
- N2 = the tumour involves more distant lymph nodes on the same side.
- N3 = the tumour involves lymph nodes on the other pulmonary lobe.

### **M (Metastasis) is classified as follows:**

- M0 = no secondary growths clinically detected (metastasis)
- M1 = distant metastasis (M1b, e.g. in the liver, brain, adrenal glands or bones) or malignant infiltration of costal or pulmonary pleura or the pericardium detected (M1a).