Lung cancer
A guide for journalists on Non-Small Cell Lung Cancer (NSCLC) and its treatment
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Overview

Lung cancer is the leading cause of cancer death globally. It kills more people than breast, colorectal and prostate cancers combined.¹ Each year 1.38 million people die as a result of the disease, equating to more than 3,000 deaths a day worldwide, or two deaths every minute.¹,²

Five year survival rates for lung cancer are poor when compared to other high incidence cancers. For example, the five year survival rate for patients with breast cancer is up to 89%;³ for lung cancer patients, that figure is only around 15%.⁴

There are two main types of lung cancer; non-small cell lung cancer (NSCLC) and small cell lung cancer (SCLC). NSCLC is the most commonly diagnosed type of lung cancer, accounting for approximately 85% of all cases.⁵

The early signs and symptoms of lung cancer are non-specific and as a consequence the majority of cases are diagnosed at an advanced stage, making successful treatment more difficult and survival outcomes poor.¹

Traditionally, treatment options have included surgery (for patients with earlier stage disease), radiation therapy and chemotherapy, alone or in combination. More recently, new treatment options, including biological therapies, have become available and are helping to improve outcomes and survival for patients.

This guide provides an overview of lung cancer, including its incidence, risk factors, symptoms, diagnosis and treatment options.
Section 1
Lung cancer

i. Types of lung cancer?
Lung cancer arises from the uncontrolled growth (proliferation) of abnormal cells inside the lung. There are two main forms of the disease, non-small cell lung cancer (NSCLC) and small cell lung cancer (SCLC).

NSCLC is the most common form of lung cancer, accounting for approximately 85% of all cases. It grows and spreads more slowly than small cell lung cancer. Early stage disease is associated with few specific symptoms; therefore approximately 70% of cases are not diagnosed until the disease is at an advanced stage when the chances for cure or significant patient benefit are limited.

NSCLC comprises a number of different types of lung cancer, which are grouped as ‘squamous’ or ‘non-squamous’. Non-squamous NSCLC includes further sub-types such as adenocarcinoma and large cell carcinoma.

SCLC is highly aggressive and is predominantly caused by smoking. It metastasises (spreads around the body) early in the disease process and accounts for approximately 15% of all lung cancers.

Figure 1 Typical location of the most common types of non small cell lung cancer

- Squamous Cell Carcinoma
  - Develops from cells that line the airways
  - Often found near the centre of the lung in one of the main airways (the left or right bronchus)
  - Associated with smoking

- Adenocarcinoma
  - The most common type of NSCLC
  - Develops from a particular type of cell which produces mucous (phlegm), which lines the airways.
  - Often found in the periphery (outer areas) of the lungs

- Large Cell Carcinoma
  - Cells appear large and round when viewed under a microscope.
  - Grows quickly and can develop in any part of the lung
ii. Causes and risk factors

**Smoking** The most common cause of lung cancer is cigarette smoking which is associated with at least 80% of all diagnoses. The risk of lung cancer amongst smokers is at least ten times higher than that of non-smokers. This risk is reduced among ex-smokers, but a small excess risk may remain for ex-smokers throughout their lives. There is also a causal link between lung cancer and use of cigars, tobacco pipes, water pipes and smoking of other tobacco products. Evidence also exists of a link between lung cancer risk and passive smoking (estimated to be 20%).

Whilst smoking is the single biggest cause of lung cancer, people who have never smoked also develop the disease. Risk factors include:

- **Ionising radiation** Exposure to ionising radiation increases the risk of lung cancer. Atomic bomb survivors and patients treated with radiotherapy for some rheumatic diseases or Hodgkin’s lymphoma are at moderately increased risk of developing lung cancer.

- **Occupational risks** There is an increased risk of lung cancer amongst workers employed in certain industries and occupations which involve high-risk agents. The most significant of these are asbestos and combustion fumes. In industrialised countries, occupational risks account for approximately 5–10% of lung cancers. Underground miners exposed to radioactive radon and its decay products have also been found to be at an increased risk of developing lung cancer.

- **Environment** Extensive evidence suggests that lung cancer rates are higher in cities than in rural settings. This is likely to be caused by urban air pollution, although it may also involve other factors, such as tobacco smoking and occupational exposures.

- **Indoor air pollution** Indoor air pollution may be responsible for the increased risk of lung cancer that exists for non-smoking women in certain regions of China and other Asian countries. This risk is highest for women living in poorly ventilated homes where coal, wood or other solid fuels are regularly burnt. Fumes from high-temperature cooking using unrefined vegetable oils such as rapeseed oil have also been associated with an increased risk of developing lung cancer. There is also a link between high concentrations of radon gas decay particles and lung cancer in some countries. This gas is emitted from natural sources and can accumulate in buildings, especially in confined areas such as attics and basements.

- **Diseases as risk factors for lung cancer** Patients with pulmonary tuberculosis are at increased risk of lung cancer, as are those with chronic bronchitis and emphysema.
iii. Symptoms and diagnosis

Common symptoms of NSCLC are mostly non-specific and may initially be disregarded by the patient. As a consequence many patients go to their doctor when the disease is at an advanced stage when symptoms become more troublesome and persist. Symptoms to watch out for include:

- Persistent cough
- A change in a persistent cough
- Shortness of breath
- Coughing up phlegm (sputum) with signs of blood
- Aches or pains when breathing or coughing
- Loss of appetite
- Fatigue
- Loss of weight

Diagnosis allows confirmation of the disease. Analysis of cancerous cell tissue (histology) is particularly important in obtaining an accurate diagnosis. There are a variety of tests available to diagnose lung cancer:

- Cytology: A sample of sputum is taken to confirm the diagnosis and type of lung cancer.
- Bronchoscopy: A visual examination of the trachea and internal parts of the lungs. Specimens of tissue may be taken from inside the lungs to gather cells for analysis.
- Needle biopsy: Alongside a CT scan this procedure is used to obtain cells for analysis.
iv. Staging

Staging reflects how advanced the cancer is and whether it has spread to other parts of the body. It helps to identify the most appropriate treatment options for the patient.

Staging determines how extensive (advanced) the cancer is. There are a variety of tests available to stage lung cancer.\(^1\)

**Radiological/nuclear medicine**

**X-rays:** detect a localised mass in the lungs or enlarged lymph nodes in the chest.

**Computed tomography (CT) scan:** a computer assisted technique which produces cross-sectional images of the body to confirm the size and location of a mass as well as possible spread to other organs.

**Magnetic resonance imaging (MRI) scan:** uses a magnetic field to create an image of the chest to determine the location and extent of cancer spread.

**Bone scan:** allows detection of spread to the bone.

**Other tests**

**Abnormal blood chemistry tests:** may suggest the presence of metastases in bone or the liver.

With early stage disease there is the chance of a cure if the tumour can be successfully surgically removed. Late stage disease has a worse prognosis than earlier stage disease.

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Prognosis

Cancer statistics often use an ‘overall 5-year survival rate’ to give a better idea of the longer term outlook for people with a particular cancer. Five year survival rates for lung cancer are poor when compared to other high incidence cancers. For example, the five year survival rate for patients with breast cancer is up to 89%. For lung cancer patients that figure is only around 15%.

![Figure 2 Lung cancer average 5 year survival rates depending on stage at diagnosis](Cancer Research UK: http://www.cancerhelp.org.uk/type/lung-cancer/treatment/statistics-and-outlook-for-lung-cancer#nonsmall)
Section 2 Epidemiology

i. Incidence & mortality

Lung cancer is the most common type of cancer worldwide (accounting for 16.5% of all cancers), and is responsible for the greatest number of cancer deaths worldwide.

**Worldwide**

- 1.6 million new cases of lung cancer are diagnosed every year.
- It is the most common cancer in men, and the third most common cancer in women in both developed and developing countries.
- Lung cancer is the leading cause of cancer mortality and is responsible for 1.38 million deaths each year.
- Each day, more than 3,000 people die from lung cancer worldwide, equal to two deaths every minute.
- Almost half of the diagnosed cases of lung cancer occur in developing countries (49.9%), with the incidence generally being lower in women (globally, 12.1 per 100,000 women compared to 35.5 per 100,000 in men).

**Europe**

Lung cancer is the leading cause of cancer related death in Europe, accounting for 18.9% of all cancer deaths in Western Europe and 21.1% of all cancer deaths in Northern Europe. Approximately 375,000 cases were attributed to lung cancer in 2000 where it accounts for an average of 20.3% of all cancer deaths.

The average estimated age-standardised incidence per 100,000 population was 71.8 for men and 21.7 for women, across the European Union (25-member states), in 2006.

**North America and Canada**

Lung cancer is the most common cause of cancer death in North America, accounting for 28.4% of all cancer deaths, and is the third most common type of new cancer cases (14.5%) in this region. North America has one of the highest lung cancer incidence rates for men and women with approximately 1.75 million new cancer cases and deaths in 2007.

**South and Central America**

Lung cancer is the most common cause of cancer death in South and Central America (accounting for 12% and 11.6% of all cancer deaths, respectively).
Asia Lung cancer is the most common cancer diagnosed in South Eastern Asia (accounting for 13.3% of all cancer deaths) and the second most common cancer diagnosed in Eastern and Western Asia (diagnosed in 17.1% and 12.8% of all cancer cases, respectively). It is also the leading cause of cancer death in Eastern, Western and South Eastern Asia accounting for 20.9%, 18.1% and 17.8% of all cancer deaths, respectively), and the second most common cause of cancer death among South Central Asian populations (accounting for 8.2% of all cancer deaths). China and Japan in particular have a high incidence and death rate by comparison to the rest of the world.

Africa Lung cancer is the third most common type of cancer (6.9%), as well as the third most common cause of cancer death (at 8.5%) in Northern Africa. It is the second most common cause of cancer death in Southern Africa, at 9.5%.

Australia Lung cancer is the most common cause of cancer deaths in Australia and New Zealand (19.6%), and in Micronesia (25.2%).
Section 3
Treatment

Treatment options vary depending on the type and stage of the cancer in addition to its size, position in the lung, whether it has spread to other parts of the body and the overall physical health of the patient.

In general the treatment options for NSCLC are:

i. **Surgery**
Patients with early stage, localised NSCLC may be successfully treated using surgery. Up to 70% of patients survive for at least five years after diagnosis if treated at this stage, with a proportion of these patients being cured.

ii. **Radiotherapy**
For patients whose cancer cannot be operated on, radiotherapy may be offered alone or in combination with chemotherapy. In addition, radiotherapy also has a well established role in providing control and relief of the symptoms of lung cancer.

iii. **Chemotherapy**
The majority of cases of NSCLC cases diagnosed at an advanced stage when the cancer has already spread to another part of the body and can no longer be successfully removed by surgery. In these cases chemotherapy is often used to treat patients. The most common chemotherapies used in NSCLC are based on a platinum-containing regimen in combination with a second therapeutic agent. Patients usually receive treatment in a number of defined “cycles” as the incremental benefit of giving continuous chemotherapy does not outweigh the cumulative toxicities experienced.

**First-line treatment** refers to the initial therapy a patient receives for advanced disease.

**Treatment until progression/maintenance** therapy describes treatment given immediately following first-line treatment, when the tumour has not progressed.

**Second line treatment** that patients receive after a first-line treatment, following disease progression.

iv. **Biological (targeted) therapy**
This is a relatively new approach to cancer treatment that target specific biological processes often essential to tumour growth. Biological therapy can include monoclonal antibodies, vaccines and gene therapies. As biological therapies precisely target cancer-specific processes, they may potentially be more effective than other types of treatment (such as chemotherapy and radiotherapy) and less toxic to non-cancerous, healthy cells.

Several types of biological therapy exist for the treatment of advanced non-small cell lung cancer. These are either given as monotherapy or in conjunction with other therapies at various stages of advanced disease (in accordance with their approved label).
References


2. 1.38 million deaths per year / 365 days – 3,771 deaths per day / 24 hours = 157 deaths per hour / 60 minutes = 2.61 deaths per minute


