What is Lung Cancer?
Lung cancer is a malignant tumour which develops from cells within the lungs and bronchi (C34). There are two clinically important categories of lung cancer based on the origin and behaviour of the cancer cells which influences the current approach to treatment.

Small cell lung cancer is also referred to as oat cell carcinoma. Approximately 25% of lung cancers are of this aggressive type.

Non-small cell lung cancer accounts for approximately 75% of all lung cancers and is divided into three main sub-types. Squamous cell (epidermoid) carcinoma is the most common form of lung cancer, arising in cells that line the airways of the lung. Adenocarcinoma arises in mucus-producing cells which line the upper airway of the lung and large cell carcinoma can occur anywhere in the lung.

Cancer of the trachea (C33) is extremely rare with only 8 registrations in the South West for 2000. Mesothelioma (C45) is a rare form of cancer which can affect the membrane that surrounds the lung (pleura).

Risk Factors
Smoking - Small cell lung cancer is predominantly found in people who are smokers, and evidence shows that tobacco smoke is the primary cause of over 90% of lung cancers. The risk of a lifetime smoker developing lung cancer is twenty-thirty times greater than a non-smoker, and this risk directly increases with the number of cigarettes smoked per day. Pipe and cigar smokers who inhale have similar mortality rates to that of cigarette smokers. The risk of lung cancer in an ex-smoker falls to the same level as a non-smoker after about 15 years. It is estimated that one third of lung cancers in non-smokers result from passive exposure to cigarette smoke.

Radon Gas - Exposure to the naturally occurring radioactive gas radon, which may accumulate into the foundations of buildings from soil emissions, is another potential cause of lung cancer. Scientists from the Imperial Cancer Research Fund (1998), who conducted a study into the effects of the gas, estimate it may cause one in 20 lung cancer cases in Britain - mostly in conjunction with smoking.

Diet - A low consumption of fruit and vegetables (particularly green vegetables and carrots) has been associated with an increased risk of lung cancer. Studies suggest that lung cancer may be prevented by dietary micronutrients such as carotenoids, vitamin C, vitamin E, and selenium.

Chemical Exposure - Exposure to chemicals such as asbestos, arsenic, vinyl chloride, nickel chromate, coal products and chloromethyl ethers, significantly increase the risk of developing lung cancer. There is a synergistic interaction between cigarette smoke and asbestos exposure, whereby exposed smokers have a lung cancer risk eight times higher than unexposed smokers. 80% of patients with mesothelioma have a history of asbestos exposure.

Lung cancer is the 2nd most common cancer in the South West
There were 3971 lung cancer registrations in 2000, 2433 men and 1538 women
Lung cancer is the most common cause of cancer death in the South West
Source: The South West Cancer Intelligence Service Registry

Symptoms
There are often no apparent symptoms in the early stages of lung cancer and when symptoms do present they may not be indicative of cancer. One of the most significant symptoms of lung cancer is haemoptysis (coughing up blood). Other symptoms include a chronic persistent cough, worsening breathlessness, repeated or slow-to-resolve chest infections, chest pain, wheeziness, a hoarse voice and weight loss.

*International Classification of Diseases, 10th Revision

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**Diagnosis**

Early diagnosis of lung cancer is difficult as the symptoms are similar to that of chronic obstructive pulmonary disease (smokers' bronchitis), which lung cancer patients may have due to smoking. The initial investigation for suspected lung cancer is usually a chest x-ray, but for accurate detection the tumour needs to be at least one centimetre in diameter. Computerised tomography (CT) scans may be used to assess the exact size of a tumour and any metastases, and a sputum sample may be examined for cancer cells. Fibre-optic bronchoscopy allows direct inspection inside the trachea and bronchi to confirm any blockages or growths, and allows biopsies to be taken for analysis. If the tumour appears to be deep within a lung or near a lung edge, a fine needle aspiration (FNA) or percutaneous needle biopsy may be performed to obtain cell samples. A mediastinoscopy allows examination of the area at the centre of the chest and local lymph nodes.

**Stage**

Most lung cancer is diagnosed too late for curative treatment to be possible. Treatment of lung cancer depends primarily upon the stage of the tumour at diagnosis, and the histology (cell type).

Small cell lung cancer has two general stages. In the 'limited' stage the cancer is only found in one lung and nearby lymph nodes. The 'extensive' stage is where cancer has metastasised outside the lung to other tissues.

Non-small cell lung cancer at stage I defines a tumour less than 3 cm found only in the lung. Tumours greater than 3 cm affecting nearby lymph nodes that involve the main bronchus and invade the visceral pleura are classified as stage II. Stage III tumours are classified by invasion of the pleural cavity, diaphragm, pericardium, and the mediastinal pleura, and metastasis to the lymph nodes in the neck, mediastinum or the opposite side of the chest. With stage IV lung cancer, distant metastasis will be present.

**Treatment**

Chemotherapy is the most common treatment for all stages of small cell lung cancer. Surgery may be used if the cancer is in the 'limited' stage, but as small cell lung cancer is very aggressive and metastasises at an early stage, surgery is generally not an option. In the early stage where cancer has not spread beyond the chest, treatment with radiotherapy after chemotherapy is effective. Patients who have responded well to chemotherapy may be given radiotherapy to prevent cancer growth in the brain. This is known as prophylactic cranial irradiation (PCI).

For non-small cell lung cancer, radical radiotherapy is used as the main treatment, particularly in stages II and III, where the cancer has not metastasised and is inoperable. Palliative radiotherapy is very effective in relieving symptoms, particularly pain and haemoptysis, while chemotherapy may shrink the tumour. Neo-adjuvant chemotherapy involves using chemotherapy before surgery and radiotherapy, to improve results of patients with later stage tumours. Continuous hyperfractionated accelerated radiotherapy (CHART) involves a patient receiving many small doses of radiotherapy over a much shorter time period than conventional radiotherapy to avoid cancer re-growth between radiotherapy doses. This has been shown to increase survival by 10% in non-small cell lung cancer patients. The use of combination treatments and CHART is still under trial. Surgery is a limited option, suitable for less than a fifth of non-small cell lung cancer patients. Thoracotomy (opening the chest wall), and median sternotomy (surgery performed by cutting through the breast bone), are standard methods used for lung cancer surgery. Video-assisted thoracoscopic surgery (VATS), may be appropriate for lobe and lymph node removal in the early stages of diagnosis where metastases have not been detected. The removal of a lobe of the lung is called a lobectomy, while a wedge resection removes a small part of the lung. Pneumonectomy is the removal of an entire lung.

Cancer causing obstructions in the trachea can be removed by palliative laser therapy which does not destroy the tumour completely, but provides symptomatic relief. Radiotherapy may be given to prolong the relief provided by laser therapy. If the airway becomes blocked by outside pressure, a stent may be used to hold the airway open.

Clinical trials - Cryosurgery (freezing the tumour), and photodynamic therapy (PDT) are being tested in clinical trials where lung cancer is inoperable. There are also several new agents under clinical trial at present including anti-cancer drugs and biological therapies. The use of chemotherapy and radiotherapy combination treatments is continuously under trial, and patients may volunteer to participate in clinical trials to evaluate promising cancer therapies.

Sources: CancerBACUP Website, Oncology Channel Website and Cancer Research UK
For England and Wales the 1997 national age standardised rate for lung cancer in males is per 72.0 per 100,000 population, and 33.7 per 100,000 in females. The South West figures are therefore significantly below the national average. The incidence rate for lung cancer starts to increase from around the age of 40 years. Nationally the incidence rate is below 3 per 100,000 population in people under 40. The South West figures are below the national average.

For England and Wales the 1990-2000 average national age standardised rate for lung cancer mortality in males is 72.6 per 100,000 population, and 29.2 per 100,000 in females. The South West figures are therefore significantly below the national average. The South West survival figures are in line with England and Wales national figures for 1 year survival rates, and above average for 5 year survival rates.