

# Chronic Obstructive Pulmonary Disease



In a two-part focus on COPD, Dr Noemi Eiser first explains the condition and how it is diagnosed

**C**hronic obstructive pulmonary disease (COPD) describes a group of conditions that include chronic bronchitis and emphysema. The condition develops from irritation of the breathing tubes (bronchi) over the years. This results in inflammation and progressive lung scarring, which impairs airflow through the bronchi and produces increasing breathlessness. The damage to the bronchi often results in an increase in mucous producing cells which is responsible for the long-term cough and phlegm (sputum) known as chronic bronchitis.

Scarring in and around the gas-exchanging air sacs (alveoli) reduces support to the bronchial airways, causing them to narrow and the lung loses its elasticity. This is emphysema and is the cause of the breathlessness. Everyone who has chronic bronchitis and emphysema has COPD and many people will have a mixture of both.

## The causes

Smoking causes over 90 per cent of COPD cases; even exposure to other people's smoking (passive smoking) increases the risk. However, as only about 20 per cent of smokers develop COPD, other factors, such as inherited predisposition, must also be important.

The rare genetic condition  $\alpha_1$ -antitrypsin deficiency is responsible for COPD in a few younger people. Occupational exposure to certain dusts and fumes, including grains, isocyanates, cadmium and coal, increases the risk (even in non-smokers), while air

pollution certainly increases symptoms and may also be a cause.

The risks of COPD increase with age; most cases are present in over-35 year olds. Although more men than women have COPD due to past smoking patterns, women are more susceptible to the effects of smoking and the number of female COPD patients is increasing.

COPD is more likely to develop in people living in areas of economic and social deprivation. This is thought to be partly due to smoking habits, passive smoking, poor nutrition, more frequent chest infections, industrial pollution and to the low birth weight associated with these circumstances.

The BLF commissioned a UK-wide survey, *Invisible Lives*, which pinpointed primary care organisations and even postcodes where COPD admissions are highest. It is now targeting these areas with awareness campaigns to encourage people with symptoms or lung function abnormalities to seek help and prevent the disease progressing.

## The symptoms

Symptoms of COPD may include any or all of the following:

- chronic (long-term) cough with production of sputum;
- breathlessness: difficulty in both breathing in and out, which increases as COPD becomes progressively more severe;
- wheeze, a noise made on breathing, and chest tightness.

As the disease progresses, flare-ups



**ABOVE:** spirometry testing overseen by BLF Nurse Manager Mollie Jackson at a BLF testing event

(acute exacerbations) become increasingly frequent when sputum turns green and your breathing is worse.

### How is COPD diagnosed?

COPD is most frequently diagnosed in smokers over 35 years old who have a productive cough and who are breathless.

#### ■ Spirometry

The diagnosis must be confirmed by a simple breathing test called spirometry,

which is carried out using a spirometer. Two measurements are made after you have taken a maximum breath in; the volume of air blown out in the first second (forced expiratory volume in one second or FEV<sub>1</sub>) and the total volume of air blown out (forced vital capacity or FVC). These measurements are compared with those expected for your age, sex and height to decide whether your lungs are normal or abnormal. If both FEV<sub>1</sub> and FVC are reduced similarly, this indicates the lungs are small, which may be due to lung fibrosis or deformity of the spine etc.

A reduction in FEV<sub>1</sub> more than that of FVC indicates obstruction to airflow due to narrowed airways. This may be due to COPD or asthma. While the abnormality is more or less constant in COPD, in asthma it varies significantly with the degree of breathlessness.

#### ■ Bronchodilator tests

If there remains any doubt between the diagnosis of asthma and COPD, bronchodilator tests are performed.

The difference is that in asthma there is a marked improvement in FEV<sub>1</sub> after inhaling a bronchodilator (reliever) spray whereas there is little change in COPD. If you notice significant variation in your breathlessness and you have been diagnosed as having COPD, it is worth having a bronchodilator test or a two-week trial of steroids (that will also improve breathing and FEV<sub>1</sub> in people with asthma), as the two conditions should be managed differently.

➔ **COPD: some of the facts**

- Research suggests that there are 3.7 million people with COPD in the UK; of these only about 900,000 have been diagnosed
- The direct cost of providing care for COPD in the NHS is about £500 million (half of this relating to hospital care)
- About 20 per cent of people who smoke develop COPD
- About 75 per cent of COPD cases may be either undiagnosed or misdiagnosed
- COPD is the only major cause of death on the increase, particularly among
- women, who are more susceptible to developing COPD than men
- About 25,000 people died of COPD in 2008; it is currently the fifth biggest killer in the UK
- One in eight emergency adult hospital admissions is due to COPD
- In the UK, COPD causes about 20.4 million lost working days for men and 3.5 million for women per year
- Hospital admissions due to COPD increased by 50 per cent between 1991 and 2003

➔ ■ **Other tests**

A chest x-ray is an essential first test to exclude other causes of symptoms; it is often relatively normal in COPD.

If your symptoms start before 35 years, you have never smoked or you have a family history of COPD, a blood test is required to check if you have an inherited form of the disease,  $\alpha_1$ -antitrypsin deficiency. If so, other family members should be tested to see whether they have the same problem.

Another blood test can exclude anaemia or polycythaemia (too thick blood) that may develop as blood oxygen drops.

Occasionally, a heart test (ECG or echocardiogram) or a CT scan of the chest is needed to exclude other diseases. CT scans are special x-rays that take a number of pictures so a 3D picture can be seen; this gives a much more detailed view than a simple x-ray.

**Diseases to rule out**

**Asthma**

■ symptoms and breathing test results may

be similar, but they vary over time and with treatment.

■ occurs in younger age group and frequently non-smokers with eczema and hay fever.

**Heart failure**

■ breathless, especially on lying down and have quite different noises heard on examination of the chest.

■ chest x-ray and heart tracing (ECG) abnormal.

**Lung cancer**

■ also in smokers but may have other symptoms – coughing up blood, weight loss, hoarse voice, pain.

■ chest x-ray needed to exclude.

**Interstitial lung disease** (inflammation and scarring in the gas-exchanging part of lung, such as idiopathic pulmonary fibrosis, asbestosis, pneumoconiosis, sarcoidosis etc.)

■ differences in chest sounds, pattern of spirometry test and abnormal chest x-ray.

**Bronchiectasis** (a condition where bronchi are damaged and enlarged, either locally in one area or throughout the lungs.)

■ cough with lots of sputum with or without breathlessness and frequent chest infections.

■ different noises heard on examination of chest.

■ diagnosis made with chest x-ray and CT scan.

**Anaemia** from many causes e.g. blood loss or leukaemia.

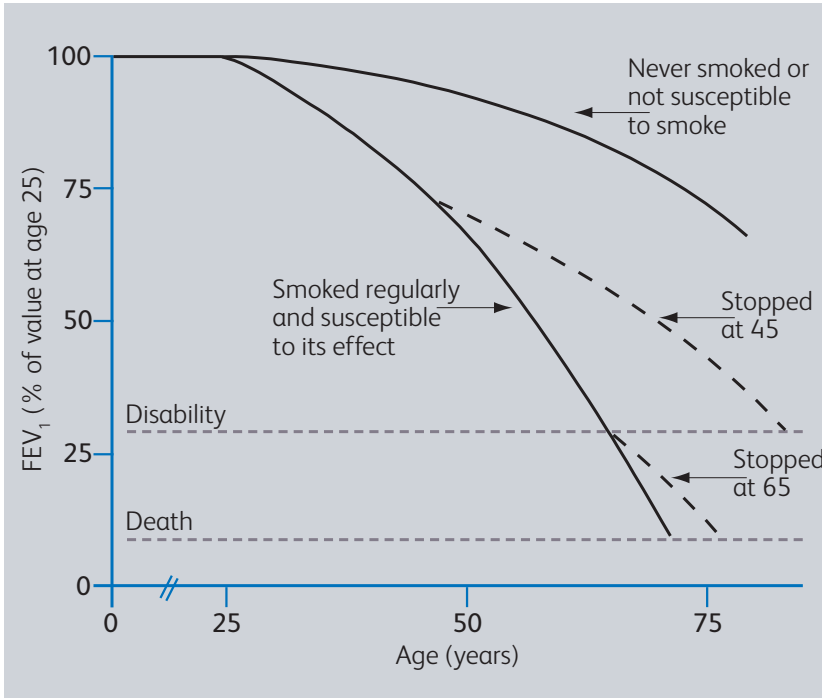
■ pale lips and low blood count (need blood test).

**Stages of COPD**

The severity of COPD is reflected in the degree of breathlessness and the degree of abnormality seen on the breathing tests.

MRC breathlessness score	
Grade 0	no breathlessness
Grade 1	breathless on strenuous exercise
Grade 2	breathless on hurrying or walking up slight slope
Grade 3	walks slower than others on flat and stops to get breath when walking at own pace
Grade 4	breathless on walking about 100 metres
Grade 5	too breathless to leave house or breathless on washing or dressing
Severity of COPD in terms of breathing tests	
Mild	FEV <sub>1</sub> between 50 % and 80 % predicted normal
Moderate	FEV <sub>1</sub> between 30 % and 49 % predicted normal
Severe	FEV <sub>1</sub> less than 30 % predicted normal

Adapted from Fletcher C, Peto R. *BR Med J* 1977; 1: 1645–1648



**ABOVE:** diagram shows decline of FEV<sub>1</sub> in COPD with age in smokers and non-smokers

Breathlessness is usefully quantified by the Medical Research Council score (see box, page opposite), but severity can also be judged by the reduction in the FEV<sub>1</sub>, measured by spirometry. These measures are helpful in deciding the level of treatment needed and eventual outcome.

### Progression of COPD

As we age, so do our lungs. This is a normal process, but it is exaggerated in smokers who develop COPD. As can be seen on the above diagram, after 30 years, there is a larger drop in FEV<sub>1</sub> over time in smokers compared to non-smokers. By the time FEV<sub>1</sub> is about 30 per cent of normal, disability is obvious.

The good news is that if you stop smoking, the exaggerated fall in lung function ceases and FEV<sub>1</sub> falls much more slowly – at the same rate as non-smokers. So it is never too late to stop smoking to prevent progression of the disease.

If you have mild COPD, you may notice slight breathlessness on exercise, such as running with or without a cough; the

symptoms may be so mild that you hardly notice them. However, it is important to seek medical help at this stage, as appropriate measures can prevent the condition progressing.

Over time, breathlessness increases: hurrying on the flat, climbing a flight of stairs, walking about 100 yards and, finally, the activities of daily living become more and more difficult. Even talking and eating become a problem.

### Severe COPD

When COPD is severe, loss of appetite and weight loss may occur and, if a cough is predominant, urinary incontinence is sometimes troublesome. Anxiety and depression often develop and tend to make breathlessness worse. These emotional problems and the fear of breathlessness may result in loss of sex drive.

As the signs of severe COPD appear, it is important to check that the blood oxygen is adequate. This can be done using a simple finger peg (pulse oximeter). If the oxygen level is 92 per cent or less, then a blood sample is needed to check oxygen and carbon dioxide (waste gas) levels. This is taken either from an artery, usually in the wrist (arterial blood gas) or from a small prick in an earlobe, made hot and red with a special cream (arterialized blood gas). This will indicate whether oxygen treatment is required and how much. When oxygen is low, heart failure, with ankle swelling, may develop.

*Next issue: managing COPD at its varying stages. For more on anxiety, see feature on pages 22–23. For more on No Smoking Day, see page 32.*

■ For more advice on COPD, call the BLF Helpline on 08458 50 50 20 (Monday to Friday, 10am to 6pm). The BLF COPD: diagnosis and treatment booklet is available via the Helpline or at [www.lunguk.org](http://www.lunguk.org).