COPD

Information brochure for chronic obstructive pulmonary disease.

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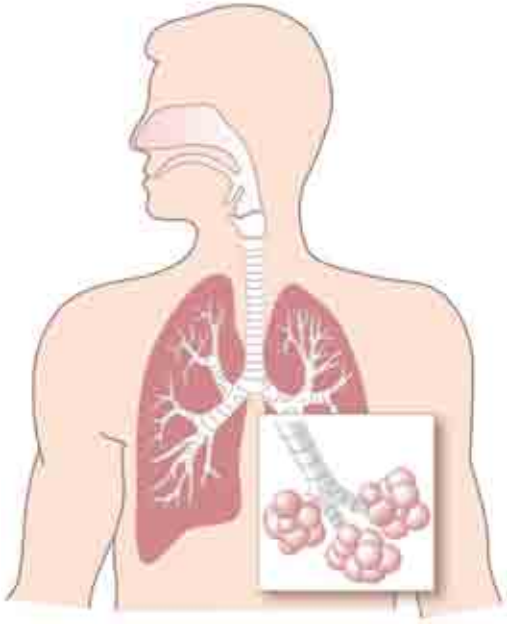
WHAT DOES COPD MEAN?

In the lungs, some 300 million alveoli ensure that the body obtains enough oxygen – breath by breath. Up to 20,000 litres of air consequently pass through the airways per day, with the rate significantly higher in the event of heavy manual labour or sport.

Particles of pollutants are removed from inhaled air in the nose, mouth and throat; heat and moisture are then added to the air for its journey into the lower respiratory tract. It reaches the alveoli via the larynx, trachea and bronchi, where fresh oxygen from the inhaled air is exchanged with “used” carbon dioxide from the blood. This goes on breath by breath, on average 15 times a minute and over 20,000 times a day. In medical terms, this process is also referred to as “gas exchange”.

While blood transports oxygen into every cell in the body, carbon dioxide takes the same route in reverse: from the cells via the blood to the lung and through the airways back into the outside air.



Upper and lower respiratory tract: the air flows through the nose/mouth, trachea and bronchi to the alveoli.

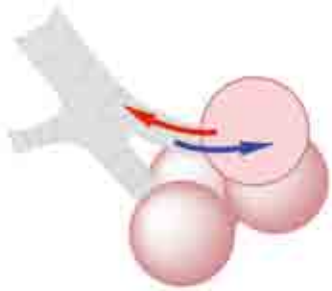
COPD is an umbrella term for obstructive bronchitis and pulmonary emphysema. The letters COPD stand for: Chronic Obstructive Pulmonary Disease.

In connection with bronchitis, the term “obstructive” implies that the bronchi are narrowed and inflamed, with the result that inhaled air can no longer flow through them smoothly. “Chronic” means that the disease is incurable, but can be treated.

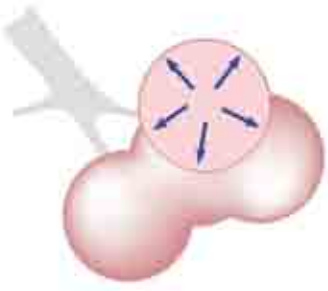
A consequence of chronic inflammation of lung tissue is pulmonary emphysema. In the progress of this disease, the alveoli increasingly expand and the alveoli walls dissolve, with the result that they are no longer available for gas exchange. Although the patient inhales air, hardly any oxygen gets into the blood. Since the inhaled air cannot be exhaled properly and is thus retained in the enlarged alveoli, the lung hyperinflates.

This hyperinflated means that even relatively healthy parts of the lung are compressed, reducing gas exchange there as well.

A hyperinflated lung also makes it much harder to breathe in fresh air. Even very moderate exertion leads to shortness of breath and breathlessness.



The gas exchange of oxygen and carbon dioxide takes place in the alveoli.



In emphysema, the alveoli expand and the alveoli walls dissolve, so that gas exchange cannot take place.

WHAT ARE THE SYMPTOMS OF COPD?

"As time went on, I found it harder and harder to get my breath and I had to keep stopping what I was doing. Soon, even climbing stairs was a problem."

Many people with COPD describe their situation in this way or similarly. It is true that every affected person has their "own COPD", but the characteristic symptoms of the disease can be summarised as follows:

· **Chronic coughing** occurs all day, but especially in the morning.

· **Shortness of breath** is initially only noticeable after strenuous exertion, but later occurs at rest.

· **Sputum** is the increased mucus produced in the bronchi; through coughing, the lung tries to get rid of this mucus.

· **Whistling or humming noises** occur during breathing when air forces its way through narrowed bronchi.

· **Frequent colds, bluish lips, a tight feeling in the chest, hippocratic nails** and a **barrel chest** can likewise occur with COPD.

The symptoms usually develop slowly over several years. As a result, most patients only consult a doctor when they suffer breathlessness – even when exerting themselves only a little.

The earlier COPD is detected, the more successfully symptoms can be reduced and a positive impact made on the progression of the disease.

It is often the general practitioner who makes the suspected diagnosis of COPD on the basis of the patient's medical history following a physical examination. The patient is then usually referred to a lung specialist for an examination.

The lung specialist measures air flow in the bronchi and the lung during breathing; this examination is called lung function measurement or spirometry.

In spirometry, the patient simply has to breathe vigorously into a measuring device a few times via a mouthpiece. The spirometer electronically measures the quantity of air breathed per unit of time and the force with which the patient breathes in and out. A computer calculates the quantity of air moved while breathing and displays this in the form of a graph:

· **Forced vital capacity (FVC)** is the maximum quantity of air the patient can exhale, having breathed in as deeply as possible beforehand.

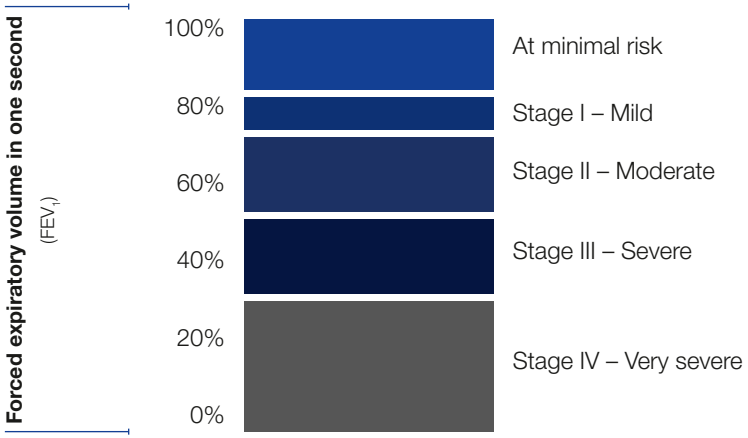
· **Forced expiratory volume in one second (FEV_1)** corresponds to the quantity of air the patient can breathe out within one second after breathing in as deeply as possible.

WHAT ARE THE SYMPTOMS OF COPD?

The COPD diagnosis is made when the lung specialist compares the measured values from the tests with normal values: while in healthy subjects, forced expiratory capacity in one second (FEV_1) is over 70 per cent of forced vital capacity (FVC), the value in COPD patients is much lower.

Without consistent treatment, the characteristic symptoms of COPD intensify. This starts a vicious circle: patients can hardly exert themselves at all because of their shortness of breath, so that they avoid exertion – but this reduces their health condition still further, which exacerbates the symptoms again and soon involves the cardiovascular system as well.

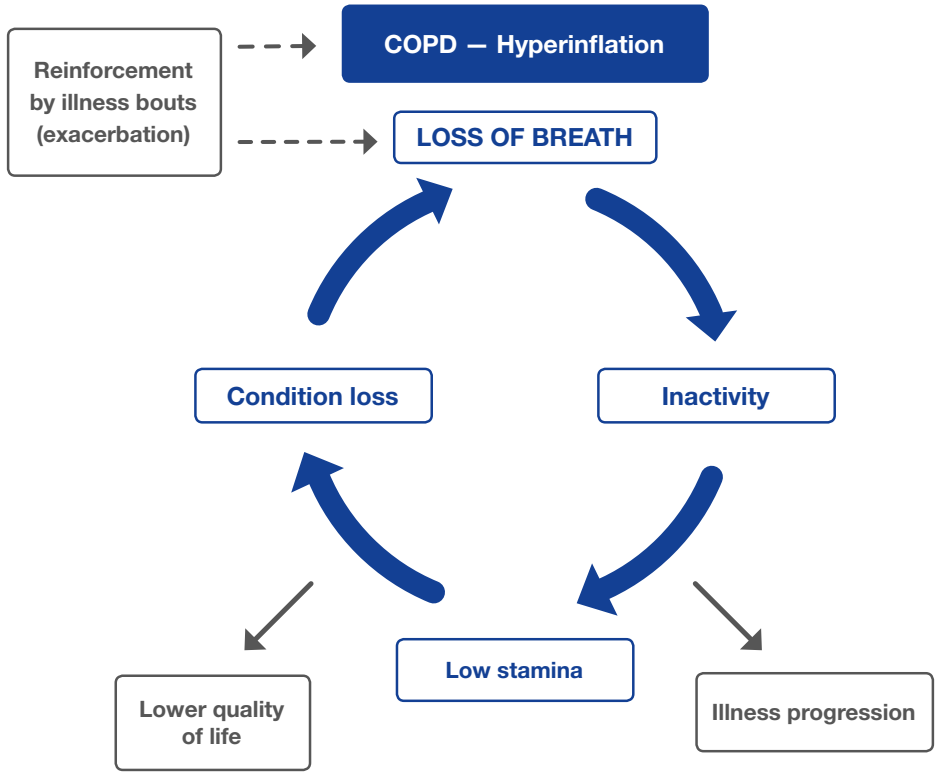
In addition, specific complications of COPD, called exacerbations, also occur frequently. These are sudden acute bouts of the illness with even more severe breathlessness, more coughing and more sputum. An exacerbation may be caused by a cold, high humidity, dust or smoke.



WHAT CAUSES COPD?

The main cause of COPD is smoking: nine out of ten people affected either smoke or used to smoke. In general, the case that the longer a person has smoked and the more cigarettes a day are smoked, the higher that person's risk of suffering from COPD.

Other triggers for COPD are passive smoking, harmful substances like dust (in mining), hazardous gases (in the workplace) and inherited risk factors. However, these triggers play only a very small role compared to smoking.



TREATING COPD

Consistent treatment by a doctor can alleviate the symptoms of COPD – and thus improve the patient's quality of life, reduce the severity of the progression of the disease and prevent exacerbations. When deciding on the type and extent of the treatment, the doctor will consider the severity of the symptoms.

If symptoms are mild, doctors frequently recommend:

· Avoiding smoking and other risk factors; having vaccinations against flu and pneumococcal infections to prevent the disease being exacerbated by an infection
· Short-acting drugs to expand the bronchi (bronchodilators), taken as required

Additionally in the case of moderate symptoms:

· Long-acting drugs to expand the bronchi (bronchodilators), taken as permanent medication
· Rehabilitation and exercise to strengthen the lungs, including power, stamina and relaxation elements, as well as training in correct use of inhalation systems

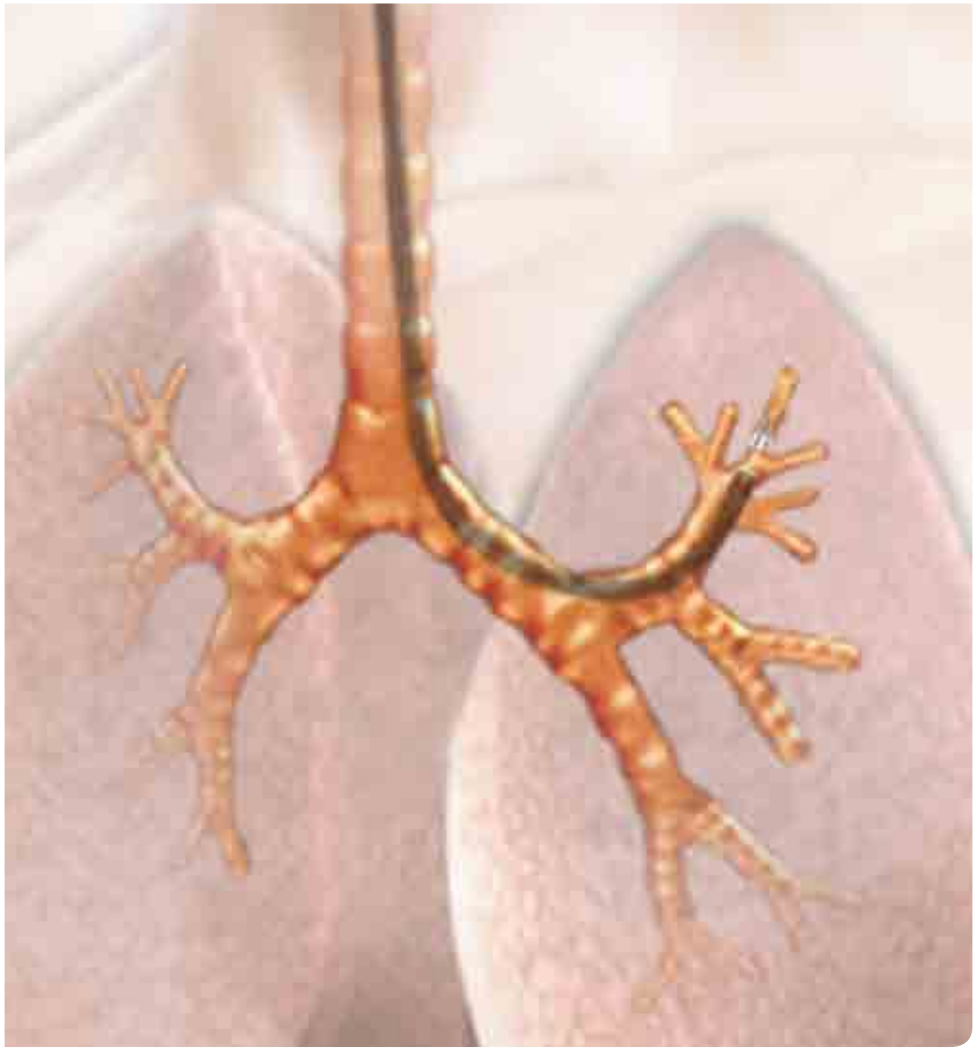
Additionally in the case of severe symptoms:

· Cortisone spray as a permanent medication
· Oxygen treatment as required or as a permanent medication
· Valve therapy

Additionally in the case of very severe symptoms:

· Surgery (lung transplant, for example)

In addition to medical treatment, COPD patients need a healthy, high-energy diet so that they do not become underweight as a result of their disease. Regular exercise – for example, in exercise groups for patients with lung problems – trains their overall health condition. Relaxation techniques such as autogenic training and specific psychological support can help patients deal better with the fear of breathlessness.



The valves prevent further air from being trapped in the lung and enable the reduction of hyperinflation.

VALVE THERAPY IN COPD

What is valve therapy?

Valve therapy in COPD is based on a beautifully simple idea: if the airway is cut off from the inhaled air by a device, the sections of lung behind that device collapse like an empty balloon because they can no longer “get their breath”.

The same thing happens when a small one-way valve deliberately prevents air from continuing to pass into a hyperinflated section of the lung (in pulmonary emphysema): the hyperinflated sections gradually collapse, giving the rest of the lung more space to “breathe”.

The valves are placed in the airways/bronchi using a bronchoscope and a catheter.

What are the benefits?

Studies* show that valve therapy significantly improves the quality of life of approximately half of COPD patients, making physical and social activities possible once again. In certain patient groups treated with valve therapy, significant improvements could be seen in key value FEV_1 and in physical performance measured by the distance walked within 6 minutes.

*Studies/references
Springmeyer SC, et al.: Treatment of heterogeneous emphysema using the Spiration IBV valves.
Thorac Surg Clin 2009; DOI 10.1016/J.Thorsurg.2009.02.005
Sterman DH, et al.: A Multicenter Pilot Study of a Bronchial Valve for the Treatment of Severe Emphysema.
Respiration 2009; DOI 10.1159/000259318
Eberhardt R, et al.: Complete unilateral versus partial bilateral endoscopic lung volume reduction in patients with bilateral lung emphysema. CHEST 2012; DOI 10.1378/chest.11-2886

The one-way valves are placed in an ideal position in the bronchi by a lung endoscopy (bronchoscopy) procedure. Side effects are rare and do not generally create significant problems.

For whom is valve therapy suitable?

Valve therapy is suitable primarily for COPD patients suffering from pulmonary emphysema who are not experiencing an adequate improvement in their symptoms – despite drugs, physical training and oxygen therapy.

Valve therapy is usually not possible in the case of prior lung surgery, pleural diseases, tumours, severe heart disease and significant overweight or underweight.

Post-treatment

Due to the chronic nature of the disease, anyone who has received valve therapy has to continue undergoing regular medical checks. These checks always examine the effect of the valves. Valve therapy is not a substitute for treatment of COPD by either medication or physiotherapy.

FAQS ON VALVE THERAPY

Is an operation required for valve therapy?
No, the one-way valve is positioned by a doctor during a bronchoscopy (lung endoscopy).

How long does it take for the valve therapy to work?
If the treatment is a success, the unnatural hyperinflation of the diseased area of the lung becomes significantly less after about three months.

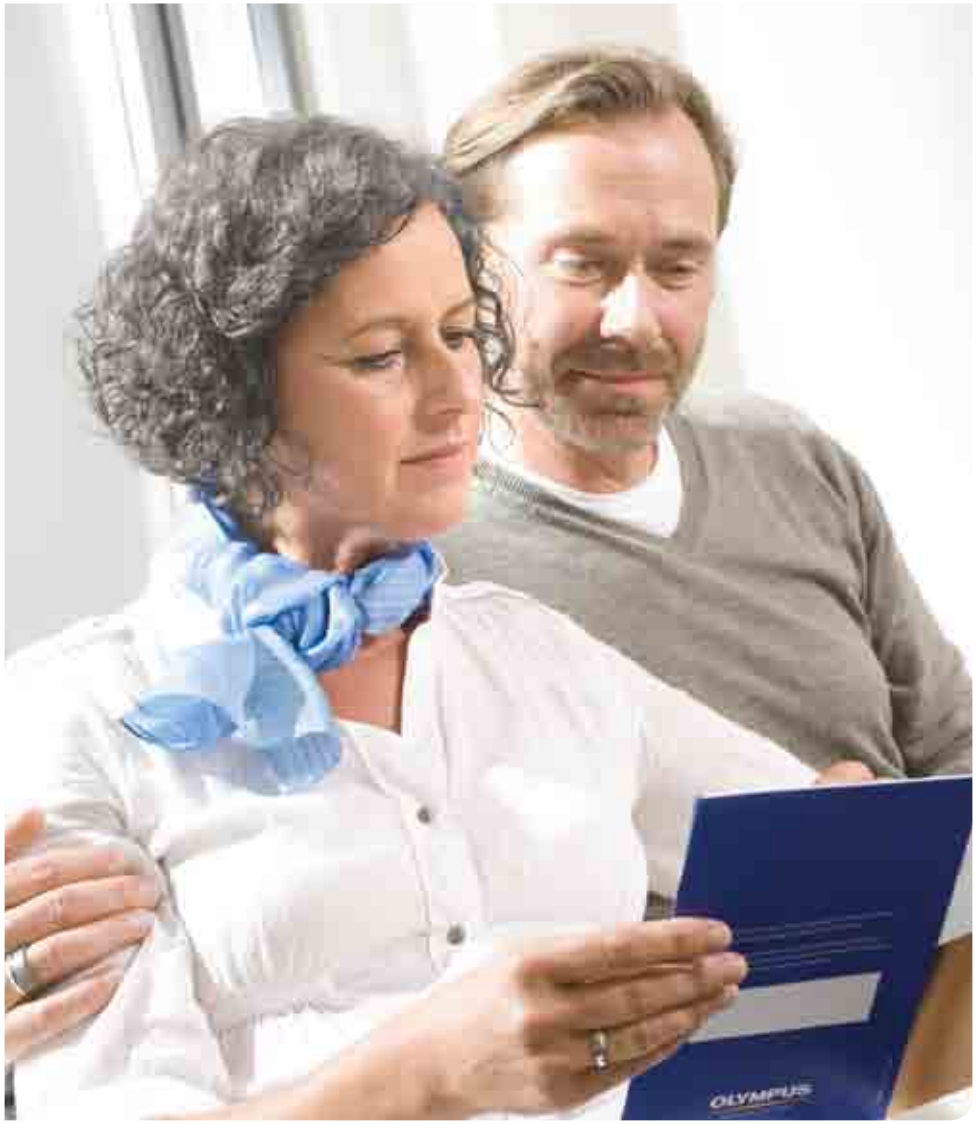
Can valve therapy improve quality of life?
Yes. The fact that the “healthier” sections of lung get a better air supply as a result and have more space to “breathe” means that oxygen supply to the body as a whole is also better. Patients experience less breathlessness, and stamina and quality of life improve.

Can the valve accidentally be coughed up with mucus?
No, the valve is firmly anchored in the wall of the bronchi. However, you can still cough up mucus.

Can the valve be taken out again?
Yes, likewise by means of a bronchoscopy.

Where can valve therapy be performed?
Lung specialists can provide you with information on the treatment. Valve therapy will then be performed in specialised lung clinics and university hospitals.

What should be done immediately after bronchoscopy?
A hospital stay may make sense after undergoing valve therapy. Lung specialists can then check the function of the valves and rule out any side effects. If you suddenly feel unwell after valve therapy and are acutely short of breath, you should visit your nearest hospital immediately and inform the doctors about your valve therapy.



GLOSSARY

Bronchial mucus
Mucus produced by the bronchi

Bronchodilators
Drugs which relax the bronchial muscle, causing the airways to dilate and thus alleviate the symptoms of COPD

Carbon dioxide
Result of the chemical reaction between oxygen (from the air breathed in) and carbon (from carbohydrates in the food); replaced in the lung by “fresh” oxygen

Chronic
Permanent, long-term

Cortisone
Drug to inhibit infections in the body

Exacerbation
Temporary significant deterioration in COPD symptoms

Exercise groups for people with lung problems
Special training groups for people with lung disease, usually run by a doctor

Forced expiratory volume in one second (FEV_1)
Forced expiratory volume in one second (FEV_1) corresponds to the quantity of air the patient can breathe out within one second after breathing in as deeply as possible

Forced vital capacity (FVC)
Forced vital capacity is the maximum quantity of air the patient can exhale having breathed in as deeply as possible beforehand

Hippocratic nails
Hippocratic nails are pathologically changed nails. The shape of the nails is rounded and strongly convex

Pneumococci
Bacteria which can cause a lung infection

Pulmonary emphysema
Unnatural enlargement of the air space in the lung due to severe enlargement and destruction of alveoli

Obstruction
Narrowing of the airways

Oxygen therapy
Administration of air with an increased concentration of oxygen to make breathing easier

Spirometry – measurementof lung function
The spirometer electronically measures the quantity of air the patient breathes in and out per unit of time; a computer calculates the quantity of air moved during breathing and displays it in the form of a graph

Suspected diagnosis
Initial diagnosis by the doctor which has to be confirmed by further tests

NOTES

This brochure serves only a form of information. Please consult the physician in charge of your treatment to find out whether valve therapy may be considered for your treatment and to obtain more information.

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