

# Lung function tests

## Information for patients

This information sheet will explain what each lung function test will involve, as well as answering some of the questions that you may have. It explains the risks and the benefits of the tests and what you can expect when you come to the hospital. If you have any other questions or concerns, please do not hesitate to speak to the physiologist caring for you.

### **Confirming your identity**

Before you have a treatment or procedure, our staff will ask you your name and date of birth and check your ID band. If you do not have an ID band we will also ask you to confirm your address. If we do not ask these questions, then please ask us to check. Ensuring your safety is our primary concern.

## **What is a lung function test?**

A lung function test involves you breathing into different pieces of equipment in order to test how well your lungs are working. There are several different lung function tests that your doctor may refer you for, these include:

- spirometry
- bronchodilator reversibility test
- gas transfer measurement
- body plethysmography
- exhaled nitric oxide measurement

Your doctor may also refer you for additional tests in the Lung Function Unit, including:

- exhaled carbon monoxide tests
- respiratory muscle tests
- capillary blood gases tests
- hyperventilation screening

## **What is spirometry?**

This test measures the volumes and speed of the air you can blow out from your lungs. It will give an indication of the capacity of your lungs and how clear your airways are. For example, the airways may be narrower in conditions such as COPD (chronic obstructive pulmonary disease) or asthma.

## **What is bronchodilator reversibility?**

After you have performed spirometry, it may be repeated after you have been given an inhaler. This will see if there is any improvement in your airways as a result of taking this medication.

## **What is a gas transfer measurement?**

The main job of the lungs is to bring oxygen into your bloodstream and to remove carbon dioxide. The gas transfer test estimates how well your lungs work to take oxygen from the air you breathe and put it into your bloodstream. Lung conditions can affect gas transfer. For example, gas transfer will be reduced in emphysema and pulmonary fibrosis.

## **What is body plethysmography?**

Body plethysmography, or lung volumes, measures the total amount of air within your lungs and gives us more detailed information about the size of your lungs.

## **What is an exhaled nitric oxide measurement?**

A fractional exhaled nitric oxide test measures how much nitric oxide is in your breath. A higher level of nitric oxide measured may indicate inflammation which may be a sign of asthma.

## **What is an exhaled carbon monoxide test?**

The exhaled carbon monoxide test measures how much carbon monoxide is in your body. Most people with high levels of carbon monoxide are smokers.

## **What are respiratory muscle tests?**

Respiratory muscle tests measure how much pressure your breathing muscles can generate when you breathe in or out to check for muscle weakness. There are two types of respiratory muscle tests: mouth pressure and sniff (SNIP) pressure tests.

## **What are capillary blood gas tests?**

A capillary blood gas test is used to check how well your lungs are working and whether they're able to exchange oxygen and carbon dioxide efficiently. A small sample of blood is taken from your earlobe.

## **What is hyperventilation screening?**

A hyperventilation screen is used to assess your breathing pattern by measuring the amount of carbon dioxide in your breath.

## **Why do I need this test?**

There are different reasons why your doctor may have referred you for a lung function test:

- to help determine if the breathing concern you may have is due to a lung condition
- to help decide if you are fit for surgery and to help the anaesthetist decide if your lungs can cope with any anaesthesia you may be given
- to monitor the progression of any existing lung conditions
- to monitor the effects of any medication or treatments that may affect the lungs – you may be asked to have a lung function test before and after starting treatment, so that the health of your lungs can be monitored

## **What are the risks of lung function tests?**

All procedures have some risks, but lung function tests are safe for most people. The risks of this procedure may include:

- dizziness
- breathlessness
- coughing
- fainting
- palpitations or fast heart rate (when taking salbutamol for bronchodilator reversibility testing)

Your risks may vary depending on your general health and other factors. You will be asked a series of questions regarding your current health and risk factors before performing your tests. If you are thought to be at a high risk, then your tests may be postponed or the procedure modified.

If you have any concerns, please speak to your physiologist prior to starting the test.

## **Are there any alternatives?**

Chest x-rays and scans can give the doctors some information about your lungs, but not the same information that the lung function tests can provide.

## **Consent**

We must by law obtain your verbal consent to this test beforehand. Staff will explain the risks, benefits and alternatives to you. If you are unsure of any aspect of the test proposed, please do not hesitate to speak with a senior member of the staff again.

## **How do I prepare for my lung function test?**

- Do not smoke or vape for 1 hour before your test.
- Do not consume alcohol for at least 8 hours before your test.
- Avoid vigorous exercise for at least 1 hour before your test.
- You can eat and drink before your appointment, but please avoid eating a large meal within 2 hours and avoid foods high in nitrates such as green leafy vegetables and beetroot.
- Wear comfortable clothing which does not restrict full chest and abdominal expansion.
- If you currently take a short-acting bronchodilator inhaler (for example, Ventolin (salbutamol), Bricanyl, Atrovent), please avoid taking this for at least 4 hours prior to your test.
- If you currently take a long-acting bronchodilator inhaler (for example, Fostair, Serertide, Serevent, Symbicort, DuaResp, Foradil, Oxis), please avoid taking this for at least 12 hours prior to your test.
- If you currently take any combination inhalers (for example, Spirivia Respimat, Dulcir Genuair, Flutiform, Onbrez, Relvar Ellipta, Seebri, Trimbrow, Trelegy), please avoid taking this for at least 24 hours prior to your test.

However, if you are feeling very breathless then please take your inhalers as normal and let the physiologist know when you last took them.

## **What happens before my lung function test?**

Before your test, the physiologist will measure your height and weight, as well as asking you to confirm your ethnicity. This is so that we can calculate the predicted values for your lung function test results. They will also ask you questions about your current health and medical conditions to ensure that it is safe to go ahead with testing.

## **What happens during my lung function test?**

Most of the tests are performed with you seated and your nose sealed with a nose peg.

## **How is spirometry performed?**

You will be asked to breathe normally into a mouthpiece and then take a deep breath in and gradually blow out as much as possible until your lungs are completely empty.

The test will be performed a minimum of three times, but you will be given adequate rest between each blow. You will then need to repeat this, but this time blowing out as fast and hard as possible until your lungs are completely empty, again for a minimum of 3 times.

### **How is bronchodilator reversibility performed?**

After you have completed the spirometry, you may be given an inhaler (this is usually 400mcg of salbutamol) via a spacer device. The physiologist will ask you to take a deep breath in while they press the inhaler down to release a dose of the medication. This will be done 4 times in total.

You will be given a 15-minute break to allow the medication to have its full effect before the spirometry test is repeated.

### **How is gas transfer performed?**

You will need to breathe normally on the mouthpiece and then be instructed to blow out until you are completely empty. You then need to take a deep breath in and hold your breath for approximately 9 seconds before blowing all the way out. This test will be performed a maximum of 5 times, but you will have a break in between each trial.

The special gas mix that you inhale contains oxygen, carbon monoxide, methane and nitrogen. The concentrations of all these gases are very low and safe but if you have any concerns please speak to your physiologist.

### **How is body plethysmography performed?**

To measure your lung volume, you will be seated in a transparent chamber with the door closed. Please note that the door is closed but not locked and there is a button that you can press to open the door from the inside. You will start by breathing normally and then take some rapid shallow breaths against a shutter blocking the mouthpiece for about two seconds. Once the shutter is open you will be asked to take a full deep breath in and then blow all the way out again. This test will be repeated a minimum of three times.

### **How is exhaled nitric oxide (FeNO) performed?**

You will be asked to breathe in through a mouthpiece until you are full up. You then need to breathe out at a steady and controlled rate for 10 seconds. There will be a visual aid on the screen to help guide you to breathe at the correct rate. You will need to complete this successfully 1 time.

### **How is exhaled carbon monoxide test performed?**

You will be asked to take a deep breath in and hold your breath, ideally for 15 seconds. Then breathe out slowly into the mouthpiece, aiming to empty your lungs completely.

### **How are respiratory muscle tests performed?**

**For mouth pressures.** You will be asked to breathe out for as long as you can, and then suck hard on a mouthpiece for at least 1 second. It will feel like sucking a very thick milkshake through a straw. This may be repeated up to 5 times. You will then be

asked to breathe in deeply first and then blow out as hard as you can into a closed off mouthpiece. This may be repeated up to 5 times

**For SNIP/SNIFF test.** A small probe is placed to block one of your nostrils. It measures the pressure while you sniff in as hard as you can. This may be repeated up to 5 times for both nostrils.

### **How are capillary blood gases performed?**

Your earlobe will be warmed up by vigorously rubbing it to increase blood flow. After a few minutes the physiologist will take a sample by pricking the earlobe and collecting the blood droplets that form in a small tube.

### **How is a hyperventilation screen performed?**

Your breathing will be monitored by placing a thin plastic tube (nasal cannula) just inside your nostrils. You may then be asked to increase your breathing rate (hyperventilate) by breathing quickly and deeply for 3 minutes. Your breathing pattern will then be monitored again. This test may take up to 25 minutes. You will also be asked to complete a questionnaire.

### **How long does the lung function test take?**

The length of the test depends on which tests your doctor has requested. On average, a lung function test will take between 40 minutes and 1 hour.

### **Additional sources of information**

For more information about lung function tests please visit:

[Patient Information \(artp.org.uk\)](http://artp.org.uk)

[Tests to measure your breathing | Asthma + Lung UK \(blf.org.uk\)](http://blf.org.uk)

### **Who to contact?**

If you have any queries or concerns after your tests, please contact the Lung Function Department.

Tel: 020 3299 4743

Email: [kch-tr.ChestUnitAdmin@nhs.net](mailto:kch-tr.ChestUnitAdmin@nhs.net)

Monday to Friday, 9am to 5pm.

### **Sharing your information**

We have teamed up with Guy's and St Thomas' Hospitals in a partnership known as King's Health Partners Academic Health Sciences Centre. We are working together to give our patients the best possible care, so you might find we invite you for appointments at Guy's or St Thomas'. To make sure everyone you meet always has the most up-to-date information about your health, we may share information about you between the hospitals.

## **Care provided by students**

We provide clinical training where our students get practical experience by imaging patients. Please tell your doctor or nurse if you do not want students to be involved in your care. Your imaging will not be affected by your decision.

## **PALS**

The Patient Advice and Liaison Service (PALS) is a service that offers support, information and assistance to patients, relatives and visitors. They can also provide help and advice if you have a concern or complaint that staff have not been able to resolve for you. They can also pass on praise or thanks to our teams.

PALS at King's College Hospital, Denmark Hill, London SE5 9RS

Tel: 020 3299 3601

Email: [kch-tr.palsdh@nhs.net](mailto:kch-tr.palsdh@nhs.net)

PALS at Princess Royal University Hospital, Farnborough Common, Orpington, Kent BR6 8ND

Tel: 01689 863252

Email: [kch-tr.palspruh@nhs.net](mailto:kch-tr.palspruh@nhs.net)

**If you would like the information in this leaflet in a different language or format, please contact our Communications and Interpreting telephone line on 020 3299 4826 or email [kch-tr.accessibility@nhs.net](mailto:kch-tr.accessibility@nhs.net)**