



Lung function

What is lung function?

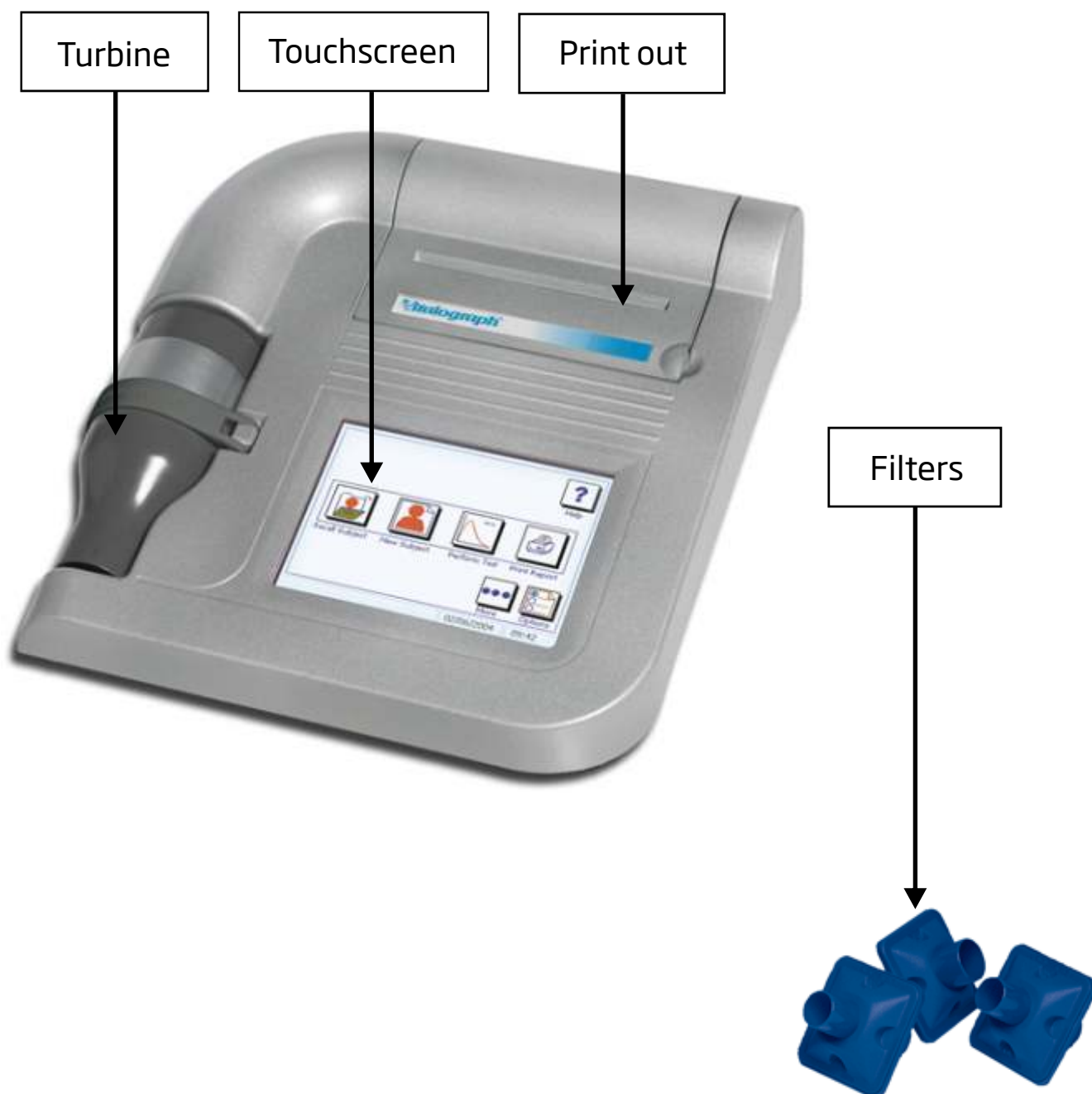
Lung function tests are known by different names; lung function tests (LFTs) respiratory or pulmonary function tests (RFTs or PFTs), 'blows' or spirometry. They measure of what's going on with your lungs. They show us whether your airways are open or floppy, whether there may be something like tight airways or sputum stopping the air coming out as fast (we call this obstruction) or whether there isn't as much air getting in and out of the lungs (we call this restriction).

Why do we do lung function?

When you come to clinic or to the ward, lung function is important as part of the picture, along with other measures like weight, the CF team's examination and how you feel. We can see if there are sudden changes which may mean that extra treatment for your chest is needed and, over the years, we can measure how steady your lung condition is. Some people find it hard to know when their chest is worse and measuring lung function helps us not to miss any problems that need extra treatment.

How do we measure lung function?

We use a machine called a spirometer (pictured below). We sometimes call this a Vitalograph as that is the make of spirometer which we use at York.



Using the spirometer to do lung function tests

At York we use a filter (pictured above right). This gives protection against bugs passing between people using the spirometer. We ask you to use alcohol hand rub before handling the spirometer.



Measurements

We usually take two measures:

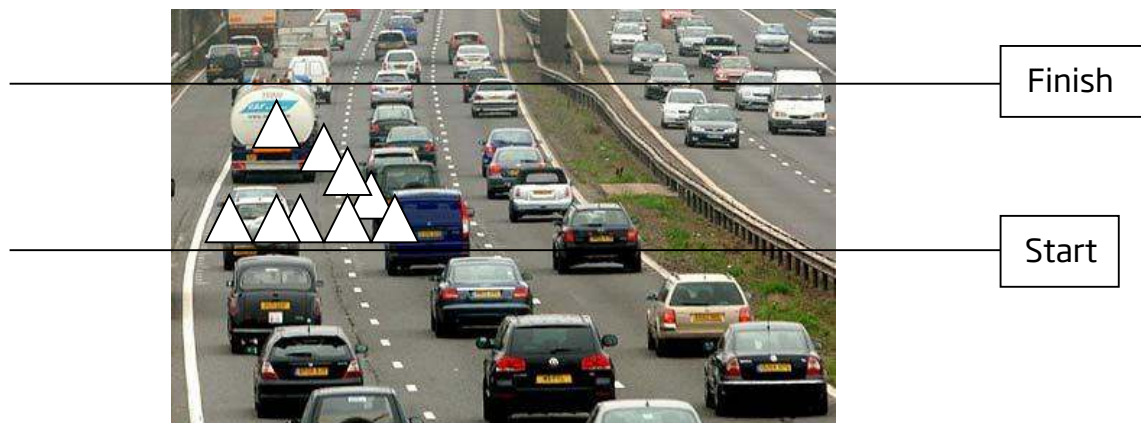
- **Slow blow** - This is also called a vital capacity or VC. We ask you to breathe in as deeply as possible, to seal your lips around the filter and breathe out slowly until no more air will come out. This measures the total amount of air you can get out of your lungs after a deep breath in.
- **Fast blow** - This may be called a forced vital capacity or FVC. This test gives us other measures such as FEV₁ which is the amount of air blown out in the first second of blowing. We ask you to breathe in as deeply as possible, seal your lips around the filter, force the breath out as fast as possible and to keep breathing out until no more air will come out.

In the same way as VC, FVC measures the total amount of air you can get out of your lungs after a deep breath in. Because FVC is a forced breath floppy airways will stop as much air getting out. So if the FVC is lots less than the VC then it may be that the airways are a bit floppy. This may mean that we change your medication or the type of physio that you do.

FEV₁ is the measure we most often discuss with people when they do lung function. This is because it shows changes best for those with CF. FEV₁ is the amount of air blown out in the first second of a fast blow. If it drops it can show that there is sputum in the way or the airways are tight.



If we count the cars that can get from the start line to the finish line in one second this may be 10 cars. If we then add some road works which block 2 lanes we can still get 10 cars through eventually but less cars will get through in one second.



FEV¹ works in this way. So when the airways are clear and not tight (like the motorway with all the lanes open) someone may blow one litre of air out in one second and two litres in total (FVC) but if the airways are tight and/or have sputum in them (like the motorway with roadworks) then the amount of air blown out in one second (FEV¹) may drop to half a litre while the total amount of air blown (FVC) may stay at two litres.

We will often ask you to do two or three of each type of blow. This is to make sure that we get the correct result. Sometimes coughing or not putting in enough effort will give a 'false' low result.

The physios will always try to make sure that we explain what the results of lung function show and will show you your past lung function so that you understand what's been happening with this measure over the last few years.

How do we stop infection passing from person to person when using the spirometer?

We use different turbines depending on what bacteria you normally grow in your sputum (for example never grow *Pseudomonas*, always grow *Pseudomonas*). We also use a new filter for each person on the turbine which creates a barrier to stop bacteria and viruses. Before doing lung function, we ask you to use alcohol gel on your hands and after every use the handset is cleaned with cliniwipes.

When do we do lung function?

At every out-patient clinic visit and at clinic visits, start, mid or end of IV antibiotics or if we're testing a new inhaler/nebuliser. We also measure lung function once or twice a week during an admission in hospital.

When don't we do lung function?

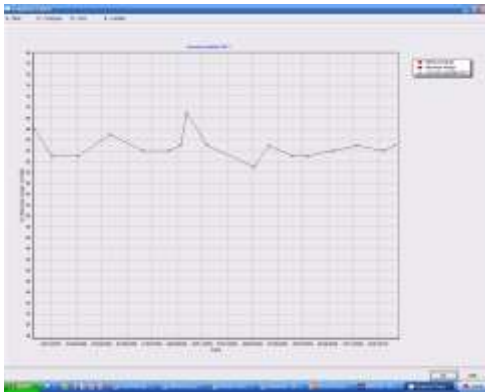
If we think that you may have a pneumothorax (air in the lining around your lung) or if you have haemoptysis (blood in your sputum), severe chest pain or have had surgery in the last 12 weeks.

What is important about lung function?

Lots of people get very anxious about whether their lung function is worse or better, even by the smallest amount. It's important to remember that lung function is just part of the picture and other things like weight, blood measures, oxygen levels and most importantly how you are feeling will also help us to make a decision about what to discuss with the person about their treatment. It is normal to have small changes in lung function. This may be due to the time of day, technique, etc, and happens in people without CF. We don't expect to see big increases in lung function every time it is done.

It is best if lung function is steady, for example we generally feel happier:

About this picture



Than this picture



What keeps lung function more stable?

Unfortunately the things that people tend to see as boring or hard to do are the things that are needed to keep lung function steady:

- **Coming to a regular clinic.** This means that we can make sure that you are having the best treatment and pick up on any problems early
- **Taking medication** (tablets, inhalers and nebulisers) that are prescribed...all the time not just when things aren't good
- **Exercise.** This improves lung function in people without CF so just think what it does if someone has a chest condition
- **Keeping weight at a good level and steady.** When weight drops or is low respiratory muscles won't be as strong and the body is less able to deal with infections
- **Physio** (but I would say that, I am a physio!!!)

How do I find out more?

Ask! You can attend a clinic or do some joint reviews of patients with the CF team, ask and we'll book a time in.

Meeting the needs and preferences of patients and carers is at the centre of everything we do. We hope that you found this leaflet useful and informative.

If you would like to comment on it, please contact Tracey Daniels, Specialist Physiotherapist for Cystic Fibrosis York Teaching Hospital Foundation NHS Trust, York Hospital, Wigginton Road, York. YO31 8HE. Tel: 01904 725528