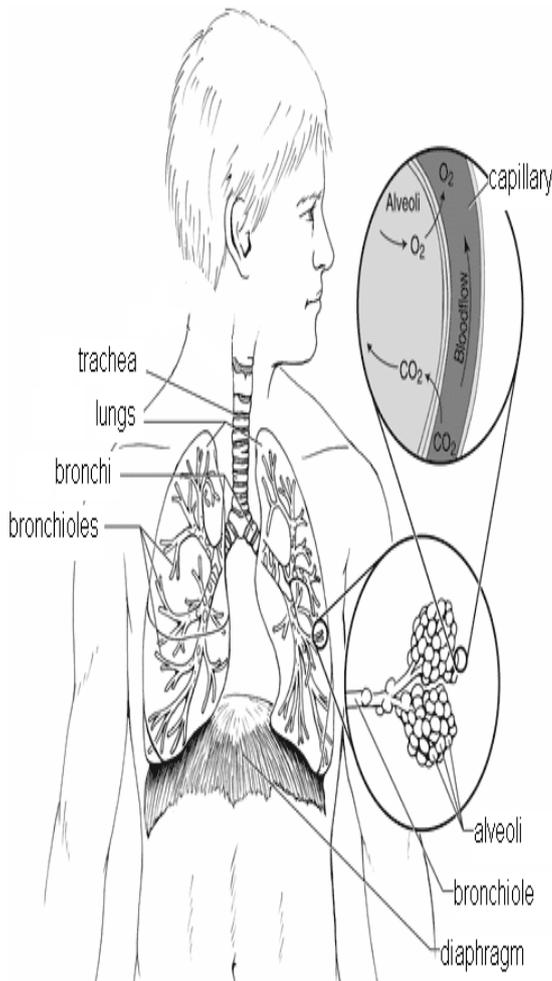


Clearing your Chest

What happens in healthy lungs?



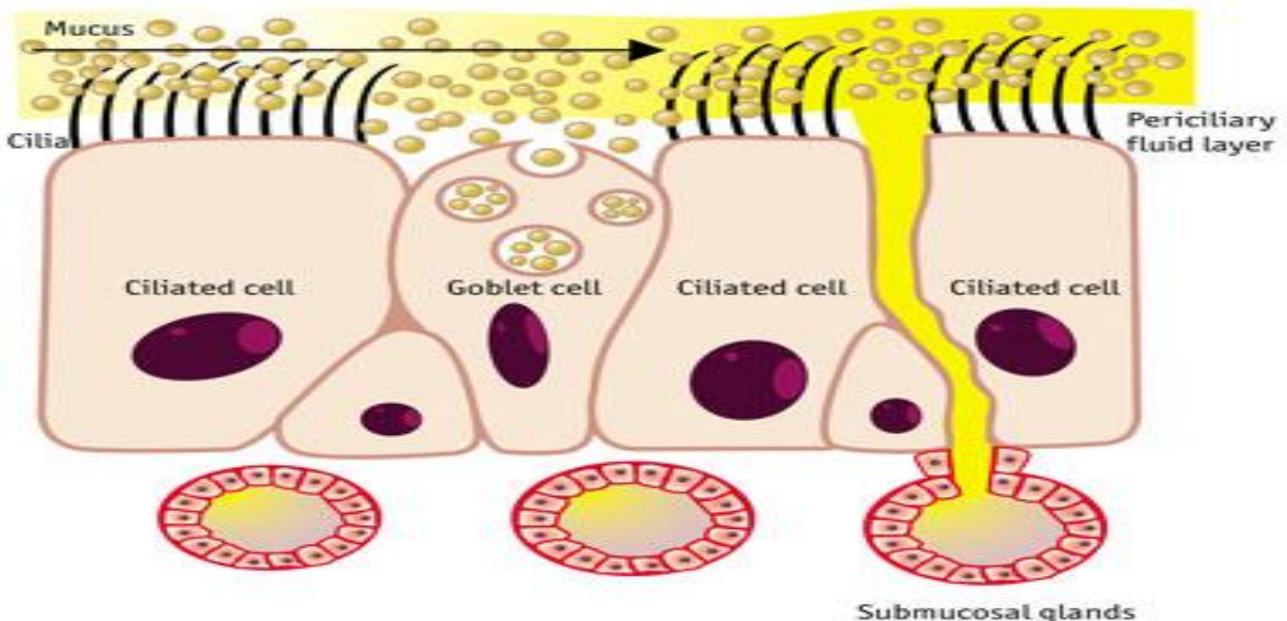
Your airways are a system of tubes, going from your large diameter trachea (windpipe) to your smaller diameter bronchi/ bronchioles, down to your alveoli. It is at your alveoli that oxygen (O_2) enters and the waste gas carbon dioxide (CO_2) leaves the blood in the capillaries (small blood vessels).

These tubes have **mucus** lining them, which helps trap germs, dust and dirt. Mucus is continuously produced. It is difficult to measure how much the average person produces, but it is approximately 1 litre of new mucus produced in the lungs per day. Normally this mucus is wafted towards the back of your throat by the action of little hairs that line your airways called **cilia**. Mucus is either coughed out or swallowed

Phlegm is the mucus which we can cough up from the lungs. In the mouth it mixes with saliva (spit) to become **sputum**, which is commonly studied by doctors to give signs of what is happening in the lungs.

Sometimes, this phlegm becomes infected and/or is difficult to clear. Also, the amount of mucus you produce may increase. Therefore it is important to keep track of changes in the colour, amount, and thickness of mucus you produce.

Diagrams showing the layout of the tubes making up the lungs (above) and the action of cilia clearing mucus from them (below)



Why do I need to clear my chest?

If mucus gets in the way of air entering or leaving your lungs, it is more difficult to get enough oxygen into your blood.

Therefore you may feel that breathing is more difficult. Also you may hear a “rattle” as you breathe. This sound is caused by air moving past “stuck” mucus.

By clearing your chest, you may find it easier to breathe and/or stop that “rattle” sound.

It is also thought that if mucus doesn't get cleared from your lungs it is more likely to become infected and result in a chest infection.

How can I clear my chest?

There are many techniques you might find helpful. Note that coughing on its own will only clear the largest airways (trachea and bronchi). If the cilia are not effectively moving mucus up to these largest airways coughing will not be helpful on its own.

Drink!

If you're dehydrated, mucus is stickier and harder to clear. Just a couple of extra drinks in the day can make a big difference to how well the cilia can waft the mucus up and out of your lungs. Be careful with alcohol and caffeinated drinks as these can be dehydrating, so if you do enjoy them then drink water too (e.g. a couple of glasses of water).

Postural drainage

This just means using gravity to help drain your lungs. You don't have to hang upside down like a bat - just lying for 15-20 mins on each side will let anything that's able to pour downhill reach the central airways and you can cough it up. This may not help all the time, but can help when their phlegm is a bit runnier. A pragmatic approach might be that when you go to bed, spend 15-20 mins lying on the side you wouldn't normally go to sleep on, then sit up and cough before snuggling down for the night.

Percussion/ Shaking/ Vibrations

These really require someone else to do something to you. Some people swear that this works for them, but there is only sketchy evidence it is effective for most people. If someone is to do percussion to you, ensure that their hands are cupped and that their hands move to a different chest area on each “hit” so you don't bruise. Individual instruction by a physiotherapist on the correct technique should be sought. It is possible to purchase handheld chest percussors which can replace the need to cup hands or, if mechanical, can do the work of percussion for you.

High Frequency Chest Wall Oscillation – “The Vest”

A piece of equipment not routinely used in most centres that vibrates very quickly when strapped round your chest.

Active cycle of breathing techniques (ACBT)

This is a chest clearance technique that helps most people most of the time. It is a sequence that involves a mixture of 4 exercises:

- a) loosening mucus up (take 3-5 really good deep breaths, holding the breath in for a couple of seconds)
- b) pushing mucus from small diameter airways to medium airways (long, slow, gentle huffs out)
- c) pushing mucus from medium airways to big airways (short, fast, strong huffs out)
- d) pushing mucus out of your big airways/ clearing the top (cough)

Between each exercise it is important to make time for some relaxed normal breathing. This avoids fatigue, airway irritation, and hyperventilation (over-breathing).

Huffing is a forced breath out with your mouth open and your cheeks relaxed, similar to when you're trying to steam up a pane of glass. The "breathier" the sound you make while huffing the better. Huffing squeezes mucus up and out of your airways, a bit like squeezing a tube of toothpaste.

Each slow, long, gentle huff is preceded by an average breath in first.
Each fast, short, strong huff is preceded by a maximum breath in first.

ACBT is flexible to fit your symptoms. Don't do so much that you get sore/ tired / hyperventilate ("hyperventilation" or taking too many deep breaths when you don't need them can make you feel dizzy / headachy, so make sure you do some normal breaths between the above techniques). Be aware that the fast strong breathing out manoeuvres (coughing and fast huffing) do increase the chance of bringing on chest tightness (the fast airflow effectively irritates the big airways and can make you wheezy). This again reinforces the fact that you need to take normal breaths between techniques. A physiotherapist can guide you on the best sequence to suit your needs. A useful typical sequence to try to begin with might be:

4 deep breaths → 5 long, slow, gentle huffs → 3 short fast strong huffs → cough



It is probably helpful to repeat the entire ACBT sequence a few times through each time you try to clear your chest. A demonstration can be seen on

<http://www.aspergillus.org.uk/newpatients/videos.php>

or https://www.youtube.com/watch?v=lxA_gWgsf4I

Autogenic Drainage

This is a technique that has much in common with the ACBT. Principally you collect mucus from airways that are furthest away and move it a bit further along until it's ready to be coughed up. This is achieved by breathing at different lung volumes, which can be extremely difficult to master. Specialist physiotherapy instruction/ assessment is advised.



Bubble/ Bottle PEP (positive expiratory pressure)

When you breathe out normally, your airways have a tendency to collapse slightly. If you blow out through a column of water, this acts as a resistance which effectively splints/props open your airways as you breathe out. This means you have bigger tubes to push phlegm out through, and therefore it can enhance your airway clearance. Use a wide tube/straw to blow out through, and 10-20cm of water depth (beware of water going everywhere so might be best over the sink!). The depth of water can influence effectiveness, so it may be worth trying different depths to work out what is best for you. Try 5-10 breaths out through the water before attempting a huff or cough. Repeat a few times. Ensure you change the water and dry the tubing/ bottle daily.



Equipment

There are devices that work in a similar way to bubble PEP and percussion which are called oscillatory PEP devices. They include:

- the "Flutter" (more info via <http://clementclarke.com/>)
- the "Acapella" (<http://www.henleysmed.com/>)
- the Pari o-pep (<http://www.pari.com/de-en/products/pari-pep-systems/pari-o-pep-1/>)
- the "Shaker" (<http://www.powerbreathe.com/products/expectoration>)
- the "Cornet" (http://www.curaplex.com/rc_cornet.asp)
- the "Aerobika" (<http://www.trudellmed.com/consumer-health/aerobika-oscillating-pep>)

Theoretically they shake loose sputum and splint your airways open as you breathe out. They may be available on prescription from your GP in a similar way to peak flow meters.

Finally

Remember that you will never get all the mucus out of your lungs as it is being continuously produced: the trick is to do something that helps it move along a bit so it's less likely to get stagnant or infected. That "something" should be done daily to deal with problems as well as stop problems developing. An analogy might be that you can treat cleaning your lungs like cleaning your teeth: make it part of your daily routine, and when you have problems you can do more of it. Ideally you should seek advice from a physiotherapist to discuss your individual chest clearance needs.