Chest physiotherapy

In several lung conditions such as NTM lung disease, bronchiectasis and COPD, the lungs are less able to remove phlegm or sputum. When old sputum sits in your airways, it causes inflammation and possibly further damage to your lungs. Bacteria, such as NTM, love getting into this phlegm and causing inflammation. By getting this mucous out of your lungs, you make it harder for the bacteria to grow there. Besides treatment with antibiotics and other medicines, chest physiotherapy can be very helpful. Here we explain what it is and how you might adopt some of the techniques

Please bear in mind that the advice given here is very general. Ideally, your GP or chest consultant should refer you to a respiratory physiotherapist, when you will be given advice on chest physiotherapy personalised for you and your techniques can be reviewed.

What is chest physiotherapy?

There are many different aspects of chest physiotherapy; here we focus on two main principles. 1) chest clearance and 2) exercise.

Why is chest clearance important?

In conditions with excess sputum (phlegm) such as NTM lung infection, cystic fibrosis, bronchiectasis, primary ciliary dyskinesia and COPD; chest clearance is considered a cornerstone of treatment. **It should become part of your daily routine.** It is used to:

- make breathing easier - excess sputum may reduce oxygenation
- reduce the number and frequency of chest infections
- prevent further damage to the lungs
- prevent excessive coughing which may have an impact on quality of life
- help clear bacteria in the lungs alongside antibiotic treatments.

How often should I clear my chest?

This varies from person to person, at the very least it should be completed daily, ideally twice per day. During a chest infection you may need to clear your chest more frequently. Many people find morning and evening best. This allows clearance from the build-up of sputum overnight and to prevent excessive coughing through the day. Clearance in the evening can prevent sleep disturbance due to coughing.

How can I make it easier to clear my chest?

Make sure your airways are open enough.
Narrow airways will make it difficult to clear your chest. If you have been prescribed short acting (reliever) inhalers or nebulisers e.g. salbutamol or ipratropium take these 10-15 minutes before you try to clear your chest.

Make sure you are well hydrated.
Inadequate hydration will make your sputum thick, sticky and harder to clear. NHS guidance on how much fluid to drink per day is 6-8 glasses which is 1.2L or 2.5 pints. Try to avoid excessive amounts of caffeinated, carbonated or alcoholic drinks as these can have a dehydrating effect on you. You will need extra fluid in hot weather and during a chest infection as you may lose fluid through sweat. If you are drinking sufficient fluid and your sputum remains thick then talk to your GP or respiratory consultant as there are medications which may **help to thin your sputum to aid clearance.**

Hygiene.
When you have coughed up some sputum it is important not to allow any bacteria that may be in it to circulate in the air. Some people may buy sputum pots with lids – please use the lids and throw pots away regularly. Some people may cough into tissues which should be placed into a bin with a lid and emptied regularly. Please do not cough into a toilet or sink – or in the outside air as that can lead to aerosols and reinfection. Hands should be washed afterwards. Swallowing sputum may not be a good idea as there is evidence that stomach acid does not always destroy NTM.

Order of treatment. This allows for optimal clearance and to allow medications to take maximal effect. If you have not been prescribed items on the list below then jump to 'know your chest'.

1) Reliever inhalers / nebulisers e.g. Salbutamol / Ipratropium.
   Wait 10-15 minutes if possible.
2) Sputum thinning nebulisers e.g. hypertonic saline
3) Chest clearance
4) Long acting inhalers (there are many different types of long acting individual or combined inhalers but typically these would be taken once or twice per day. If unsure check with your pharmacist)
5) Nebulised / Inhaled antibiotics

Know your chest.

It is good to know what is normal for you. How breathless are you doing daily activities? What colour is your sputum? How thick is it? How much do you produce daily? How wheezy or tight are you? What is your normal temperature? (measure it twice per day for a week). *If you know what is normal for you then you can spot changes from normal* that may be the early signs of a chest infection. If you can identify an infection early, it can be treated before you become too unwell.

Types of chest clearance.

There are several different ways for you to clear your chest, some involve breathing exercises, and some involve the use of OPEP devices (oscillating positive airways pressure) (see links at the end of this webpage). There is no strong evidence to suggest one technique is better than another so you need to find a technique that is effective for you and you can incorporate it into your day-to-day routine. Some of the techniques are unsuitable for some people with other conditions. We will list these with the techniques but suggest trying the breathing exercises first as these may be effective for you without the need for a device.

Breathing techniques.

#Active cycle of breathing technique (ACBT)

Avoid huffing if you have coughed up blood within the last 48hours.

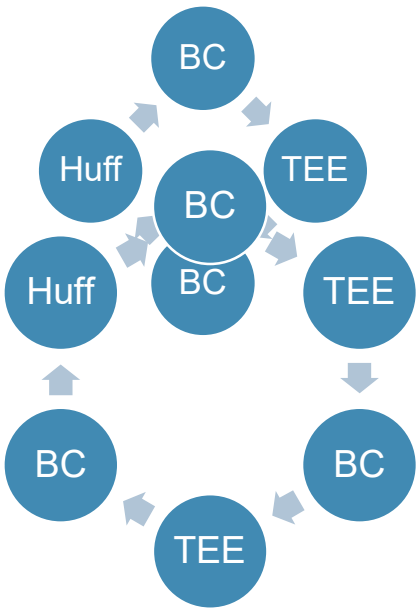
There are 3 parts of this which have fancy names, try not to get bogged down by the names rather focus on what you need to do.

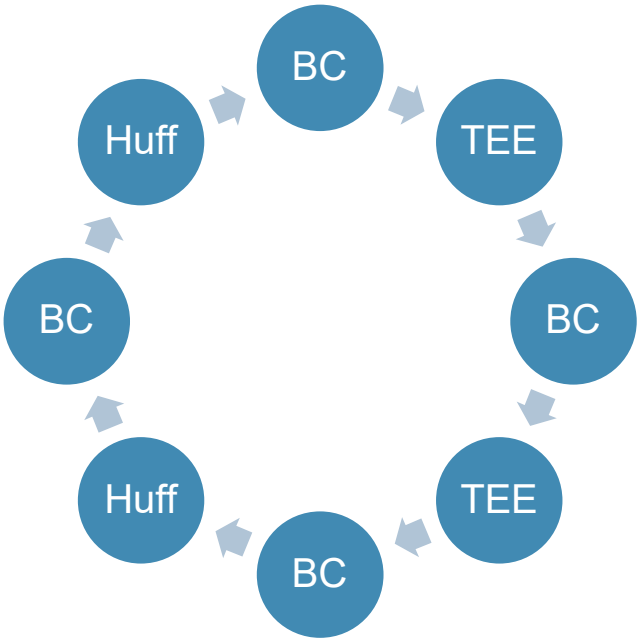
1) Thoracic expansion exercises (TEE) - **Deep breath in**. this is a steady breath in through your nose until you cannot breathe any more air in and hold it for 3 seconds if you can. This gets air behind the sputum.
2) Forced expiratory technique (FET) – **Huff out**. this is a forced breath out through an open mouth also called a huff like steaming up a mirror or glasses. It can be a long huff if you think the sputum is deep in your lungs or a shorter huff if it feels higher or in the middle of your chest. This moves sputum along your airways. (If you find your chest gets tight doing this you may find AD more suitable).
3) Breathing control (BC) – **Relaxed breathing**. This should be in and out through your nose. You should see your tummy gently be pushed out as your lungs fill but don't force it out. Keep your shoulders relaxed as you do this. This stops you from feeling lightheaded or over tired.

Start with 20 seconds of relaxed breathing, take 2-3 deep breaths followed by relaxed breathing then do 2 huffs – if your sputum is moved high enough to cough it up do so, if not do some relaxed breathing for 20 seconds or so. Then repeat.

How many deep breaths versus huffs is up to the individual. Some people stick rigidly to 3 deep breaths then 2 huffs and 20 seconds relaxed breathing. Others may do several cycles of deep breaths with relaxed breathing then a couple of huffs at the end. Its good to experiment to see what works for you best. At the end of chest clearance I usually encourage people to finish on a couple of deep breaths.

ACBT is very flexible – the following diagrams show how it may vary.





https://www.youtube.com/watch?v=XvorhwGZGm8

https://www.cysticfibrosis.org.uk/the-work-we-do/resources-for-cf-professionals/supporting-clinicians/resources-for-clinicians/physiotherapy-leaflets

 # Autogenic Drainage (AD)

This is gentle and safe to use even of you are coughing up some blood.

It involves breathing at different volumes and works by moving sputum from the smallest airways to the bigger ones like squeezing toothpaste along a toothpaste tube.

This may work best if you produce a lot of sputum.

The breath in

- Should be moderate sized and gently through your nose so you do not hear the breath in; if it is too fast you will hear it.
- Fully inflate your lungs and hold the breath for a couple of seconds if you can.

The breath out

- Should be through a **wide-open mouth** and is a gentle sigh as if gently steaming a mirror or glasses
- should not be forced
- listen for the sound of sputum moving

Cough suppression

- try to supress your cough for as long as possible during this breathing exercise to make it more effective.

Start with a test breath – this is a breath in and out as described above. You may need to do several until you start to hear the crackles of sputum moving.

- If you hear loud crackles at the start of the breath out your sputum is high up – try to huff / cough and clear it.
- If the crackles are quieter and towards the end of your breath out your sputum is further along towards the end of your airways.

Initially take a full AD style breath in then breathe all the air out through a wide mouth without forcing it (if this makes you wheezy then you are probably forcing it too much) then take a moderate breath in and breath all the air out again. Repeat this until the crackles become louder. As the crackles get louder gradually take a slightly bigger breath in and a moderate breath out (you don't need to breathe all the way out as you take a bigger breath in) until you are taking a full breath in and a moderate breath out.

The 2nd link below has an AD leaflet which includes a diagram that shows the breathing at different levels.

https://www.youtube.com/watch?v=Ek4R0Ok6pAE

https://www.cysticfibrosis.org.uk/the-work-we-do/resources-for-cf-professionals/supporting-clinicians/resources-for-clinicians/physiotherapy-leaflets

 # Postural drainage

Postural drainage may not be helpful as a chest clearance on its own. It is most effective when used in conjunction with other types of airway clearance such as the breathing exercises or OPEP devices.

Postural drainage is using gravity to drain the sputum out of a specific area of your lungs. It used to be common to have people tipped over pillows or a wedge in a head down position to clear their chest. **We do not recommend head down tilt anymore as it can worsen acid reflux and can increase cardiac problems.**

Postural drainage can be used if you can feel sputum in a particular part of your lungs or have been told for example your right lung has a lot of sputum in it. If this is the case you can sit/lie in a position with that area uppermost to allow sputum to drain to the bigger airways where it can be coughed / huffed out.

If you do not know or cannot feel where the sputum is but find that you cough when you go to sleep, try doing your evening session of chest clearance lying for 10 minutes on your right side then roll over to your left and repeat. If you find this helps you can continue.

 # Exercise.

Many people with a lung condition are fearful of exercise and see getting short of breath when exercising as bad or even dangerous. Getting breathless is a normal response to your body working a little harder than usual. If a person goes out jogging they will breathe harder. If you don't exercise much then climbing stairs can make you breathe harder. With both of these scenarios if you regularly do them the activities will get easier and you will feel less breathless. Exercise is vital.

The benefits of exercise include:

- Strengthening your bones and muscles.

- Strengthening your heart and lung muscles.
- Strengthening your joints.
- Reducing breathlessness during day-to-day activities.
- Reducing anxiety and depression.
- Reducing stress
- Lowering blood pressure

Everyone has the ability to improve their fitness and muscle strength no matter if you have not exercised for a long time. However, if you have not exercised in a while or have additional conditions that may place you at risk during exercise then contact your GP prior to starting. If you use oxygen at rest or are concerned that your oxygen levels are dropping during exercise you may need an ambulatory oxygen assessment; your GP may be able to advise you further. You may be able to find a pulmonary rehabilitation group in your area. Your GP or respiratory consultant may be able to refer you so that you can start to exercise and be monitored in a safe environment. It is also good to meet other people in a similar situation.

What type of exercise should I do?

Exercise can include normal activities of living such as shopping, housework, gardening walking the dog etc. Or you could start a new activity such as an exercise class or dancing but make sure the leader of any organised activity is aware of your health needs. Try to include exercise that strengthens your muscles and exercise that makes you more breathless.

How much exercise should I do?

Try to complete 150 minutes of moderate intensity exercise per week or 20 minutes per day. Moderate intensity means that you are breathing more heavily than usual but can still carry on a conversation with full sentences. If you are not breathing more heavily than usual then you need to increase the level you are working at. If you are unable to string a sentence together then stop, recover your breath and re-start at a gentler pace.

If whilst exercising you feel dizzy, clammy, experience any sudden chest pain, get very wheezy, or have muscle weakness then please stop and seek medical advice.

If you are finding that the exercise you choose is causing joint soreness it may be worthwhile trying alternate exercise.

You may ache following starting a new exercise – this can be reduced by ensuring that you warm up gently and cool down rather than stopping exercising suddenly. This can be as simple as walking for a few minutes before and after.

If you are prescribed an inhaler such as Salbutamol (Ventolin) which you take if your chest gets tight or wheezy take it with you when you exercise. If you know that exercise makes you tight then take it prior to starting as well.

Progressing your fitness.

If you exercise and continue exactly the same level, then your strength and fitness will improve up to a point and then level off. It is important to continue to progress your exercise in order to continue to improve. This can be increasing the length of the exercise e.g., walking for a

few more minutes, the speed of the exercise e.g. completing the same distance in less time or the resistance e.g. walking up an incline or turning resistance up on an exercise bike.

During a chest infection it is important to continue to exercise. You should still aim to achieve the same level of breathlessness. However, it will take less exertion than usual to reach this level and you may not be able to exercise for as long in one session. If you continue some exercise while feeling unwell you should return to your pre-infection fitness level much quicker.

https://www.blf.org.uk/support-for-you/keep-active/why-is-it-important

https://shop.blf.org.uk/products/exercise-handbook-hcp

 # Devices

Devices can aid chest clearance. The ones discussed here are the Acapella, the Aerobika and the Flutter. These are all OPEP devices (oscillating positive airways pressure) they work by providing a little resistance as you blow into them and vibrating at the same time which holds your airways open and helps shake the sputum off your airway walls. You need to have enough breath to blow out for a few seconds for these to be effective. These can be prescribed by your GP. There is not much difference between these although it is not as easy to use the flutter if postural drainage is to be used. It is slightly easier to blow into the aerobika than the acapella and the flutter is slightly harder still but can give a more forceful vibration.

https://www.youtube.com/watch?v=KORwlyeLmJg

Acapella® choice vibratory PEP device.

This should not be used if you have coughed up any blood or have been told you have a hole in your lung / collapsed lung (pneumothorax).

The Acapella has a little rocker inside which moves up and down as you breathe through it.

You will need to follow the manufacturer's guidelines on cleaning and sterilising the acapella.

Sit comfortably; seal your lips around the acapella and keep it in your mouth. Breathe in through your nose and out through the acapella. Keep your cheeks stiff.

Take a breath in until your lungs are full and breathe out with a steady but not too forceful breath.

Try to do several breaths then take some normal breaths.

After every 10 breaths do a huff / cough or two. Sooner if needed. Aim for 10 lots of 10 breaths.

This can be used with ACBT or AD breathing styles – see breathing techniques.

This can be used with postural drainage positions – see postural drainage

Aerobika® OPEP device

This should not be used if you have coughed up any blood or have been told you have a hole in your lung (pneumothorax).

The Aerobika has a valve inside which opens / closes as you breathe through it.

You will need to follow the manufacturer's guidelines on cleaning and sterilising the Aerobika.

Sit comfortably; seal your lips around the Aerobika. It is easier to breathe in and out through the Aerobika than try to coordinate putting it into your mouth just for exhaling. Keep your cheeks stiff.

Take a breath in until your lungs are full and breathe out with a steady but not too forceful breath.

Try to do several breaths then take some normal breaths.

After every 10 breaths do a huff / cough or two. Sooner if needed. Aim for 10 lots of 10 breaths.

This can be used with ACBT or AD breathing styles – see breathing techniques.

This can be used with postural drainage positions – see postural drainage.

The Flutter®

This should not be used if you have coughed up any blood, have been told you have a hole in your lung (pneumothorax) or heart failure.

The Flutter has a little ball bearing inside which moves up and down in a cone as you breathe through it.

You will need to follow the manufacturer's guidelines on cleaning and sterilising the Flutter.

Sit comfortably; Take a breath in until your lungs are full and breathe out with a steady but not too forceful breath having sealed your lips around the Flutter. Keep your cheeks stiff.

Try to do several breaths then take some normal breaths.

If you hold the flutter <u>with the stem slightly upwards</u> it will move sputum from deeper or further along your airways.

If you hold the flutter <u>with the stem more horizontally / slightly down</u> it will move sputum from higher up in your airways.

Take care not to tilt it too far either way or the ball bearing will not sit in the cone and it will not work.

After every 10 breaths do a huff / cough or two. Sooner if needed. Aim for 10 lots of 10 breaths.

This can be used with ACBT or AD breathing styles – see breathing techniques.

This can be used with postural drainage positions – see postural drainage but is more difficult to do so as the ball is required to be kept in the cone for the Flutter to work effectively.