

An Introduction to Postural Drainage & Percussion

Postural Drainage and Percussion (PD & P), also known as chest physical therapy (CPT), is a way to help people with cystic fibrosis (CF) breathe with less difficulty and stay healthy. PD & P uses gravity and percussion to loosen the thick, sticky mucus in the lungs so it can be removed by coughing. Unclogging the airways is key to keeping lungs healthy.

PD & P is easy to do using the techniques described here. For the child with CF, PD & P can be done by physical therapists (PT), respiratory therapists (RT), nurses, parents, siblings and even friends.

People with CF sometimes use other types of treatments, such as inhaled bronchodilators and antibiotics to keep their lungs healthy. If ordered, bronchodilators should be taken **before** PD & P to open the airways, and inhaled antibiotics should be taken **after** PD & P so that the medicine gets to the infection better. Your care center doctor or therapist will help you figure out a routine that will work best for you or your child.

KNOW YOUR LUNGS

Learning more about the respiratory system and its relationship to other organs in the body can help you to understand why PD & P treatments are effective.

Getting Rid of Mucus

The goal of PD & P is to clear mucus from each of the five lobes of the lungs by moving mucus into the larger airways so that it can be coughed out. The right lung is composed of three lobes: the upper lobe, the middle lobe and the lower lobe. The left lung is made up of only two lobes: the upper lobe and the lower lobe.

The lobes are divided into smaller sections called segments. The upper lobes on the left and right sides are each made up of three segments: **top (apical)**, **back (posterior)** and **front (anterior)**.

The lungs are made up of a network of air tubes, air sacs and blood vessels. These sacs allow for the exchange of oxygen and carbon dioxide between the blood and air. It is these segments that are being drained. Note the position of each lung segment in Figure 1 below.

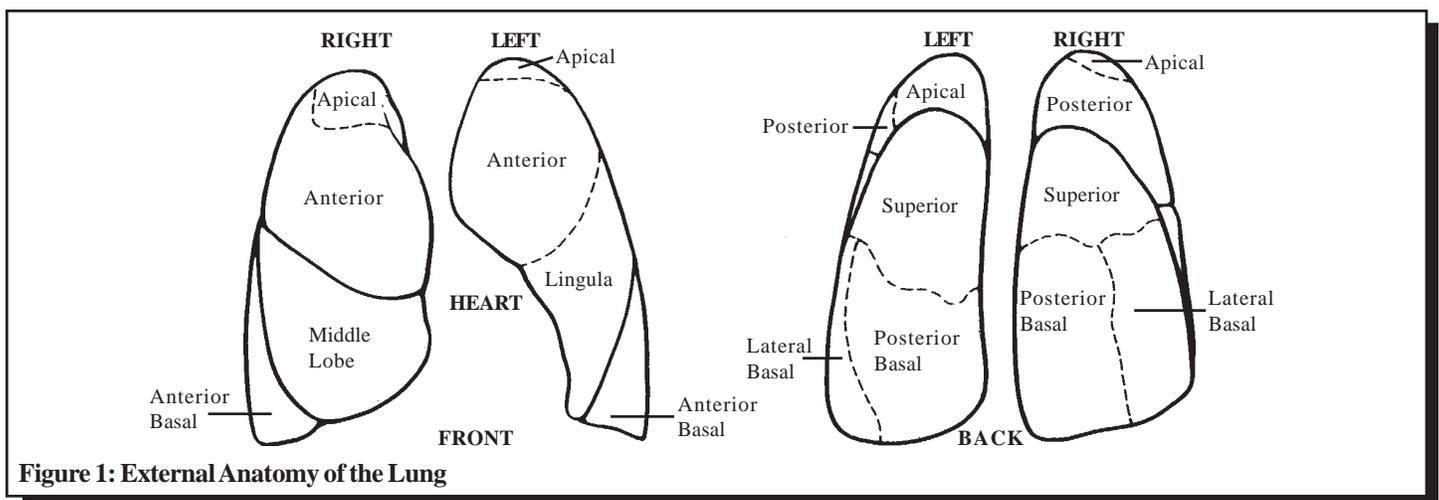


Figure 1: External Anatomy of the Lung

*Words that appear in bold italic are defined on page 3.

PERFORMING PD & P

The performance of PD & P involves a combination of techniques including: multiple positions to drain the lungs, percussion, vibration, deep breathing and coughing.

Once the person is in one of the positions, the caregiver does percussion on the chest wall. This is usually given for a period of three to five minutes and sometimes followed by vibration over the same area for approximately 15 seconds (or during five *exhalations*). The person is then encouraged to cough or huff forcefully to get the mucus out of the lungs.

Description of PD & P Techniques

Postural drainage uses gravity to help move mucus from the lungs up to the throat. The person lies or sits in various positions so that the part of the lung to be drained is as high as possible. The part of the lung is then drained using percussion, vibration and gravity. For a complete description of these positions, see diagrams on pages 4 through 7. Your CF care team may tailor these positions to yours or your child's needs.

Percussion or clapping by the caregiver on the chest wall over the part of the lung to be drained helps move the mucus into the larger airways. The hand is cupped as if to hold water but with the palm facing down as in Figure 2. The cupped hand curves to the chest wall and traps a cushion of air to soften the clapping.

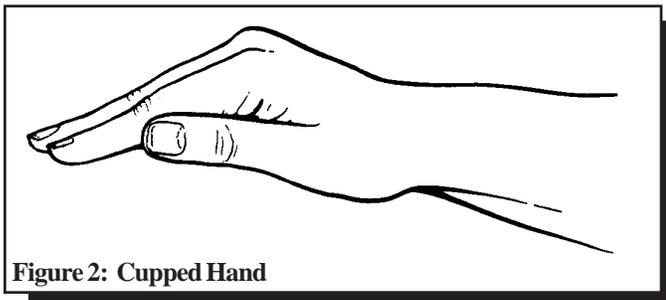


Figure 2: Cupped Hand

Percussion is done forcefully and with a steady beat. It should not be painful or sting if the hand is cupped properly. Each percussion also should have a hollow sound. Most of the movement is in the wrist with the arm relaxed, making percussion less tiring to do.

Special attention must be taken to not clap over the spine, breastbone, stomach and lower ribs or back to prevent injury to the spleen on the left, the liver on the right and the kidneys in the lower back.

Different devices may be used in place of the traditional cupped palm method for percussion. Ask your doctor or therapist for advice.

Vibration gently shakes the mucus into the larger airways. The caregiver places a hand firmly on the chest wall over the part of the lung being drained and tenses the muscles of the arm and shoulder to create a fine shaking motion. Then, the caregiver applies a light pressure over the area being vibrated. (The caregiver also may place one hand over the other, then press the top and bottom hand into each other to vibrate.) Vibration is done with the flattened hand, not the cupped hand, as in Figure 3. Exhalation should be as slow and as complete as possible.

Deep breathing moves the loosened mucus and may lead to coughing. Breathing with the *diaphragm*, belly breathing or lower chest breathing is used to help the person take deeper breaths and get the air into the lower lungs. The

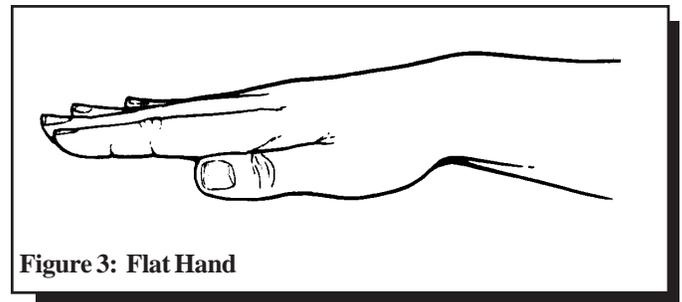


Figure 3: Flat Hand

belly moves outward when the person breathes in and sinks in when he or she breathes out.

Coughing is key in clearing the airways of mucus. A forced but not strained exhalation, following a deep *inhalation*, may help a person cough. The mucus can then be coughed out.

Huffing

Huffing is a type of cough. It also involves taking a breath in and actively exhaling. It is more like “huffing” onto a mirror or window to steam it up. It is not as forceful as a cough but can work better and be less tiring.

Timing of PD&P

Generally, each treatment session can last for 20 to 40 minutes. PD & P is best done before meals or one and a half to two hours after eating to decrease the chance of vomiting. Early morning and bedtimes usually are recommended. The length of PD & P and the number of times of day it is done may need to be increased if the person is more congested or getting sick. Your CF doctor or therapist will help you know what positions, how often and how long PD & P should be done.

ENHANCING PD & P FOR THE PERSON AND CAREGIVER

Both the person with CF and the caregiver should be comfortable during PD & P. Before starting, the person should remove tight clothing, jewelry, buttons and zippers around the neck, chest and waist. Light, soft clothing, such as a T-shirt, may be worn. **Do not do PD & P on bare skin.** The caregiver should remove rings and other bulky jewelry such as watches or bracelets. A supply of tissues or a place to cough out the mucus should be nearby.

Doing PD & P Comfortably and Carefully

The caregiver should not lean forward when doing percussion, but should remain in an upright position to protect his or her back. The table on which the person with CF lies should be at a comfortable height for the caregiver.

Purchasing Equipment

Equipment such as drainage tables, electrical and non-electrical palm percussors and vibrators may be helpful. These can be purchased from medical equipment stores. Older children and adults may find percussors useful when doing their own PD & P.

Talk to your doctor or therapist at your CF care center about equipment for PD & P.

Pillows, sofa cushions, bundles of newspapers under pillows for support, cribs with adjustable mattress heights/tilts, foam wedges and bean bag chairs work for many families. Infants can be positioned with or without pillows in the caregiver's lap.

Making PD & P More Enjoyable

To enhance the quality of the time you spend doing PD & P, do one of the following:

- Schedule PD & P around a favorite TV show.
- Play favorite songs or recorded stories.
- Spend time playing, talking or singing before, during and after PD & P.
- For kids, encourage blowing or coughing games during PD & P, such as blowing pinwheels or coughing the deepest cough.
- Ask willing and capable relatives, friends, brothers and sisters to do PD & P. This can provide a welcome break from the daily routine.
- Minimize interruptions.

Finding ways that make PD & P more enjoyable can help you keep a regular routine and get maximum health benefits.

Glossary

Diaphragm: The main breathing muscle – a dome-shaped muscle between the chest and abdomen. People with CF may learn to use the diaphragm to cough better or make breathing easier.

Exhalation(s): Breathing out; the flow of air out of the lungs with each breath.

Inhalation: Breathing in; the flow of air into the lungs.

INSTRUCTIONS FOR POSTURAL DRAINAGE POSITIONS

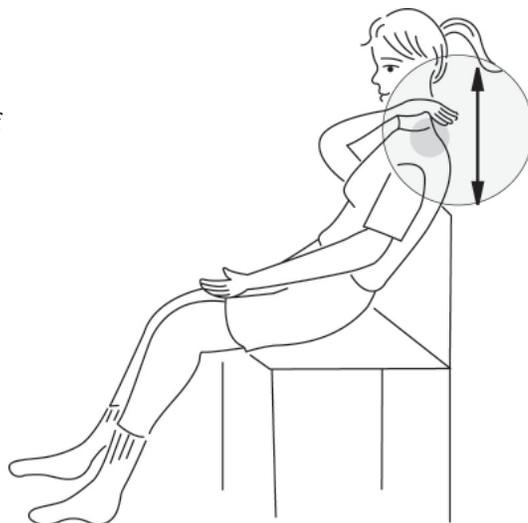
The following diagrams describe the positions for PD & P. In the diagrams, shaded areas show where the chest should be percussed or clapped.

Pillows may be used for added comfort. If the person tires easily, the order of the positions can be varied, but all areas of the chest should be percussed or clapped.

Please remember to percuss and vibrate only over the ribs. Avoid percussing and vibrating over the spine, breastbone, stomach and lower ribs or back to prevent trauma to the spleen on the left, the liver on the right and the kidneys in the lower back. Do not percuss or vibrate on bare skin.

Self-Percussion — Upper Lobes

Your child should sit upright and reach across his or her chest to clap on front of chest over the muscular area between the collarbone and the top of the shoulder blade. Repeat on the opposite side. Your child can also clap his or her own upper back if able to reach it.



Upper Front Chest — Upper Lobes

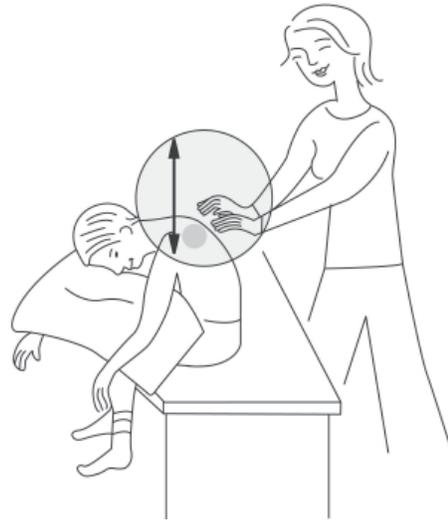
Have your child sit upright. Clap on both sides of upper front chest over the muscular area between the collarbone and the top of the shoulder blade.



* Children shown without shirts to better demonstrate the PD & P technique in illustrations. Images are from the CF Family Education Program.

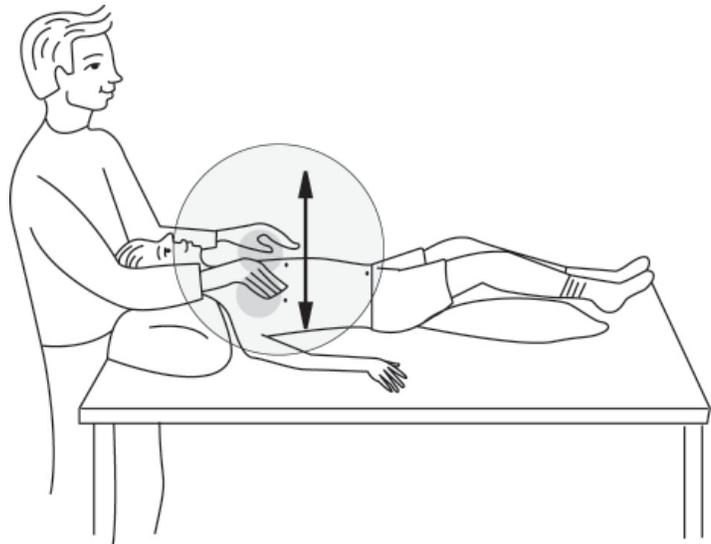
Upper Back Chest — Upper Lobes

Have your child sit up and lean forward on a pillow over the back of a sofa or soft chair at a 30 degree angle. Stand or sit behind your child and clap both sides of the upper back. Take care not to clap on your child's backbone.



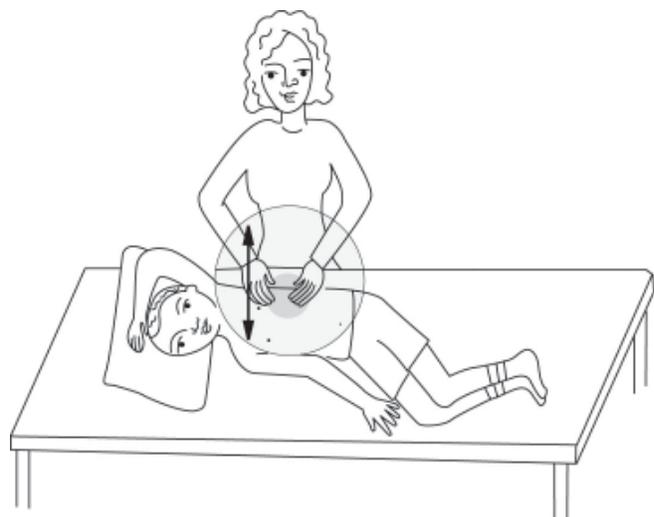
Upper Front Chest — Upper Lobes

Have your child lie on his or her back with arms to sides. Stand behind your child's head. Clap both sides of your child's chest between the collarbone and nipple.



Left Side Front Chest

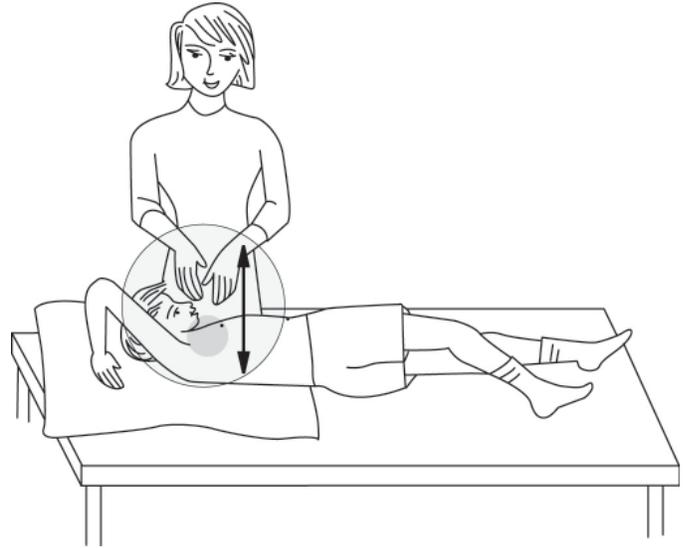
Have your child lie with left side up and raise his or her left arm over head. Clap over the lower ribs just below the nipple area on front side of left chest. Do not clap on your child's stomach.



* Children shown without shirts to better demonstrate the PD & P technique in illustrations. Images are from the CF Family Education Program.

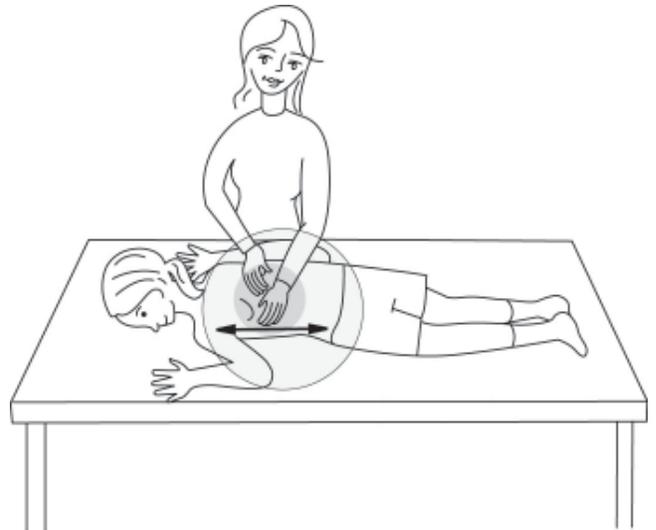
Right Side Front Chest

Have your child lie with right side up and raise right arm over head. Clap over the lower chest just below the nipple area on front side of right chest. Do not clap lower ribcage.



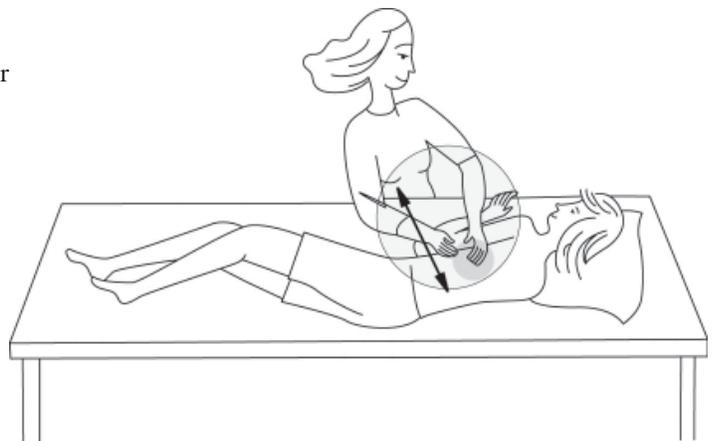
Lower Back Chest — Lower Lobes

Have your child lie on his or her stomach. Clap both sides at the bottom of chest just above the bottom edge of the ribcage. Do not clap lower ribcage or over the backbone.



Left Lower Side Back Chest — Lower Lobe

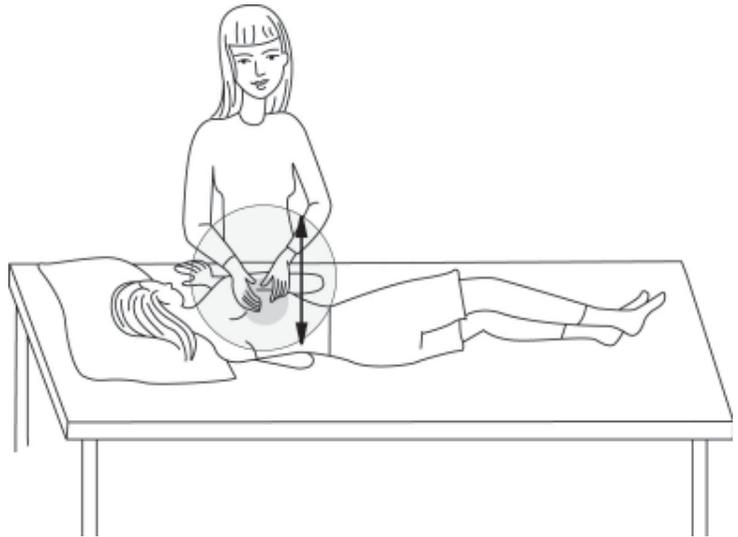
Have your child lie with left side up and roll toward you a quarter turn so you can reach your child's back. Clap on lower left side of chest just above the bottom edge of the ribcage.



* Children shown without shirts to better demonstrate the PD & P technique in illustrations. Images are from the CF Family Education Program.

Right Lower Side Back — Lower Lobe

Have your child lie right side up and roll toward you a quarter turn so you can reach your child's back. Clap on lower right side of the chest just above the bottom edge of the ribcage.



* Children shown without shirts to better demonstrate the PD & P technique in illustrations. Images are from the CF Family Education Program.