



## Coping with Airway Mucus

Airway mucus can be a problem for many individuals with chronic lung diseases, especially those with COPD, chronic bronchitis, and bronchiectasis. Unfortunately, there is no one way to remove it that works for everyone. There are many variables to consider: how much mucus, how thick the mucus is, where the mucus is, and the level of your lung function as it relates to your ability to cough and “clear” the mucus or get it out of the airways to avoid symptoms of blockage or infection. To understand mucus removal, we first need to talk about what mucus is and how a healthy body removes it compared to a less healthy body.

---

### What is Airway Mucus?

Mucus is the way the lungs protect you as it isolates and cleans out inhaled pollutants, particulate matter and even bacteria, viruses, and fungi. Airway mucus is always present in everyone’s body starting with the nose down to the alveoli (al-vee-oh-lee: the tiny air sacs in your lungs that bring oxygen to your blood when you breath in, and remove carbon dioxide when you breathe out). Mucus is produced by special “goblet” cells located in the airways. Increased mucus is often the result of inflammation in the airways and increased mucus production is the way the body attempts to protect the lungs. The mucus tends to become thicker as airway disease progresses or if you are not consuming enough water. The problem is getting rid of the excess mucus...especially when you have lung disease. As the lung disease progresses, mucus can become thicker, and muscles used for coughing can weaken making it even harder to cough mucus up and out.

### How Do I Get Rid of Airway Mucus?

Mucus is removed from the respiratory tract with the help of tiny hairs in the airways called cilia (seal-lee-ah). These cilia are found in the airways in large numbers. When the cilia move together in a wave-like motion, they bring up the mucus in an efficient manner. However, lung disease and exposure to pollutants and irritants, especially with vaping and smoking, can damage or destroy the cilia until they no longer work as efficiently. At this point, the cilia are not able to move as much mucus (especially thicker mucus) and the inability to move the contaminated mucus often leads to infections and lung irritation as well as disrupting the airflow causing the patient to experience feeling tightness in the chest and short of breath.

Once mucus is brought up higher into the airways, coughing is the final step to remove it from the body. To have an effective cough, lots of air is required. Obviously, with poor airflow due to lung disease, coughing becomes a problem and often results in a dry or unproductive cough (coughing but not bringing up any mucus). Combine all of this with the damage or loss of cilia and you can understand why so many people have problems removing mucus from their lungs.

There are several aids to help rid the body of mucus, but as mentioned earlier, not all solutions work for everyone.

1. **Non-pharmaceutical: good hydration and adequate exercise to help you move the mucus.** The goal of these approaches is to thin the mucus to make it easier for damaged cilia to move the mucus and require less effort with coughing. Drinking plenty of water is known to thin mucus.  
(Reference: Randell SH, Boucher RC, University of North Carolina Virutal Lung Group.. Effective mucus clearance is essential for respiratory health. Am J Respir Cell Mol Biol. 2006; 35(1): 20-28. doi: <https://doi.org/10.1165/rcmb.2006-0082SF>)
2. **Pharmacological:** Some doctors recommend oral medications such as guaifenesin/dextromethorphan (brand name Mucinex DM®) or N-acetyl cysteine (NAC) to thin the mucus for people with very thick mucus,

but these oral medications are often not a very effective treatment. Discuss the use of these treatments with your doctor first.

Nebulized hypertonic saline (often combined with a pretreatment of bronchodilators) is effective at clearing mucus in bronchiectasis.

3. **Mechanical airway oscillating (AOD).** Mechanical therapy ranges from very inexpensive to very expensive and all can be used along with the items listed above. Some of the least expensive options are handheld devices, such as positive expiratory pressure (PEP) devices, including a **lung flute™**, **an Acapella™** or **Aerobika™** device. These are small plastic, non-prescription devices that provide resistance when you breathe out and help the cilia move the mucus. In the early stages of lung disease these can be very helpful, but as lung disease progresses many patients find that the effort is too much for them.

**An educational video on the lung flute device can be found [here](#).**

A more expensive option is a “**cough assistive device**” which requires a prescription. With these devices you breathe in air delivered with variable force and then when you exhale, the device produces a variable suction bringing mucus higher up the airway so it can be easier to expel. *It is important that this device, and all the ones that follow, are used under a doctor’s guidance to determine what the best and safest setting is for you, as these devices are not appropriate for patients with certain forms of COPD such as bullous emphysema.* There are also devices like the **Airvo™2** that provide steam or vapor along with high flow oxygen which are often covered by insurance. One recent device even uses sound waves to activate the cilia to move mucus. For a video on user experience of using a cough assistive device click [here](#).

4. **High-frequency chest wall oscillation (HFCWO) devices.** These devices can be expensive and sometimes are only covered by insurance if you have a diagnosis of bronchiectasis but may be purchased with a prescription, provided you can afford them. The **air percussion vests** are worn over the torso like a jacket and pulsate the chest cavity to mobilize mucus from the lower airways and dislodge mucus from the bronchial walls. Common for use with cystic fibrosis patients, in later stages of the disease. These devices inflate and pulsate the air in the jacket around the chest. This means that during treatment your vest must remain attached to the unit providing the air. A second type is a **mechanical percussion device**. A recently approved device first introduced as the **Aflovest™** (featured in the movie Six Feet Apart), provides pulses through the use of small, oscillating motors and is battery operated and self-contained to allow the patient mobility during treatment while loosening and moving mucus. Another type is the **Monarch® Airway Clearance System** that uses pulmonary oscillating discs and the creation of magnetic fields to move mucus.
5. **Intra-pulmonary Percussive Ventilation (IPV) devices.** These units act as nebulizers to get medication deep into the lungs and have adjustable pressure and pulse sequences to loosen mucus deeply embedded in the airways. Pioneered by Dr. Forest Bird (inventor of the ventilator) who invented IPV for his wife, this type of device is used in many hospitals and is generally considered gentler than external percussive devices. (Reference: Reyhler G, Debier E, Contal O, Audag N. Intrapulmonary percussive ventilation as an airway clearance technique in subjects with chronic obstructive airway diseases. *Respir Care*. 2018;63 (5): 620-631. doi: <https://doi.org/10.4187/respcare.05876>)

## Airway Clearance Techniques You Can Use to Improve Your Coughing Results

There are several different coughing techniques but the most common for individuals with COPD are **controlled coughing**, **active cycle of breathing** and the **huff maneuver**. The idea of a coughing technique is to make your coughing more effective, less irritating to your throat and less fatiguing.

1. **Controlled coughing:** While sitting, lean forward and take a deep breath in through your nose. When exhaling, fold your arms across your lower chest and cough shortly but sharply a few times through your slightly opened mouth. Breathe in again through your nose like you are sniffing and when your lungs are

full continue with the controlled coughing.

2. **The huff coughing technique:** This is the most effective technique for a majority of COPD patients. While in a sitting position, lean slightly forward. Take in a deep breath then, using your stomach muscles, make several short exhalations with your mouth open making a “ha, ha, ha” sound. Keep some tissues handy to cough into.
3. **Active cycle of breathing technique (ACBT):** This approach involves 3 steps:
  - a. Relax your airways by taking approximately 6 gentle breaths while placing one hand on your stomach as you breathe. You could use the pursed lip technique when breathing out (pursing your lips like you are kissing someone) to keep the airway open longer.
  - b. Breathe deeply using a 3-second breath hold (chest clapping can help) to get air behind mucus and clear it.
  - c. The third phase is the **huff cough** which helps force the mucus out of your lungs.

With either of these techniques, it is advised to practice them for short lengths of time several times a day as opposed to practicing them once a day for an extended time.

The important thing to remember is that whatever method or device you use, it is important to get the mucus out. In doing so you lower your risk of infection and eliminate any airway blockage.

Here is a link to a [video](#) from the cystic fibrosis community on airway clearance techniques.

## How Do I Make Sure I Do Not Infect Others If I Have a Respiratory Infection Like the Flu or COVID-19?

- You should not stop using your device if it is helping to control your symptoms. Remember to talk to your doctor about specific instructions for airway clearance during respiratory infections as you may need to clear your airways more often.
- Limit your exposure to others when performing airway clearance techniques.
- Make sure you cough facing away from others into a disposable tissue (if there is no choice use your sleeve by putting an elbow to your face.)
- As airway clearance procedures may increase the number of infectious particles in the air, conduct airway hygiene procedures at home in a separate, well-ventilated room.
- Wash your hands frequently.

---

This page was reviewed on July 28, 2020 by the COPD Foundation **Content Review and Evaluation Committee.**