



What is Mucociliary Clearance?

Our bodies need oxygen to survive. The best way to get oxygen from the outside atmosphere is to breathe in large amounts of air through the nose and mouth into the lungs where it is absorbed into the blood stream and pumped, by the heart, throughout the body. Unfortunately, outside air also contains things we don't want in our lungs, like pollutants, germs and dust. These unwanted particles are breathed in, as well. Sometimes these particles can be dangerous or cause disease, so the body has developed an elegant system for removing unwanted particles called **mucociliary clearance**. Mucociliary clearance, combined with an effective and vigorous cough, is the primary form of defense used by the lungs.

Mucociliary clearance impairment can be acquired as the result of environmental damage to the airways, chronic infection or toxic exposures, or it can be inherited due to genetic mutations affecting one or more components of the system. Cystic fibrosis (characterized by unusually thick mucus) and primary ciliary dyskinesia (characterized by impaired ciliary motion) are two recognized genetic disorders of mucociliary clearance. The severity of lung disease seen in these genetic disorders demonstrates the importance of mucociliary clearance in maintaining lung health.

What Happens in Mucociliary Clearance?

Mucus of just the right amount and the right consistency ("stickiness") lays over the surfaces of airways, ears and sinuses like a blanket. The mucus rests on a "carpet" of moving cilia. Particles that do not belong in these areas get trapped by the sticky mucus and "swept" to the large airways where they can be coughed out or swallowed. It sounds like a simple system, but both components—cilia and mucus—are individually very complex and impairment in any feature of either upsets the delicate balance required for effective mucociliary clearance.

Airway Clearance Therapy and Mucociliary Clearance

Impaired or ineffective mucociliary clearance leads to serious diseases of the airways. Airway clearance therapy is an essential part of the treatment plan for individuals with impaired mucociliary clearance because it aids in moving debris-laden and infected mucus from the smaller airways to the larger airways where it can be more easily managed by coughing, swallowing or suctioning. High-frequency chest wall oscillation, the technology used in the SmartVest®, has the additional benefit of mimicking cough, another important component of lung defense.