Bronchiectasis - The Most Misunderstood Cough in the Room

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ELECTROMED, INC.

Disclosure

I am an employee of Electromed

Learning Objectives

- Bronchiectasis Overview: Understand pathophysiology, disease progression, and treatment management
- Bronchiectasis Overlap: Describe overlap syndromes and identify patients earlier
- Airway Clearance Therapy: Review airway clearance therapy options and considerations when managing bronchiectasis

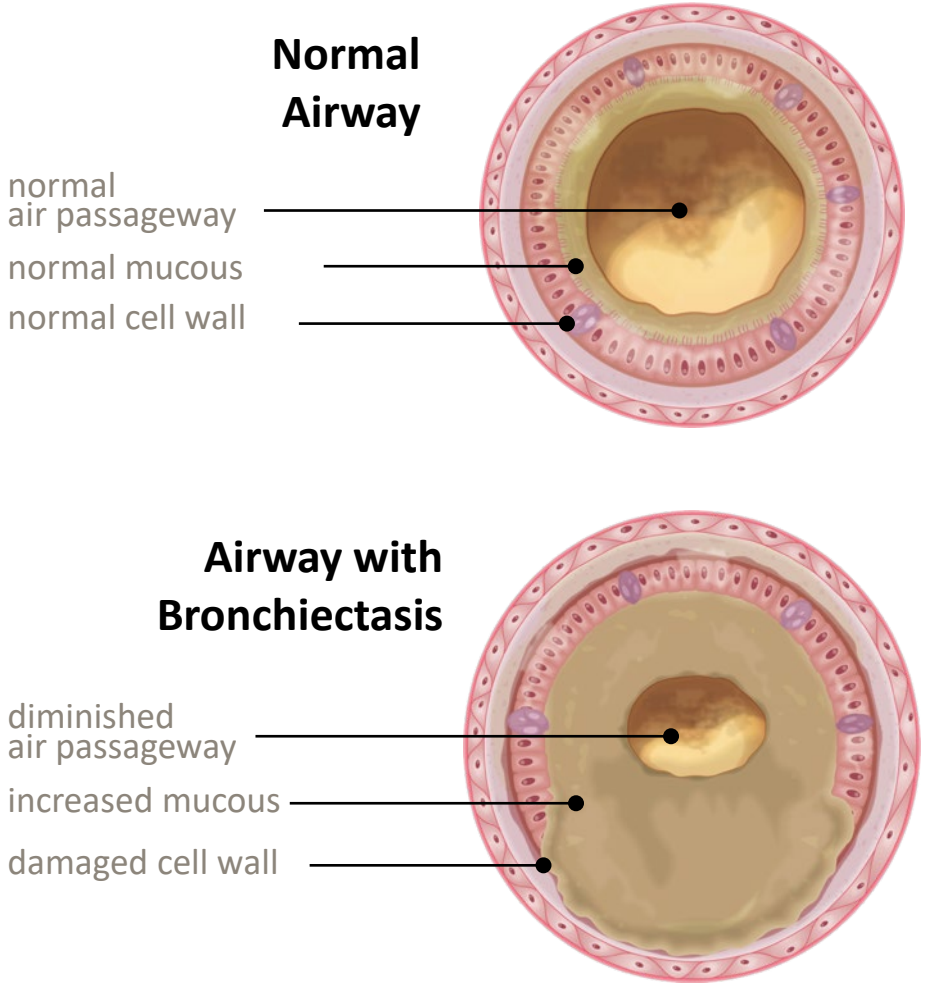
01 Bronchiectasis Overview

Bronchiectasis

(bron-kee-eck-tuh-sis)

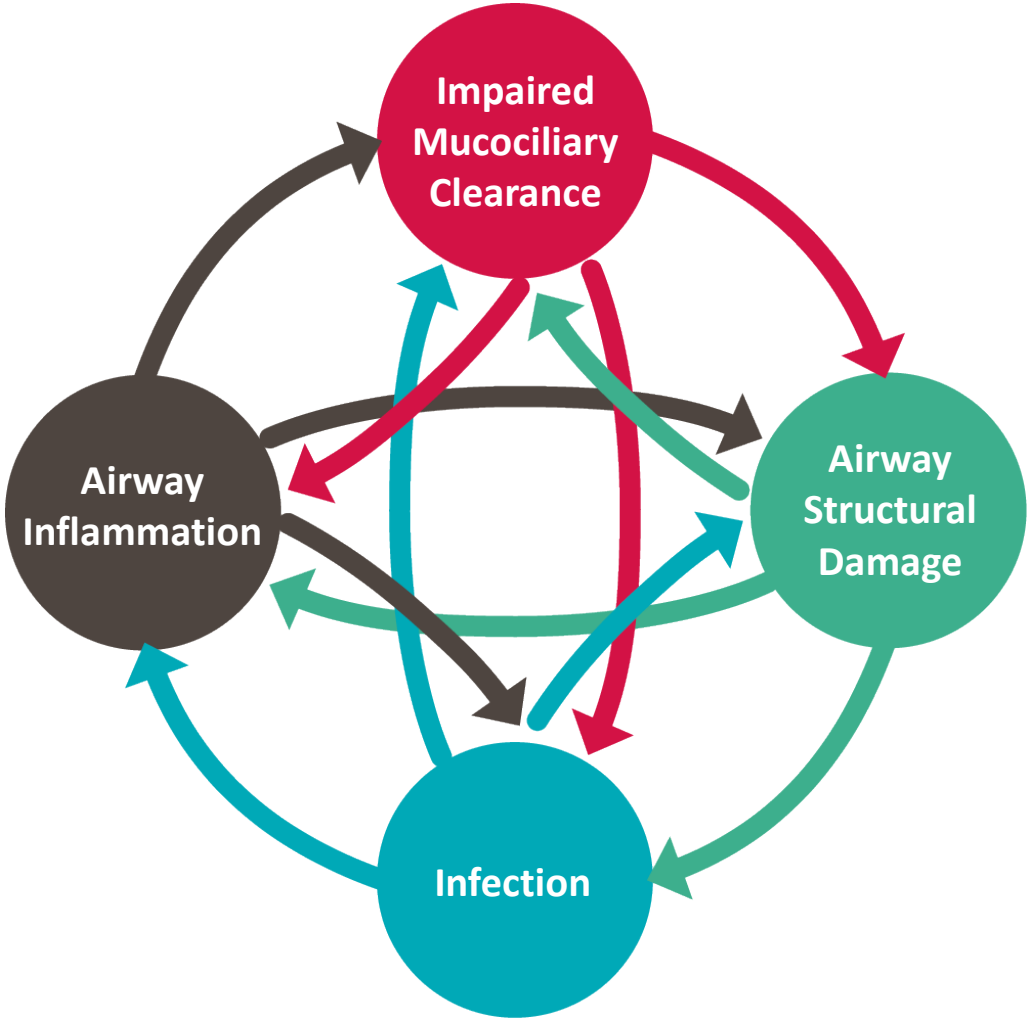
Abnormal widening of the airways

- Damaged airways impairs bronchial drainage
- Bacterial growth, infections, and inflammation lead to progressive lung damage



Bronchiectasis Toolbox. (2025) https://bronchiectasis.com.au/bronchiectasis/bronchiectasis/pathophysiology
https://www.bronchiectasisandntminitiative.org/Learn-More/I-am-a-Patient-or-Caregiver/Bronchiectasis-FAQs

Vicious Vortex



Flume, PA., Chalmers JD., Olivier, KN. Advances in bronchiectasis: endotyping, genetics, microbiome, and disease heterogeneity. *Lancet*. 2018 September 08; 392(10150): 880-890. doi: 10.1016/S0140-6736(18)31767-7

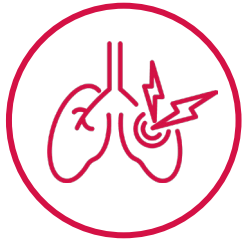
Bronchiectasis Symptoms

- Recurrent respiratory infections
- Chronic productive cough
- Hemoptysis
- Fatigue
- Wheezing

Bronchiectasis & NTM 2024 Research Data

47.7%

History of pneumonia



61.6%

Diagnosed with past or current NTM

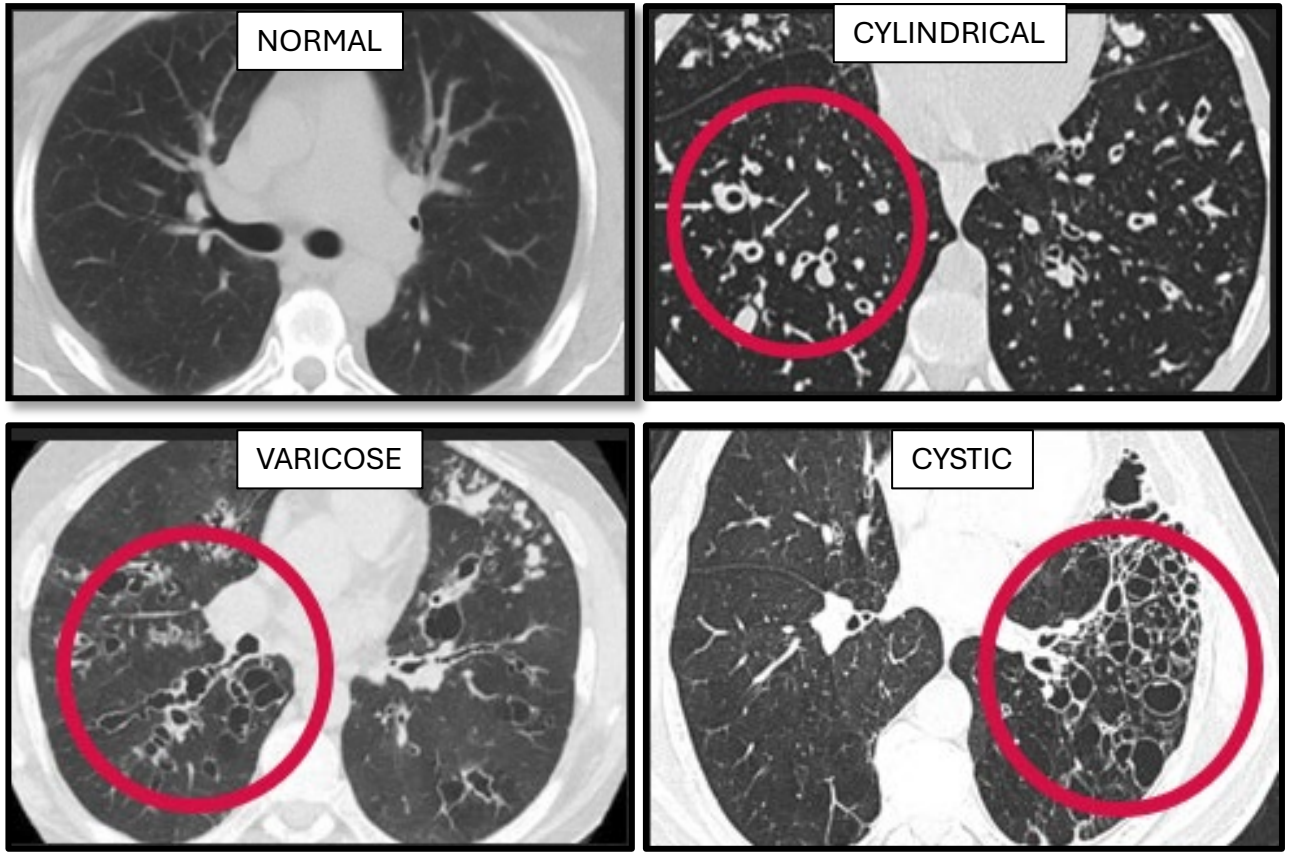
20.6%

Diagnosed with past or current *pseudomonas*

Bronchiectasis and NTM Research Registry: 2021 Registry Highlights. (2021). https://www.bronchiectasisandntminitiative.org/Research/Registry/Bronchiectasis-and-NTM-Research-Registry

Bronchiectasis Diagnosis

- 25% of patients wait ≥ 10 years to be diagnosed
- Delayed diagnosis results in recurrent exacerbations and progressive lung damage
- High Resolution CT Scans (HRCT) is the Gold Standard for diagnosis



https://www.thelancet.com/journals/lanres/article/PIIS2213-2600(26)00017-2/fulltext#box1

Bronchiectasis Diagnosis

Pulmonary Function Test (PFT)

- Determine baseline lung function

Sputum Cultures

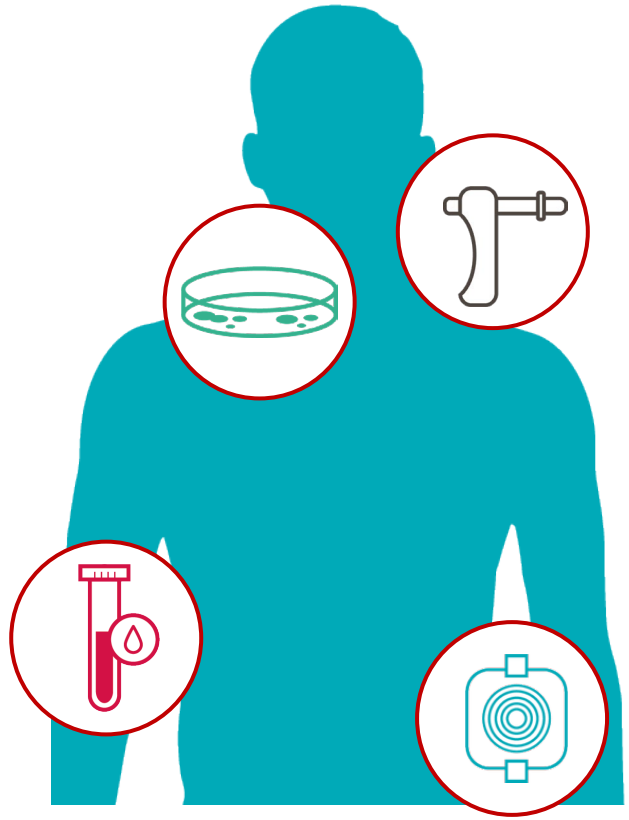
- Pathogens including bacteria, mycobacteria, fungus

Blood

- Immune deficiencies and inflammatory diseases

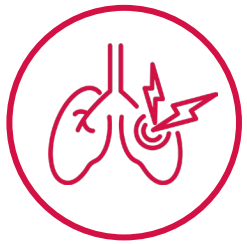
Genetic & Sweat Test

- Test for underlying causes such as cystic fibrosis



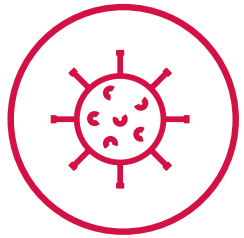
https://www.lung.org/lung-health-diseases/lung-disease-lookup/bronchiectasis/symptoms-diagnosis

Bronchiectasis Etiologies



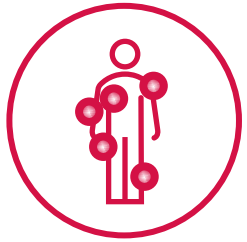
Post-infectious

- Tuberculosis
- Pneumonia
- NTM



Immunodeficiencies

- Common variable immunodeficiency
- HIV



Autoimmune & Connective Tissue

- Rheumatoid arthritis
- Inflammatory bowel disease

Genetic

- Cystic Fibrosis
- Primary Ciliary Dyskinesia
- Alpha-1 antitrypsin deficiencies

Gastrointestinal

- Gastroesophageal reflux disease
- Aspiration

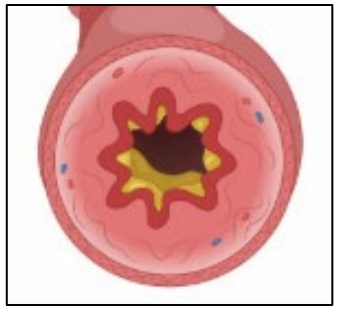
Idiopathic

- 40-50% of BE patients

Halaseh, RM., Al-Ahmad, M. Boppana, L., et al. Bronchiectasis: Past insights, present clinical evidence, and future research pathways. *Respiratory Medicine,* 2026; 254, 108744

02 Overlap Syndromes

Chronic Inflammatory Airway Diseases

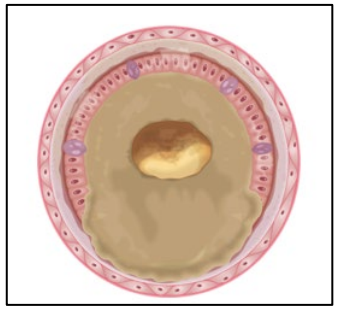


#1 Asthma – 24.9 million individuals diagnosed in the U.S.

- 20.2 million adults, 4.6 million children
- Estimated economic cost is $50 billion annually

#2 COPD – 11.1 million adults diagnosed in the U.S.

- 4th leading cause of death
- Estimated economic cost is $50 billion annually

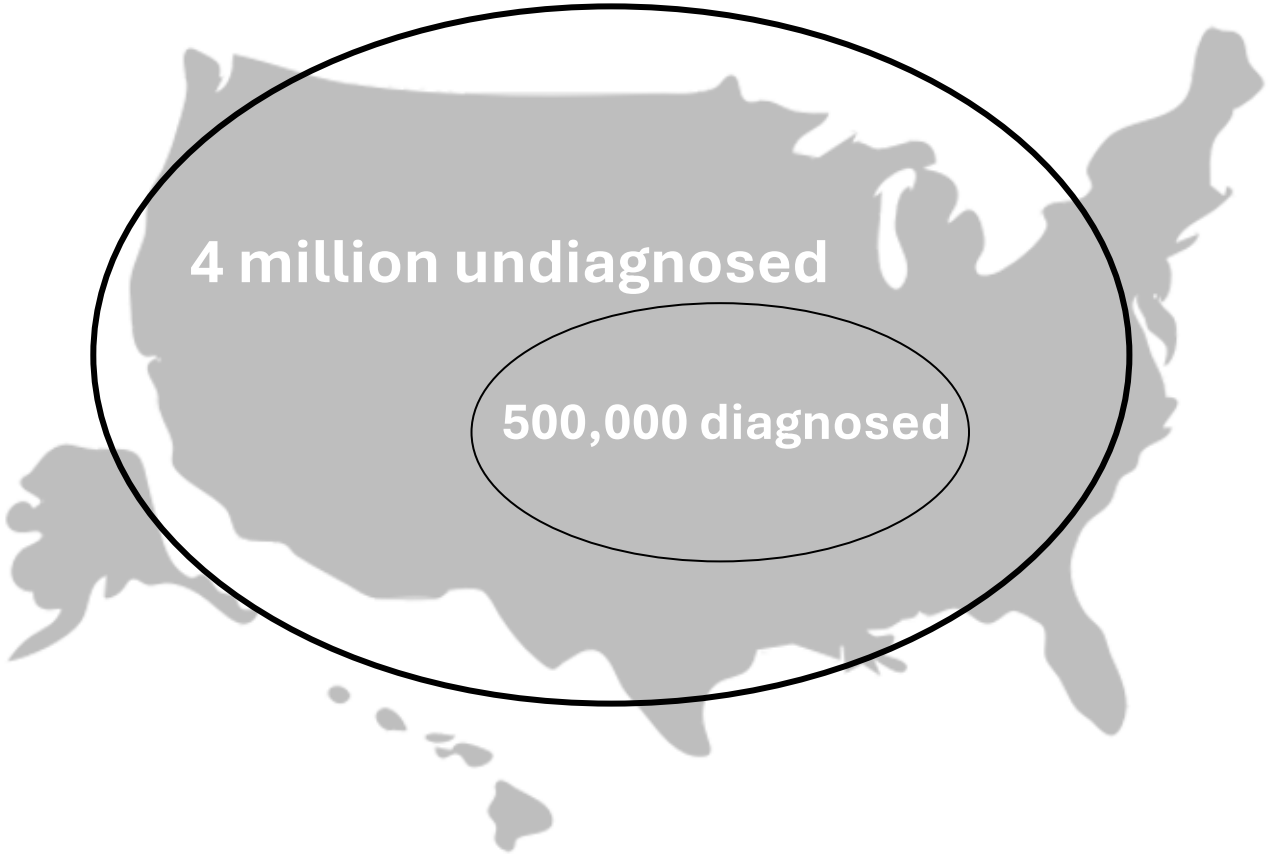


#3 Bronchiectasis – 500,000 adults diagnosed in the U.S.

- Estimated economic cost is $15 billion annually

https://acaai.org/asthma/asthma-101/facts-stats/
https://www.lung.org/lung-health-diseases/lung-disease-lookup/copd/for-health-professionals/copd-in-your-state
https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/ghe-leading-causes-of-death
Roberts, J., et al. The Economic Burden of Bronchiectasis: A Systematic Review. CHEST, 2023; 164, 1396-1421

Bronchiectasis Prevalence & Burden



- 701 per 100,000
- 8% annually growth

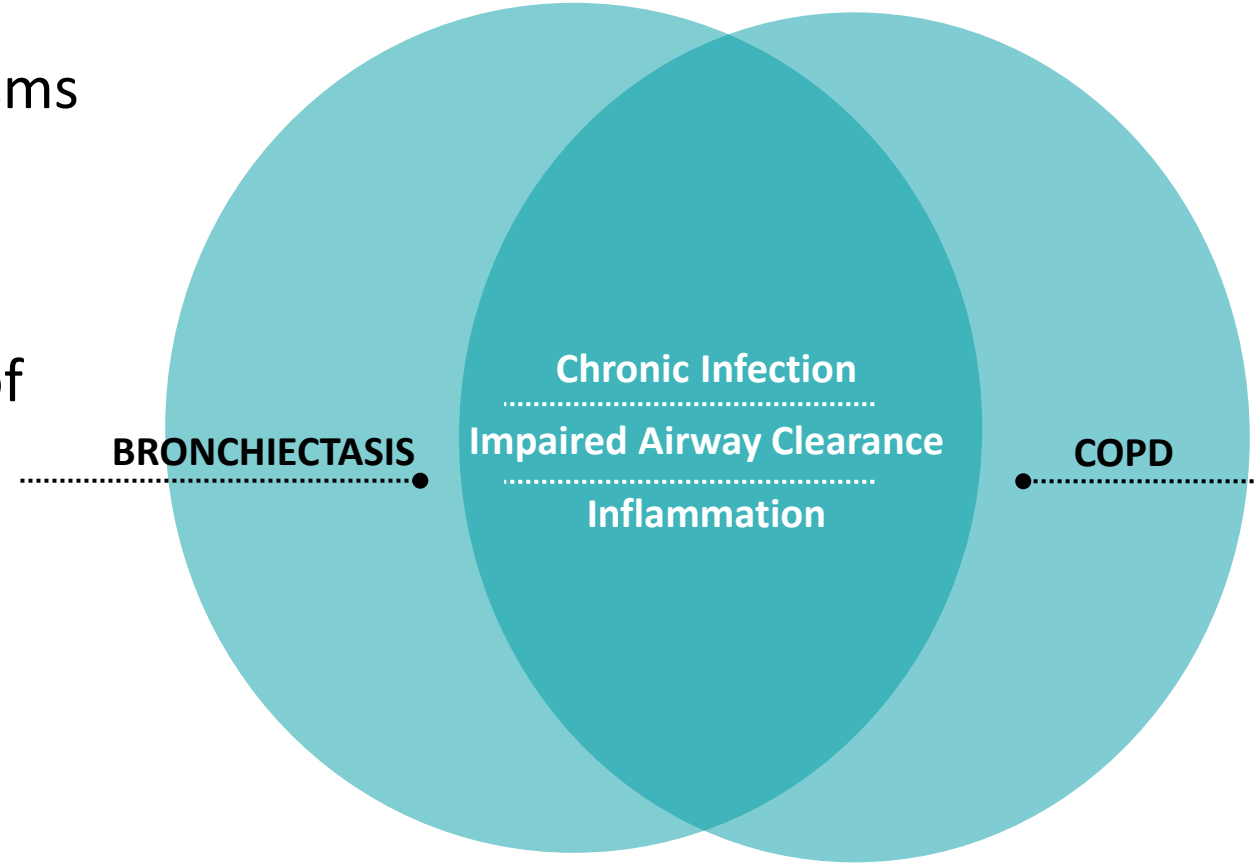
- Female predominant
- ↑ NTM & *P. aeruginosa*

- 52% hospitalized within 1-year of Dx
- Annual medical costs $$$

Im Y, Henkle E, Choi H. Epidemiology of bronchiectasis. In: Chalmers JD, Shoemark A, Aliberti S, eds. Bronchiectasis (ERS Monograph). Sheffield, European Respiratory Society, 2026; pp. 13–28 [https://doi.org/10.1183/2312508X.10001025].
Weycker, D, Hansen GL, Seifer FD. Prevalence and incidence of noncystic fibrosis bronchiectasis among US adults in 2013. *Chronic Respiratory Disease*. 2017; 14(4):377-384, doi:10.1177/1479972317709649

Bronchiectasis-COPD Overlap

- Separate diseases with shared mechanisms
- 35-69% of COPD patients experience BE overlap
- Prevalence of BE correlates to severity of COPD
- 55% 5-year mortality rate
  - 3x higher than BE alone

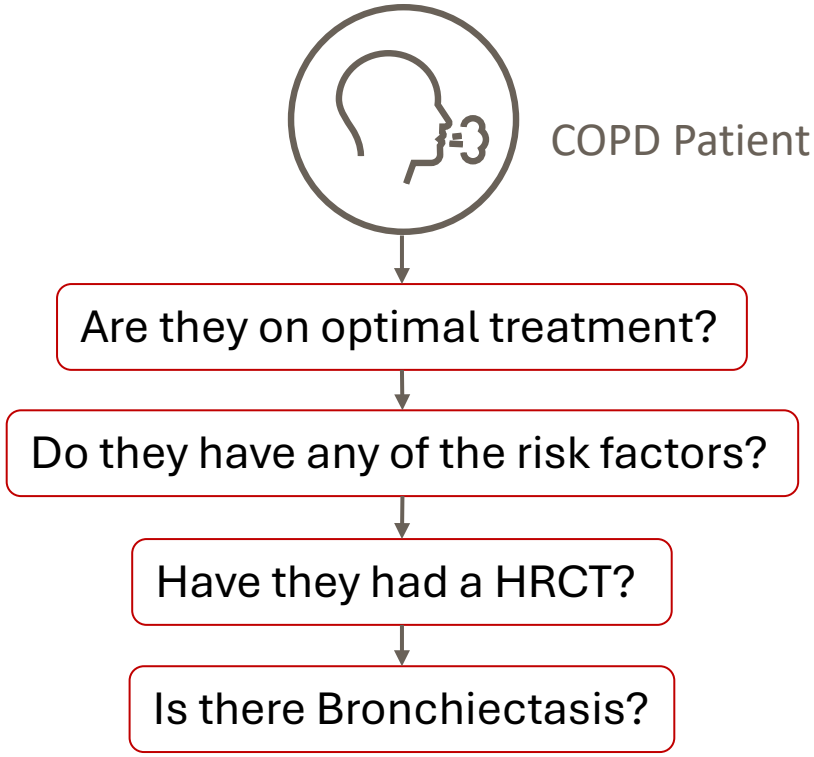


Martinez-Garcia, MA., et al. Bronchial infection and temporal evolution of bronchiectasis in patients with chronic obstructive pulmonary disease. *Infectious Diseases Society of America,* 2021;72(3):403-10. DOI: 10.1093/cid/ciaa069
Oscullo, G., & Martinez-Garcia, MA. The true history of COPD-bronchiectasis overlap syndrome. *Respiratory Investigation.* 2025;63(6):1201-1203. https://doi.org:10.1016/j.resinv.2025.09.021

Bronchiectasis-COPD Overlap

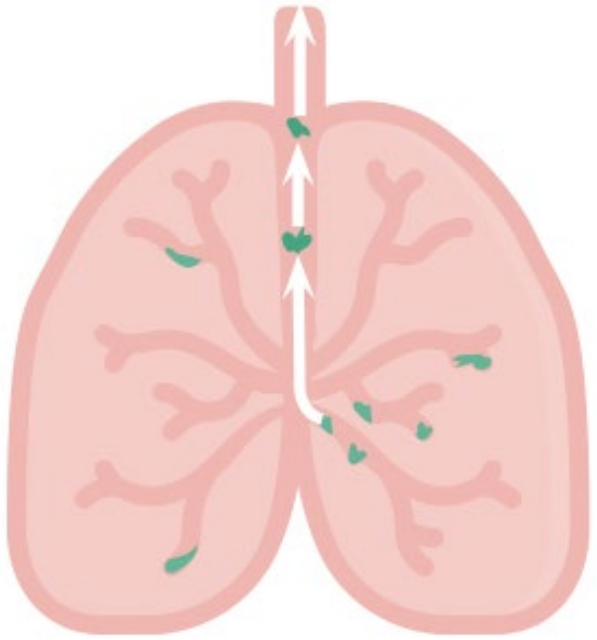
Disease Severity Risk Factors

- ❑ Dyspnea
- ❑ Chronic mucopurulent sputum
- ❑ *Pseudomonas aeruginosa*
- ❑ Hemoptysis
- ❑ Hospitalizations
- ❑ Exacerbations
- ❑ Macrolide treatment



Martinez-Garcia, MA., et al. Bronchial infection and temporal evolution of bronchiectasis in patients with chronic obstructive pulmonary disease. *Infectious Diseases Society of America,* 2021;72(3):403-10. DOI: 10.1093/cid/ciaa069
Oscullo, G., & Martinez-Garcia, MA. The true history of COPD-bronchiectasis overlap syndrome. *Respiratory Investigation.* 2025;63(6):1201-1203. https://doi.org:10.1016/j.resinv.2025.09.021

Bronchiectasis-Asthma Overlap

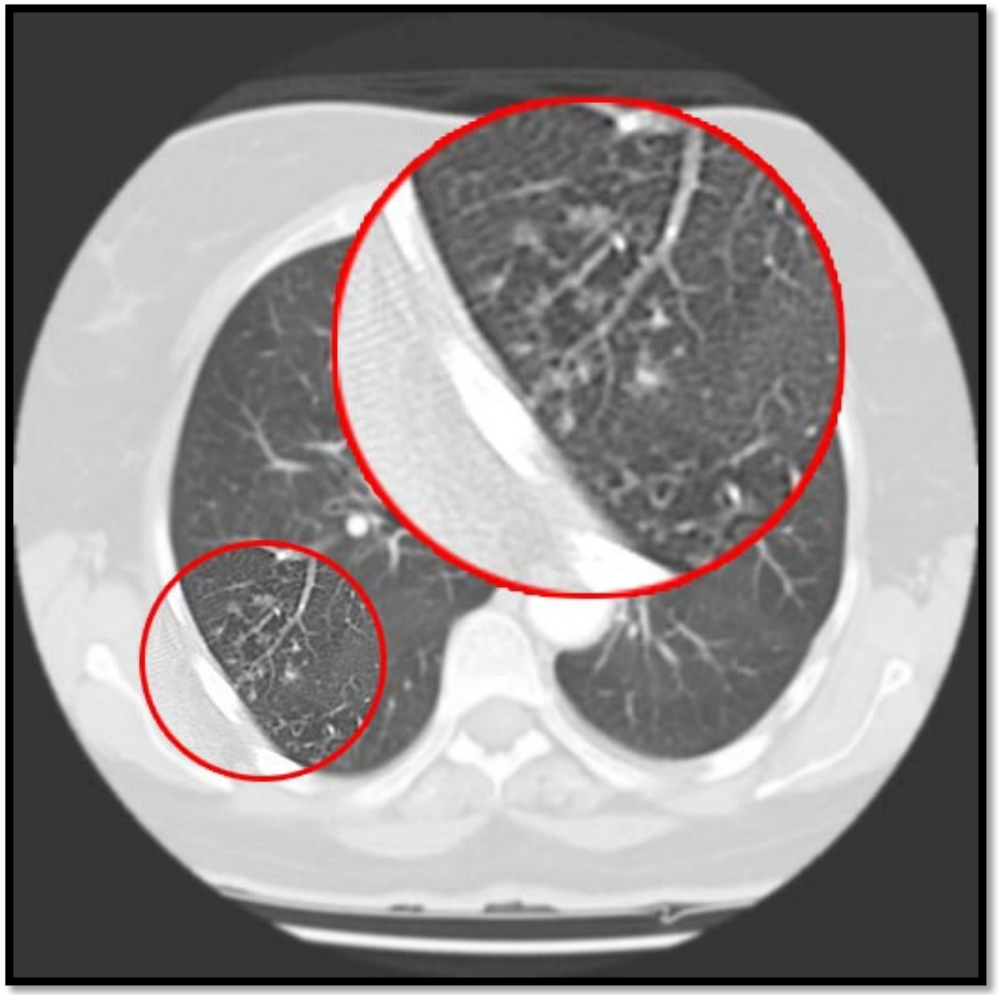


- Up to 50% of refractory asthmatics have bronchiectasis
- Increased risk of exacerbations, infections, & hospitalizations
- Phenotypes
  - Asthma-dominant
  - BE-dominant
  - Advanced BE w/ severe asthma
- Mucus plugging
  - Increased prevalence of pathogens, such as *Pseudomonas aeruginosa*
  - Increased fungal sensitivity, such as to *Aspergillus fumigatus*

Fouka E, Polverino E, Lindén A, *et al.* COPD, asthma and bronchiectasis overlap. *In:* Chalmers JD, Shoemark A, Aliberti S, eds. Bronchiectasis (ERS Monograph). Sheffield, European Respiratory Society, 2026; pp. 159–178 [https://doi.org/10.1183/2312508X.10001925].
Lin, Z., Pan, C., He J., et al. The Phenotypes of Asthma-Bronchiectasis Overlap: Clinical Characteristics and Outcomes. *Allergy Asthma Immunol Res.* 2025 Mar;17(2):196-211. https://doi.org/10.4168/aair.2025.17.2.196

Nontuberculous Mycobacteria

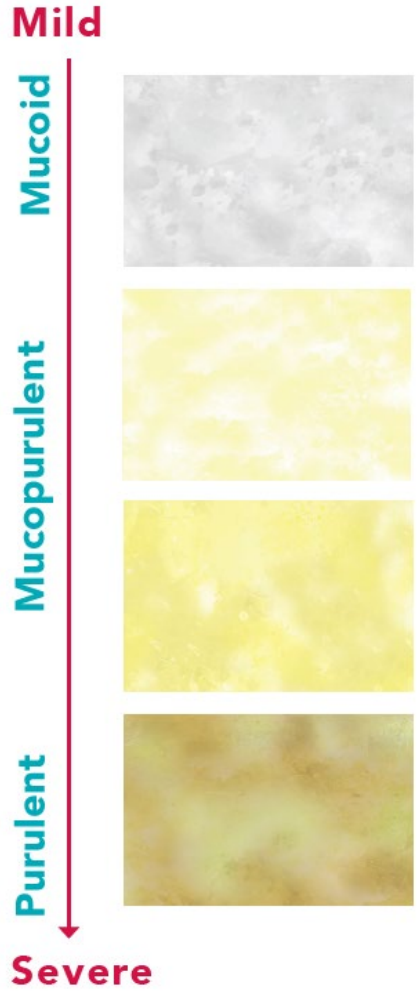
- Can cause or worsen bronchiectasis
- Naturally occurring in water and soil
- 200 NTM species
  - MAC is most common (tree-in-bud)
- Symptoms:
  - Cough; hemoptysis
  - Fever & night sweats
  - Loss of weight & appetite
  - Fatigue
  - Shortness of breath



https://www.cdc.gov/nontuberculous-mycobacteria/about/index.html
Kumar K, Loebinger MR. Nontuberculous mycobacterial infections and bronchiectasis. *In:* Chalmers JD, Shoemark A, Aliberti S, eds. Bronchiectasis (ERS Monograph). Sheffield, European Respiratory Society, 2026; pp. 179–194 [https://doi.org/10.1183/2312508X.10002025]

Sputum

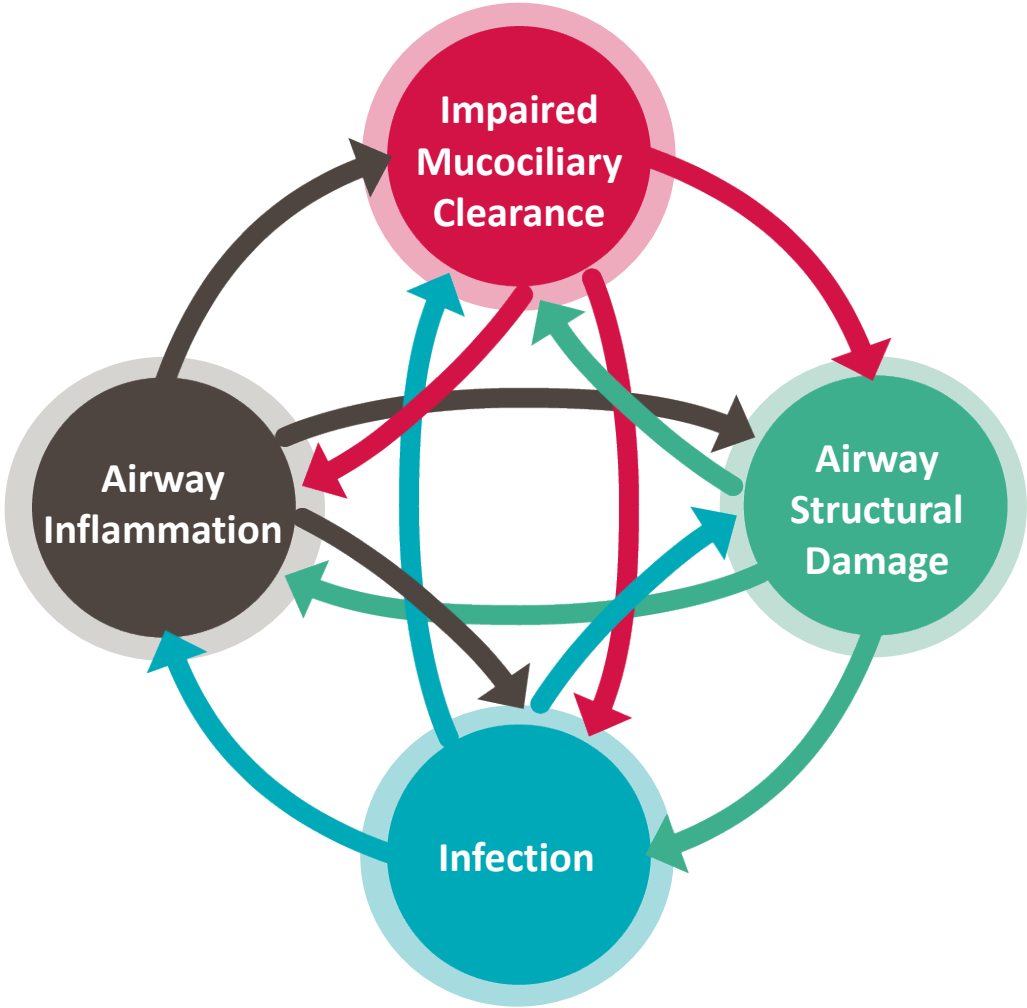
- **Mucus Plugging**
  - Plugging can occur in airways before they become bronchiectatic
- **Sputum Cultures**
  - *Pseudomonas aeruginosa*
  - Nontuberculous Mycobacteria
- **Sputum Color**
  - Purulent sputum is associated with increased exacerbations
  - Purulent sputum is associated with a greater risk of hospitalizations and mortality



Aliberti, S., et al. Objective sputum colour assessment and clinical outcomes in bronchiectasis: data from the European Bronchiectasis Registry (EMBARC). European Respiratory Journal (2024), 63(4):2301554; https://doi.org/10.1183/13993003.01554-2023
Im, Y., et al. Disease severity and activity in bronchiectasis: A paradigm shift in bronchiectasis management. Tuberculosis and Respiratory Diseases. (2024); 88(1):109-119. https://doi.org/10.4046./trd.2024.0120

Treatment

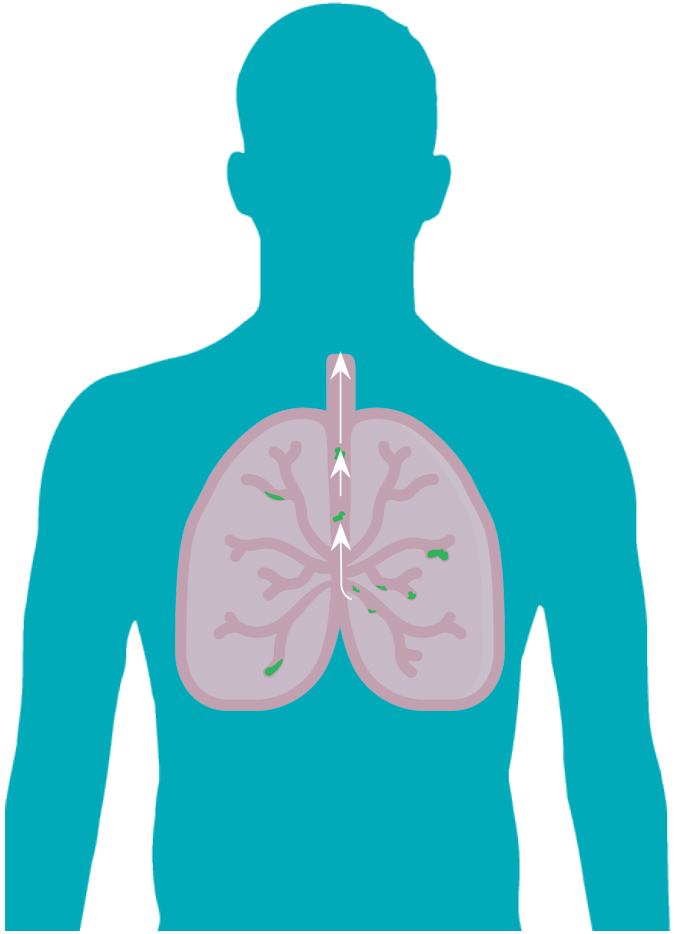
- **Airway Clearance is mainstay treatment**
  - Airway clearance therapies
  - Mucoactive drugs
- **Pulmonary rehab**
  - Exercise & education
- **Antibiotics**
  - Oral, inhaled, IV
- **Anti-inflammatory medications**
  - Macrolides, DPP1-inhibitor



Chalmers JD, Haworth CS, Flume P, et al. European Respiratory Society clinical practice guideline for the management of adult bronchiectasis. Eur Respir J 2025; 66: 2501126 [DOI: 10.1183/13993003.01126-2025].

03 Airway Clearance Therapy

Airway Clearance



Airway Clearance Therapy

is a mainstay bronchiectasis treatment

Goals of Airway Clearance Therapy

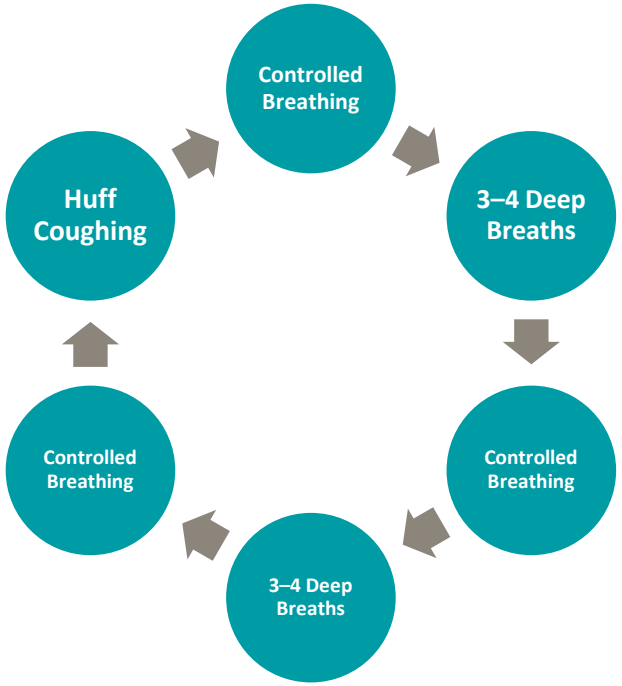
- Decrease symptom burden
- Reduce exacerbations
- Preserve lung function
- Improve quality of life

McShane, PJ, & Tino, G. Bronchiectasis. CHEST. 2019 Apr; 155(4):825-833. doi: 10.1016/j.chest.2018.10.027. Epub Nov4

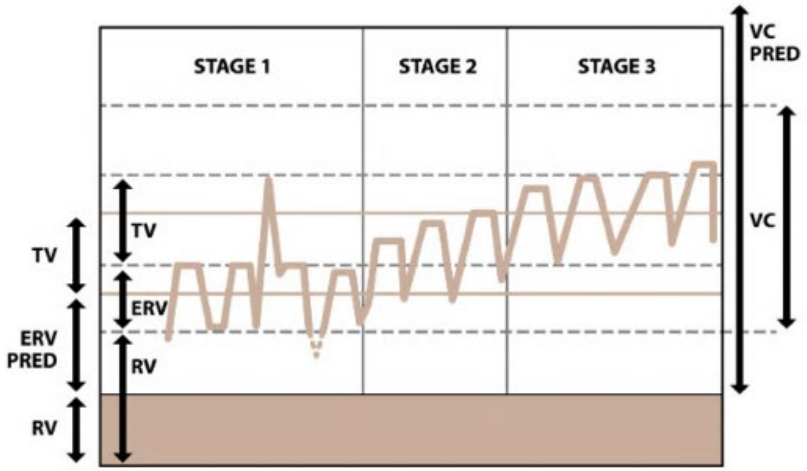
Breathing Exercises

Huff Cough

Active Cycle of Breathing



Autogenic Drainage

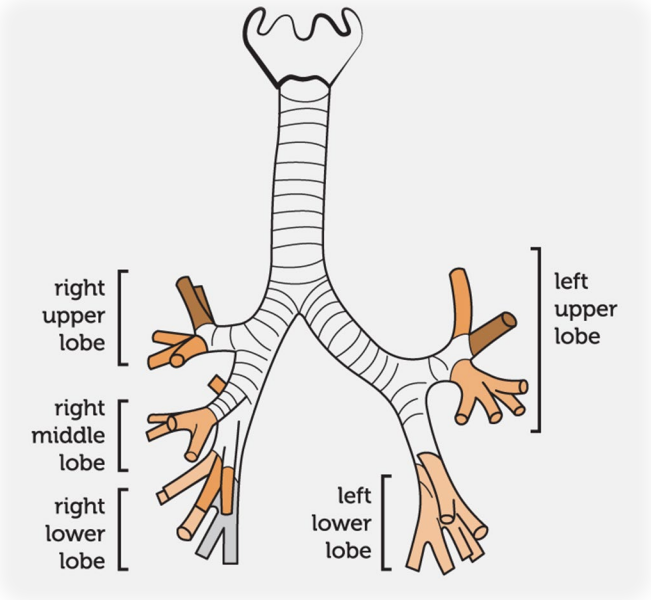


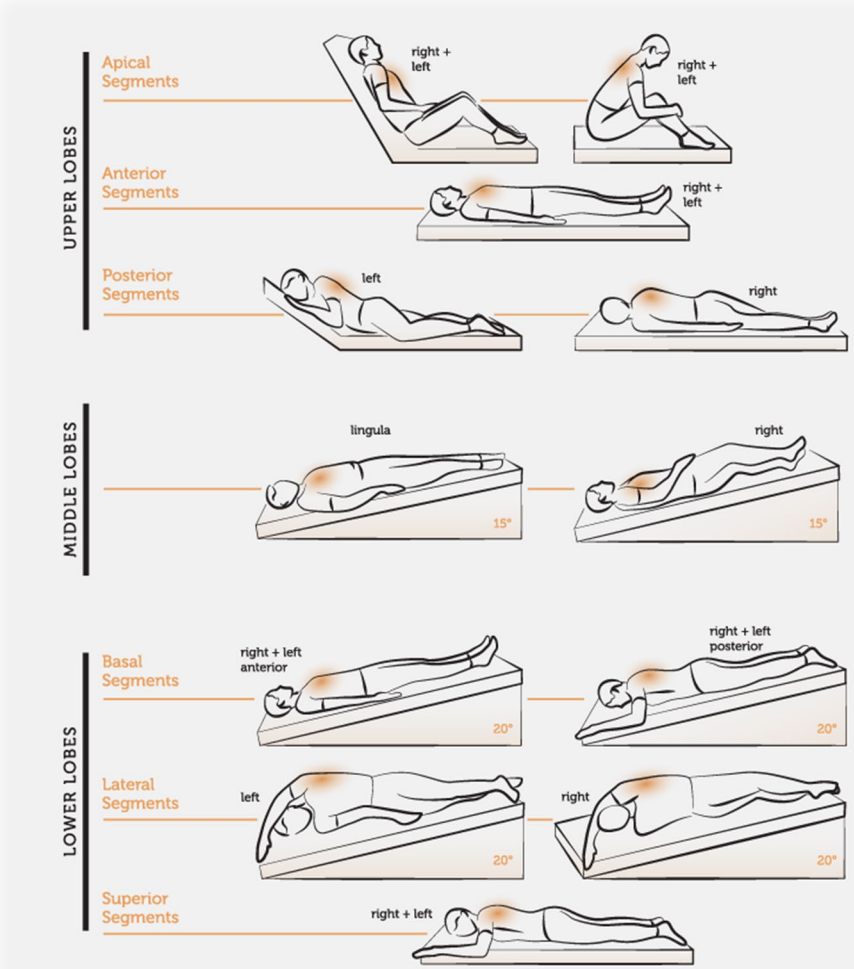
Stage 1: Small Peripheral Airways
Stage 2: Medium Airways
Stage 3: Large Central Airways

https://bronchiectasis.com.au/physiotherapy/techniques/the-active-cycle-of-breathing-technique
https://www.bronchiectasisandntminitiative.org/Learn-More/I-am-a-Patient-or-Caregiver/Coping-with-Airway-Mucus/Manual-Airway-Clearance-Techniques

Manual Therapies

- Chest physical therapy
- Postural drainage





https://bronchiectasis.com.au/physiotherapy/techniques/the-active-cycle-of-breathing-technique
https://www.bronchiectasisandntminitiative.org/Learn-More/I-am-a-Patient-or-Caregiver/Coping-with-Airway-Mucus/Manual-Airway-Clearance-Techniques

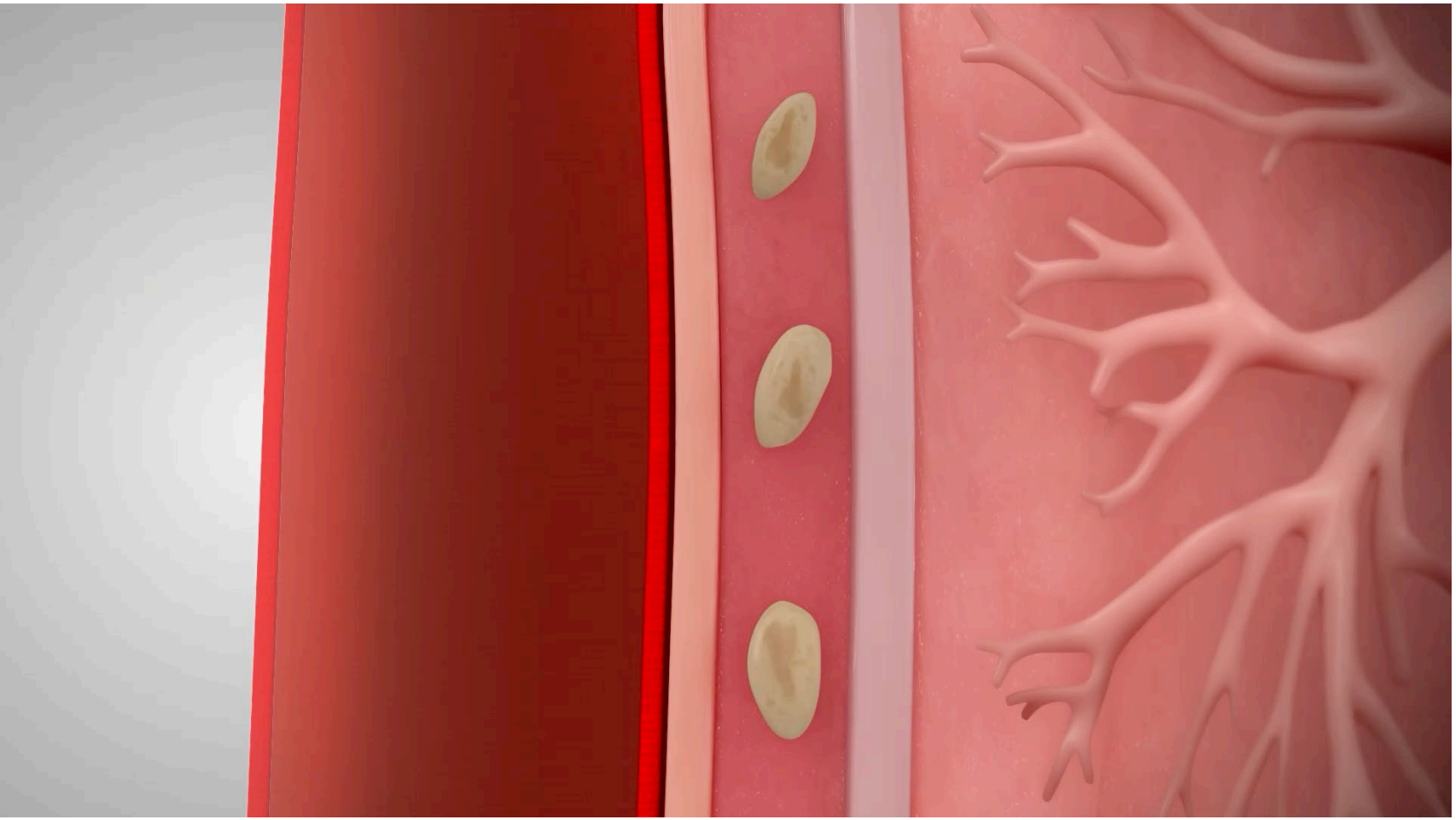
Device Therapies

OSCILLATING POSITIVE EXPIRATORY PRESSURE (OPEP)

OSCILLATION LUNG EXPANSION (OLE)

HIGH FREQUENCY CHEST WALL OSCILLATION (HFCWO)

High Frequency Chest Wall Oscillation



- **SHEERS** mucus from the walls of the airway.
- **THINS** secretions, by reducing viscosity
- **PROPELS** mucus towards the larger airways.

Sievert CE, et al. 2016. Using high frequency chest wall oscillation in a bronchiectasis patient population: An outcomes-based case review. Respiratory Therapy, 11(4), 34-38.

HFCWO Data from the Bronchiectasis Research Registry

Why didn't we receive HFCWO?

AIM 1 (HFCWO) Total Participants n=5673

AIM 1 (%)	Prescribed HFCWO n =518	Not Prescribed HFCWO n=5155
Asthma	31.7	25.3
COPD†	17.0	16.3
Dyspnea	72.1	38.5
Fatigue	61.5	46.8
Cough	90.9	76.6
P. aeruginosa	34.5	22.0

†not significant; all others p<0.002

9% At baseline** evaluation, only **9% of BE** patients were prescribed HFCWO for airway clearance.

AIM 2 (No HFCWO) Total Participants n=4679

AIM 2 (%)	Met CMS Criteria* n=2703	Did Not Meet CMS Criteria n=1976
Asthma	28.0	21.3
COPD	18.4	13.5
Dyspnea	45.7	31.3
Fatigue	52.4	38.7
Cough	97.3	46.1
P. aeruginosa	27.0	13.2

all comparisons p<0.001

58% **2703/4679** of qualifying patients did not receive HFCWO therapy but met the CMS criteria at baseline.

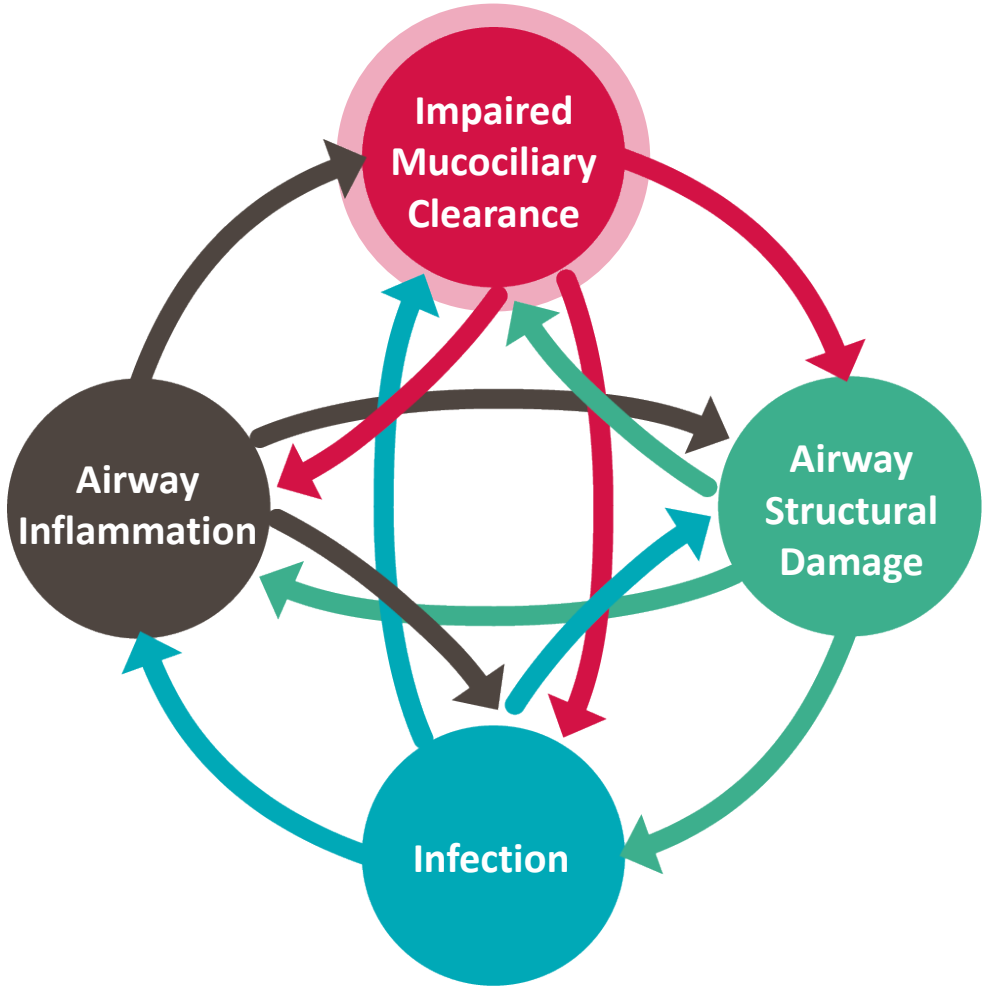
AIM 3

13% of patients **not prescribed HFCWO at baseline later received it**—and were found to be more clinically unstable, with higher rates of exacerbations, hospitalizations, and antibiotic use.[1]

- **58%** of patients without HFCWO met clinical criteria
- Patients who qualified for HFCWO were sicker
- **What's the gap?**

Feir, C., et al. *Pulmonary Medicine,* 2026, 6884898, 69-70, 2026. https://doi.org/10.1155/pm.6884898

Airway Clearance Selection



- Coordination
- Expiratory flow/strength
- Understanding/cognition
- Dependent vs independent
- Tolerance
- Preference

Call to Action

- **What to look for…**
  - Chronic productive cough
  - Frequent exacerbations
  - Co-morbidities
- **What does the HRCT show?**
- **What does the Sputum show?**
- **Airway Clearance Management**
  - Decrease exacerbations
  - Preserve lung function
  - Improve quality of life

Summary

- > 4 million adults with undiagnosed bronchiectasis in the United States
- Bronchiectasis commonly co-exists with COPD, asthma, and NTM
- Airway Clearance Therapy is the cornerstone of bronchiectasis treatment

Resources

Bronchiectasis & NTM ASSOCIATION

bronchiectasisandntminitiative.org

WORLD BRONCHIECTASIS DAY JULY 1ST

worldbronchiectasisday.org

NTMir Nontuberculous Mycobacteria Info & Research

ntminfo.org

Thank You!

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Q&A