

Elevating Awareness of Bronchiectasis: Comprehensive Strategies for Diagnosis, Management, and Treatment

Presented by:
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Alyssa Dittner, BSRT, RRT, PDE, TTS



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****This presentation was created to inform and educate respiratory therapists.****

Disclosure

(TR Aksamit)

Relevant Financial Relationship(s)

None

Director: Bronchiectasis and NTM Association

Past-chair: U.S. Bronchiectasis Research Registry

Research clinical study activity:

- U.S. Bronchiectasis Research Registry
- Bayer, Cipro DPI, Global PI
- Aradigm/Grifols, Cipro liposomal
- Insmed, inhaled liposomal amikacin, brensocatic
- BI, BI1291583
- Verona, ensifentrine
- Zambon, inhaled colistin
- AztraZeneca, benralizumab
- Armata, AP-PA02 phage
- Spero, SPR720
- Electromed, HillRom, RespiTech

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Objective - Bronchiectasis

- Understand the pathophysiology, epidemiology, and signs and symptoms
- Diagnosis and treatment options
- Bronchiectasis is not COPD or asthma
- Identify strategies for patient education and support
- Increased awareness including World Bronchiectasis Day
- Summary and Q&A

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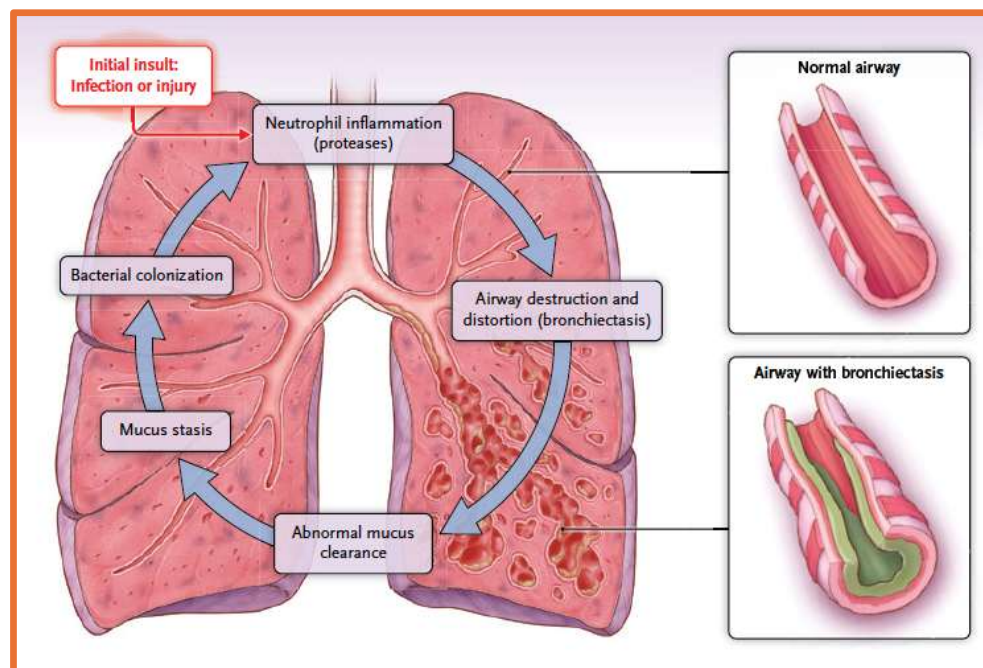
What is Bronchiectasis?

Bronchiectasis:

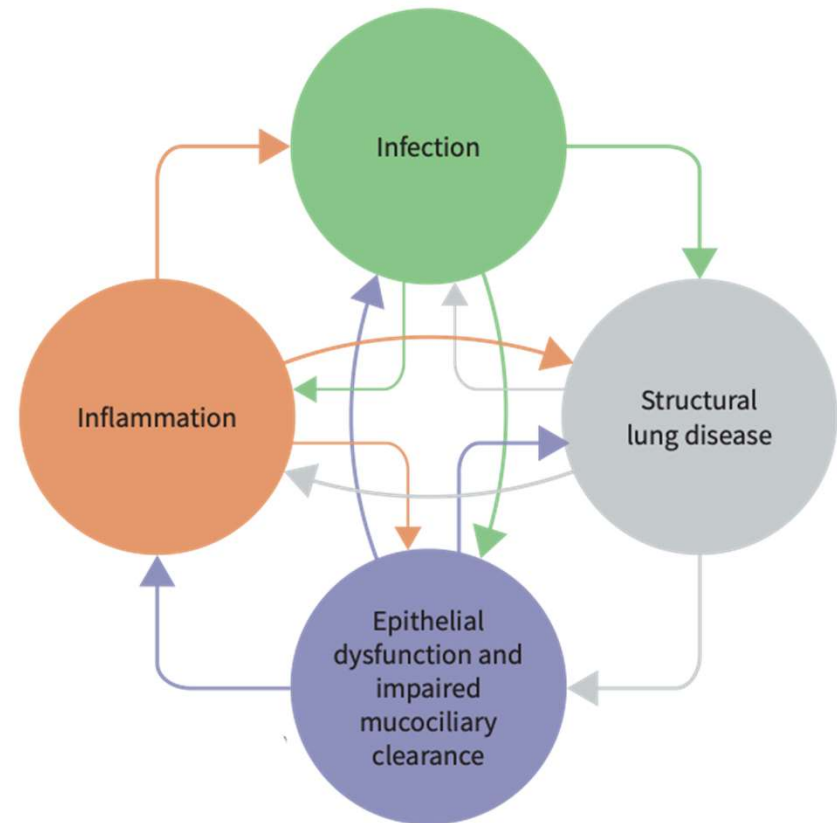
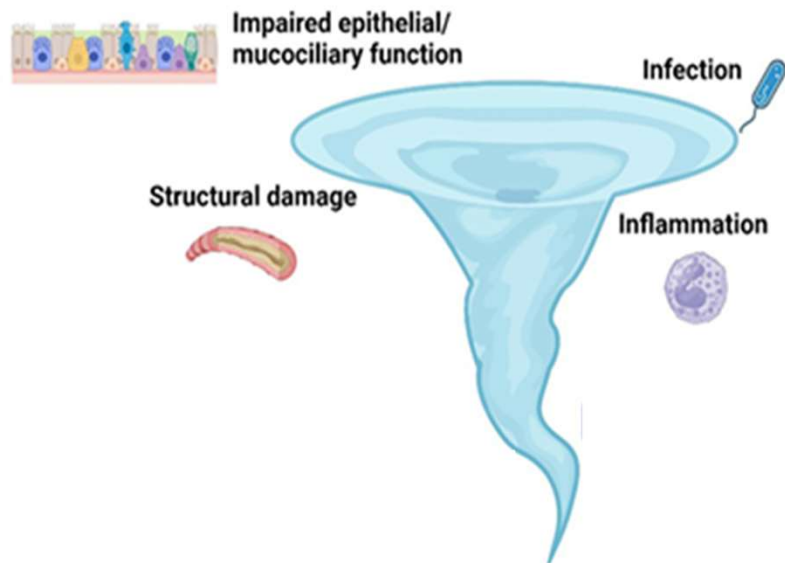
- Infection
- Inflammation
 - Neutrophilic predominant
 - Limited eosinophilic, 20%
- Epithelial dysfunction and impaired mucociliary clearance
- Structural disease
 - Bronchial dilatation
 - Bronchial wall thickening
 - Mucous plugging

Etymology: Greek, bronchus + ektasis, stretching

Flume et al. *Lancet* 2018; 392: 880
O'Donnell AE. *N Engl J Med.* 2022;387:533.



Bronchiectasis Pathogenesis



Epidemiology and Burden of Disease - Bronchiectasis

- An estimated 350,000 to 500,000 adults are affected by bronchiectasis in the United States.
- Increases 8% per year
- More common in women than men
- The prevalence increases significantly with age:
 - Ages 60 and older: 300 to 500 per 100,000.
 - Ages under 40-50: 40 to 50 per 100,000.

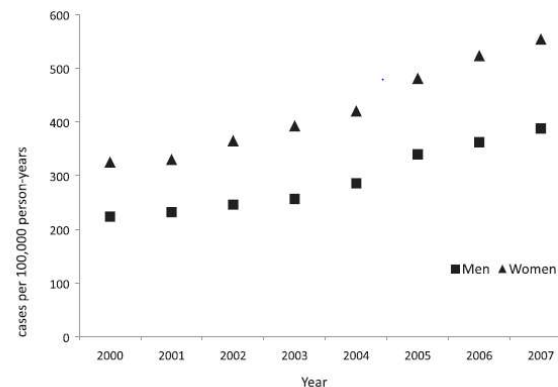


FIGURE 4. Trend in annual prevalence of bronchiectasis by sex.

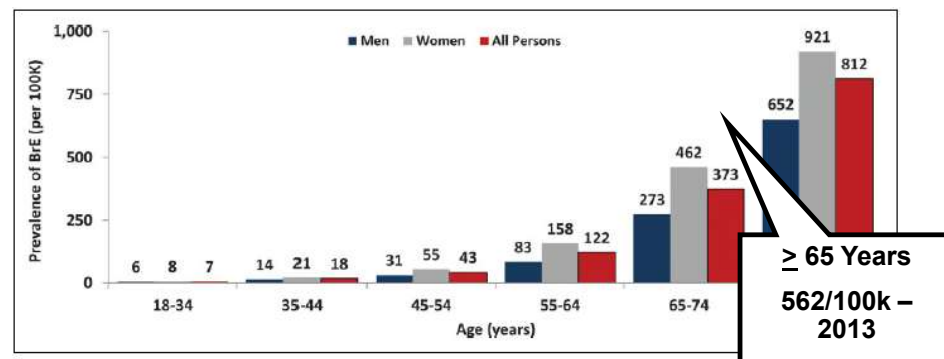


Figure 2. Prevalence of bronchiectasis among US adults, by age and sex.

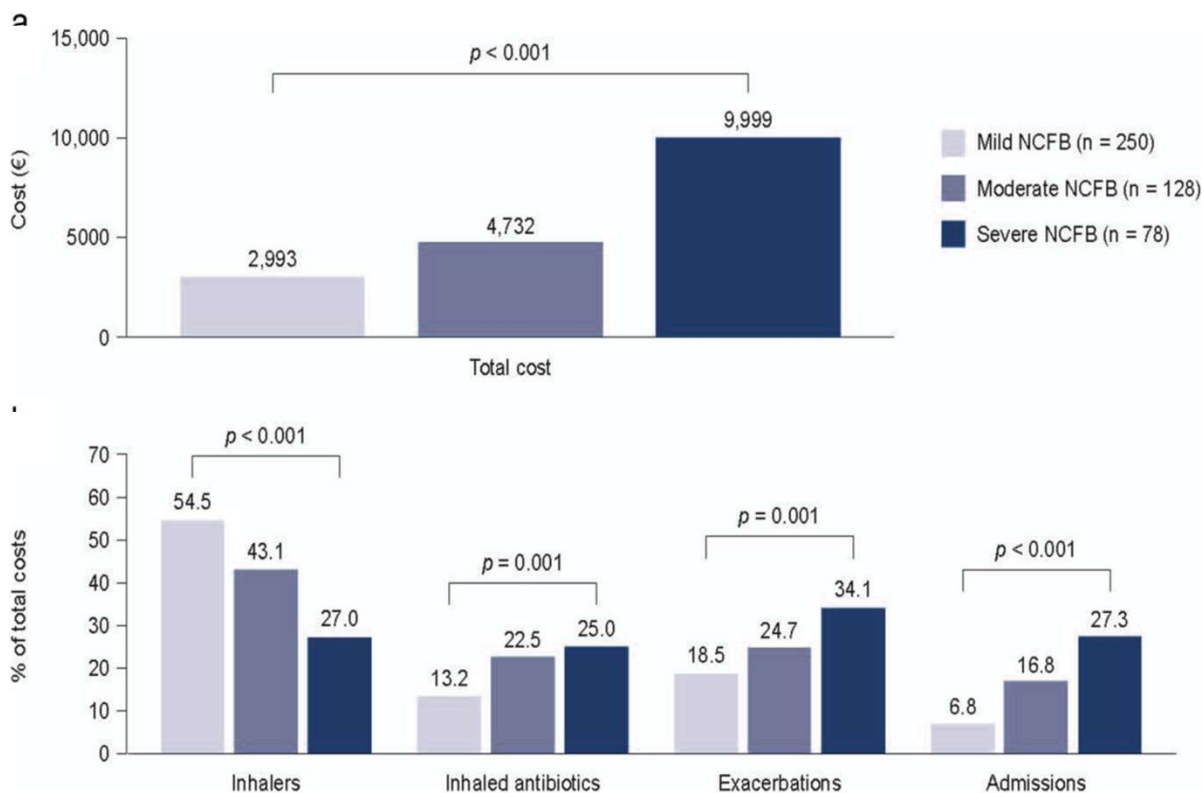
Seitz AE, et al. *Chest*. 2012;142:432.

Weycker D, et al. *Chron Respir Dis*. 2017;14:377.

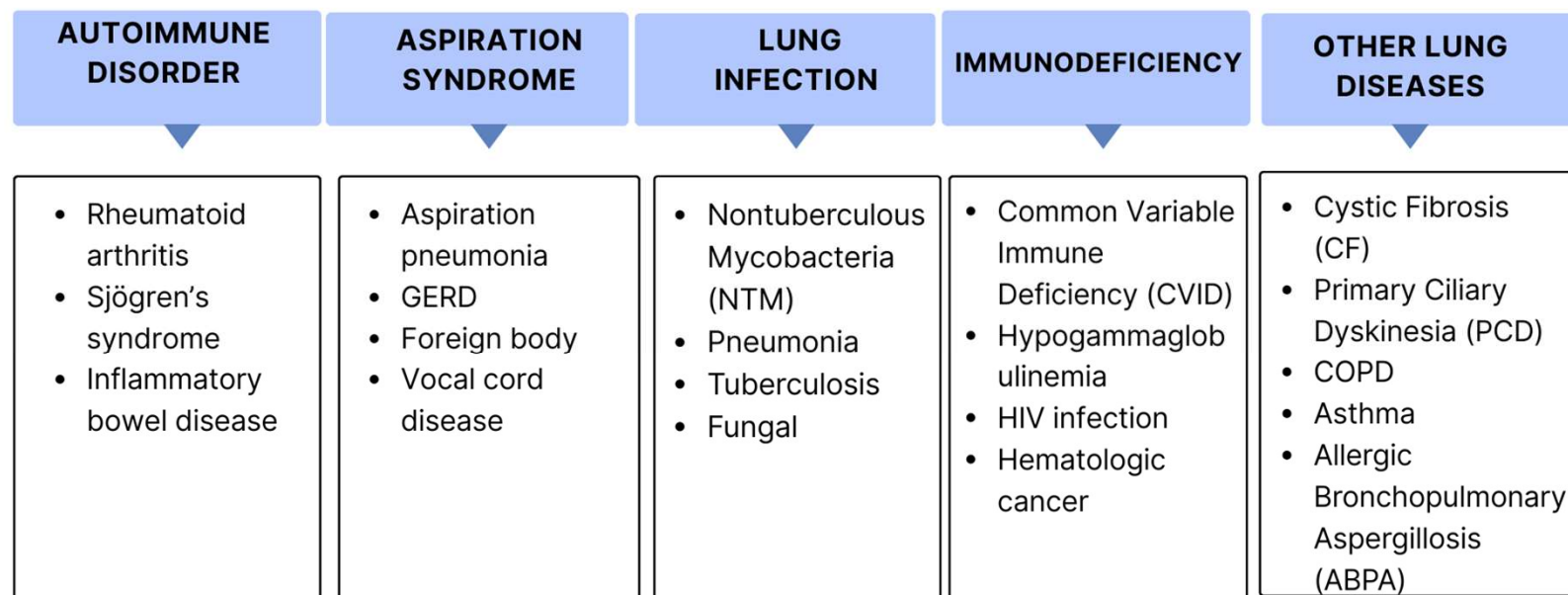
Epidemiology and Burden of Disease - Bronchiectasis

Management Costs of BE

- Two US studies reported total annual costs of approximately US\$26,000 in patients without exacerbations, increasing to US\$36,000–37,000 in patients with exacerbations.
- P. aeruginosa* infection increased management costs by US\$31,551 to US\$56,499, as reported in two US studies, with hospitalization being the main cost driver.

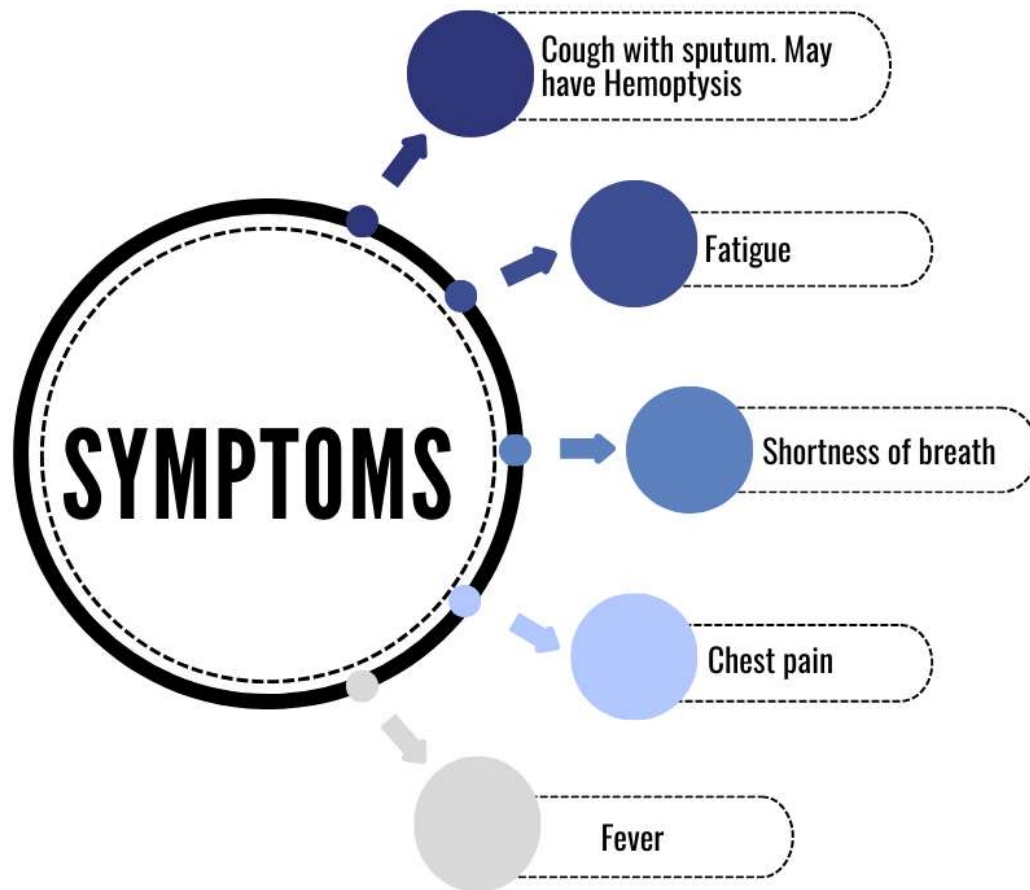


Causes Associated with Bronchiectasis



*Idiopathic remains a common cause of bronchiectasis

Signs and Symptoms - Bronchiectasis



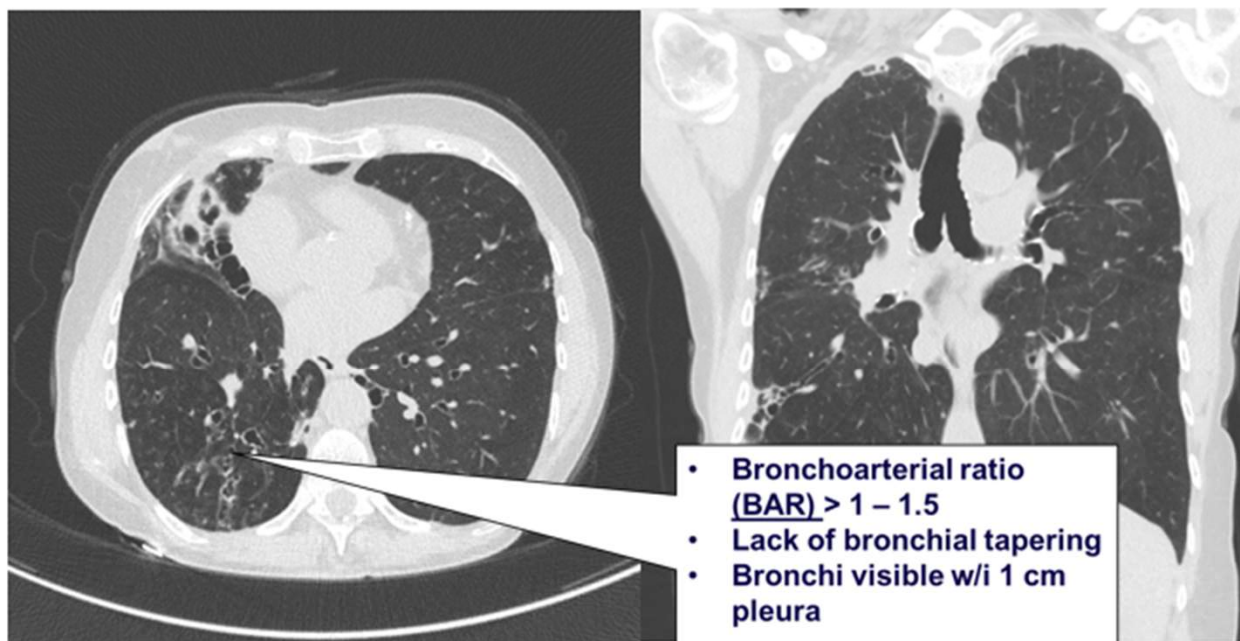
When to Suspect Bronchiectasis

- Chronic cough with sputum production
- Frequent respiratory infections

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High Resolution Computed Tomography (HRCT)



- Bronchoarterial ratio (**BAR**) $> 1 - 1.5$
- Lack of bronchial tapering
- Bronchi visible w/i 1 cm pleura
- Bronchial wall thickening
- Mucous plugging



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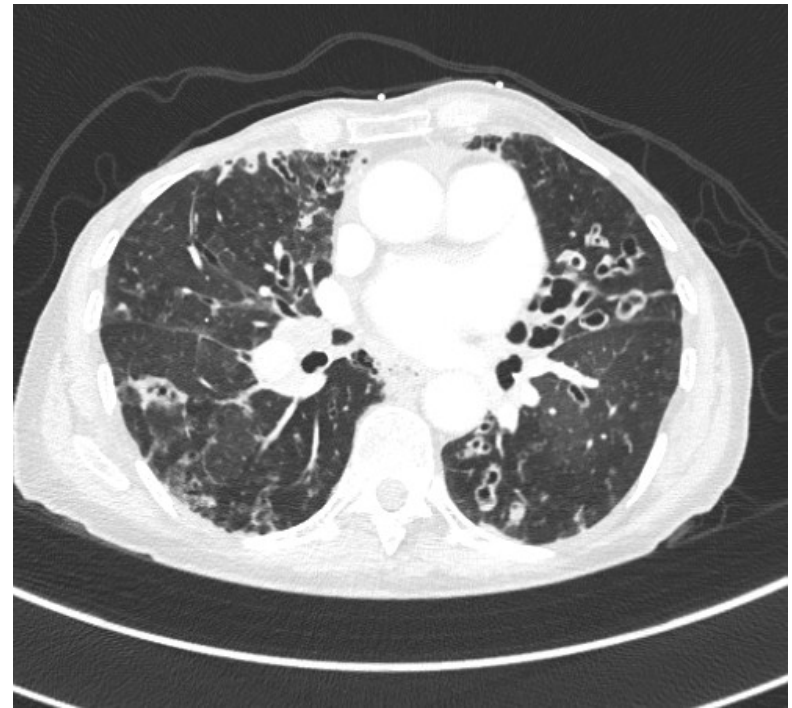
High Resolution Computed Tomography (HRCT)

Spectrum of Disease Varies

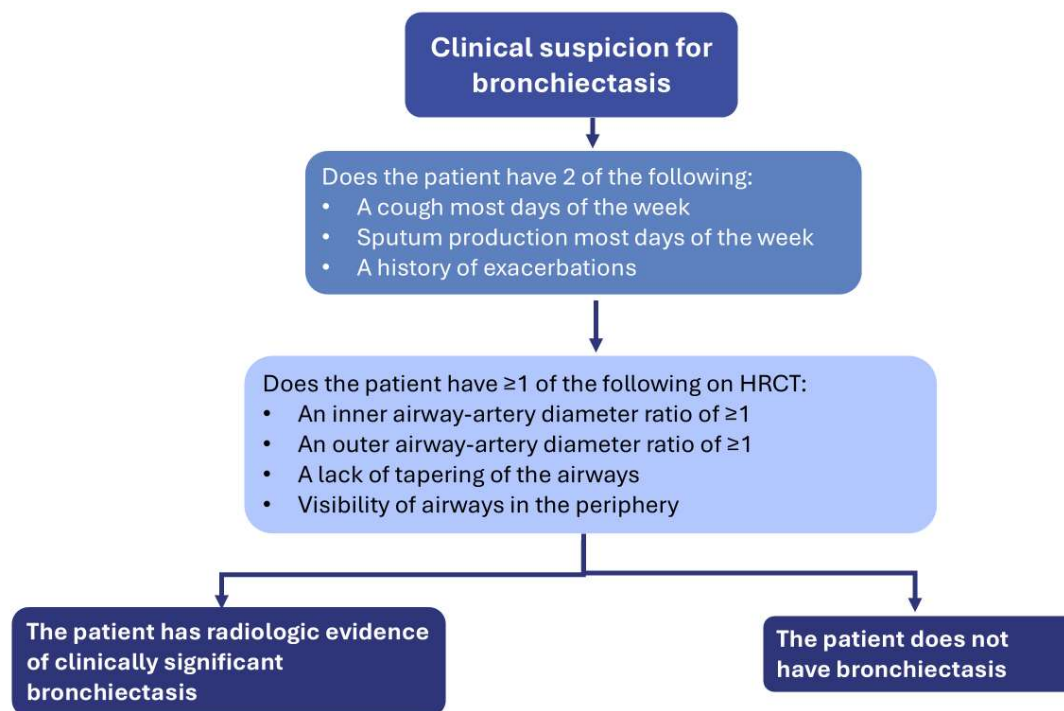
Patient 1



Patient 2



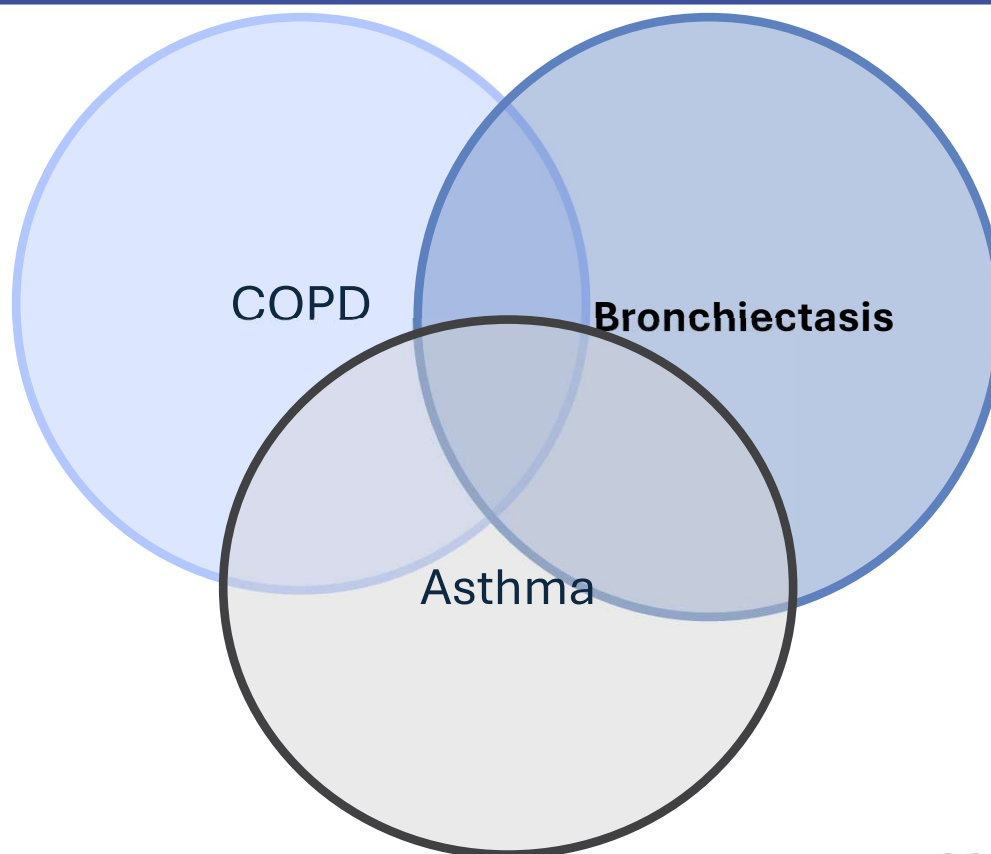
Clinical Suspicion for Bronchiectasis



Bronchiectasis-COPD-Asthma Overlap Syndrome

Bronchiectasis does NOT equal COPD

Bronchiectasis-COPD-Asthma Overlap Syndrome



****These conditions should be managed based on specific diagnoses***

Martinez-Garcia MA, et al. *CHEST*. 2018;154: 737

Polverino E, et al. *Eur Respir J*. 2018; 52: 1800328

Chalmers JD. *CHEST*. 151; 2017: 1204



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Case Study

78y.o. female previous (39 years) 10-15 pack year smoker with 3 weeks of increased cough, sputum, fatigue, and dyspnea.

Carried diagnosis of COPD for almost 5 years

•**PHx:** autoimmune hepatitis (on azathioprine), portal HTN, thrombocytopenia, rhinosinusitis, osteopenia, GERD

•**Exam:** VSS, BMI 17

•Anicteric

•Lungs: Pectus but no wheezes, rhonchi, rales, rubs, or consolidative change

•Ext: No C, C, E

•**Labs:** Hg: 12, plt: 84, WBC: 5.0

•Sodium: 140, potassium: 4.1, Cr: 0.38, ALT: 16, alk phos: 126



Case Study

Exacerbations: 4 in past year

IgG: 659 mg/dl (767-1590) IgM: 7 mg/dl (37-286) IGA: < 1 mg/dl (61-356)

Normal alpha-1-antitrypsin, IgE, and normal sweat chloride 25, 21

Sputum: Moraxella Catarrhalis - course of Augmentin (amoxicillin-clavulanate) given

Case Study

Spirometry

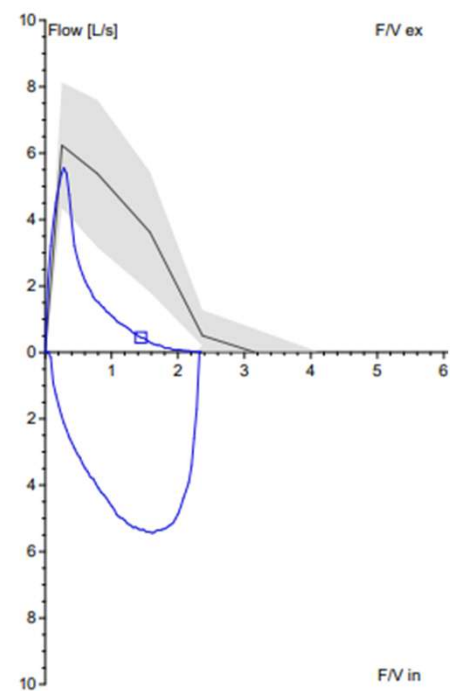
		Pred	LLN	Pre	Pre%Pred	PreZ-score	PreZ-score 5 4 3 2 1 Pred 2 3
FVC	L	3.15	2.24	2.37	75 %	-1.40	3
FEV 1	L	2.43	1.70	1.44	59 %	-2.20	2
FEV1/FVC	%	78.2	65.4	60.7	78 %	-2.16	2
FEF 25-75%	L/s	1.93	0.89	0.60	31 %	-2.30	2
PEF	L/s	6.2	4.3	5.6	89 %	-0.59	3
PIF	L/s	4.8	2.4	5.5	114 %	0.05	4
FIVC	L	3.15	2.24	2.24	71 %	-1.63	3
MEF 50 % MIF 50%				16			
FET	sec			15.26			

DLCO

		Pred	LLN	Pre	Pre%Pred	PreZ-Score	PreZ-Score 5 4 3 2 1 Pred 2 3
DLCO_SB	ml/(min*mmHg)	20.6	15.5	17.3	84 %	-1.03	3
VA_SB (B)	L	5.10	4.08	3.93	77 %	-1.91	2
KCO	ml/(min*mmHg*L)	4.02	3.07	4.42	110 %	0.64	4

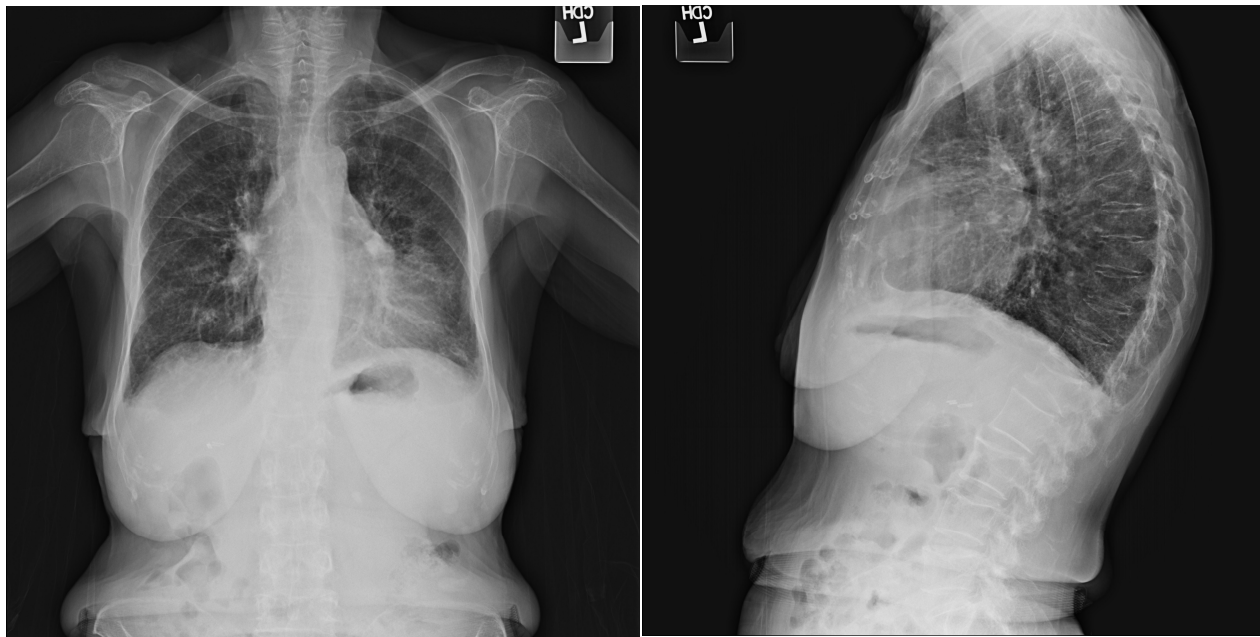
PULSE OXIMETRY (LLN: 93)

	Pre
Resting O2	97
Resting Pulse	60
Exercise O2	97
Exercise Pulse	116
Exercise Time	3:00
Step Height (5 or 9 inches)	9

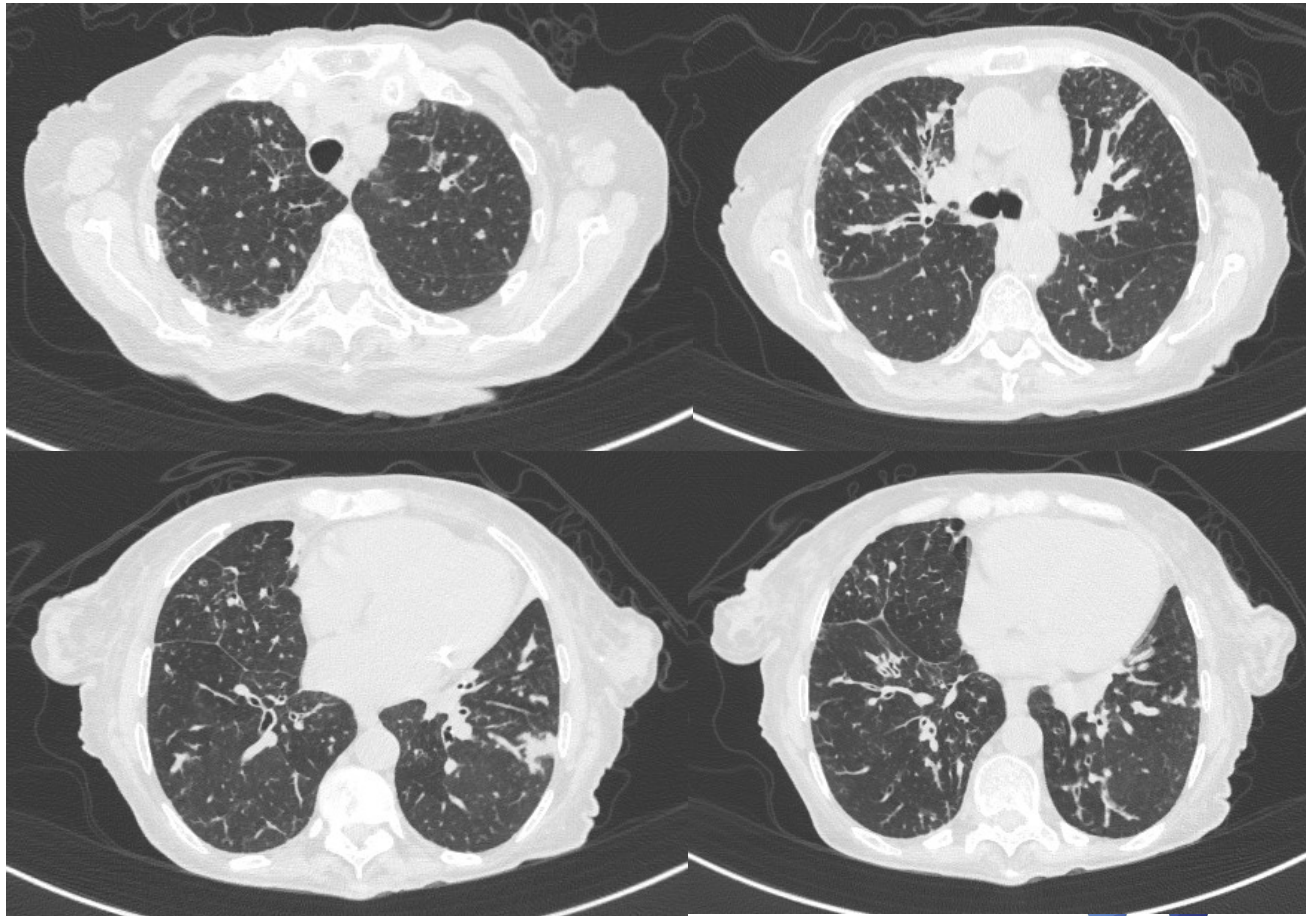


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Case Study



Case Study



Case Study

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Sputum: Moraxella Catarrhalis

Airway clearance: Aerobic activity, active clearance therapy, nebulized albuterol, 3% (7% not tolerated), Aerobika (PEP valve) BID, but no vest (rib fx)

GERD: Followed Hepatology/esophageal clinic
PPI and reflux precautions

Rhinosinusitis: Followed by ENT (rhinology) s/p surgery
BID mometasone and Cipro saline rinses

Immunology: IVIG replacement

Case Study

Exacerbations: NONE going on 18 months

Clinical Suspicion for Bronchiectasis

Know your patient: Who/when to ask questions about whether bronchiectasis may be present:

Avoid delay in diagnosis

- Chronic productive cough
- Frequent antibiotic use for respiratory infections (≥ 2 per year)
- Isolation of pseudomonas or nontuberculous mycobacteria (NTM, e.g. MAC) in sputum
- Refractory symptoms when diagnosis of asthma, COPD, or both present
- Hemoptysis
- Non-resolving associated (respiratory) symptoms: fatigue, weight loss

Diagnostic Methods - Bronchiectasis

Key Diagnostic Steps:

- **Medical History & Physical Examination**
- **Radiology and Imaging**
 - High-Resolution CT Scan
- **Sputum Cultures**
 - Bacterial Cultures
 - Acid-Fast Bacillus (AFB) Cultures
 - Fungal Cultures
- **Pulmonary Function Testing (PFT)**
- **Laboratory Tests**
 - Complete Blood Count (CBC) with Differential
 - Immunoglobulin Levels (Ig Levels)
 - ABPA (Allergic Bronchopulmonary Aspergillosis) Evaluation
 - Genetics: cystic fibrosis (CF), primary ciliary dyskinesia (PCD)

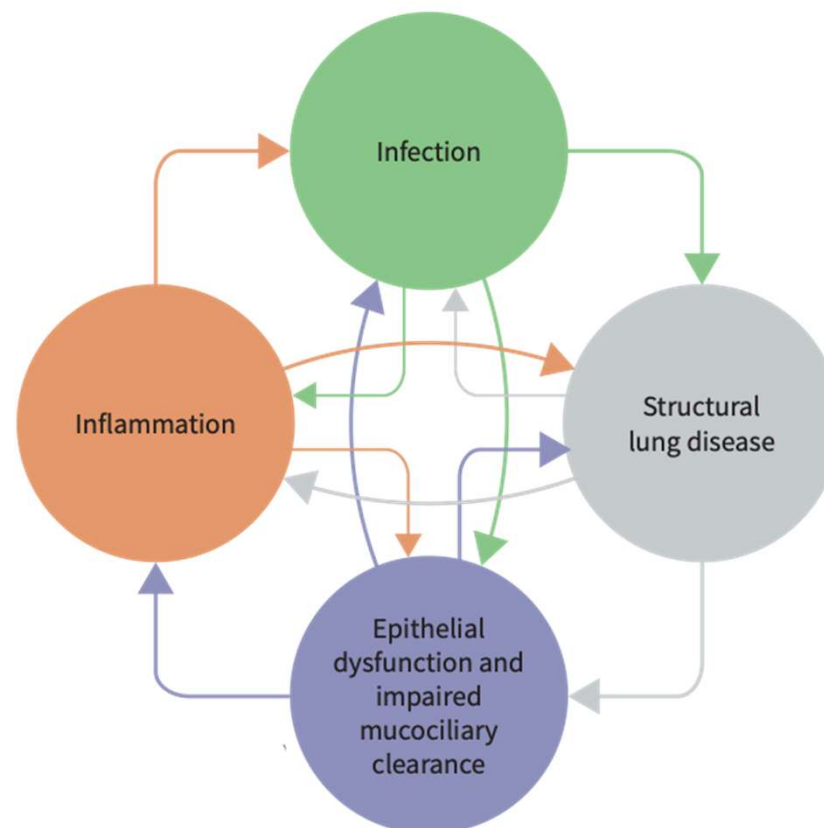
Delay in diagnosis is common.



Chessari, et al. *ERJ Open Res.* 2024;10(2):00713-2023, Hill AT, et al. *Thorax.* 2019;74(suppl 1):1-69. Polverino, et al. *Eur Respir J.* 2017;50:1700629. Martínez-García MA, et al. *Arch Bronchopneumol.* 2018;54:88-98. Chang, et al. *Eur Respir J.* 2021;58:2002990.

Treatment - Bronchiectasis

- Airway clearance
- Mucus thinning medication
- Bronchodilator
- Medication management
 - Antibiotics: oral, systemic, inhaled
 - Anti-inflammatory
- Pulmonary rehabilitation
- Treat co-morbidities/underlying disease
 - GERD, rhinosinusitis, other
 - Asthma, COPD
- Vaccination up to date
- Smoking Cessation



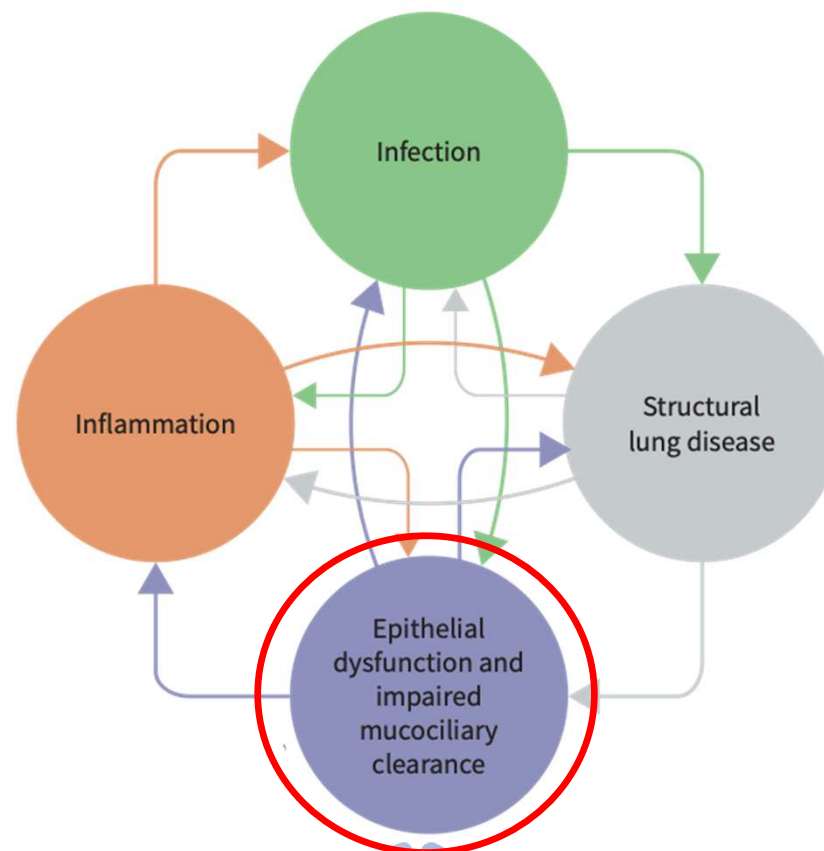
Johnson, et al. *Eur Respir Rev.* 2024;33:230234
Choi H, et al. *Eur Respir J.* 2024; 63: 2400518
Flume PA, et al. *Lancet.* 2018;392:880
Polverino E, et al. *Eur Respir J.* 2017;50:1700629



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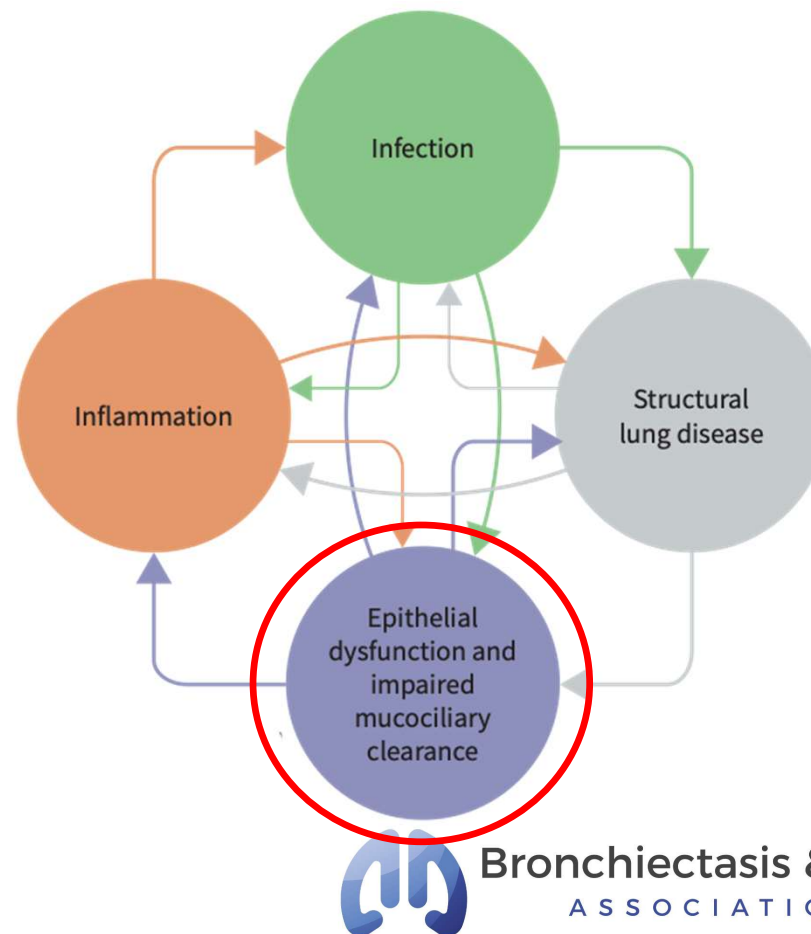


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Medication – Bronchiectasis – Mucociliary Clearance

Mucociliary Clearance:

- Nebulized Hypertonic Saline : 3% , 7%
- N-acetylcysteine (NAC) – limited
- Mannitol – not recommended
- Dornase alpha – not recommended



Johnson, et al. *Eur Respir Rev.* 2024;33:230234
Choi H, et al. *Eur Respir J.* 2024; 63: 2400518
Flume PA, et al. *Lancet.* 2018;392:880
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Hill AT et al. *Thorax.* 2019; 74:1
Martínez-García MA, et al. *Arch Bronchopneumol.* 2018;54

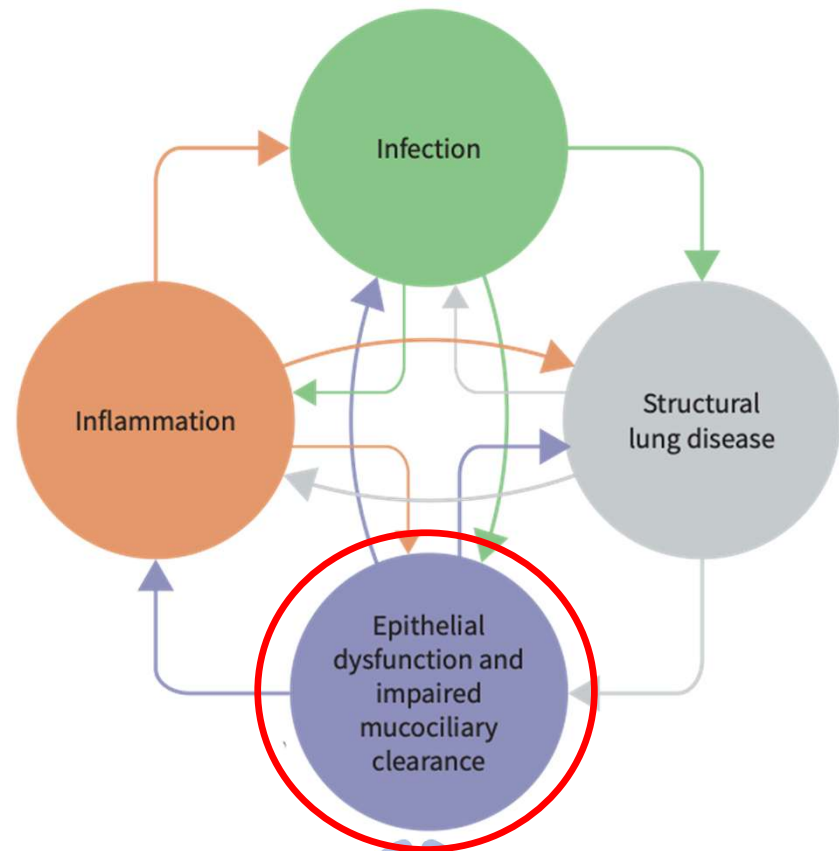


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Airway Clearance Therapy (ACT) - Bronchiectasis

Positive effects of airway clearance:

- Increase in sputum volume
- Reduced peripheral airways obstruction
- Fewer inflammatory cells in sputum
- Improved exercise capacity
- Reduced impact of cough on QoL



Johnson, et al. *Eur Respir Rev.* 2024;33:230234
Choi H, et al. *Eur Respir J.* 2024; 63: 2400518
Flume PA, et al. *Lancet.* 2018;392:880
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Breathing Techniques - Bronchiectasis

Breathing Techniques for Mucus Clearance

- [Active cycle of breathing](#): Combines breathing control, thoracic expansion exercises, and forced expirations to loosen and remove mucus.
- [Huff Cough](#): Using quick, forced exhalations to move mucus from the lower airways up to the upper airway for easier removal.
- [Autogenic drainage](#): Involves inhaling at various lung volumes and adjusting exhalation force to mobilize and move mucus effectively
- [ELTGOL](#): Focuses on controlled expiration in a lateral posture, using an open glottis to allow for slow and sustained exhalation

Spinou et al. *Eur Respir J.* 2024; 63: 2301689
Basavaraj A, et al. *Respir Med Res.* 2024; 86: 101
Herrero-Cortina B et al. *Eur Respir J.* 2023; 62: 2202053
Basavaraj A et al. *Chest.* 2020; 158: 1376

Airway Clearance Therapy (ACT) - Bronchiectasis

- OPEP (Oscillatory Positive Expiratory Pressure)
- Manual Chest Physiotherapy (CPT)
- Postural Drainage & Positioning
- VEST Therapy (HFCWO)



Spinou et al. *Eur Respir J.* 2024; 63: 2301689
Basavaraj A, et al. *Respir Med Res.* 2024; 86: 101
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Airway Clearance – Clinical Outcomes

Patient-Reported Outcomes:

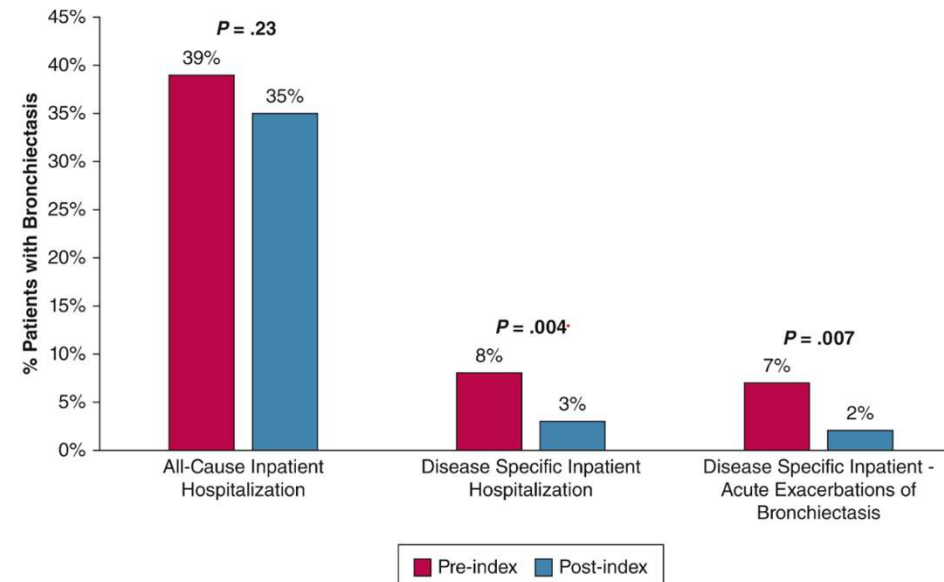
- Significant improvement in Health-related Quality of Life (HRQoL) across seven studies involving 146 participants

Reductions in pulmonary hyperinflation

- FRC decreased by 19% with non-PEP devices
- FRC decreased by 30% with airway oscillatory devices

Improved patient outcomes with HFCWO

- Decreased hospitalizations
- Reduced length of stay by 33%
- Fewer inpatient visits (from 2.4 visits before the index to 1.8 visits after)
- Decrease antibiotic use
 - Oral antibiotics use decreased 9%
 - IV antibiotic use decreased 47%



Camacho Urribarri ME, et al. *Chest Pulmonary*. 2024;163:100013.

Lee AL, et al. *Chr Respir Dis*. 2015; 12: 36

Lee AL, et al. *Cochrane Database Syst Rev*. 2015; 11

Medication – Bronchiectasis - Infection

Mucociliary Clearance:

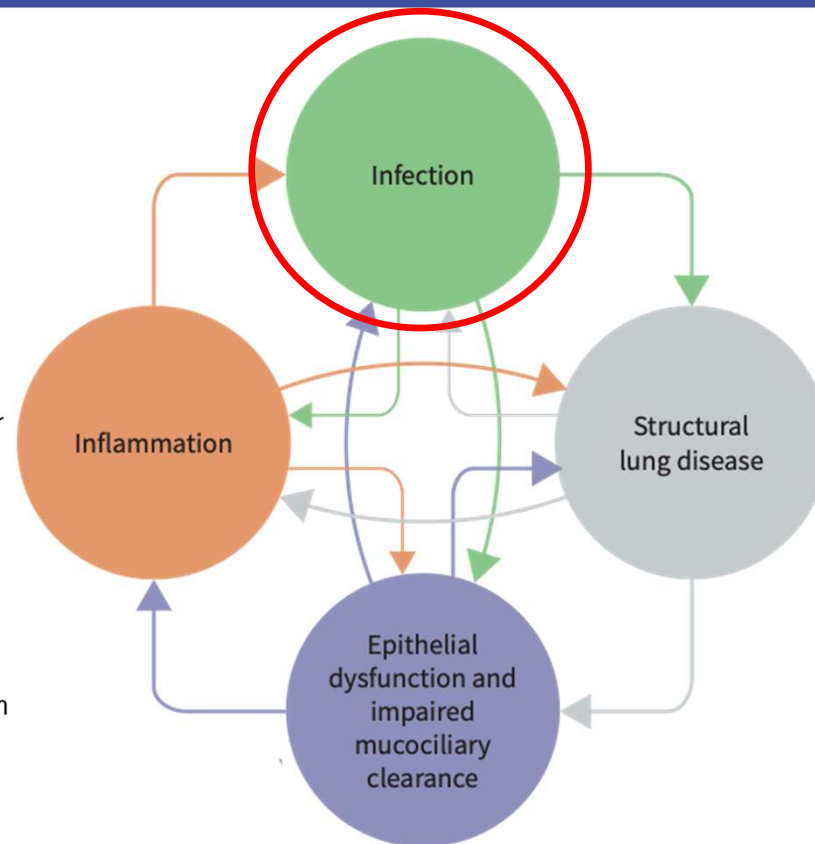
- Nebulized Hypertonic Saline : 3% , 7%
- N-acetylcysteine (NAC) – limited
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Antibiotics:

- Sputum culture informative, e.g. pseudomonas, staphylococcus, other
- Consider caution regarding resistance and side effects for frequent exacerbators

Inhaled Antibiotics:

- For patients with frequent infections
- Best evidence supports aminoglycosides (e.g., tobramycin) and colistin



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Medication – Bronchiectasis - Inflammation

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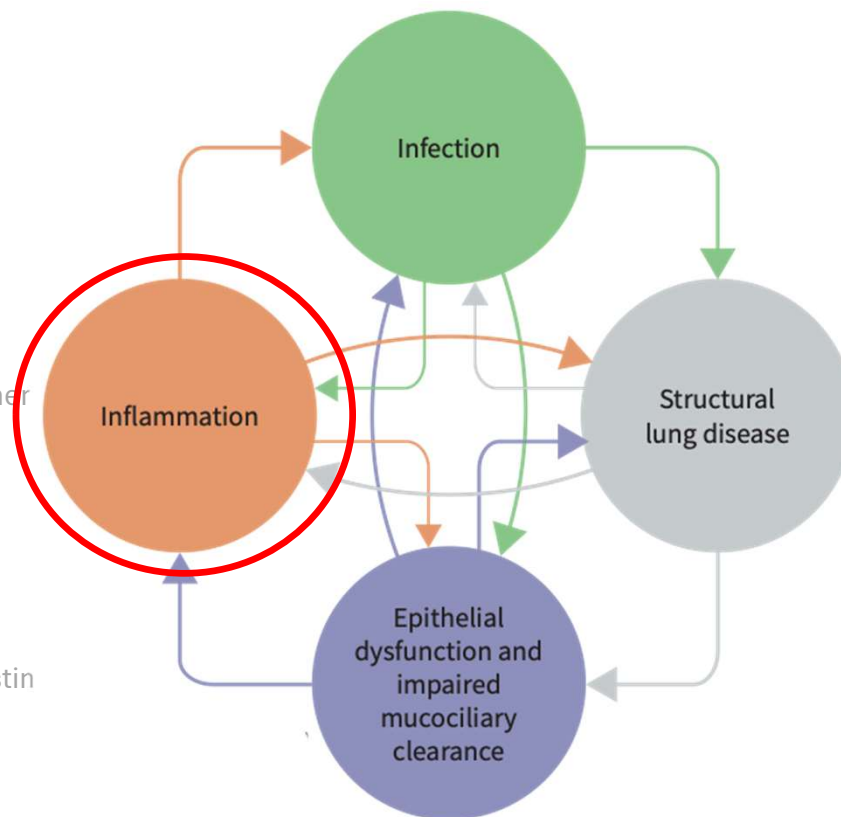
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Anti-Inflammatories:

- Inhaled corticosteroids (ICS) – Asthma, otherwise avoid
- Use ICS with caution—may increase risk of NTM and other infections
- Macrolides (e.g. azithromycin, erythromycin)



Medication – Bronchiectasis - Inflammation

Mucociliary Clearance:

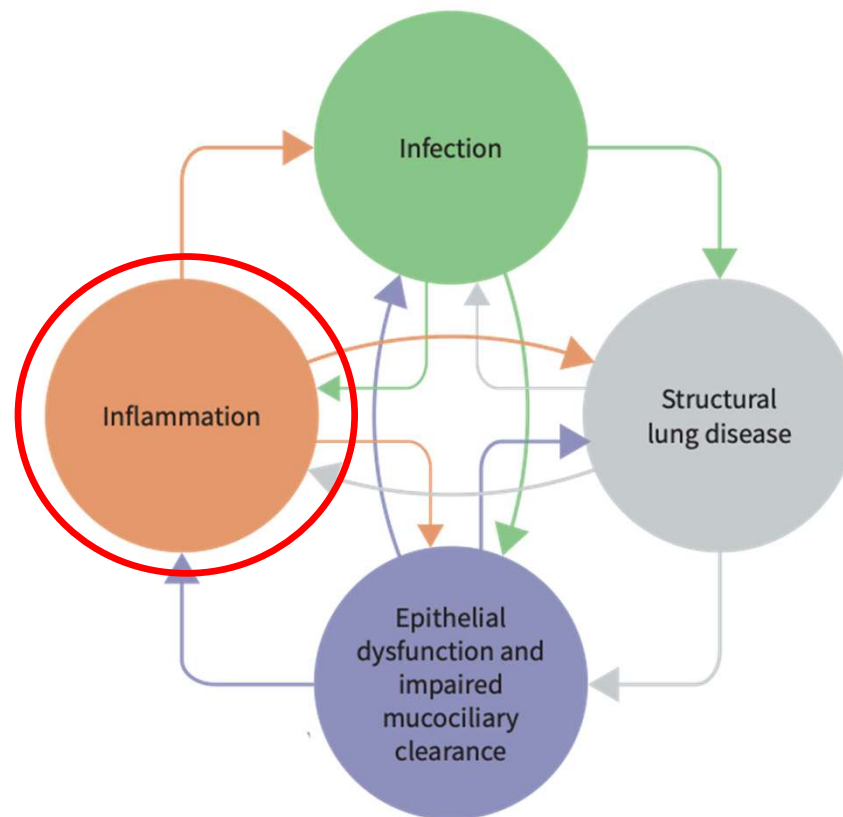
Brensocatib is an oral potent reversible inhibitor of Dipeptidyl peptidase-1: (DPP-1) and other neutrophil serine proteases (neutrophilic inflammation)

Not FDA approved - yet

Chalmers JD, et al. *N Engl J Med.* 2025; 392: 1569
Choi H, et al. *Eur Respir J.* 2024; 63: 2400518
Chalmers JD, et al. *Eur Respir J.* 2025; 65: 2401551

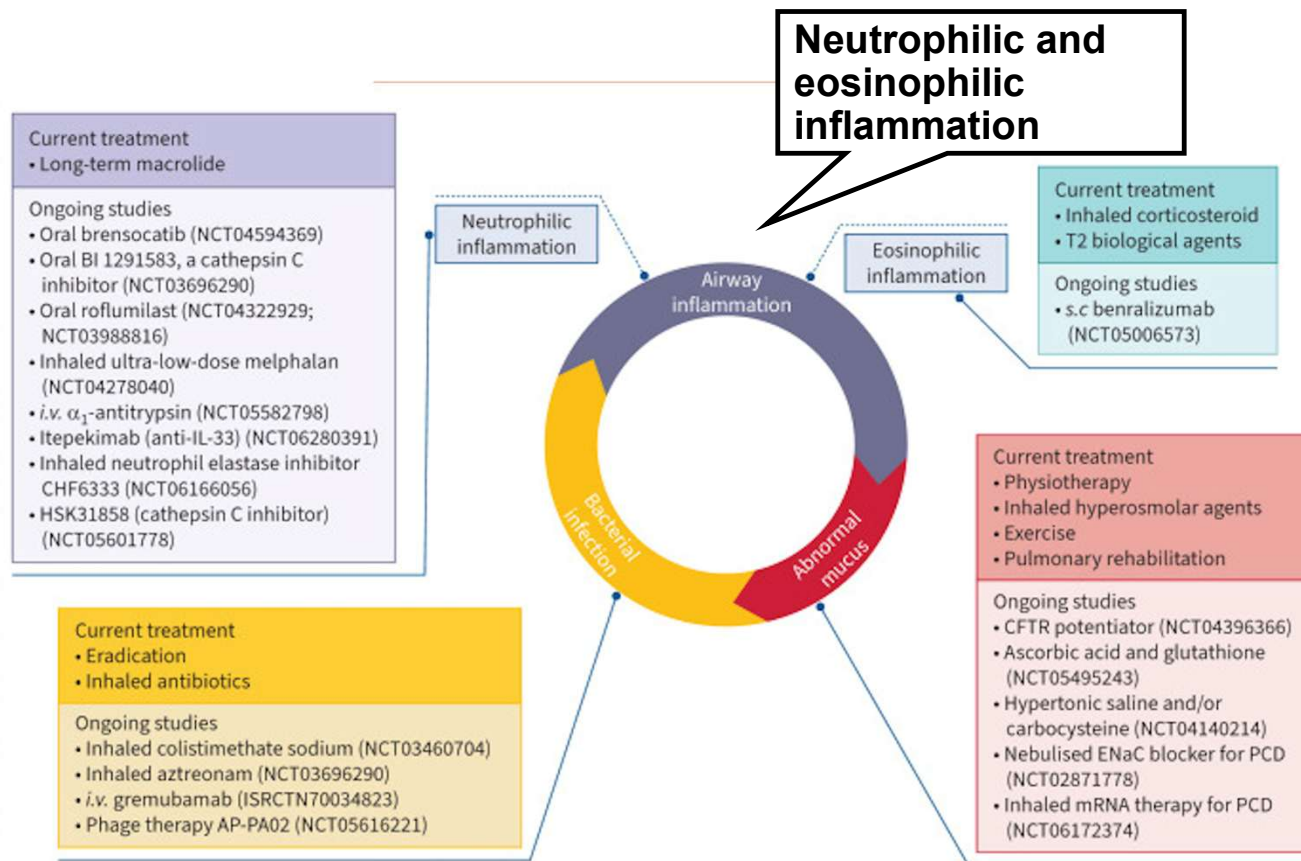
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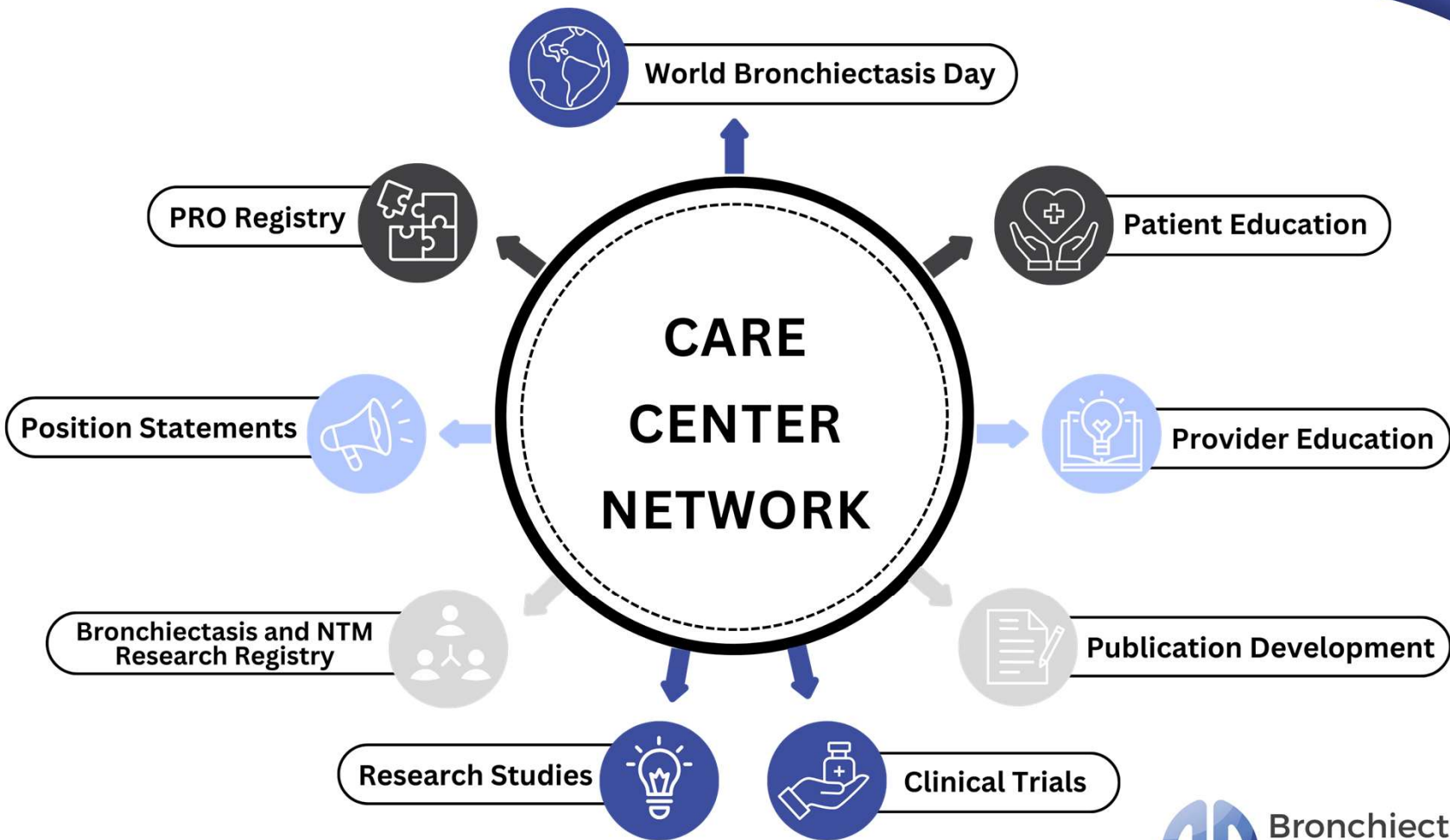
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Research and Advancements

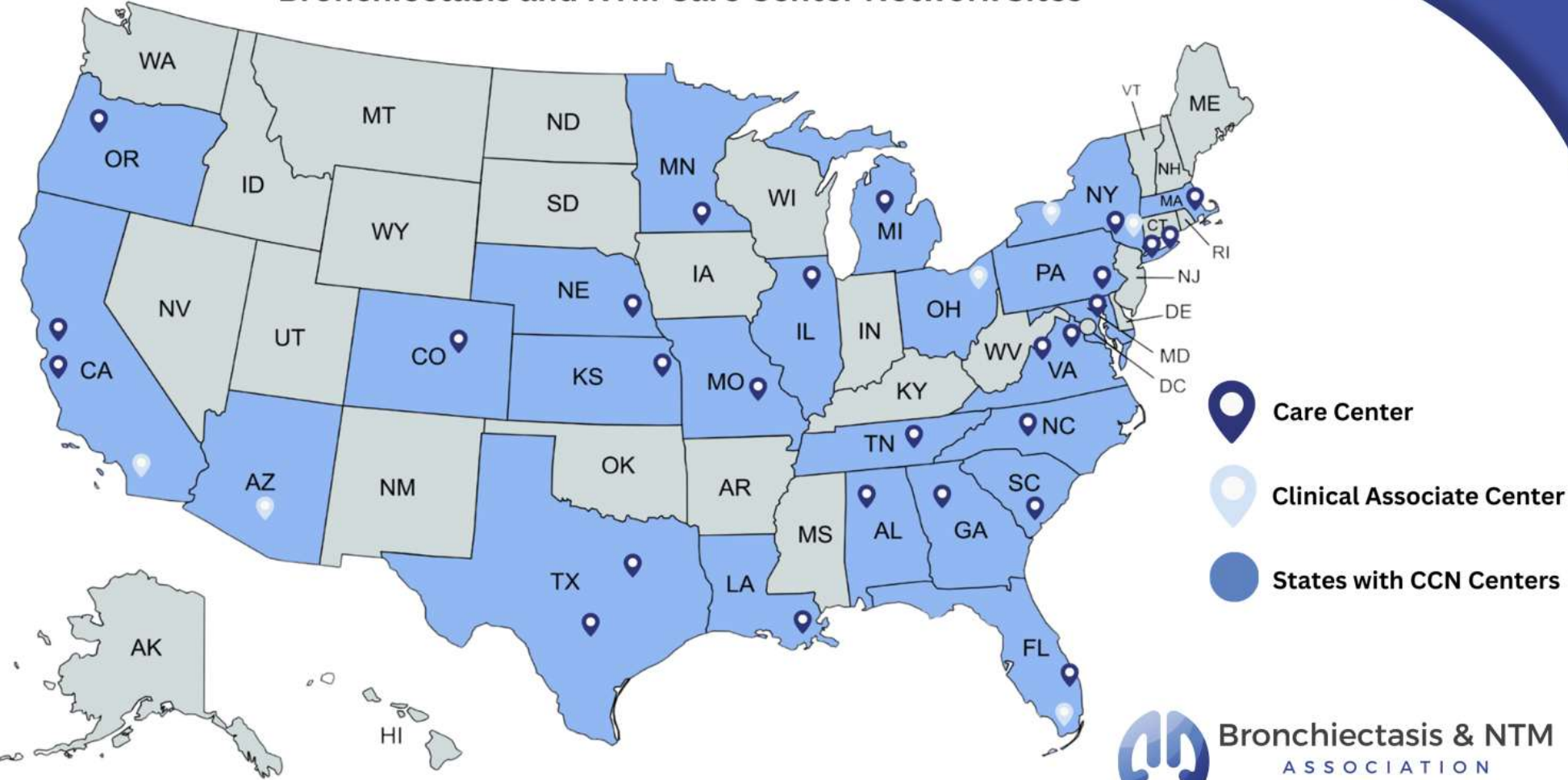


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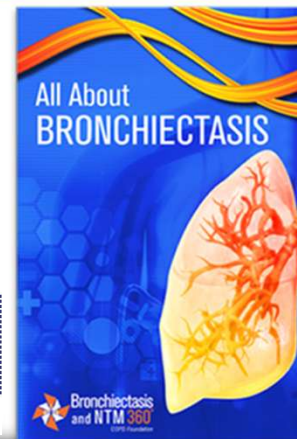
Bronchiectasis and NTM Care Center Network Sites



Patient Education and Support

BronchandNTM.org

- Downloads Library
- Podcast Channel
- Newsletter
- BronchandNTM360Social
- Find a CCN location



Bronchiectasis Action Plan

Patient please fill out this section prior to the office visit.

Name: _____ Date: _____

State of last sputum culture: _____ I am currently being treated for: _____

How Do I Feel RIGHT NOW? MOST DAYS:
 Would you like to track your symptoms daily? Visit <https://www.bronchandntm.org/CCN/ActionPlan> or scan the QR code to download a free app on the App Store or Google Play.
 I feel: Better worse about the same
 My energy level is: better worse about the same
 My cough is: Wet Dry
 Currently my sputum Color: _____ Amount produced in a day: _____ Consistent blood: Yes No
 My other symptoms include: _____
 Since I last saw the doctor less in the hospital? yes no I have started a new medicine for my lungs? yes no
 My current airway clearance routine is: _____
 In the past, I have tried these devices/techniques and they didn't work well for me: _____
 Concerns I wish to talk to my doctor about: _____

MY GOALS: Please number your top three goals from 1-3:
 ... Improve my health ... Increase my activity level ... Quit smoking ... Gain or lose weight ... Avoid Lung Infections
 ... Make changes to my environment ... Improve my mental health ... Find a support group ... Learn more about my diagnosis
 ... Other: _____

Fill in to learn more about pulmonary rehab: Yes No

MY GOALS: Please number your top three goals from 1-3:
 ... Take all medicines/supplements as prescribed ... Be active for 30 minutes a day
 ... Avoid smoking and avoiding irritants ... Drink an adequate amount of water/fluids daily
 ... Perform airway clearance ... When a day ... Eat regularly, focusing on nutrient-dense whole foods
 ... Get adequate sleep and rest ... Get regular, focusing on nutrient-dense whole foods
 ... Other: _____

NOTIFY YOUR HEALTH CARE PROVIDER (NON-URGENT) IF YOU ARE EXPERIENCING 1 OR MORE OF THESE SYMPTOMS WITHIN 48-72 HOURS: (The may be having an exacerbation that will, and an antibiotic may be needed.)

ACTION PLAN

I am more short of breath than usual. Get plenty of rest
 I am coughing more frequently. Hydrate more by increasing fluid intake
 My mucus has changed in color. Increase airway clearance therapy
 My mucus has changed in thickness or amount. Avoid smoking and irritating irritants
 I have coughed up some blood. Call provider if symptoms do not improve
 I have less energy than usual. Rest and hydrate
At a minimum, increase how often you do airway clearance during these times.

Extremely tired or confused
 Coughing up large amounts of blood and/or rust
 Oxygen level is below 90%
 Short of breath at rest and/or with little activity
 New fever of 102°F or greater

SEEK EMERGENCY CARE OR CALL 911

Date of Next Visit: _____



Medication Record For:	Vaccines	Medications	Medication Allergies	Sputum Culture
Name _____	Date(s): Pneumococcal _____ Flu _____ COVID-19 _____ Pertussis _____ Shingles _____ Emergency Contact Name: _____ Phone #: _____	_____	_____	_____
Date _____			*Macrolide monotherapy (azithromycin/clarithromycin) is not recommended for those at risk of NTM.	



WBD Global Partner Resources



Objective - Bronchiectasis

- Understand the pathophysiology, epidemiology, and signs and symptoms
- Diagnosis and treatment options
- Bronchiectasis is not COPD or asthma
- Identify strategies for patient education and support
- **Increased awareness including World Bronchiectasis Day**
- Summary and Q&A

World Bronchiectasis Day July 1, 2025



World Bronchiectasis Day aims to raise global awareness, share knowledge, and discuss ways to reduce the burden of bronchiectasis for patients and their families worldwide.

Join us in spreading the word!

www.WorldBronchiectasisDay.org



WBD Global Partner Resources



WorldBronchiectasisDay.org

Resources available in:

- English
- Japanese
- Arabic
- German
- Spanish
- Portuguese
- Italian
- French
- Traditional Chinese
- Simple Chinese

Basics of Bronchiectasis

What is bronchiectasis?
Bronchiectasis is a chronic lung disease characterized by enlarged airways that are thickened and, in some cases, damaged. These changes can cause mucus to build up in the airways, which can lead to repeated infections, causing more lung damage and worsening respiratory symptoms.

What are the symptoms of bronchiectasis?
Symptoms vary greatly between people, but most have a long-term cough, producing sputum, but some might have a dry cough with little or no sputum. Other symptoms include recurrent infections, severe lung infections, fatigue, unexplained iron-deficient anemia, weight loss, and chest pain.

How is bronchiectasis diagnosed?
Bronchiectasis is typically diagnosed by a high resolution computed tomography (CT) scan of the lungs - a form of x-ray that gives a very detailed picture of your lungs. The image will show the location of any airway abnormalities when the lung is inflated to the extent of lung damage.

What are the treatments?
There are two key parts to proper treatment. First, it is important to remove retained mucus from the airways (mucus clearance), which may include manual airway clearance techniques, use of airway clearance devices, medications, aerobic exercise, and breathing therapy of some kind. Second, preventing and treating infections when present. This process involves selecting a suitable antibiotic to treat bacteria, fungi, viruses or mycoplasmas that are present in the airways. Once the type of infection is identified, it is treated with the appropriate antibiotic.

Is there a cure?
There currently is no cure for bronchiectasis, but it can be treated effectively. Watch for early warning signs of flare-ups and work with a health care provider to find the best treatment plan. Research and clinical trials are being done now to find better treatments for bronchiectasis.

Resources:
www.bronchiectasis.org
www.bronchiectasis.org/japanese
www.bronchiectasis.org/arabic
www.bronchiectasis.org/german
www.bronchiectasis.org/spanish
www.bronchiectasis.org/portuguese
www.bronchiectasis.org/italian
www.bronchiectasis.org/french
www.bronchiectasis.org/traditional-chinese
www.bronchiectasis.org/simple-chinese

WORLD BRONCHIECTASIS DAY
Annually observed on July 1st, World Bronchiectasis Day aims to raise global awareness about bronchiectasis and offers ways to reduce the burden of bronchiectasis for patients worldwide.

FACES OF BRONCHIECTASIS

Research and Clinical Trials

What is research?
Medical research is the investigation of health issues in order to better understand and treat them. There are many types of research, including clinical trials, which are important for developing diagnostic tools and tests, medical devices, and new treatments.

What is a clinical trial?
Clinical trials investigate the safety and effectiveness of devices and treatments. They also play a significant role in identifying the benefits, limitations, and long-term side effects of devices or treatments.

What are the phases of clinical trials?

- Phase I:** This phase explores whether the treatment is safe, typically, a small group receives the treatment for the first time. Researchers monitor for negative side effects, decide on safe dosages, and how the body reacts to the treatment.
- Phase II:** This phase investigates whether the treatment is useful. A larger group of patients receives the treatment. Researchers can monitor safety but also look at how well the treatment works at different doses. This phase helps to decide whether the treatment is effective, and to find the most effective dose of the treatment.
- Phase III:** This phase is used to find out how the new treatment compares to others. This phase usually involves a much larger group of patients to compare the new treatment with other treatments or a placebo (often called a "sugar pill" or "pill with no treatment benefit"). Phase III trials can often be the most effective, safe, and correct dose. This phase is the last step before a new treatment is approved.
- Phase IV:** After a treatment's approval, a phase 4 trial continues to monitor the safety and efficacy of the treatment over time. Researchers may also investigate new uses for the treatment, any long-term side effects, or interactions with other medicines.

Each phase of a clinical trial builds upon the previous one to determine whether a treatment is safe and effective for patients. Regulatory agencies like the FDA (Food and Drug Administration) in the United States carefully review information from each phase of clinical trials before deciding whether to approve a treatment for widespread use.

How can I learn more about clinical trials that are available to me?
Your health care provider can provide information for you regarding available clinical trials. You can also find information on ongoing clinical trials on ClinicalTrials.gov.

This document was reviewed by the World Bronchiectasis Day Global Planning Committee. For more information visit: www.WBDGlobalPlanning.org

Treatment of Bronchiectasis

What types of therapies should I use to treat my bronchiectasis?
A variety of bronchiectasis care can be made by any of your providers including primary care, respiratory pulmonology or other specialists. Once you have a confirmed bronchiectasis diagnosis by chest imaging (eg. CT scan), additional evaluation may be needed. Therefore, referral to a specialist in respiratory medicine is not essential if available for long-term management of the condition.

What are the goals for the treatment of bronchiectasis?
Bronchiectasis is manageable with proper evaluation and attention. Goals for treating bronchiectasis include reducing symptom burden, preventing exacerbations (ie. repeated infections or flare-ups), improving or maintaining quality of life, and maintaining lung function.

What are some common treatments for bronchiectasis?
Airway clearance: Keeping the airways clear of mucus is an essential component of treatment. Regularly moving mucus out of the airways will help prevent infection and improve and better management of bronchiectasis. There are many ways to help remove mucus from your lungs, and an experienced respiratory nurse may help you learn how to support airway clearance devices and techniques that may be helpful.

Medications: Your health care provider may prescribe you medications to assist with opening the airways, reducing mucus, and drying secretions. Sometimes these medications may be taken by mouth, and other times they can be inhaled into your lungs. If the recommended medication is to be inhaled, you may need instructions from the manufacturer on how to use the device to breathe in the medicine.

Drugs: Some patients with bronchiectasis may require supplemental oxygen that will help oxygen in their blood to flow. Your physician will recommend how much and when you should use oxygen based on tests and evaluation.

Antibiotics: Antibiotics may be required to treat infections, and these may be given by mouth or intravenously (IV). Antibiotics can also include more severe antibiotics that are not treated often. Study with your medicines. Additionally, a maintenance program may include inhaled antibiotics.

Lung Surgery: On occasion, lung surgery (called lung resection) may be an effective form of treatment when there is only one area of the lung that is affected by bronchiectasis. Lung surgery may help improve symptoms and lower the number of flare-ups.

What are other things that can be done for those with bronchiectasis to feel better?
Get vaccinated
Don't smoke or vape
Keep all scheduled appointments with your health care team
Maintain a healthy weight
Take all medicines as prescribed
Keep all recommended vaccines up to date

For more information on the treatment of bronchiectasis visit: www.WBDGlobalPlanning.org
Resources available in: English, Japanese, Arabic, German, Spanish, Portuguese, Italian, French, Traditional Chinese, Simple Chinese

Virtual Patient Roundtable

Bronchiectasis and NTM 360



Bronchiectasis & NTM ASSOCIATION

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Questions