Bronchiectasis: What you Need to Know

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Objective

- Understanding how bronchiectasis affects the population
- Epidemiology and pathophysiology and understanding of the disease process and progression
- How to identify indication of bronchiectasis on HDCT
- Treatment options

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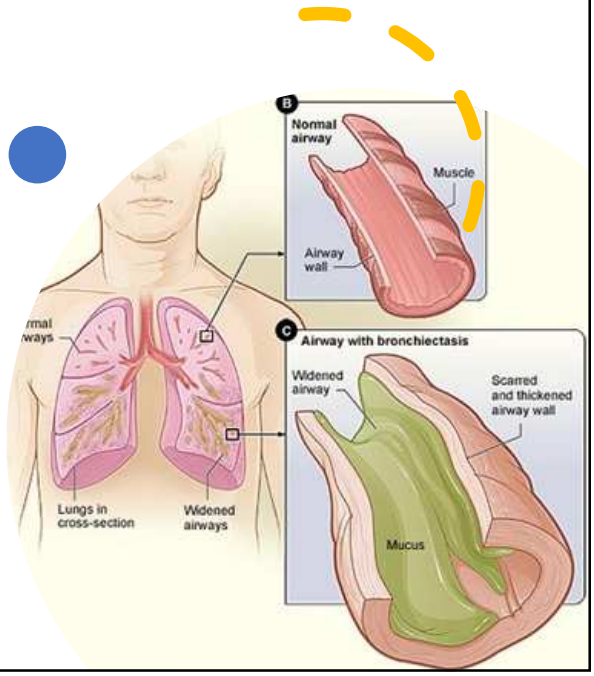
What is Bronchiectasis

- Defined as permanent dilation of the bronchi, excess mucus production and scaring. This causes reduced airflow and increases chances of recurrent/serious lung infections such as PNA and Non-tuberculosis mycobacteria.



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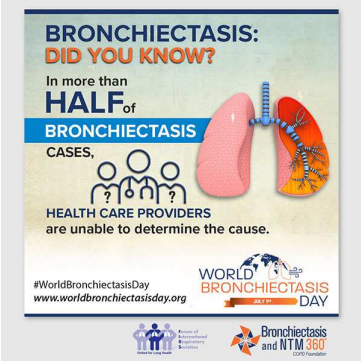
Epidemiology

- Affects 350,000 to 500,000 in the US
- More common in women
- 40% of cases are from unknown causes “idiopathic bronchiectasis”
- Increasing by 8.7% per year (2013-2017 nationwide population study)
- Third leading chronic inflammatory disease of the airway



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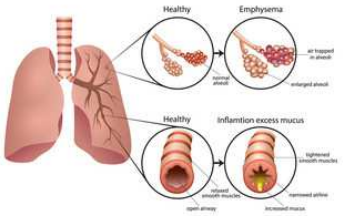
How is Bronchiectasis Different from COPD?

COPD

Involves narrowing of the airways and damage to the alveoli/air sacs in the lung, resulting in reduced lung function and airflow obstruction.

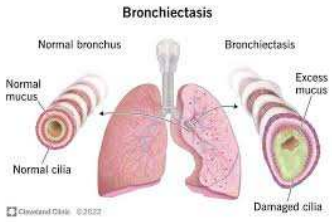
- Causes:
  - Smoking
  - Secondhand smoke,
  - Air pollution
  - Chemical fumes, dust
  - lung infections
  - Genetic condition (alpha-1 antitrypsin deficiency)



Bronchiectasis

Primarily involves widening and scarring of the airways, leading to excessive mucus production and inability to clear airways effectively.

- Causes:
  - Immune system disorders
  - Aspiration –Food or liquids enter the lungs
  - Respiratory infections
  - Gastroesophageal Reflux Disease (GERD)- Stomach contents flows back up into the throat and into the lungs



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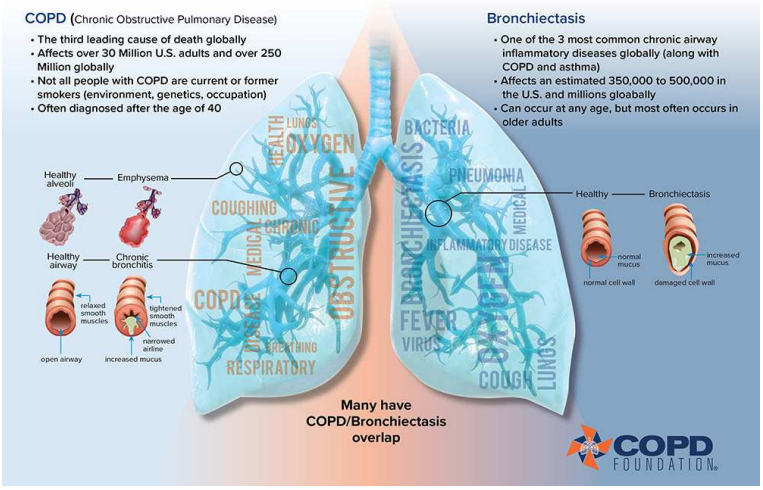
What are COPD and Bronchiectasis?

Common Impact:
Symptoms - Frequent Infections - Disability



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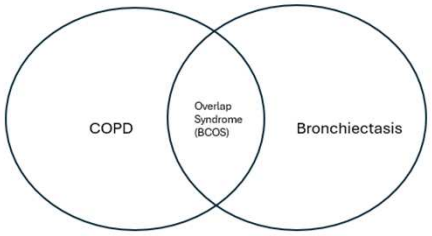
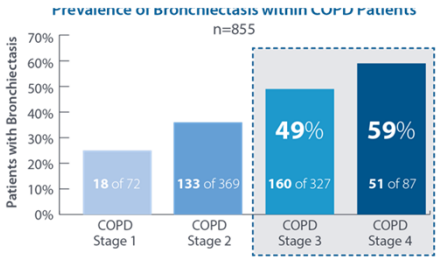
Bronchiectasis and COPD Overlap Syndrome (BCOS)



Overlap Syndrome:

- When two conditions coexist at the same time
- Bronchiectasis and COPD are two separate disease requiring different treatment but when a person is diagnosed with both simultaneously



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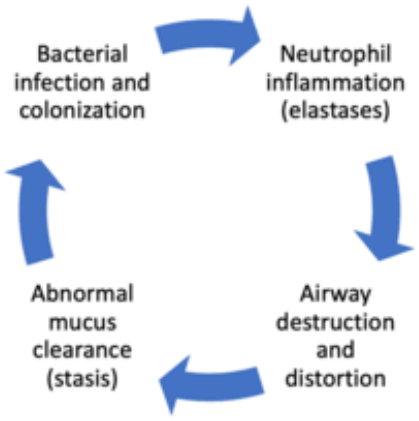

Pathophysiology: Vicious Cycle

- Initial insult – Infection, inhalation injury, aspiration PNA
- Neutrophilic inflammation –To fight infection
- Airway distortion- Thickening and widening of the bronchial walls
- Decrease mucus mobilization and mucus plugging
- Bacterial colonization and infection

Progressive lung decline

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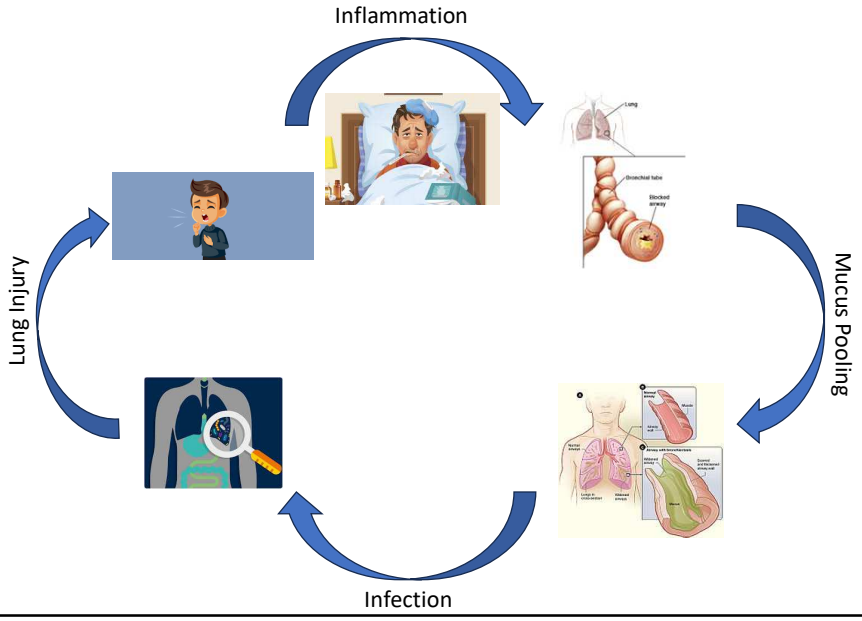
Vicious Cycle



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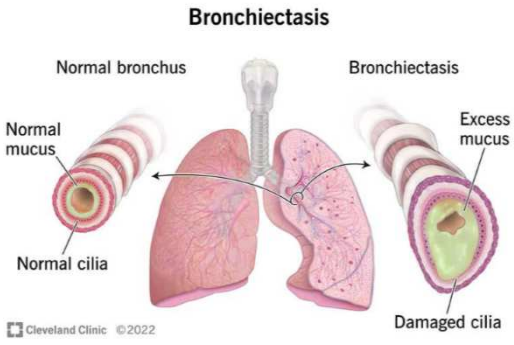
Risk factors



- Over 65
- Respiratory infections
  - Pneumonia
  - Pertussis -whooping cough
  - Tuberculosis
- Allergic Bronchopulmonary Aspergillosis (ABPA)
- Chronic pulmonary aspiration
- Autoimmune diseases
  - ➢ Rheumatoid arthritis
  - ➢ Diabetes
- COPD
  - ➢ Alpha 1 antitrypsin deficiency
- Asthma
- Primary Ciliary Dyskinesia

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Symptoms/ Tests for Diagnosis

Clinical Presentation

- Chronic cough
- Excessive sputum production
- Recurrent respiratory infections

Test for Diagnosis

- Chest X-ray
- High-Resolutions Computed Tomography of chest (Gold standard)
- Sputum Culture
- Pulmonary Function Test
- Bronchoscopy

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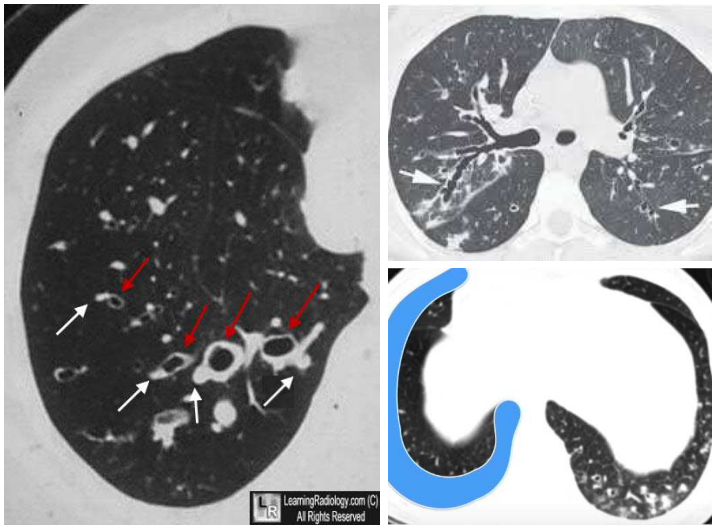

Parameters for Imaging

- Signet ring appearance – Bronchial is more then 1.5 times the adjoining vessel
- Non-tapering bronchi
- Bronchi visible at the periphery of the lung

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Secondary indication of Bronchiectasis

- Bronchial wall thickening
- Mucus plugging
- Tree in bud pattern
- Air trapping

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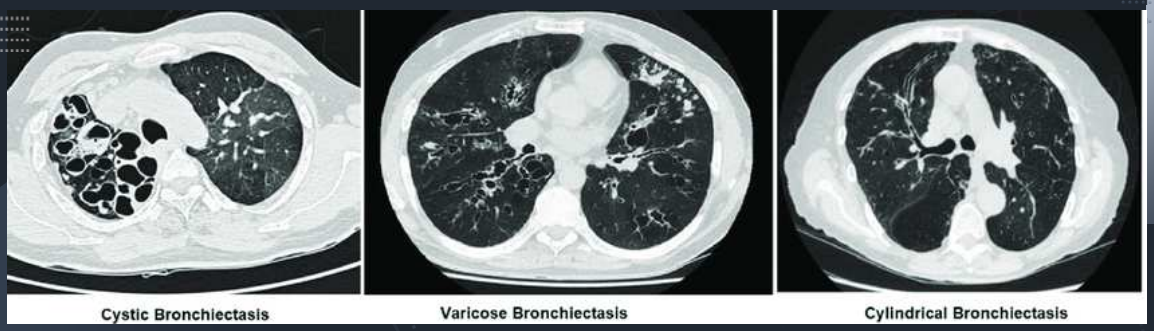

Types of Bronchiectasis

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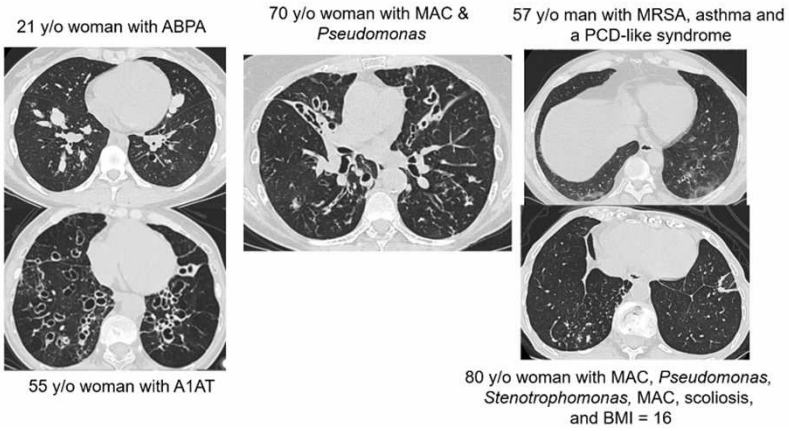
Clinical Evaluation



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Treatment BTS

BTS Guideline

Step 1
- Treat underlying cause
- Airways clearance techniques +/– pulmonary rehabilitation
- Annual influenza vaccination
- Prompt antibiotic treatment for exacerbations
- Self management plan

Step 2
If 3 or more exacerbations/yr despite Step 1*
- Physiotherapy reassessment and consider muco-active treatment

Step 3
If 3 or more exacerbations/yr despite Step 2*
- 1) If *Pseudomonas aeruginosa*, long trem inhaled anti-pseudomonal antibiotic or alternatively long term macrolide
- 2) If other Potentially Pathogenic Microorganisms, long term macrolides or alternatively long term oral or inhaled targeted antibiotic
- 3) If no pathogen, long term macrolides

Step 4
If 3 or more exacerbations/yr despite Step 3*
- Long term macrolide and long term inhaled antibiotic

Step 2
If 5 or more exacerbations/yr despite Step 4*
- Consider regular intravenous antibiotics every 2-3 months

*Consider this step if significant symptoms persist despite previous step, even if not meeting exacerbation criteria

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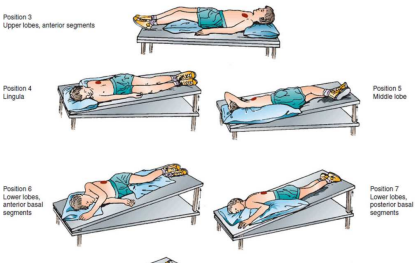

Treatment

- Education
- Investigate and treat underlying etiologies
- Breathing techniques
- Airways clearance
  - OPEP
  - Manual CPT
  - Postural drainage positioning
  - Vest
- Medication

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Medication

- Mucolytic
  - 7% Hypertonic saline – Reduces the bacterial load. Inhaling saltwater makes a hostile environment for Bactria.
  - Mucomist- No data to support use
- Bronchodilators
  - Short Acting Bronchodilator
  - Long-Acting Bronchodilator
- Antibiotics
- Inhaled Corticosteroid
  - Not recommended routinely

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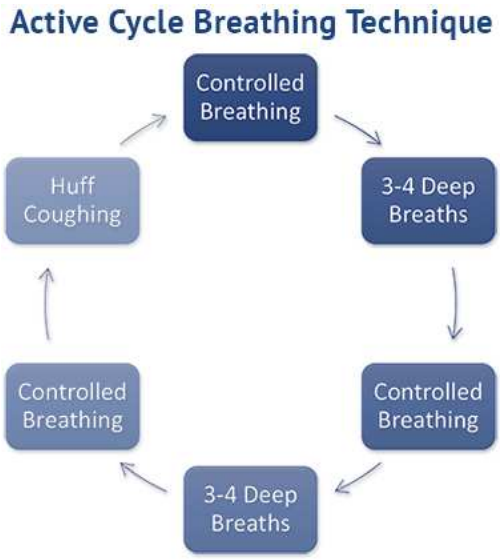
Breathing Techniques

- Autogenic drainage: Involves inhaling at different lung volumes and adjusting exhalation to move mucus
- Active cycle of breathing: Combines breathing control, thoracic expansion exercises and a forced expiration
- Huff Cough: Helps move mucus from the lower airways to the upper airways using quick forced exhales



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Pulmonary Rehab

- Patient-centered exercise training and collaborative self-management education
- 5-year study completed on 213 participants found benefits similar to those found for COPD.
  - Significant improvement in dyspnea
  - Improved exercise tolerance
  - Improved quality of life

MMRC Dyspnea Scale

Grade 0
Not troubled by dyspnea unless on strenous exercise

Grade 1
Dyspnea when hurrying or walking up hill

Grade 2
Dyspnea when walking on level (slower/stop for breath after 15 minutes)

Grade 3
Severe dyspnea when walking on level (need to stop after 100 m/a few minutes)

Grade 4
Very severe dyspnea till cannot leave the house

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Goal of Treatment

Overall, the goal should be to

- Reduce exacerbations
- Control symptoms
- Improve quality of life
- Preserve lung function
- Reduce mortality
- Reduce hospitalizations

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Support

- Bronchiectasis Toolbox https://bronchiectasis.com.au/
- COPD foundation Bronchiectasis 360 https://www.bronchiectasisandntminitiative.org/
- British Thoracic Guidelines for bronchiectasis in adults 2018

https://www.brit-thoracic.org.uk/quality-improvement/guidelines/

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Take Away

- High resolution CT is the gold standard for diagnosis
- Bronchiectasis may be seen on on a chest x-ray, however, many are underdiagnosed, and a CT will be able to provide a differential diagnosis
- Treatment should be a tailored approach, focusing on only one driver of disease can yield limited clinical response
- Bronchiectasis patients have an extremely high treatment burden due to the use of time-consuming interventions, including airway clearance regimens and nebulized antibiotics.

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Questions

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