Small Airways Disease
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Objectives
- Recognize the HRCT findings seen in small airways disease
- Learn the differential diagnoses for the HRCT findings seen in small airways disease

Small Airways: Definitions
- Small airway
  - Airways ≤ 2mm diameter
- Bronchiole
  - Small airway with following features:
    - No cartilage
    - No glands
- Types of bronchioles
  - Membranous bronchioles
  - Respiratory bronchioles

Small Airways: Secondary Pulmonary Lobule
- Secondary Pulmonary Lobule
  - Smallest functioning subunit of lung surrounded by connective tissue septa
  - Supplied by a lobular bronchiole and lobular arteriole
  - Drained by veins and lymphatics in the interlobular septa

Small Airways: Imaging
- Thin-section, HRCT
  - 1.25 mm collimation or less
  - Inspiration and exhalation images
  - MIP images
  - MinIP images

Small Airways: HRCT findings
- Centrilobular nodules
- Tree-in-bud
- Focal area of low lung density
Small Airways: HRCT findings

- Centrilobular nodules: nodule in the center of the secondary pulmonary lobule
  - Ill-defined
  - Ground glass
  - Soft tissue
- Tree-in-bud
- Focal area of low lung density

Small Airways: HRCT findings

- Centrilobular nodules
- Tree-in-bud: branching, V or Y shaped nodular density at the center of the secondary pulmonary lobule
- Focal area of low lung density

Small Airways: HRCT findings

- Centrilobular nodules
- Tree-in-bud
- Focal area of low lung density: geographic area of low density in the lung secondary to airway fibrosis (constrictive bronchiolitis)

Small Airways: Differential

- Centrilobular nodules
- Infectious bronchiolitis
- Hypersensitivity pneumonitis
- Respiratory bronchiolitis
- Follicular bronchiolitis
- Langerhans cell histiocytosis

Small Airways: Differential

- Tree-in-bud
- Infection
- Aspiration
- Follicular bronchiolitis
- Mucous plugging (ABPA)
- Cystic fibrosis / Primary ciliary dyskinesia
- Adenocarcinoma

Small Airways: Differential

- Focal area of low lung density
- Sequela of infection
- Inhalational lung disease (chemical fumes, smoke)
- Lung and stem cell transplants
- Hypersensitivity pneumonitis
- Asthma
- Diffuse neuroendocrine cell hyperplasia
Small airways: Summary

- Small airways are ≤ 2mm diameter
- HRCT findings seen in small airways disease
  - Centrilobular nodules
  - Tree-in-bud
  - Focal area of low lung density
- Differential diagnoses for small airways disease includes a broad category of diseases and clinical history in correlation with radiologic and histopathologic findings is the best approach to obtain the correct diagnosis.

Small airways: References