AMSER Case of the Month:

70-year-old female with chronic dry cough

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Patient Presentation

• **HPI:** 67-year-old female presenting for chronic intermittent nonproductive cough associated with post-nasal drip, rhinorrhea, and occasional shortness of breath ongoing for the last several years. Symptoms have progressed over the past month.

• **PMH:** Hypertension. Hyperlipidemia.
• **SHx:** Never smoker.
What Imaging Should We Order?
### Variant 1:

**Chronic cough lasting more than 8 weeks. No known risk factors for lung cancer. Initial imaging.**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>Relative Radiation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiography chest</td>
<td>Usually Appropriate</td>
<td>☀️</td>
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<tr>
<td>CT chest with IV contrast</td>
<td>May Be Appropriate</td>
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<tr>
<td>CT chest without IV contrast</td>
<td>May Be Appropriate</td>
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<td>MRI chest without and with IV contrast</td>
<td>Usually Not Appropriate</td>
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<tr>
<td>FDG-PET/CT skull base to mid-thigh</td>
<td>Usually Not Appropriate</td>
<td>☢️</td>
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</tbody>
</table>
Findings (Unlabeled)
Findings (Labeled)

Possible Right Midlung Nodule

Lower Lung Interstitial Prominence

Cardiomegaly

No prior chest radiographs available for comparison.

Chest CT follow-up recommended.
## ACR Appropriateness Criteria

**American College of Radiology**

**ACR Appropriateness Criteria®**

**Incidently Detected Indeterminate Pulmonary Nodule**

**Variant 1:** Adult greater than or equal to 35 years of age. Incidentally detected indeterminate pulmonary nodule on chest radiograph. Next imaging study.

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<td>Radiography chest</td>
<td>May Be Appropriate</td>
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<tr>
<td>Image-guided transthoracic needle biopsy</td>
<td>Usually Not Appropriate</td>
<td>Varies</td>
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<tr>
<td>MRI chest without and with IV contrast</td>
<td>Usually Not Appropriate</td>
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</table>
Findings (Labeled)

Solid, round 8 mm nodule with smooth and well-defined margins

6 mm Nodule
Findings (Unlabeled)

Inspiratory

Expiratory
Findings (Labeled)

- **Inspiratory**
  - Mosaic Pattern of Attenuation
  - Scattered Nodules

- **Expiratory**
  - Moderate Air Trapping
Findings (Unlabeled)
Findings (Labeled)

FDG-Avid Lesion corresponding with 8 mm Lung Nodule on CT

FDG-Avid Lesion corresponding with 6 mm Lung Nodule on CT
Differential Diagnosis

• Metastatic Cancer
• Pulmonary Adenocarcinoma
• Follicular Bronchiolitis
  • Sjogren Syndrome
  • Rheumatoid Arthritis
• Diffuse Idiopathic Pulmonary Neuroendocrine Cell Hyperplasia
Surgical Intervention

• Bronchoscopy with Transbronchial Biopsy and EBUS TBNA: Nondiagnostic

• Right Thoracoscopy with RUL and RLL Wedge Resection pursued
Histopathology

- **Granular Chromatin**
  - "Salt and Pepper"

- **Mild Traction Bronchiolectasis**

- **Dilated Bronchiolar Lumen**

- **Bronchiolar Lumen (Arrow) with Cellular Proliferation Surrounding Bronchiole (Circle)**

- **Peribronchiolar, Mildly Atypical Epithelial Cells forming Pseudorosettes**
  - Tumorlet presenting as a nodule on left. Higher magnification on right.

- **Spindle Cells of Relatively the Same Size and Shape**
Positive Staining for Synaptophysin

Histopathology

Final Pathological Report

• Right upper lobe, Wedge Resection
  • Typical carcinoid tumor, 0.6 cm, Negative margin
  • Carcinoid tumorlets (x3)

• Right lower lobe, Wedge Resection
  • Typical carcinoid tumor, 0.6 cm, Negative margin
  • Carcinoid tumorlets and neuroendocrine hyperplasia, multifocal (x20)
  • One lymph node, negative for metastasis (0/1)
Final Dx:

Diffuse Idiopathic Pulmonary Neuroendocrine Cell Hyperplasia (DIPNECH)
DIPNECH is a rare pre-neoplastic pulmonary disorder that is characterized by hyperplasia of pulmonary neuroendocrine cells

- Pulmonary neuroendocrine cells are distributed throughout the pulmonary tract from the bronchi to the alveolar ducts
  - Neuroendocrine cells (NECs) play a role in lung development in fetal life and decrease in density as we age
  - In adults, NECs play a role as airway chemoreceptors and can cause airway vasoconstriction through release of serotonin

Epidemiology

- Lung neuroendocrine tumors (NETs) account for about 1-2% of all lung malignancies
- Hayes et al. 2022 performed a cohort study of 311 patients and found that 20% of those diagnosed with Lung NETs had DIPNECH
- Baseline demographics for those with DIPNECH were 95% female, 59% never smokers, and had a mean BMI of 34.4
Etiology
- Idiopathic

Clinical Presentation
- Long history of cough, breathlessness, dyspnea, and wheezing
- Most patients will also show evidence of obstructive lung disease on pulmonary function testing

Differential Diagnosis
- Reactive airway disease (asthma), obstructive bronchial neoplasm, endobronchial metastasis, granulomas, pneumoconiosis

Diagnosis
- Surgical biopsy is the gold standard
- CT chest can aid in diagnosis (see following slide for typical radiological findings)
Case Discussion

Imaging
- DIPNECH is characterized by cellular proliferation of the bronchial wall
- Typical CT findings include
  - Bronchial wall thickening
  - Mild bronchiectasis, lobular or regional air trapping
  - Mosaic pattern of attenuation
  - Lung nodules in a centrilobular distribution
  - Lower lung zone predominance in the craniocaudal plane

Treatment
- Al-Toubah et al. treated patients with presumed or confirmed DIPNECH with somatostatin analogs. 79% showed symptomatic improvement, and 14/15 showed improvement in FEV1 after treatment.

Prognosis
- Hayes et al. 2022 cohort study found that the DIPNECH cohort had a 15-year survival rate of 86%.
References:


