Interesting case
Case 1
Case 1: Question

1.1 What is the intralobular distribution?

1. Centrilobular
2. Perilymphatic
3. Random
1.1 What is the intralobular distribution?

1. Centrilobular
2. Perilymphatic
3. Random
Perilymphatic

Centrilobular

Random
1. Centrilobular
Case 1: Question

1.2 What is the diagnosis?
1. Silicosis
2. Bronchiolitis
3. Lymphangitic carcinomatosis
4. Miliary tuberculosis
1.2 What is the diagnosis?

1. Silicosis

2. Bronchiolitis

3. Lymphangitic carcinomatosis

4. Miliary tuberculosis
1. Silicosis
   Centrilobular well defined nodule/
   Perilymphahahtic nodule

2. Bronchiolitis
   Centrilobular ill-defined nodule/ Tree in bud

3. Lymphangitic carcinomatosis
   Smooth-nodular thickened interlobular septum/
   Perilymphahatic nodule

4. Miliary tuberculosis
   Random well defined nodule
**Case 1**

<table>
<thead>
<tr>
<th>Lung volume</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern</td>
<td>Centrilobular nodule/Bronchial dilatation</td>
</tr>
<tr>
<td>Distribution</td>
<td>Craniocaudal Lower</td>
</tr>
<tr>
<td></td>
<td>Axial Diffuse</td>
</tr>
<tr>
<td></td>
<td>Intralobular Centrilobular</td>
</tr>
<tr>
<td>Associated finding</td>
<td>Pulmonary-arterial hypertension</td>
</tr>
</tbody>
</table>

**Diagnosis:** Bronchiolitis

**Histology:** Bronchiolitis
2.1 What is the intralobular distribution?

1. Centrilobular
2. Perilymphatic
3. Random
2.1 What is the intralobular distribution?

1. Centrilobular
2. Perilymphatic
3. Random
1. Centrilobular
Case 2 : Question

2.2 What is the diagnosis ?

1. Bronchial spreading tuberculosis
2. Miliary metastasis
3. Lymphatic carcinomatosis
Case 2: Answer

2.2 What is the diagnosis?

1. Bronchial spreading tuberculosis
2. Miliary metastasis
3. Lymphatic carcinomatosis
Common presentation

1. Bronchial spreading tuberculosis
   Centrilobular well defined nodule

2. Miliary tuberculosis
   Random well defined nodule

3. Lymphatic carcinomatosis
   Smooth-nodular thickened interlobular septum/
   Perilymphatic nodule
1. Bronchial spreading tuberculosis

- Sputum AFB 08/12/2006: AFB positive 2+

- Sputum Culture 08/12/2006: Mycobacterium tuberculosis

- Histopathology: Peribronchial inflammation
## Case 2

<table>
<thead>
<tr>
<th>Lung volume</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern</td>
<td>Centrilobular nodule</td>
</tr>
<tr>
<td>Distribution</td>
<td></td>
</tr>
<tr>
<td>Craniocaudal</td>
<td>Upper</td>
</tr>
<tr>
<td>Axial</td>
<td>Diffuse</td>
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<tr>
<td>Intralobular</td>
<td>Centrilobular</td>
</tr>
<tr>
<td>Associated finding</td>
<td>Bronchiectasis</td>
</tr>
</tbody>
</table>

**Diagnosis:** Pulmonary tuberculosis

**Histology:** Peribronchial inflammation
3.1 What is the intralobular distribution?

1. Centrilobular
2. Perilymphatic
3. Random
Case 3: Answer

3.1 What is the intralobular distribution?

1. Centrilobular
2. Perilymphatic
3. Random
3. Random
3.2 What is the diagnosis?

1. Bronchial spreading tuberculosis
2. Miliary tuberculosis
3. Lymphatic carcinomatosis
3.2 What is the diagnosis?

1. Bronchial spreading tuberculosis
2. Miliary tuberculosis
3. Lymphatic carcinomatosis
Common presentation

1. Bronchial spreading tuberculosis
   Centrilobular well defined nodule

2. Miliary tuberculosis
   Random well defined nodule

3. Lymphatic carcinomatosis
   Smooth-nodular thickened interlobular septum/
   Perilymphatic nodule
2. Miliary tuberculosis

- Sputum AFB  17/06/2013  : AFB positive 1+
- Sputum Culture  17/06/2013  : Negative
- Histopathology  : Caseous granulomatous inflammation
### Case 3

<table>
<thead>
<tr>
<th>Lung volume</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern</td>
<td>Nodule</td>
</tr>
<tr>
<td>Distribution</td>
<td></td>
</tr>
<tr>
<td>Craniocaudal</td>
<td>Diffuse</td>
</tr>
<tr>
<td>Axial</td>
<td>Diffuse</td>
</tr>
<tr>
<td>Intralobular</td>
<td>Random</td>
</tr>
<tr>
<td>Associated finding</td>
<td>-</td>
</tr>
</tbody>
</table>

**Diagnosis:** Miliary tuberculosis

**Histology:** Caseous granulomatous inflammation
Case 4
4.1 What is the intralobular distribution?

1. Centrilobular
2. Perilymphatic
3. Random
4.1 What is intralobular distribution?

1. Centrilobular
2. Perilymphatic
3. Random
1. Centrilobular
4.2 What is the diagnosis?

1. Bacterial bronchiolitis
2. Silicosis
3. Bronchial spreading tuberculosis
4.2 What is the diagnosis?

1. Bacterial bronchiolitis
2. Silicosis
3. Bronchial spreading tuberculosis
1. Bacterial bronchiolitis
   Centrilobular poorly defined nodule
2. Silicosis
   Centrilobular well defined nodule/ Perilymphatic
3. Bronchial spreading tuberculosis
   Centrilobular well defined nodule
3. Bronchial spreading tuberculosis

- Sputum AFB 16/01/2006 : Negative
- Sputum Culture 16/01/2006 : Negative
- Histopathology : Necrosis and fibrosis
Pre treatment 2549

Post treatment 2552
### Case 4

<table>
<thead>
<tr>
<th>Lung volume</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pattern</strong></td>
<td>Centrilobular nodule/Consolidation</td>
</tr>
<tr>
<td><strong>Distribution</strong></td>
<td>Craniocaudal</td>
</tr>
<tr>
<td></td>
<td>Axial</td>
</tr>
<tr>
<td></td>
<td>Intralobular</td>
</tr>
<tr>
<td><strong>Associated finding</strong></td>
<td>Lymph node enlargement</td>
</tr>
</tbody>
</table>

**Diagnosis:** Tuberculosis

**Histology:** Necrosis and fibrosis
Case 5
5.1 What is the intralobular distribution?

1. Centrilobular
2. Perilymphatic
3. Random
5.1 What is the intralobular distribution?

1. Centrilobular
2. Perilymphatic
3. Random
1. Centrilobular
Histology

Granulomatous inflammation suggestive of tuberculosis. Few eosinophils are scattered at submucosal. (AFB negative)
Clinical discussion

- A known case of Tb ileum status post complete treat ment
- Sputum AFB 02/03/2006 : Negative
- Sputum Culture 15/06/2006 : Negative
- Histology: Granulomatous inflammation (AFB negative)
Confidence in diagnosis

**Group B:** Disease accurately identified with short Ddx

- Silicosis, Coal worker pneumoconiosis
- Sarcoidosis, Beryliosis
- COP, Chronic eosinophilic pneumonia
- DIP, Hypersensitivity pneumonitis
- NSIP
- RB-ILD
<table>
<thead>
<tr>
<th>Category 1</th>
<th>Category 2</th>
<th>Category 3</th>
<th>Category 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>No invasive procedure needed if clinical and CT feature are typical</td>
<td>BAL</td>
<td>Transbronchial Bx</td>
<td>Surgical lung Bx</td>
</tr>
<tr>
<td>× UIP</td>
<td>× PAP</td>
<td>× Sarcoidosis</td>
<td>× Nonspecific CT appearance without a clinical explanation</td>
</tr>
<tr>
<td>× Lymphangiomymomatosis</td>
<td>× Infection</td>
<td>× Lymphagitic carcinoma</td>
<td>× Typical CT appearance of condition with atypical features</td>
</tr>
<tr>
<td>× Langerhan's histiocytosis</td>
<td></td>
<td>× Lymphoperiferative disorders</td>
<td>× Typical clinical features of a condition with atypical CT</td>
</tr>
<tr>
<td>× HP</td>
<td></td>
<td>× Malignancy</td>
<td></td>
</tr>
<tr>
<td>× Pneumoconiosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>× Collagen vascular disease</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Case 5**

<table>
<thead>
<tr>
<th>Lung volume</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pattern</strong></td>
<td>Centrilobular nodule</td>
</tr>
<tr>
<td>Craniocaudal</td>
<td>Lower</td>
</tr>
<tr>
<td>Axial</td>
<td>Diffuse</td>
</tr>
<tr>
<td>Intralobular</td>
<td>Centrilobular</td>
</tr>
<tr>
<td><strong>Associated finding</strong></td>
<td>Lymph node enlargement</td>
</tr>
</tbody>
</table>

**Diagnosis:** Hypersensitivity

**Histology:** Granulomatous inflammation
Case 6
Case 6: Question

6.1 What is the main pattern of this HRCT?

1. Reticulation

2. Groundglass opacity

3. 1 and 2
6.1 What is the main pattern of this HRCT?

1. Reticulation

2. Groundglass opacity

3. 1 and 2
6.2 What kind of the lines is in majority?

1. Interlobular line
2. Intralobular line
6.2 What kind of the lines is in majority?

1. Interlobular line

2. Intralobular line
6.3 What is the intralobular distribution?

1. Panlobular
2. Perilobular
3. Centrilobular
6.3 What is the intralobular distribution?

1. Panlobular
2. Perilobular
3. Centrilobular
6.4 What is the diagnosis?

1. Pulmonary alveolar proteinosis
2. Hypersensitivity pneumonitis
3. Lymphangitic carcinomatosis
6.4 What is the diagnosis?

1. Pulmonary alveolar proteinosis
2. Hypersensitivity pneumonitis
3. Lymphangitic carcinomatosis
Case 6

PAP

Lymphangitic carcinomatosis
Histology

Consistent with pulmonary alveolar proteinosis (PAS positive)
**Group A: Confident CT diagnosis**

- IPF
- Lymphangitic spreading: Bx
- Alveolar proteinosis: BAL, Bx
- Asbestosis
- Lung edema/ Left heart failure
### Case 6

<table>
<thead>
<tr>
<th>Category 1</th>
<th>Category 2</th>
<th>Category 3</th>
<th>Category 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>No invasive procedure needed if clinical and CT feature are typical</td>
<td>BAL</td>
<td>Sarcoidosis</td>
<td>Nonspecific CT appearance without a clinical explanation</td>
</tr>
<tr>
<td>× UIP</td>
<td>× PAP</td>
<td>× Lymphagitic carcinoma</td>
<td>× Typical CT appearance of condition with atypical features</td>
</tr>
<tr>
<td>× Lymphangio- myomatosis</td>
<td>× Infection</td>
<td>× Lymphopheriferative disorders</td>
<td>× Typical clinical features of a condition with atypical CT</td>
</tr>
<tr>
<td>× Langerhan's histiocytosis</td>
<td></td>
<td>× Malignancy</td>
<td></td>
</tr>
<tr>
<td>× HP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>× Pneumoconiosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>× Collagen vascular disease</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Case 6

<table>
<thead>
<tr>
<th>Lung volume</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern</td>
<td>GGO/ intralobular line</td>
</tr>
<tr>
<td>Craniocaudal</td>
<td>Diffuse</td>
</tr>
<tr>
<td>Axial</td>
<td>Diffuse</td>
</tr>
<tr>
<td>Intralobular</td>
<td>Panlobular</td>
</tr>
<tr>
<td>Associated finding</td>
<td>-</td>
</tr>
</tbody>
</table>

**Diagnosis** : PAP

**Histology** : PAP
7.1 What is the main pattern of this HRCT?

1. Groundglass opacity
2. Honeycombing
3. Consolidation
4. All of the above
7.1 What is the main pattern of this HRCT?

1. Groundglass opacity
2. Honeycombing
3. Consolidation
4. All of the above
7.2 What is the craniocaudal distribution?

1. Upper
2. Diffuse
3. Lower
Case 7: Answer

7.2 What is the craniocaudal distribution?

1. Upper
2. Diffuse* (Correct Answer)
3. Lower
7.3 What is the axial distribution?

1. Peripheral
2. Diffuse
3. Central
7.3 What is the axial distribution?

1. Peripheral
2. Diffuse
3. Central
Case 7: Question

7.4 Are these HRCT findings typical of UIP?

1. Yes
2. No
7.4 Are this HRCT findings typical of UIP?

1. Yes

2. No
HRCT Criteria for UIP

1. Peripheral basal reticulation

2. Honeycombing

3. Absence of atypical findings
   - Consolidate
   - GGO
   - Centrilobular nodules
<table>
<thead>
<tr>
<th>Category 1</th>
<th>Category 2 BAL</th>
<th>Category 3 Transbronchial Bx</th>
<th>Category 4 Surgical lung Bx</th>
</tr>
</thead>
<tbody>
<tr>
<td>No invasive procedure needed if clinical and CT feature are typical</td>
<td>× PAP</td>
<td>× Sarcoidosis</td>
<td>× Nonspecific CT appearance without a clinical explanation</td>
</tr>
<tr>
<td>× UIP</td>
<td>× Infection</td>
<td>× Lymphangitic carcinoma</td>
<td>× Typical CT appearance of condition with atypical features</td>
</tr>
<tr>
<td>× Lymphangio-myo-matosis</td>
<td></td>
<td>× Lymphopheriferative disorders</td>
<td></td>
</tr>
<tr>
<td>× Langerhan's histiocytosis</td>
<td></td>
<td>× Malignancy</td>
<td>× Typical clinical features of a condition with atypical CT</td>
</tr>
<tr>
<td>× HP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>× Pneumoconiosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>× Collagen vascular disease</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Case 7

**Clinical diagnosis:** Chronic hypersensitivity

**Histology:** None

<table>
<thead>
<tr>
<th>Lung volume</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pattern</strong></td>
<td><strong>GGO/reticulation/honeycombing</strong></td>
</tr>
<tr>
<td>Craniocaudal</td>
<td>Diffuse</td>
</tr>
<tr>
<td>Distribution</td>
<td>Peripheral</td>
</tr>
<tr>
<td>Axial</td>
<td>Peripheral</td>
</tr>
<tr>
<td>Intralobular</td>
<td>Centrilobular</td>
</tr>
<tr>
<td>Associated finding</td>
<td>-</td>
</tr>
</tbody>
</table>
8.1 What about the lung volume?

1. Increased
2. Normal
3. Decreased
Case 8 : Answer

8.1 What is lung volume?

1. Increased
2. Normal
3. Decreased
8.2 What is the main pattern of this HRCT?

1. Cyst

2. Reticulation

3. Septal thickening
8.2 What is the main pattern of this HRCT?

1. Cyst
2. Reticulation
3. Septal thickening
8.3 What is the craniocaudal distribution?

1. Upper
2. Diffuse
3. Lower
8.3 What is the craniocaudal distribution?

1. Upper
2. Diffuse
3. Lower
8.4 What is the axial distribution?

1. Peripheral

2. Diffuse

3. Central
8.4 What is the axial distribution?

1. Peripheral

2. Diffuse

3. Central
8.5 What is the associated finding?

1. Lymph node enlargement
2. Rounded atelectasis
3. Pleural thickening
8.5 What is the associated finding?

1. Lymph node enlargement

2. Rounded atelectasis

3. Pleural thickening
<table>
<thead>
<tr>
<th>Category1</th>
<th>Category2</th>
<th>Category3</th>
<th>Category4</th>
</tr>
</thead>
<tbody>
<tr>
<td>No invasive procedure needed if clinical and CT feature are typical</td>
<td>BAL</td>
<td>Transbronchial Bx</td>
<td>Surgical lung Bx</td>
</tr>
<tr>
<td>✗ UIP</td>
<td>✗ PAP</td>
<td>✗ Sarcoidosis</td>
<td>✗ Nonspecific CT appearance without a clinical explanation</td>
</tr>
<tr>
<td>✗ Lymphangio-myomatosis</td>
<td>✗ Infection</td>
<td>✗ Lymphagitic carcinoma</td>
<td>✗ Typical CT appearance of condition with atypical features</td>
</tr>
<tr>
<td>✗ <strong>Langerhan's histiocytosis</strong></td>
<td></td>
<td>✗ Lymphoperif-erative disorders</td>
<td>✗ Typical clinical features of a condition with atypical CT</td>
</tr>
<tr>
<td>✗ HP</td>
<td></td>
<td>✗ Malignancy</td>
<td></td>
</tr>
<tr>
<td>✗ Pneumoconiosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>✗ Collagen vascular disease</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Confidence in diagnosis

**Group A: Confident CT diagnosis**

- IPF
- Lymphangitic spreading: Bx
- Lymphangiomyomatosis
- **Langerhans cell histocytosis**
- Alveolar proteinosis: BAL, Bx
- Asbestosis
- Lung edema/ Left heart failure
### Case 8

<table>
<thead>
<tr>
<th>Lung volume</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pattern</strong></td>
<td>Cyst/ nodule</td>
</tr>
<tr>
<td>Craniocaudal</td>
<td>Upper</td>
</tr>
<tr>
<td>Axial</td>
<td>Diffuse</td>
</tr>
<tr>
<td>Intralobular</td>
<td>Centrilobular</td>
</tr>
<tr>
<td><strong>Associated finding</strong></td>
<td>Rounded atelectasis, pleural thickening</td>
</tr>
</tbody>
</table>

**Diagnosis:** PLCH

**Histology:** Inconclusive (chronic inflammation, no langerhans cell)
9.1 What is the main pattern of this HRCT?

1. Ground glass opacity
2. Reticulation
3. Septal thickening
4. All
9.1 What is the main pattern of this HRCT?

1. Ground glass opacity
2. Reticulation
3. Septal thickening
4. All
9.2 What is the diagnosis?

1. Pulmonary alveolar proteinosis

2. Hypersensitivity pneumonitis

3. NSIP
9.2 What is the diagnosis?

1. Pulmonary alveolar proteinosis
2. Hypersensitivity pneumonitis
3. NSIP
Histology

Alveolar proteinosis
Confidence in diagnosis

**Group A:** Confident CT diagnosis

- IPF
- Lymphangitic spreading: Bx
- Lymphangiomyomatosis
- Langerhans cell histocytosis
- **Alveolar proteinosis:** BAL, Bx
- Asbestosis
- Lung edema/ Left heart failure
<table>
<thead>
<tr>
<th>Category 1</th>
<th>Category 2</th>
<th>Category 3</th>
<th>Category 4</th>
</tr>
</thead>
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<tr>
<td>No invasive procedure needed if clinical and CT feature are typical</td>
<td><strong>BAL</strong></td>
<td><strong>Sarcoidosis</strong></td>
<td>Nonspecific CT appearance without a clinical explanation</td>
</tr>
<tr>
<td><strong>UIP</strong></td>
<td><strong>PAP</strong></td>
<td><strong>Lymphangitis</strong></td>
<td>Typical CT appearance of condition with atypical features</td>
</tr>
<tr>
<td><strong>Lymphangio-myomatosis</strong></td>
<td><strong>Infection</strong></td>
<td><strong>Lymphatic carcinoma</strong></td>
<td>Typical clinical features of a condition with atypical CT</td>
</tr>
<tr>
<td><strong>Langerhan's histiocytosis</strong></td>
<td></td>
<td><strong>Lymphoproliferative disorders</strong></td>
<td></td>
</tr>
<tr>
<td><strong>HP</strong></td>
<td></td>
<td><strong>Malignancy</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Pneumoconiosis</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Collagen vascular disease</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Case 9

<table>
<thead>
<tr>
<th>Lung volume</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern</td>
<td>GGO/ intralobular line</td>
</tr>
<tr>
<td>Craniocaudal</td>
<td>Lower</td>
</tr>
<tr>
<td>Distribution</td>
<td>Axial</td>
</tr>
<tr>
<td>Intralobular</td>
<td>Diffuse/ perilymphatic</td>
</tr>
<tr>
<td>Associated finding</td>
<td>-</td>
</tr>
</tbody>
</table>

Diagnosis: PAP
Histology: PAP
Suspected diffused lung disease

Chest radiograph

- Normal or equivocal
  - HRCT with prone views
    - Normal
    - Abnormal
      - Bx if clinical/physiologic evidence of disease
      - See next slide
  - See next slide

- Abnormal
  - HRCT
    - See next slide
  - Suggestive of sarcoidosis
    - Trans bronchial Bx
Suspected diffused lung disease

- Specific CT pattern (UIP, EG, LAM, HP, Lipoid Pneumonia)
  - Accept CT diagnosis if clinical scenario is consistent
- CT pattern suggestive of HP sarcoid, lymphagitic carcinoma, PAP, alveolar carcinoma, eosinophilic pneumonia, BOOP
  - Trans bronchial biopsy and/or bronchoalveolar lavage (CT directed)
- Other CT pattern
  - Thoracoscopic biopsy (CT directed)
Thank you