High resolution computed tomography (HRCT) scan from a 57 year old male with surgical lung biopsy confirmed usual interstitial pneumonia. The HRCT demonstrates features typical for idiopathic pulmonary fibrosis/usual interstitial pneumonia such as peripheral honeycomb change without significant ground glass opacity.

Although as the disease progresses, it is possible to assemble a list of clinical and radiographic features that predict the presence of IPF/UIP. Several studies have addressed the role of HRCT in the diagnosis of IPF. High resolution computed tomography uses thin collimation (1–2 mm) to obtain resolute images of the lung. Conventional computed tomography, with collimation typically around 10 mm, lacks adequate resolution to reliably identify and classify patients with interstitial lung disease. The HRCT features of IPF are described in Table 1. Similarly, it is possible to assemble a list of clinical and radiographic features that predict the presence of IPF in the absence of a surgical lung biopsy with a high degree of confidence (Table 2).

Several studies have addressed the ability of HRCT to predict IPF/UIP confirmed by surgical lung biopsy (Table 3). In general, the presence of consistent clinical and radiographic features is associated with a high positive predictive value. However, the absence of such features does not necessarily preclude a diagnosis.

### Table 1. HRCT Features of IPF

**Features suggestive of IPF**

<table>
<thead>
<tr>
<th>Distribution of disease in a lower lobe, subpleural pattern</th>
<th><strong>Features suggestive of a diagnosis other than IPF</strong></th>
</tr>
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<tbody>
<tr>
<td>Reticular abnormalities with honeycomb</td>
<td>Pleural thickening/edema</td>
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<td>Ground-glass opacities are not a major feature</td>
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- Distribution of disease in a lower lobe, subpleural pattern
- Reticular abnormalities with honeycomb
- Ground-glass opacities are not a major feature
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**Features suggestive of a diagnosis other than IPF**

- Pleural thickening/edema
- Predominance of ground glass opacities
- Significant mediastinal/hilar lymph node enlargement
- Central/ubular nodules and cysts

HRCT features consistent cavity sign (IPF distinct from usual interstitial pneumonia)

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**Case Scenario 1.**

High resolution computed tomography scan from a 71 year old male with surgical lung biopsy confirmed usual interstitial pneumonia. The high resolution computed tomography was read as nonspecific interstitial pneumonia. Bilateral reticulonodular infiltrates, traction bronchiectasis, and moderate ground glass opacities are present. Honeycomb change is not present.

**Case Scenario 2.**

High resolution computed tomography scan from a 71 year old male with surgical lung biopsy confirmed usual interstitial pneumonia. The high resolution computed tomography was read as nonspecific interstitial pneumonia. Bilateral reticulonodular infiltrates, traction bronchiectasis, and moderate ground glass opacities are present. Honeycomb change is not present.
### TABLE 2. ATS/ERS CRITERIA FOR THE DIAGNOSIS OF IPF IN THE ABSENCE OF A SURGICAL LUNG BIOPSY

<table>
<thead>
<tr>
<th>Major Criteria</th>
<th>Exclusion of other known causes of interstitial lung disease such as drug toxicities, environmental exposures, and connective tissue diseases</th>
</tr>
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<tbody>
<tr>
<td>- Laboratory Approach to the Diagnosis of IPF</td>
<td>- Clinical criteria (including HRCT) are required to confirm an alternative diagnosis.</td>
</tr>
<tr>
<td>- Primary care physicians</td>
<td>- Histopathologic features suggestive of other diseases, such as NSIP or other causes of ILD, must be considered.</td>
</tr>
<tr>
<td>- HRCT = High resolution computed tomography; IPF = Idiopathic pulmonary fibrosis; SLB = Surgical lung biopsy; PPV = Positive predictive value; NPV = Negative predictive value</td>
<td></td>
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### TABLE 3. TEST CHARACTERISTICS FOR A CLINICAL/HRCT DIAGNOSIS OF IPF COMPARED TO CLINICAL/HRCT/SLB

<table>
<thead>
<tr>
<th>Study</th>
<th># of Patients</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PPV %</th>
<th>NPV %</th>
</tr>
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<tr>
<td>Raghu, et al</td>
<td>59</td>
<td>78</td>
<td>90</td>
<td>88</td>
<td>82</td>
</tr>
<tr>
<td>Hunninghake, et al</td>
<td>91</td>
<td>74</td>
<td>81</td>
<td>86</td>
<td>67</td>
</tr>
<tr>
<td>Flaherty, et al</td>
<td>96</td>
<td>37</td>
<td>100</td>
<td>100</td>
<td>33</td>
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**Notes:** HRCT = High resolution computed tomography; PPV = Positive predictive value; NPV = Negative predictive value.
Raghu et al evaluated the role of a clinical/HRCT approach to the diagnosis of IPF. Of the IIPs, UIP and NSIP occur more frequently and they are the most difficult to separate clinically, radiographically, and histopathologically. Flaherty et al evaluated the ability of HRCT characteristics to identify histopathologically confirmed cases of UIP or NSIP in 96 consecutive cases. A minority of cases (27/98, 28%) of HRCT results that were felt to be diagnostic of IPF/UIP, all 27 were confirmed by SLB. Interestingly, the majority of cases not felt to be diagnostic of IPF/UIP (46/68, 67%) were confirmed as IPF/UIP by SLB. Only a minority (23/69, 33%) of the cases felt to be NSIP by HRCT were confirmed by SLB. This study and others highlight the difficulty of using clinical/radiographic criteria to make a diagnosis of NSIP and suggest that a clinical/radiologic diagnosis of NSIP should prompt the clinician to consider obtaining a surgical lung biopsy to rule out the presence of UIP.

**Role of Surgical Lung Biopsy in the Diagnosis of IPF**

Surgical lung biopsy is required to confirm the diagnosis of non-IPF IIP; however, use of SLB findings is not without difficulty. Histopathologic classification of UIP is difficult, particularly the separation of IPF/UIP from NSIP.17 The utility of SLB is further complicated because individual patients may display features of both IPF/UIP and NSIP in different lung biopsy specimens. Flaherty et al evaluated 100 patients with suspected IIP that had an SLB obtained from 96 consecutive cases.

**Table 2. ATS/ERS criteria for the diagnosis of IPF in the absence of a surgical lung biopsy**

| Table 3. Test characteristics for a clinical/radiologic diagnosis of IPF compared to clinical/radiologic/SLB 18
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**Table 3. Test characteristics for a clinical/radiologic diagnosis of IPF compared to clinical/radiologic/SLB**

18. R一会儿 we recommend computerized tomography (CT) of the thorax as an initial screening tool for all patients with ILDs. Although some studies have suggested that HRCT is not as accurate as SLB in the diagnosis of IPF/UIP, the benefit of a noninvasive test that can help to exclude other causes of ILD is substantial. Further studies are needed to confirm the role of HRCT in the diagnosis of IPF/UIP.

**References**


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CASE SCENARIO 2.

High resolution computed tomography scan from a 71 year old male with surgical lung biopsy confirmed usual interstitial pneumonia. The high resolution computed tomography was read as nonspecific interstitial pneumonia. Bilateral reticular infiltrates, traction bronchiectasis, and moderate ground glass opacities are present. Honeycomb change is not present.

The lack of effective treatment, the absence of a cure, and the difficulty of diagnosis and treatment of idiopathic pulmonary fibrosis (IPF) are a group of acute and chronic interstitial lung diseases with unknown etiology. Of the IIPs, idiopathic pulmonary fibrosis (IPF) and nonspecific interstitial pneumonia (NSIP) occur more frequently than cryptogenic organizing pneumonia, respiratory bronchiolitis interstitial lung disease, desquamative interstitial pneumonia, acute interstitial pneumonitis, and lymphocytic interstitial pneumonia. Assigning an accurate diagnosis is critical given the varied prognoses and treatment options. The “gold standard” for diagnosing an IIP involves an interaction between the clinician, radiologist, and pathologist; however, not all patients may require a surgical lung biopsy to establish a diagnosis. This article discusses recent data highlighting the role of high resolution computed tomography (HRCT) and surgical lung biopsy (SLB) in the diagnosis of IIP, particularly in the identification of IPF.

General diagnostic approach

The signs and symptoms of patients with IIP are non-diagnostic. Most patients present with a history of dyspnea, cough, and restrictive pulmonary physiology. The clinical evaluation is critical in confirming that there are not features (drug/environmental exposures, systemic illnesses, etc.) which could account for the patient’s pulmonary disease and remove them from the realm of IIP. Similarly, physiologic testing supports the suspicion of IIP when restrictive pulmonary physiology and impaired gas exchange are present. At this point in the evaluation radiographic studies assume paramount importance. Although a chest radiograph can confirm the presence of interstitial infiltrates, it lacks the sensitivity and specificity of HRCT. It is with HRCT that the pulmonologist, along with a thoracic radiologist, further refine the differential diagnosis and ultimately make a decision regarding the need for a surgical lung biopsy.

Importance of confirming the presence of idiopathic pulmonary fibrosis

Idiopathic pulmonary fibrosis is a distinctive type of chronic fibrosing interstitial pneumonia of unknown cause limited to the lungs and associated with a surgical lung biopsy showing a histopathologic pattern of usual interstitial pneumonia (UIP). Patients with IPF have the greatest risk of mortality with a median survival of 2 to 6 years.¹² Baseline features such as the presence of honeycombing on HRCT may be correlated with survival.¹² There is no treatment with proven efficacy for IPF, although as the pathogenesis of this disease is unraveled, exciting potential therapies are being investigated.¹³ The lack of effective treatment, the grave prognosis, and the potential for enrollment into clinical trials highlight the importance of an accurate diagnosis of IPF.

Role of HRCT in the diagnosis of IPF

High resolution computed tomography uses thin collimation (1–2 mm) to obtain residual images of the lung. Conventional computed tomography, with collimation typically around 10 mm, lacks adequate resolution to reliably identify and classify patients with interstitial lung disease. The HRCT features of IPF are described in Table 1.² Similarly, it is possible to assemble a list of clinical and radiographic features that predict the presence of IPF in the absence of a surgical lung biopsy with a high degree of confidence (Table 2).

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