What’s New About Subsolid Pulmonary Nodules

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Nodule Classification

- Characteristics
- New IASLC/ATS/ERS classification
- Differential diagnosis
- Prognosis
- Management guidelines
Nodule Classification

• Solid
• Subsolid (SSN)
  - Ground glass (GGN)
  - Part solid nodule (PSN)
• Requires thin-section CT for assessment
Screening Studies

ELCAP

• 34% of SSN’s malignant; only 7% of SN’s

• PSN – 63% malignant

• GGN – 18% malignant
# Adenocarcinoma CT-Histopathologic Correlation

<table>
<thead>
<tr>
<th>WHO 2004</th>
<th>IASLC/ATS/ERS 2011</th>
<th>CT Findings</th>
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<tbody>
<tr>
<td>AAH</td>
<td>AAH</td>
<td>GGN</td>
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<tr>
<td>BAC</td>
<td>AIS</td>
<td>GGN</td>
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<td></td>
<td></td>
<td>GGN (part solid)</td>
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<tr>
<td>Adenocarcinoma</td>
<td>MIA</td>
<td>GGN/PSN</td>
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<tr>
<td>Mixed Subtype (with BAC component)</td>
<td>Lepidic predominant adenoCA (non-mucinous)</td>
<td>PSN/PSN</td>
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<td></td>
<td>Invasive mucinous adenocarcinoma</td>
<td>PSN with ↑solid areas</td>
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<td></td>
<td></td>
<td>SN</td>
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<td></td>
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<td>Consolidation</td>
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<tr>
<td>Adenocarcinoma Mixed type</td>
<td>Invasive adenocarcinoma classified by subtype</td>
<td>SN or PSN with ↑solid component</td>
</tr>
</tbody>
</table>

Travis WD. J Thorac Onc 2011; 6:244-285
Atypical Adenomatous Hyperplasia (AAH)

- Precursor of adenocarcinoma
- Proliferation of type II pneumocytes
- GGN < 5 mm
Atypical Adenomatous Hyperplasia (AAH)
Adenocarcinoma in situ (AIS) (Prior bronchoalveolar carcinoma)

- Pre-invasive < 3 cm
- Pure lepidic growth
- No invasion, non mucinous
- GGO or Part solid GGO
Adenocarcinoma in situ - (Prior BAC)
Minimally Invasive Adenocarcinoma (MIA)

- Lepidic predominant tumor (< 3 cm)
- < 5 mm stromal invasion
- No lymphatic, vascular or pleural invasion
- Complete histology needed
- GGN & PSN (small)
Minimally Invasive Adenocarcinoma

Predominantly GGO
Part solid nodular areas within GGO
Lepidic Predominant Adenocarcinoma (LPA)

- Lepidic predominant tumor
- > 5 mm stromal invasion
- Lymphatic, vascular or pleural invasion
- PSN or solid nodule
Lepidic Predominant Adenocarcinoma

• Part-solid (ground glass with a solid component)
Invasive Mucinous Adenocacinoma

- > 5 mm stromal invasion
- Solid (or PSN) consolidation
Invasive Mucinous Adenocarcinoma
Differential Diagnosis

• 30-70% subsolid nodules resolve

• Benign
  • Infection
  • Focal fibrosis/scarring
  • Focal inflammation: OP; EP or NSIP
Part solid nodule-post inflammatory

Baseline

3 months
Subsolid Nodules

- 53 GGN’s in 49 patients
  - 75% BAC or adenoCA with BAC
  - 6% AAH
  - 19% Nonspecific OP/fibrosis
- Similar CT morphology

Kim; Radiology.2007; 245:267-75.
Growth Rates

• Low dose screening over 3 years

• 61 of 82 cancers average volume doubling time - 52-1733 days
  • GGN – 813 days
  • PSN – 457 days
  • Solid – 149 days

• 2 year stability does not indicate benign

Hasegawa M. BJR 2000;73:1252
BIOPSY

Follow

STOP
Proposed Guidelines for Subsolid Nodule Management

• No categorization into high or low risk patients

• Guidelines interpreted in light of clinical history
Suggested interim guidelines for management of subsolid pulmonary nodules. LDCT indicates low-dose CT.

Godoy MCB, Naidich DP. J Thoracic Imaging 2012; 27:240-248
Conclusion

- Persistent SSN has a higher malignancy rate compared to solid nodules
- No CT features can reliably differentiate benign vs malignant lesion
- SSN’s have a long VDT – 2 year stability does not indicate benign lesion
- Guidelines must be used in the clinical context of each individual