Fleischner Society Guidelines for Solid Nodules

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http://radiology.uchicago.edu/index.php?q=faculty-lectures
What is a Pulmonary Nodule?

- **Definition**: A rounded opacity, well or poorly defined, measuring up to 3 cm in diameter

What is a Pulmonary Nodule?

Axial Coronal Sagittal

Recommendations for Management of Patients with Lung Nodules

Guidelines for Management of Patients with Lung Nodules

- ACCP Guidelines 2003

  Follow-up CT for ALL indeterminate nodules recommended at 3, 6, 12 and 24 months

Fleischner Society Guidelines 2005

- Data from Lung Cancer Screening programs revealed that majority of smokers over 60 yrs old have lung nodules

- Multidisciplinary committee charged with developing new guidelines
Factors Influencing Risk

Clinical Data
- Age
- Smoking
- Symptoms
- Known cancer
- Immune status

Factors Influencing Risk

Imaging Features

- Size
- Growth rate
- Location
- Morphology
- Calcium/fat content

Relevant Parameters

**Imaging Features**

- Size
- Growth rate
- Location
- Morphology
- Calcium/fat content

# Nodule Size and Probability of Malignancy

<table>
<thead>
<tr>
<th>Size</th>
<th>ELCAP</th>
<th>Mayo</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤3mm</td>
<td>1%</td>
<td>0.1%</td>
</tr>
<tr>
<td>2-5mm</td>
<td>1%</td>
<td>0.7%</td>
</tr>
<tr>
<td>4-7mm</td>
<td>24%</td>
<td></td>
</tr>
<tr>
<td>6-10mm</td>
<td>24%</td>
<td></td>
</tr>
<tr>
<td>8-20mm</td>
<td>18.7%</td>
<td></td>
</tr>
<tr>
<td>21-30mm</td>
<td>33.3%</td>
<td></td>
</tr>
<tr>
<td>21-45mm</td>
<td>80%</td>
<td></td>
</tr>
</tbody>
</table>

*(Fleischner Society Guidelines. H. MacMahon. RSNA 2010.)*
Growth rate of Nodules

- **Volume doubling time (VDT):**
  26% diameter increase = One volume doubling
- **Typical lung Ca VDT = 100 - 200 days**
  Range = 30 - 1000+ days

### Mean Doubling Times According to CT Features

<table>
<thead>
<tr>
<th>HRCT Type</th>
<th>n</th>
<th>Mean VDT ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type G</td>
<td>19</td>
<td>813 ±375</td>
</tr>
<tr>
<td>Type GS</td>
<td>19</td>
<td>457 ±260</td>
</tr>
<tr>
<td>Type S</td>
<td>23</td>
<td>149 ±125</td>
</tr>
</tbody>
</table>

### Mean Doubling Times According to CT Features


<table>
<thead>
<tr>
<th>Size (mm)</th>
<th>n</th>
<th>Mean VDT + SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10</td>
<td>22</td>
<td>536 +283</td>
</tr>
<tr>
<td>10-15</td>
<td>23</td>
<td>466 +481</td>
</tr>
<tr>
<td>16-20</td>
<td>9</td>
<td>325 +353</td>
</tr>
<tr>
<td>&gt;20</td>
<td>7</td>
<td>299 +273</td>
</tr>
</tbody>
</table>

Factors Influencing Risk

Imaging Features
- Size
- Growth rate
- Location
- Morphology
- Calcium/fat content

Overall Shape
Solid/Non-solid
Edge features

Spiculated  Lobulated

Smooth  Part-Solid

Factors Influencing Risk

Imaging Features
- Size
- Growth rate
- Location
- Morphology
- Calcium/fat content

Guidelines for Management of Small Pulmonary Nodules detected on CT Scans:
MacMahon et al. Radiology 2005; 237:395-400

- **Incidental Nodules**
  In persons of 35 years of age or older with chest CT scans performed for reasons unrelated to cancer or opportunistic infection, such as to evaluate for pulmonary embolism.
<table>
<thead>
<tr>
<th>Nodule Size</th>
<th>Low risk patient</th>
<th>High risk patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 4 mm</td>
<td>No follow-up needed</td>
<td>CT follow-up CT at 12 months; if unchanged, no further follow-up</td>
</tr>
<tr>
<td>&gt; 4-6 mm</td>
<td>CT follow-up at 12 months; if unchanged, no further follow-up</td>
<td>Initial CT follow-up at 6 to 12 months, then at 18-24 months if no change</td>
</tr>
<tr>
<td>&gt; 6-8 mm</td>
<td>Initial CT follow-up at 6 to 12 months, then at 18 to 24 months if no change</td>
<td>Initial CT follow-up at 3 to 6 months, then at 12 and 24 months if no change.</td>
</tr>
<tr>
<td>&gt; 8 mm</td>
<td>One or more of the following: CT follow-up at 3, 9, 24 months/ Dynamic CT / PET scan / Biopsy</td>
<td></td>
</tr>
</tbody>
</table>

Fleischner Society Recommendations for Follow-up and Management of Small Nodules
Compliance with Fleischner Society Guidelines for Management of Small Lung Nodules:

A Survey of 834 Radiologists

Ronald L. Eisenberg, et al. Radiology June 2010 (255) 3

- Of 834 respondents 649 (77.8%) were aware of the Fleischner Society guidelines and 490 (58.8%) worked in practices that employed them or similar guidelines.

- Management selections were consistent with the Fleischner guidelines in 34.7%–60.8% of responses for the three scenarios.

Extended authorizations are available via the CareCore National Web site. Requests for extended authorizations are initially available for:
- Solitary pulmonary nodule based on the Fleischner Society guidelines
- Follow-up of endovascular abdominal aorta grafts and/or stents
- Multiple sclerosis in active treatment (e.g., natalizumab)
- Surveillance testing in patients with underlying malignant conditions for which the ASCO or NCCN guidelines support follow-up testing for that stage of disease
IMPACT OF IMPLEMENTATION OF FLEISCHNER SOCIETY PULMONARY NODULE SURVEILLANCE CRITERIA WITHIN THE MADIGAN ARMY MEDICAL CENTER

William T. Lewis, DO* and Mohammed Naeem, MD

Prior to use of Guidelines, 1091/2377 (48)% of all chest CTs were for nodule surveillance
After Guidelines chest CTs for nodule surveillance reduced 31% (15% of total workload)
Saved 90 staff man-hours & 113 technologist man-hours
Cost reduction of $135,300
Patient dose reduction of 1579 mGy

Updates

- New information from NLST trial results
- Guidelines for non-solid/part-solid nodules
