

## **Ground Glass Nodules**

In distinction to solid nodules, no distinction is made between patients with risk factors for lung cancer and those without. Many of these nodules that turn out to be cancer are adenocarcinomas, which has a high incidence in non-smokers.

Follow up CTs should be use **low dose technique** and images should be reconstructed at **1 mm slices**. Thin slices all better detection of subtle solid components and allow more accurate measurements.

Measurement: Measure ground glass on lung windows, measure solid component on mediastinal windows. Reported size is average of long and short dimensions.

Percutaneous or transbronchial biopsy is not recommended for ground glass nodules - -poor diagnostic yield and discordant results versus open lung biopsy.

### **Solitary pure ground glass nodules 5 mm and less**

- No follow-up needed
- Many of these probably represent adenomatous hyperplasia
- Typically stable or very indolent over many years
- Doubling time on the order of 3-5 years, difficult to detect change with limited precision of measurements.
- Always use thinnest slices available to evaluate (1mm preferred) -- thin solid nodules can look like ground glass on thicker slices
- Metastatic disease is very unlikely to be pure ground glass

### **Solitary pure ground glass nodules larger than 5 mm**

- Follow-up in 3 months to determine persistence
- If resolves, likely infection or inflammatory in nature. No follow-up.
- If unchanged at 3 months, yearly follow-up for at least 3 years
- Increase in size, attenuation, or a new solid components are indications for surgical resection.
- Many of these lesions are benign or dysplastic/low grade lesions
- Malignancy rate ~18%
- Delay in treatment does not affect survival
- FDG PET is not helpful in characterizing, 67% of malignant lesions are PET negative

### **Solitary partly solid ground glass nodules**

- Follow-up in 3 months to determine persistence
- If resolves, likely infection or inflammatory in nature. No follow-up.

- If lesion decreases in size, check density change. Adenocarcinomas can decrease in size secondary to fibrosis or atelectasis. Can show decrease in size and increase in attenuation.
- Malignancy rate: ~63%
- Size of solid component based on average of long and short dimension, in mediastinal windows
- Increasing solid component worrisome of developing invasive component
- Larger the solid component, more likely invasive carcinoma
- When solid component is less than 5 mm, a conservative approach of yearly follow-up for at least 3 years is recommended

### **Multiple well defined pure ground glass nodules 5 mm or less**

- Follow up CTs at 2 and 4 years
- Consider other diagnoses, e.g. respiratory bronchiolitis in smokers

### **Multiple well defined pure ground glass nodules at least one larger than 5 mm, no dominant lesion**

- Follow up CT at 3 months
- If GGNs persist, then yearly follow-up for at least 3 years
- Increase in size, attenuation, or a new solid components are indications for surgical resection.

### **Multiple well defined pure ground glass nodules at least one larger than 5 mm, dominant lesion**

- Dominant lesion determines further management.
- Follow up CT at 3 months
- If dominant lesion has a solid component larger than 5 mm, consider resection
- For part solid lesions larger than 10 mm, consider PET/CT.

**Naidich, D et al., Recommendations for the management of subsolid pulmonary nodules detected at CT: a statement from the Fleischner Society. *Radiology*. 2013 Jan; 266(1):304-17.**