

# İNSİDENTAL PULMONER NODÜLLER

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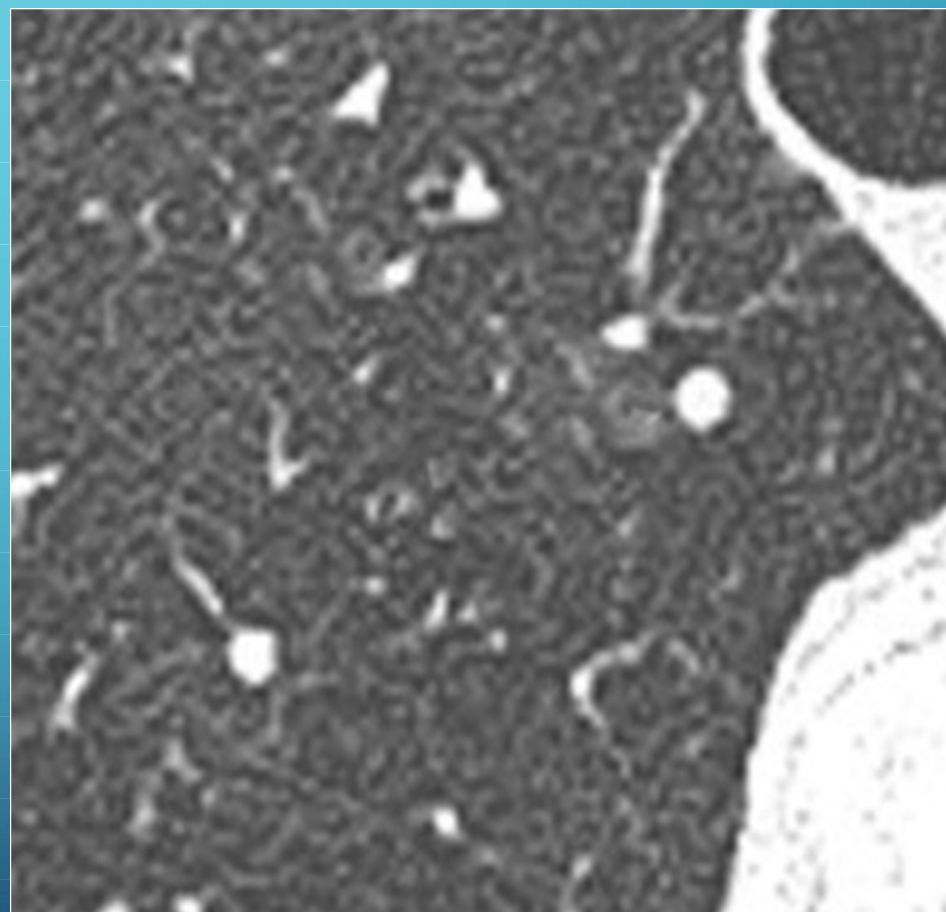
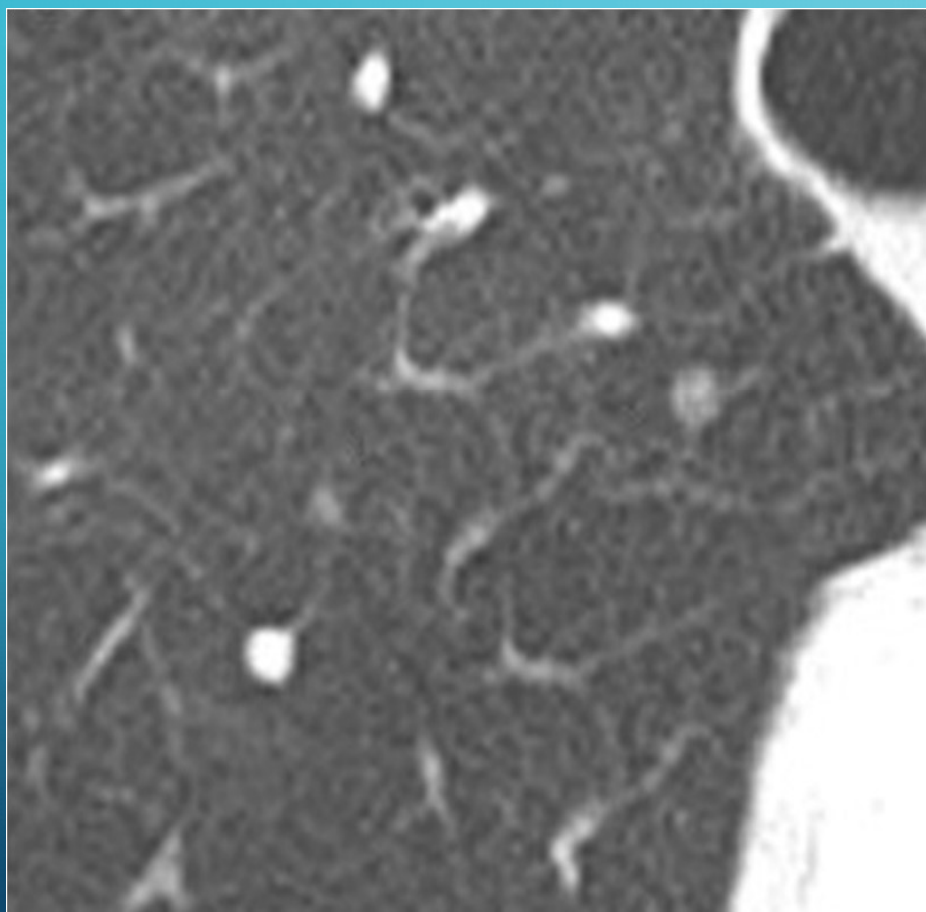
KARADENİZ TEKNİK ÜNİVERSİTESİ RADYOLOJİ

- 35 yař üstü hastalarda insidental olarak saptanan nodüllerin yönetimi ✓
- İmmüsupresif hastalar X
- Kanseri hastaları X
- 35 yař altı hastalar ve çocuklar X

# GENEL ÖNERİLER

- Kesit kalınlığı  $\leq 1.5$  mm
- Sagittal ve koronal reformat
- Doz azaltıcı yöntemler (doz modülasyonu, iteraktif rekonstrüksiyon vb.)
- Manuel ölçüm: aksiyel, sagittal ya da koronal planda kısa ve uzun aks boyutun ortalaması
- Otomatik ya da semi-otomatik volüm ölçümü
- Önceki tetkikler ile karşılaştırma





**How should the dimension of a solid pulmonary nodule be expressed?**

For purposes of risk estimation, the dimension of small pulmonary nodules (<10 mm) should be expressed as the average of maximal long-axis and perpendicular maximal short-axis measurements in the same plane. For larger nodules and masses, both long- and short-axis measurements should be recorded (grade 2B evidence).

**How should part-solid nodules be measured?**

As with solid nodules, the average of the long and short dimensions of the nodule, including ground-glass and any cystic components, should be measured and recorded for smaller nodules (<10 mm). For larger nodules, both long and short dimensions should be recorded. For all part-solid nodules, the maximum diameter of the solid component should be measured if this component is >3 mm, understanding that measurements may be unreliable for small solid components. Dimensions of both solid and nonsolid components should be recorded to document change in the future (grade 2B evidence).

**Which measurement unit should be used?**

Measurements and averages should be expressed to the nearest whole millimeter (grade 1B evidence).

**Should the dimension of every pulmonary nodule be measured?**

No, small nodules <3 mm should not be measured due to accuracy limitations. Descriptors such as "micronodule" are preferable. Also, when multiple nodules are present, only the largest or morphologically most suspicious nodules need be measured. The location of each measured nodule should be explicitly referenced in the report (grade 1C evidence).

**What CT section thickness should be used for measuring lung nodules?**

Critical measurements for small (<10 mm) lung nodules and small solid components should be obtained by using contiguously reconstructed sections with a thickness  $\leq 1.5$  mm. Larger nodules and masses can usually be measured adequately on thicker sections (grade 1B evidence).



**What should the section orientation be?**

Measurements should be performed on transverse (axial) sections, unless the maximal dimensions lie in a coronal or sagittal plane, in which case the measurements should be made in those planes and this should be documented in the radiologic report. Measurement on off-axis oblique reformations are difficult to reproduce and thus are not recommended (grade 2B evidence).

**Which reconstruction algorithm should be used?**

A high-spatial-frequency (sharp) filter should be used when measuring nodules <10 mm. For nodules ≥10 mm, the reconstruction algorithm has no substantial effect on measurement accuracy (grade 1C evidence).

**Which display window settings should be used?**

Although a soft-tissue window can be useful when evaluating changes in nodule density over time, lung nodules, including the solid portion of part-solid nodules, should be measured on lung windows by using a high-spatial-frequency (sharp) filter (grade 2B evidence).

**Which dose settings and image noise reduction algorithms can be used?**

Dose reduction techniques are appropriate up to a point at which significant loss of image quality occurs. Evidence suggests that excessive radiation dose reduction and image noise reduction algorithms can have a significant effect on the accuracy of pulmonary nodule measurements. The clinical implications of this effect are under investigation (grade 2B evidence).

**At which lung volume should CT examinations for the measurement of lung nodules be acquired?**

CT examinations to measure lung nodules should be acquired at full inspiration (grade 2B evidence).

**When can a pulmonary nodule be stated to have changed in size?**

A pulmonary nodule can be determined to have changed in size when its average diameter has increased or decreased by at least 2 mm (rounded to the nearest millimeter). Smaller changes in measured diameter can be spurious, especially for ill-defined nodules (grade 2A evidence) and do not reliably indicate change.

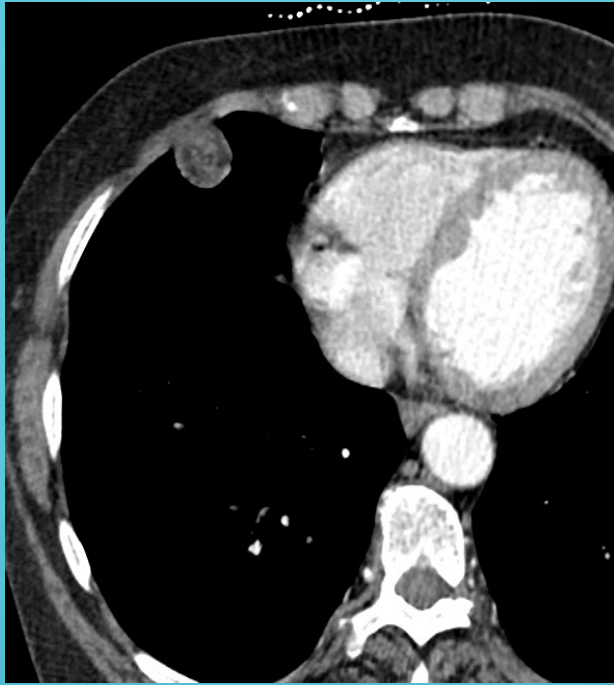
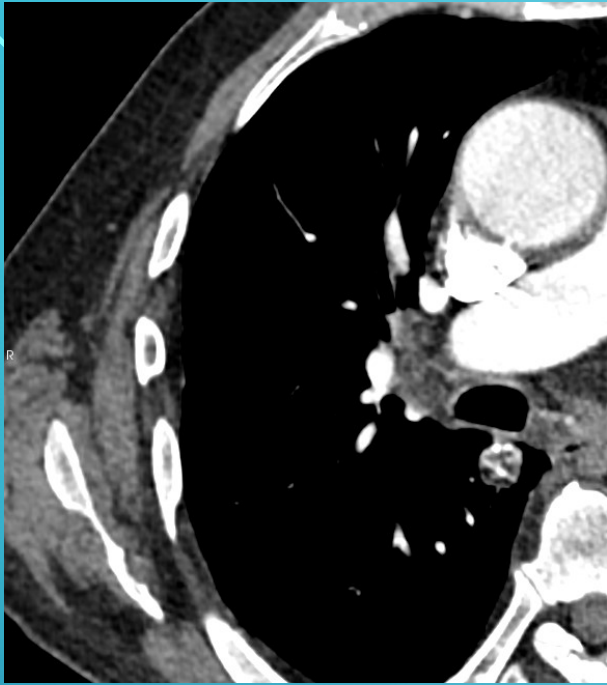
**Which previous CT examination should be used for comparison when evaluating for potential growth?**

Although the last available examination should be used as a reference to determine interval growth, comparisons with earlier prior examinations will increase reader confidence and accuracy when evaluating the longitudinal evolution of a given nodule (grade 1 evidence).

# SOLID NODÜL

- Santral, lamellar, difüz ve patlamış mısır şeklinde kalsifikasyon
- Yağ içeriđi
- Dansite ölçümü yumuşak doku penceresi, ince kesit ve küçük ROI
- Takip X

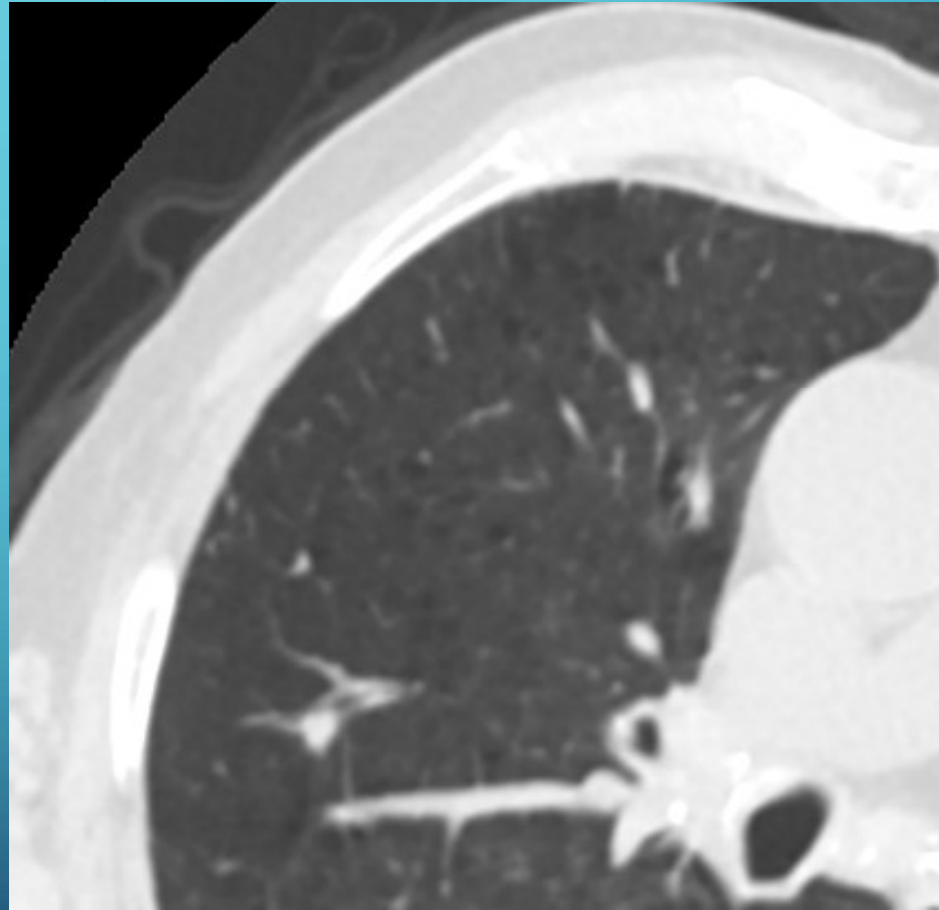
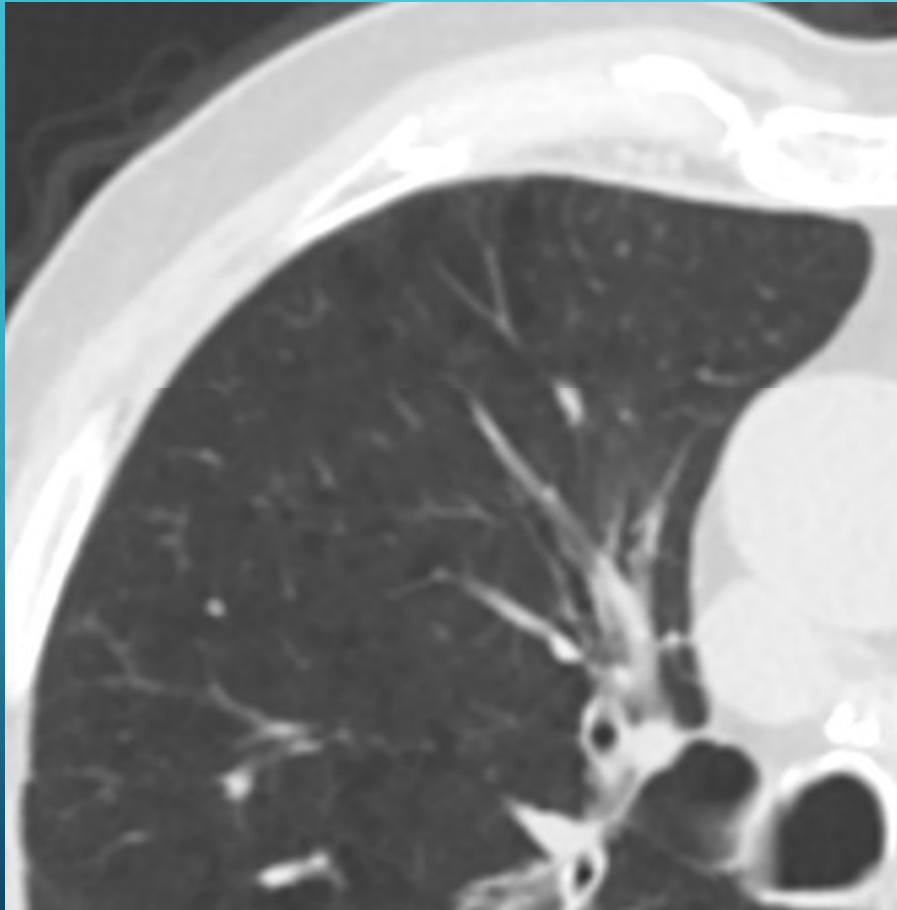


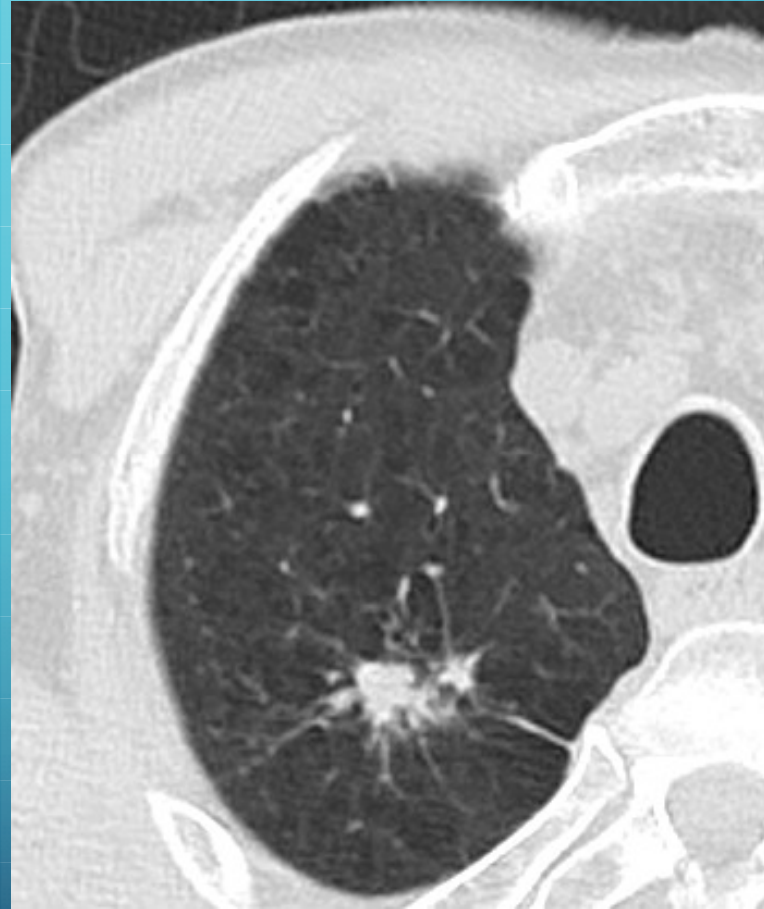
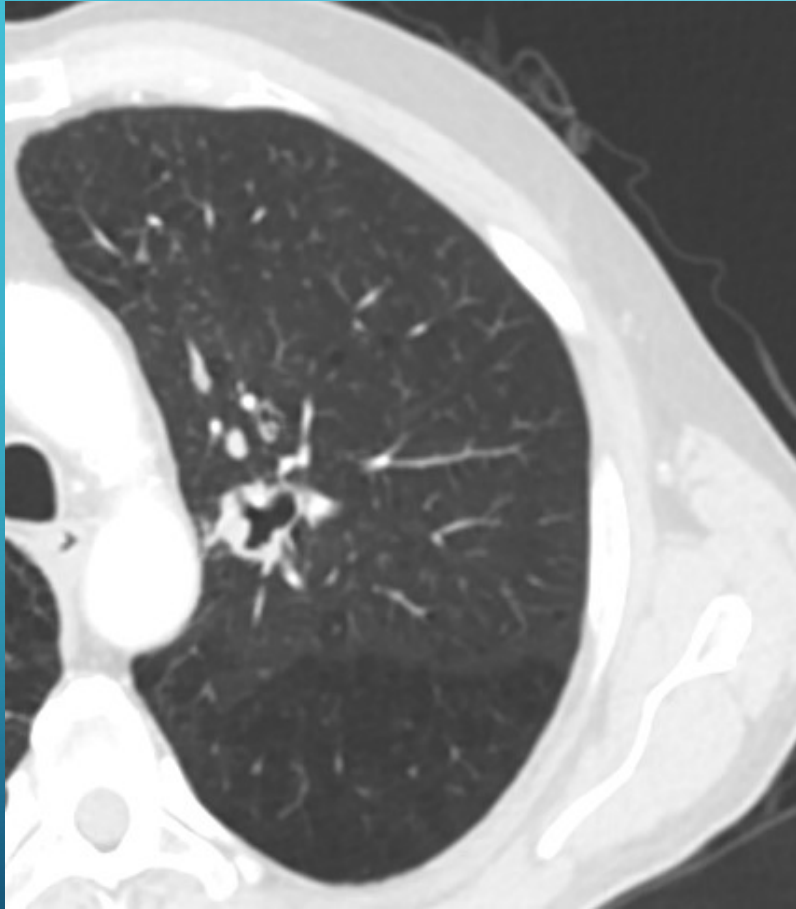




# SOLID NODÜL

- < 6 mm, tek solid nodül
  - Düşük risk, rutin takip **X**
  - Yüksek risk, üst lob yerleşim ve/veya şüpheli morfoloji, 12. ay BT
- 6-8 mm, tek solid nodül
  - Düşük risk, 6-12. ay kontrol BT, morfoloji ya da kontrol BT'de stabilite şüpheli ise 18-24. ay kontrol BT
  - Yüksek risk, 6-12. ve 18-24. ay kontrol BT
- > 8 mm, tek solid nodül, 3 ay BT veya PET-BT veya doku tanısı

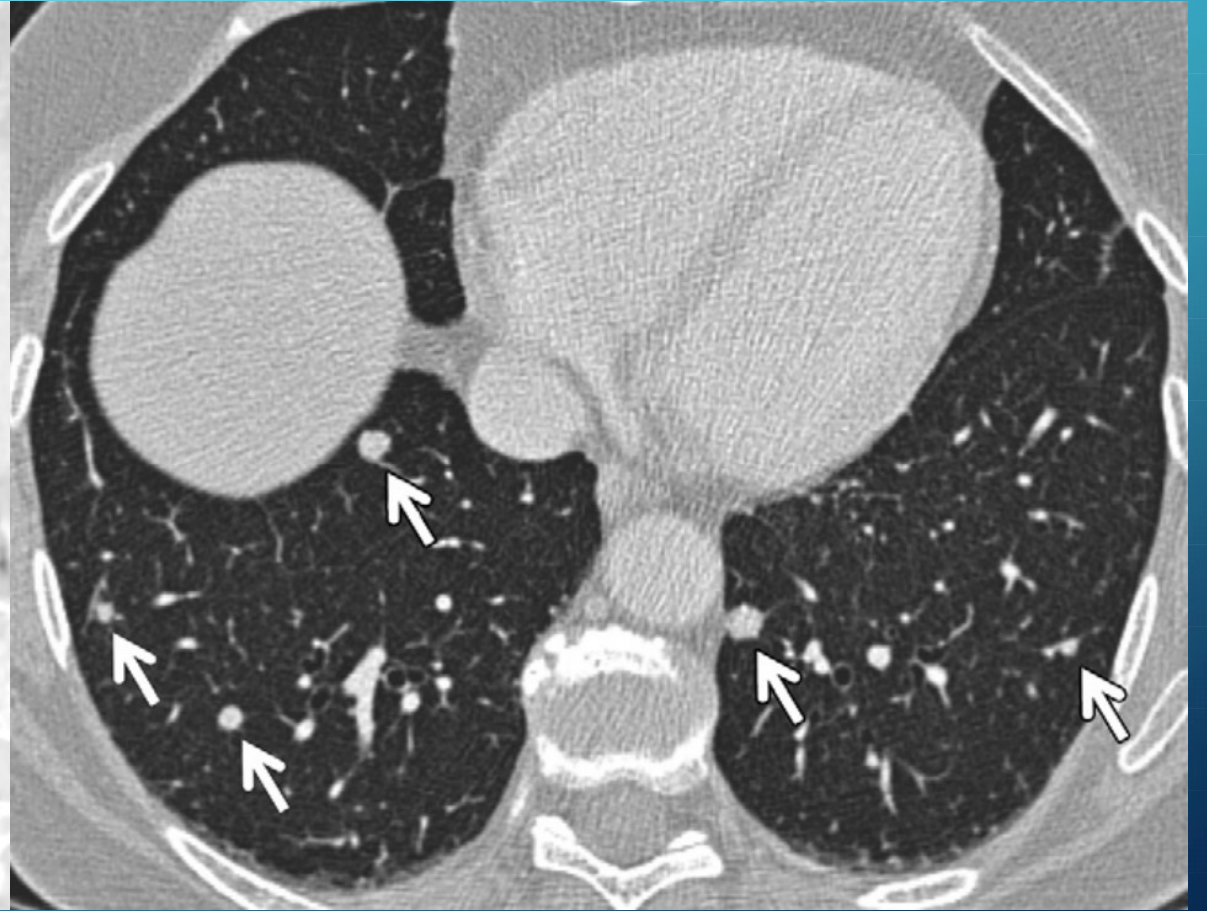
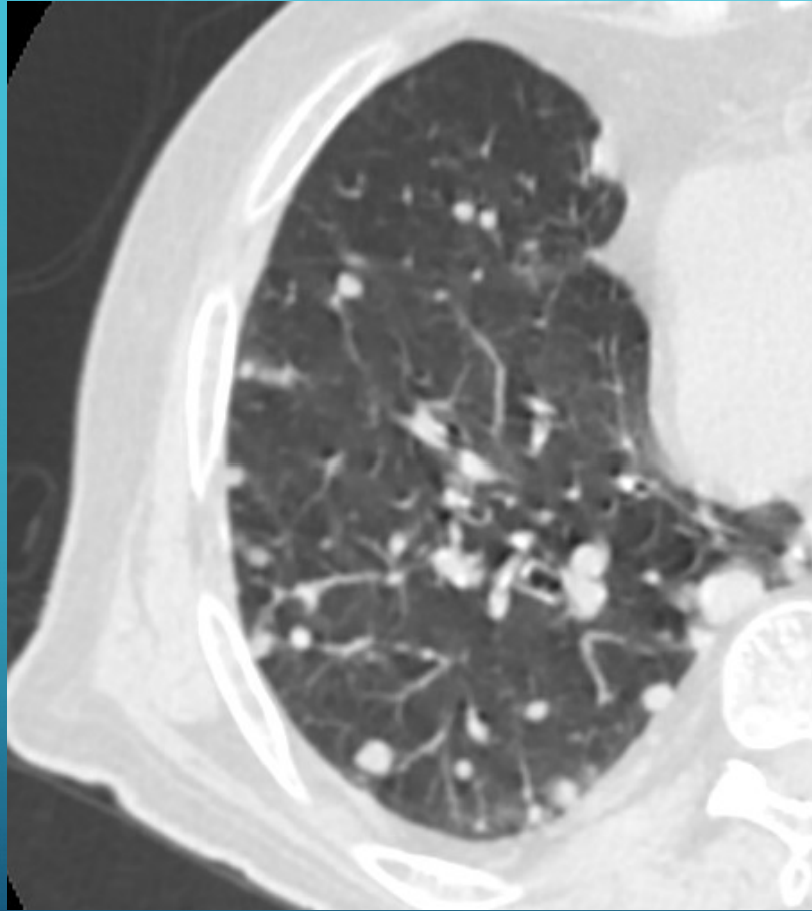






# SOLID NODÜL

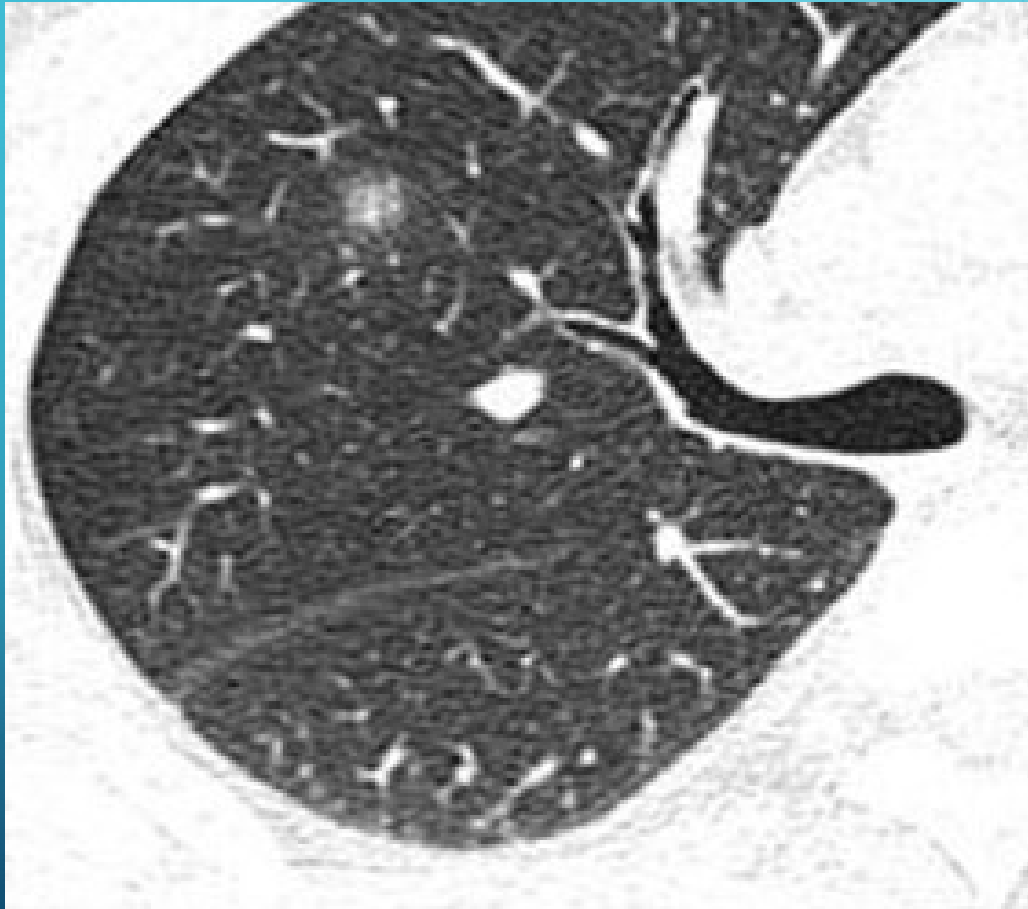
- Multiple solid nodüllerin yönetiminde en şüpheli nodül (dominant) dikkate alınır.
- $< 6$  mm, multiple solid nodül
  - Düşük risk, rutin takip **X**
  - Yüksek risk, 12. ay BT
- $\geq 6$  mm, multiple solid nodül
  - 3-6. ay BT, 18-24 ay BT

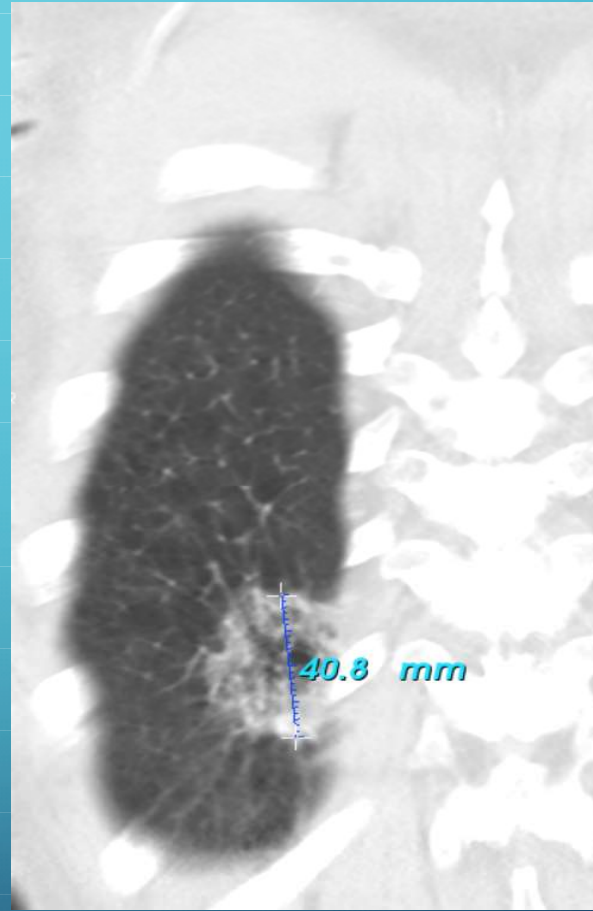
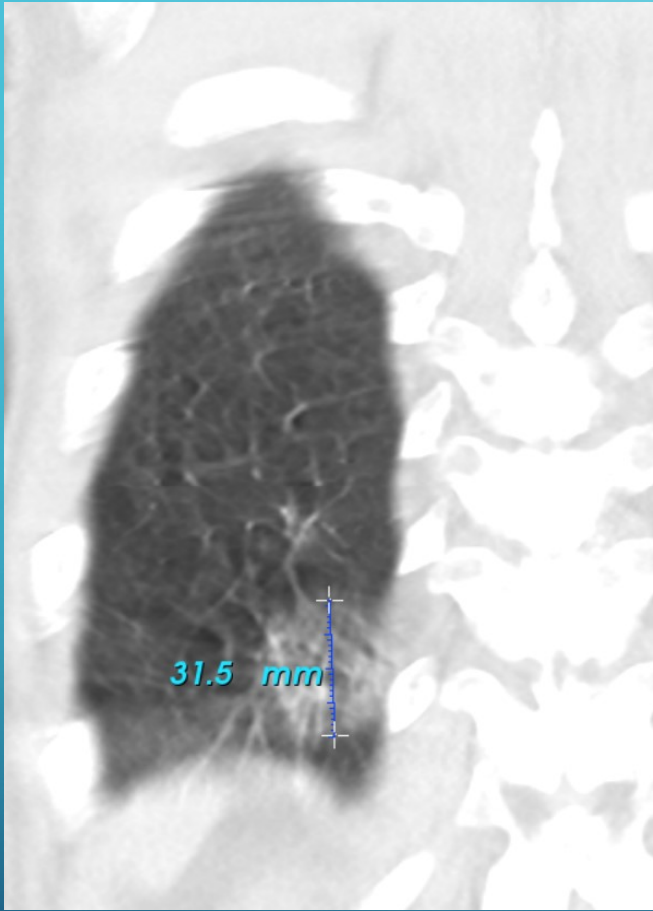


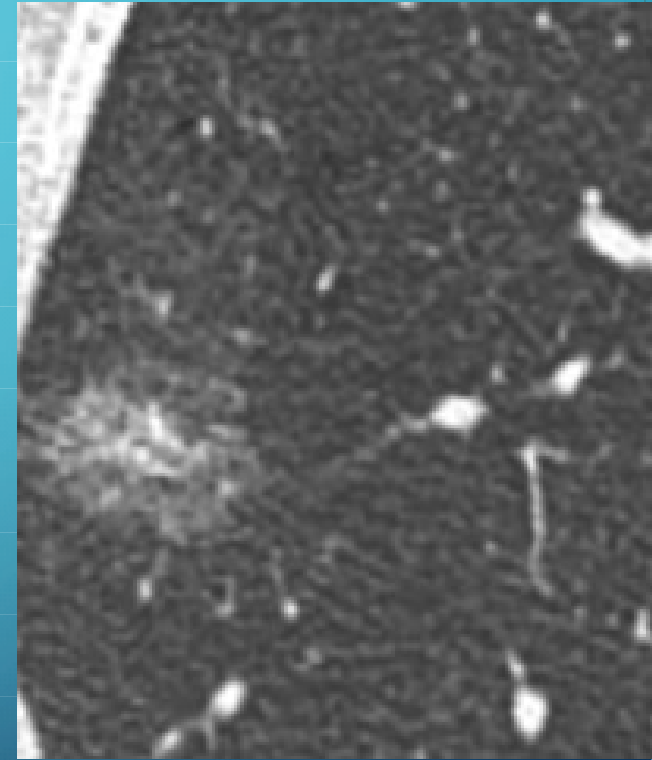
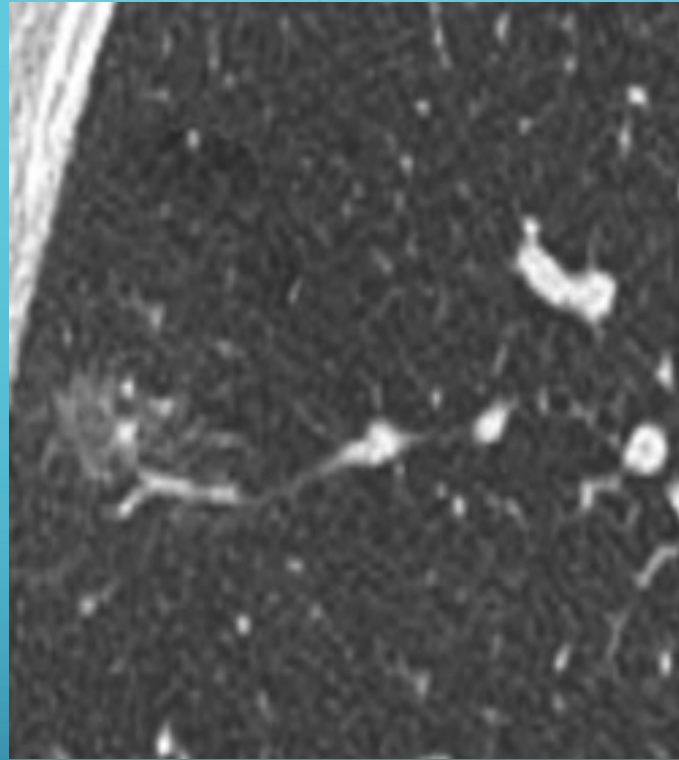
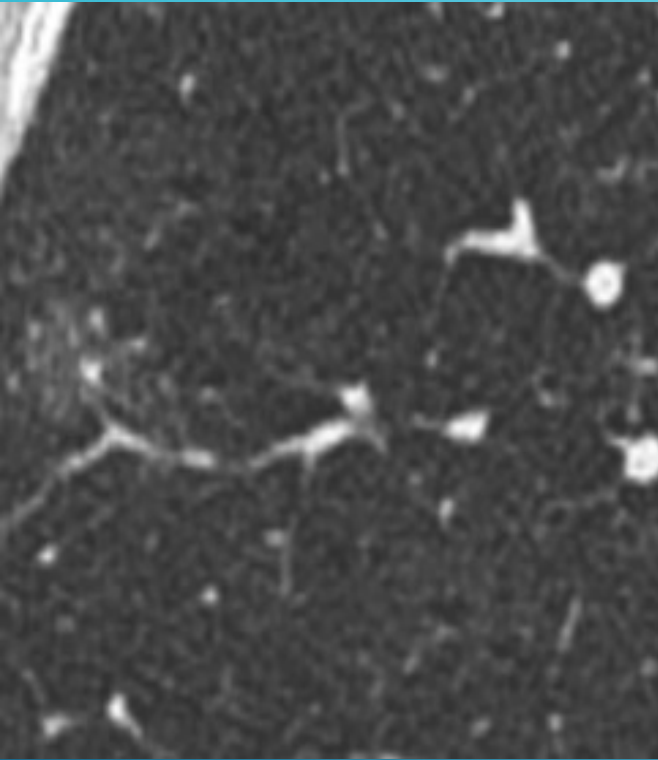
# SUBSOLİD NODÜL

- $< 6$  mm, tek buzlu cam dansitesinde nodül
  - Rutin takip **X**
  - Şüpheli nodül, 2. ve 4. yıl BT
- $\geq 6$  mm, tek buzlu cam dansitesinde nodül
  - 6-12. ay, 3. yıl ve 5. yıl BT
  - $> 10$  mm nodüllerde ve kistik değişiklikler var ise ilk kontrol BT 6. ayda





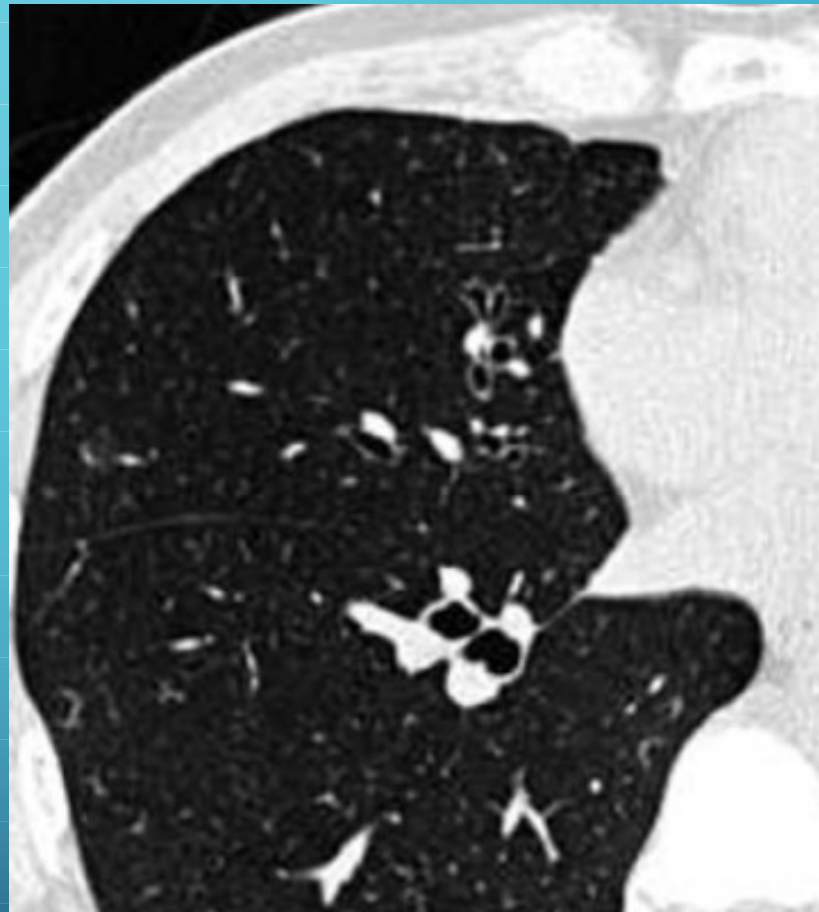
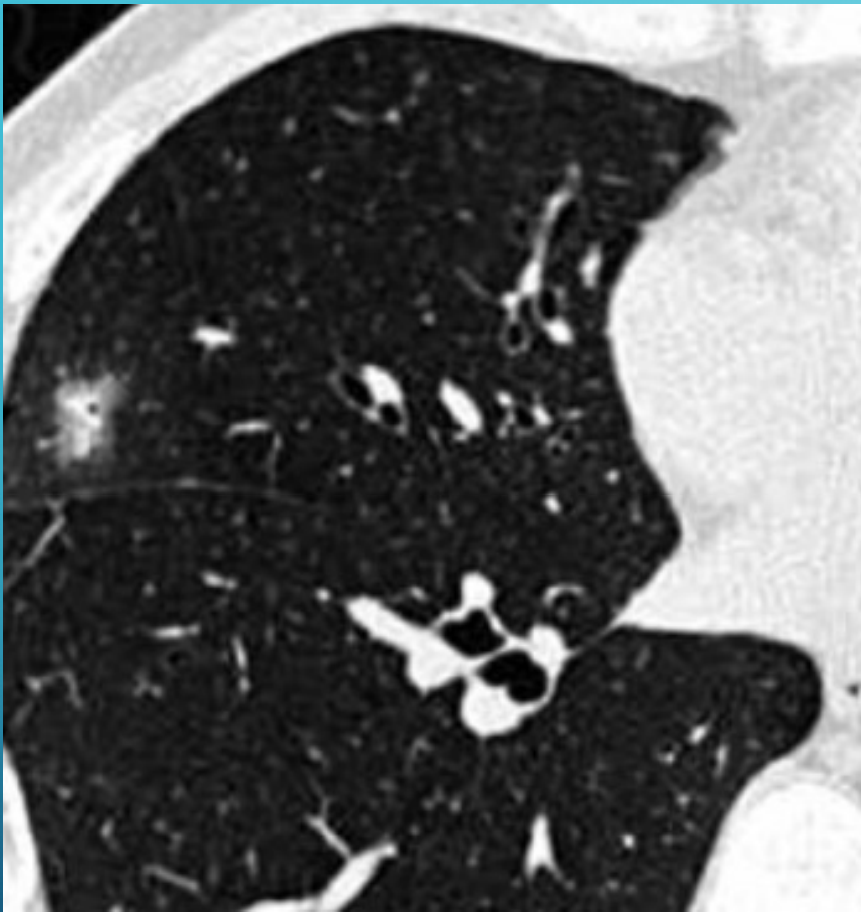


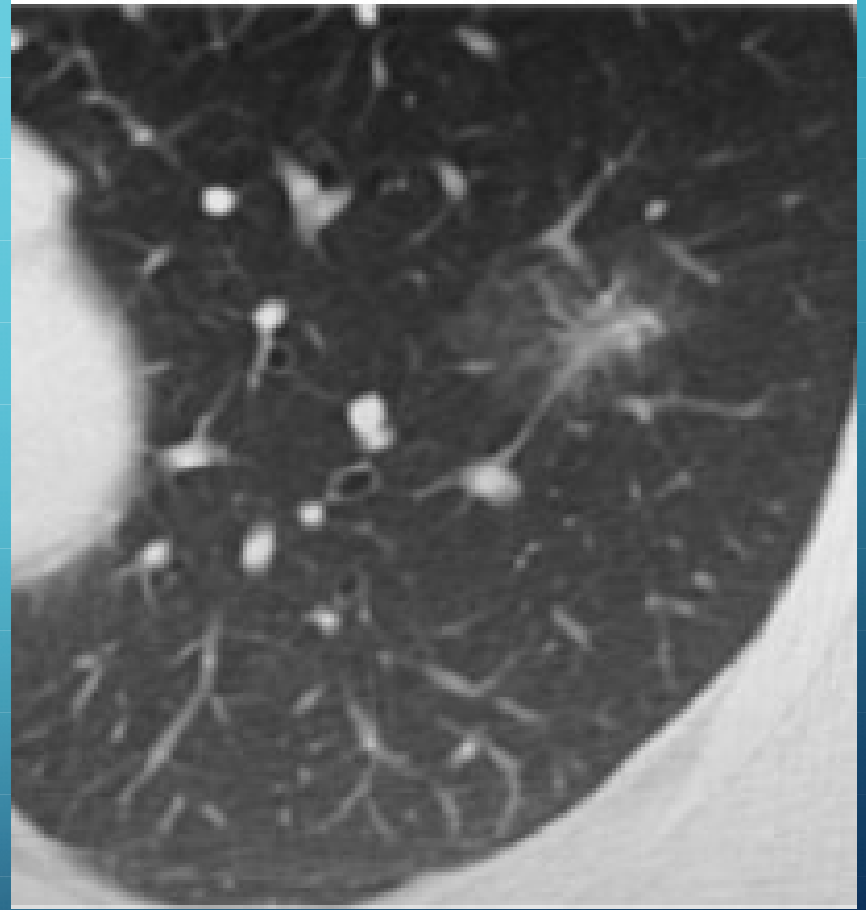
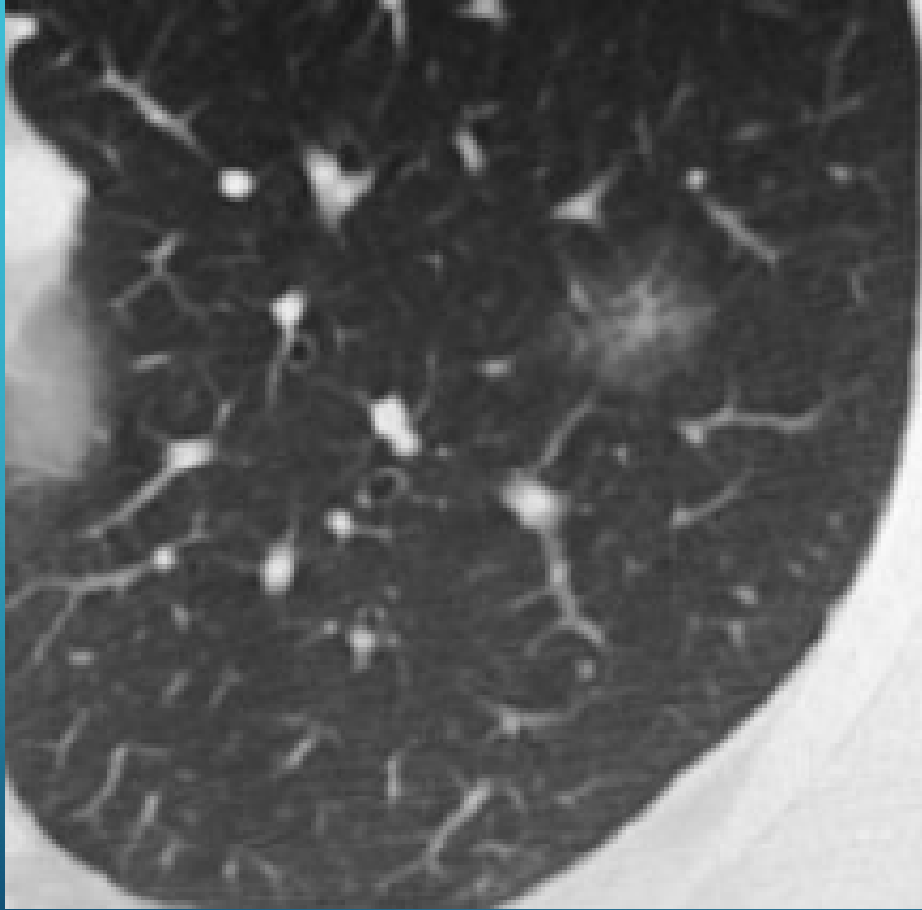




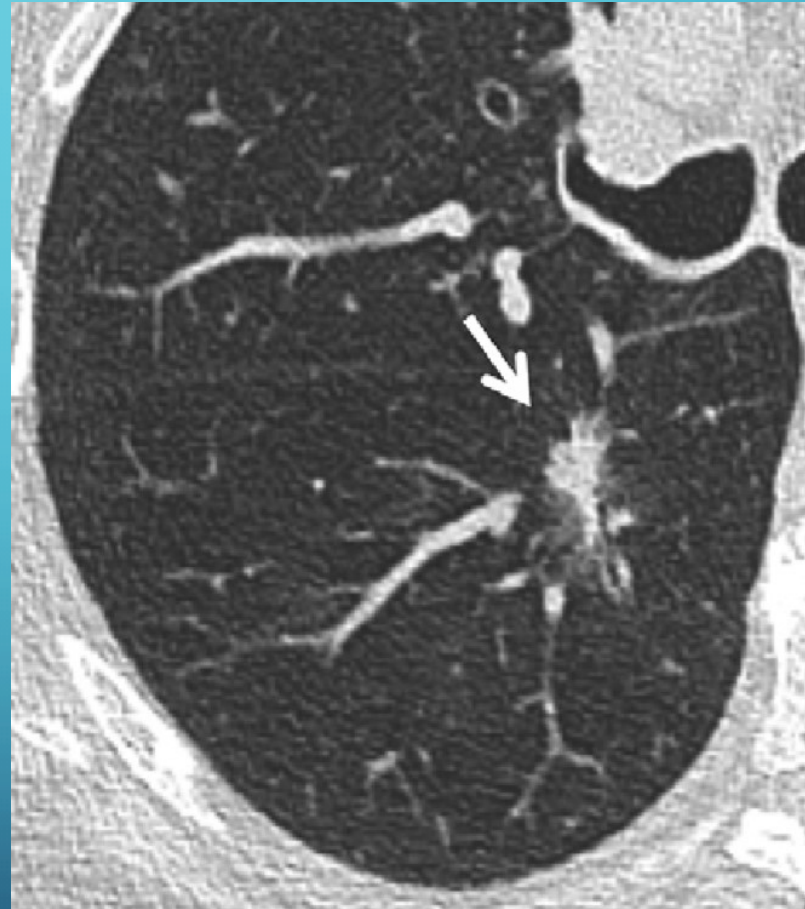
# SUBSOLİD NODÜL

- $< 6$  mm, tek kısmi solid nodül
  - Rutin takip **X**
  - Şüpheli nodül, 2. ve 4. yıl BT
- $\geq 6$  mm, solid komponent  $< 6$  mm tek kısmi solid nodül
  - 3-6. ay, 5 yıl süresince yıllık BT
- $\geq 6$  mm, solid komponent  $> 6$  mm tek kısmi solid nodül
  - 3-6. ay BT
  - Nodül şüpheli (lobüle-spiküler konturlu, kistik değişiklikler), solid komponent  $> 8$  mm, solid komponent büyüyorsa PET-BT, biyopsi ya da rezeksiyon









# SUBSOLİD NODÜL

- $< 6$  mm, multiple kısmi solid ya da buzlu cam dansitesinde nodül
  - 3-6. ay BT, persistans mevcut ise 2 ve 4. yılda BT
- $\geq 6$  mm, multiple kısmi solid ya da buzlu cam dansitesinde nodül
  - 3-6. ay BT, persistans mevcut ise takip dominant nodüle göre planlanır.

# RİSK FAKTÖRLERİ

- Nodül boyutu ve morfoloji
  - Spiküler kontur
- Nodül lokasyonu
  - Üst lob
  - Perifissürel ve subplevral
- Nodül sayısı
  - NELSON çalışması, 1-4 risk yüksek, 5 ve üzeri düşük risk
  - PanCan çalışması multiple nodülde risk soliter nodülden düşük



# RİSK FAKTÖRLERİ

- Büyüme hızı
  - Solid nodül, 100-400 gün
  - Subsolid nodül, 3-5 yıl
- Anfizem ve fibrozis
- Yaş cinsiyet, ırk, ve aile öyküsü
  - 35 yaş altı AC CA nadir
  - Kadın cinsiyet
  - Zenciler, Havai yerlileri

# RİSK FAKTÖRLERİ

- Sigara ve karsinojenler
  - $\geq 30$  paket yılı, son 15 yıl içerisinde sigarayı bırakan
  - Asbestoz, uranyum, radon
  - Elektronik sigara?
  - Sigara-adenokanser ilişkisi daha zayıf

# RİSK TAHMİNİ

- American College of Chest Physicians (ACCP)
  - Düşük risk (<%5): genç yaş, sigara içmemek ya da ağır içici olmaması, küçük, düzgün sınırlı nodül, üst lob dışında lokasyon
  - Orta risk (%5-65):
  - Yüksek risk (> %65): ileri yaş, ağır içici, büyük, spiküler ya da irregüler konturlu nodül, üst lob lokasyonu
- Risk tahmin modelleri
  - Tammemagi risk tahmin aracı
  - Brock modeli (Pan Can, Vancouver modeli)



## Brock Calculator

### Nodule Characteristics

#### Nodule Size (1-30mm)

#### Nodule Count

#### Nodule Type

 Pure Ground Glass Part Solid Solid

#### Nodule in Upper Lobe

 Yes No

#### Spiculation

 Yes No

### Patient Characteristics

#### Age (18-100)

#### Gender

 Male Female

#### Family History of Lung Cancer

 Yes No

#### Emphysema

 Yes No

#### Brock Model Probability

1.9%

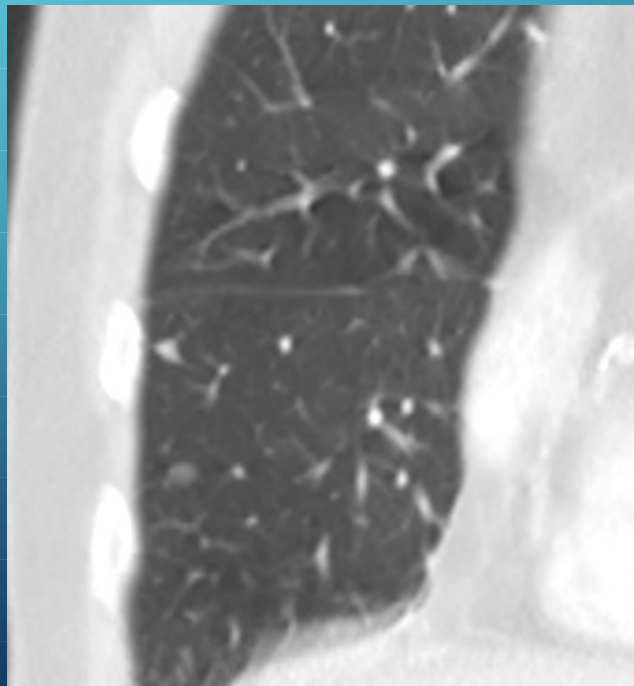
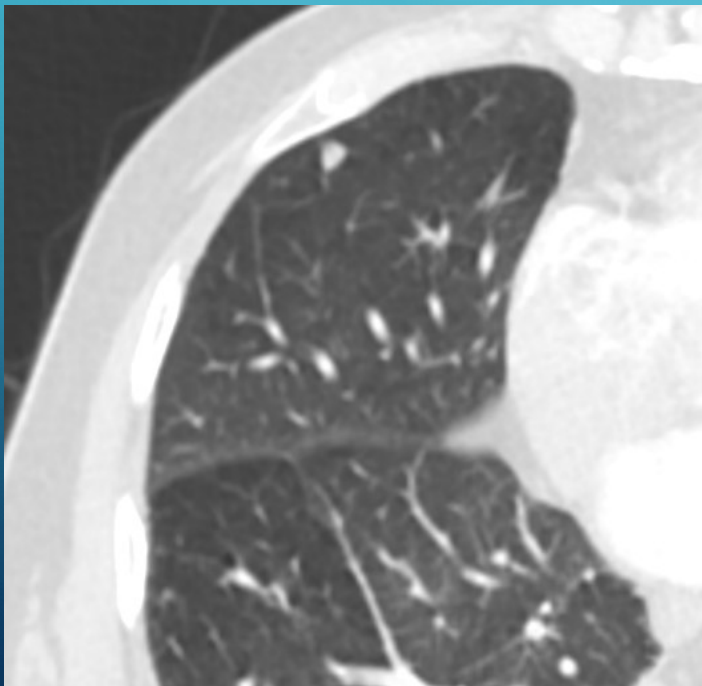
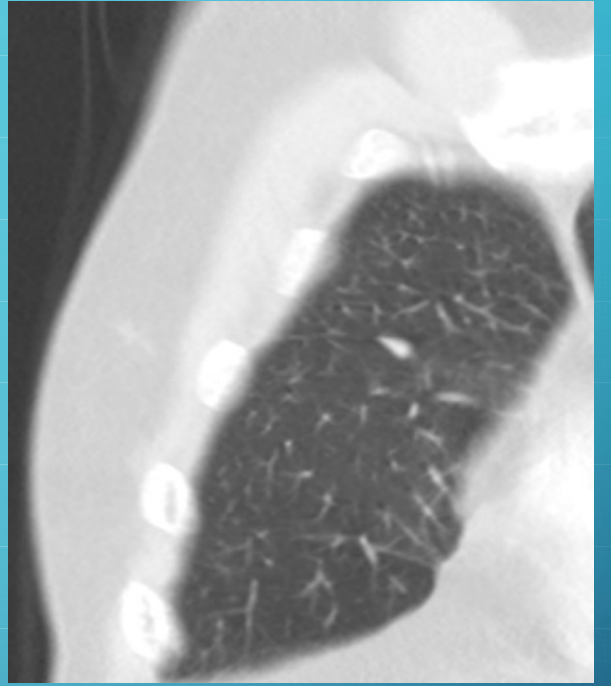
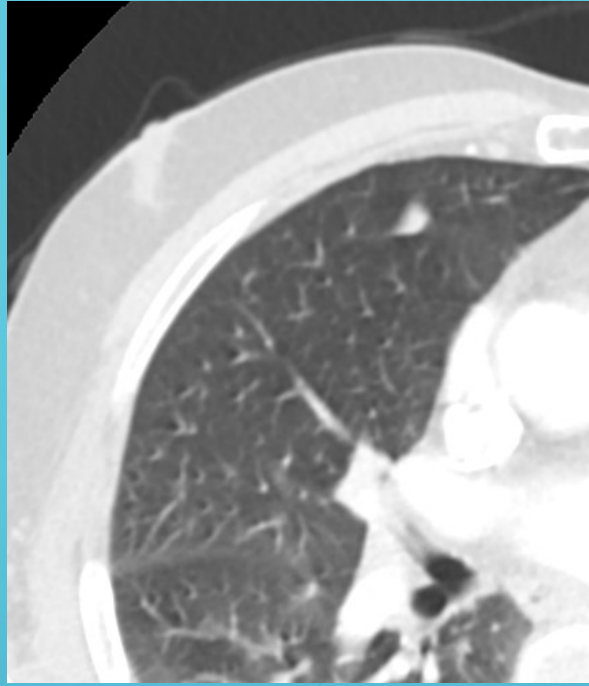
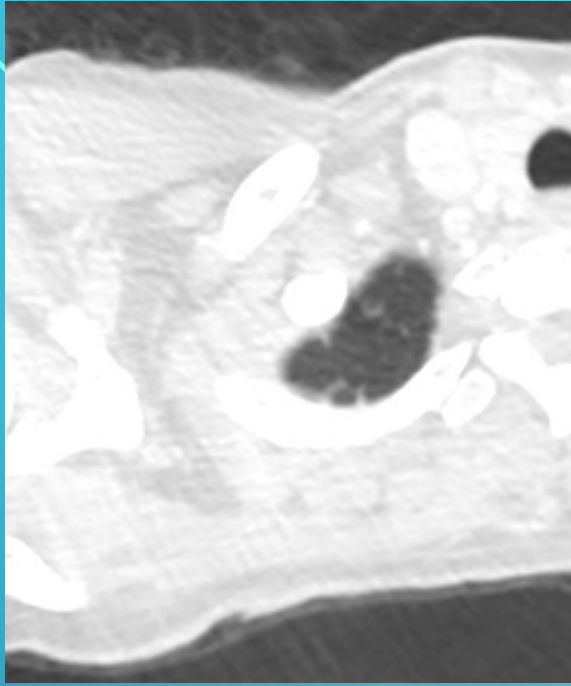
Calculate

- Apikal ve kostofrenik skar

- Subplevral, elonge, düz veya konkav kontur

- Perifissüral ve subplevral nodüller

- Transvers kesitlerde oval-üçgen, sagittal ve koronal kesitlerde lentiform
- Plevraya uzanan ince septa
- Takip X
- Fissürde çekinti, kanser öyküsü, spiküler kontur şüpheli, 6-12. ay BT





- İnkomplet toraks CT

- $< 6$  mm, takip X

- 6-8 mm, 3-12. ay BT

- $> 8$  mm ya da şüpheli nodül, rutin toraks BT

- Nodül takibi için kısıtlı BT X