

FİBROTİK AKCİĞER HASTALIKLARINDA RADYOLOJİK İPUÇLARI

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Hacettepe Ü. Radyoloji Anabilim Dalı

İnterstisyel AC Hastalığında YÇBT

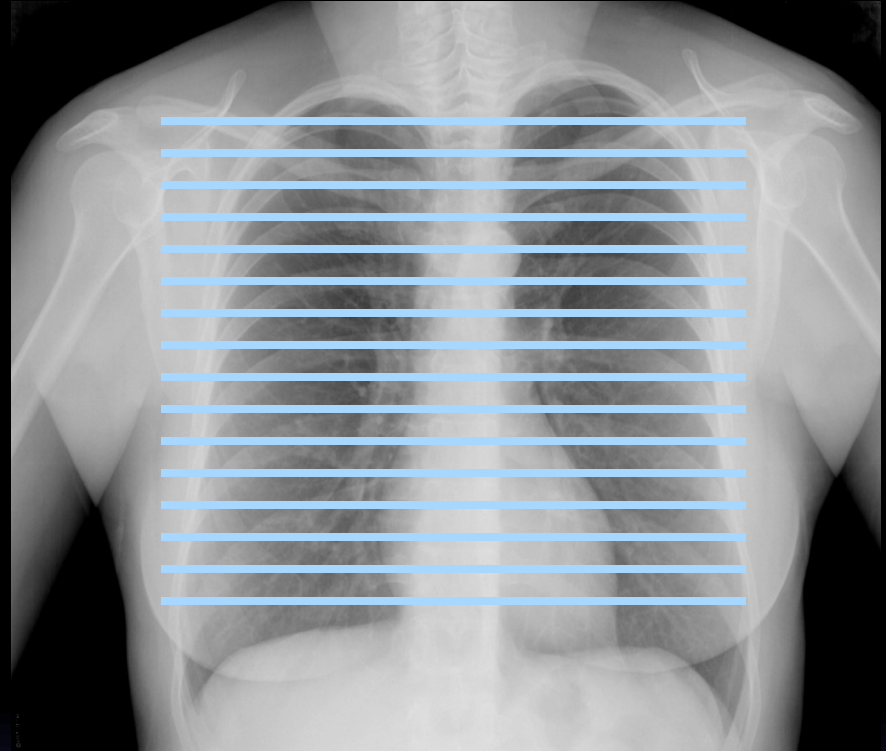
- Tanı- ayırıcı tanıda
- Hastalık aktivitesinin tahmininde
- Biyopsi yerinin ve yönteminin belirlenmesinde
- Tedaviye yanıtın izleminde

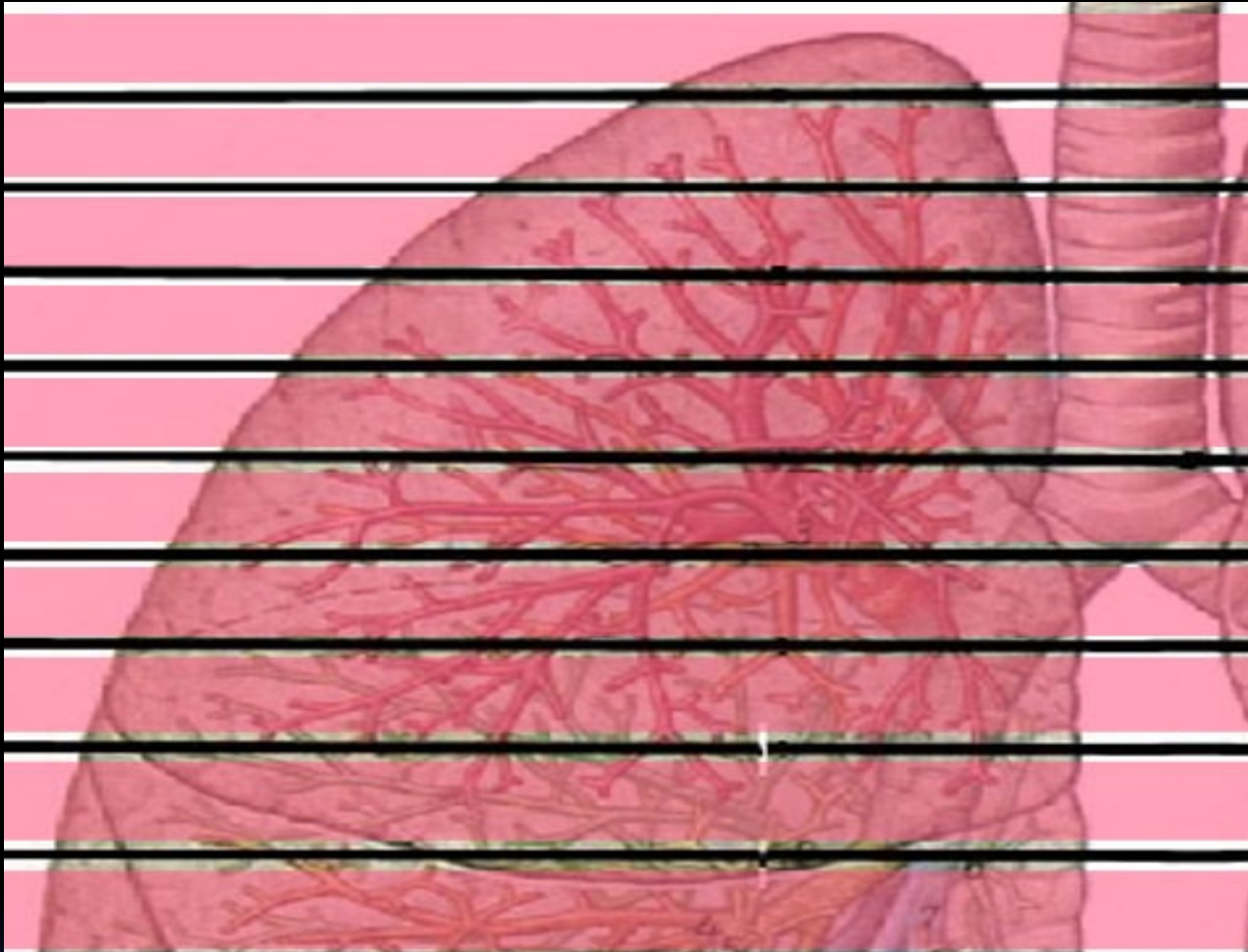
Yüksek Çözünürlüklü BT

- Klasik Yüksek Çözünürlüklü BT
- Hacimsel Yüksek Çözünürlüklü BT

Klasik Yüksek Çözünürlüklü BT

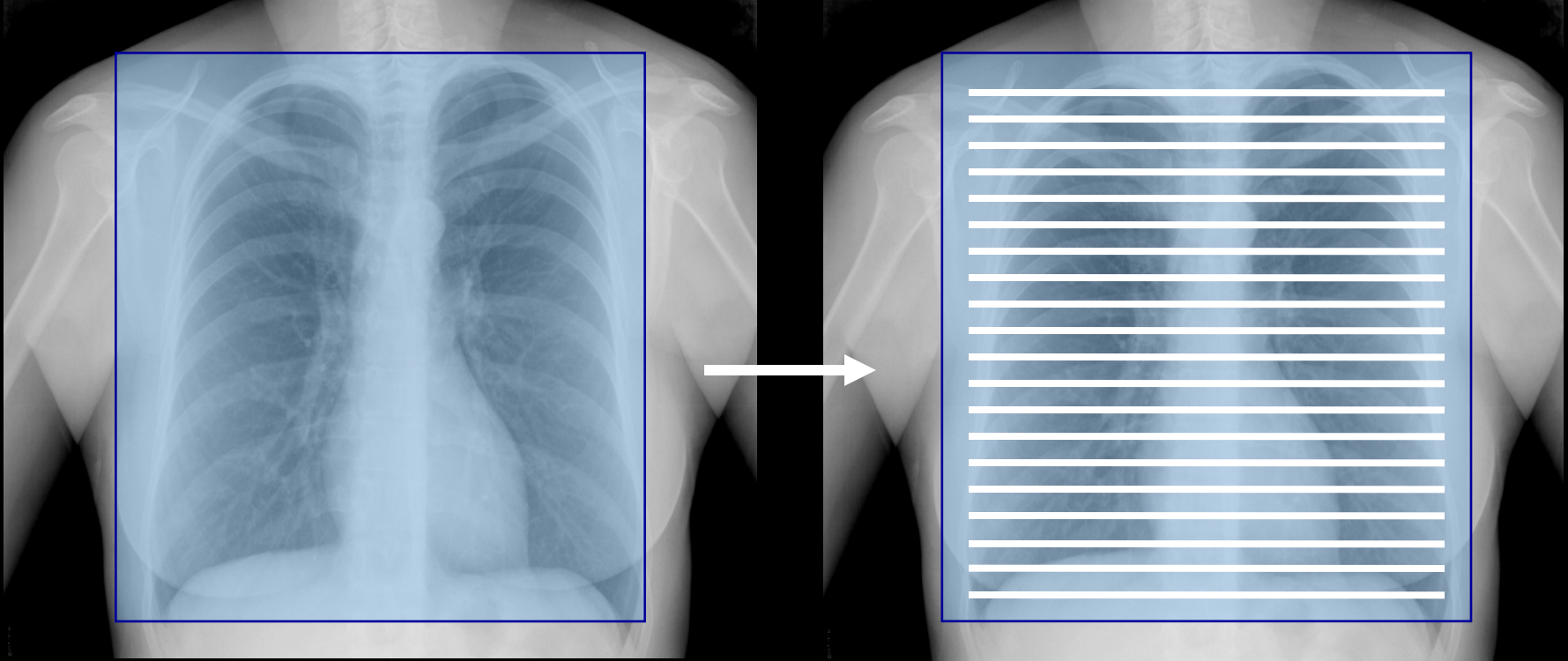
- Her 10 mm'de bir 1- 1.5 mm kalınlığında aralıklı kesitler
- Yüksek kVp (140)
- Parenkim değerlendirilir
- Kontrastsız yapılır
- Reformat yapılamaz
- 1-2 mSv





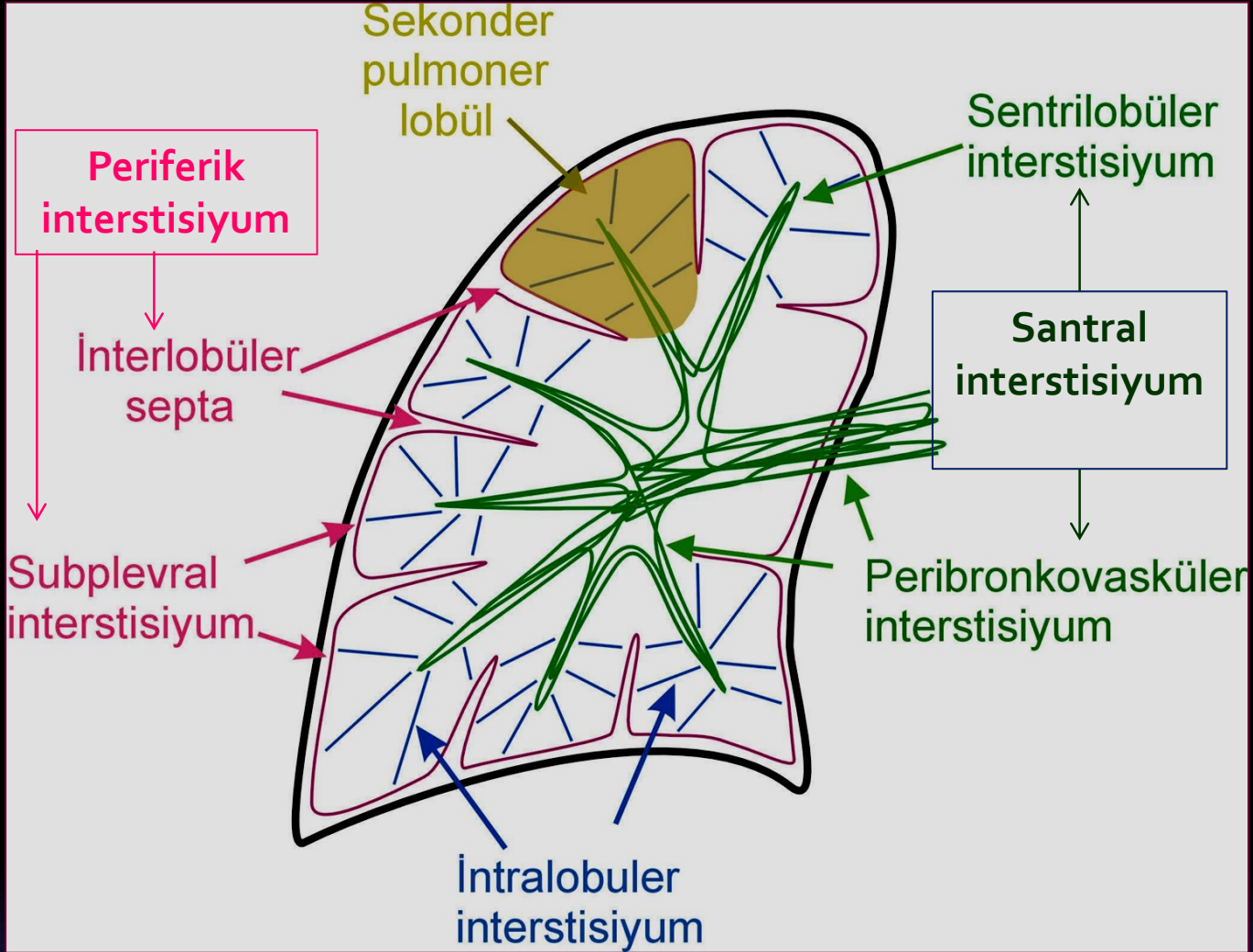
1-1.5 mm
8.5-9 mm

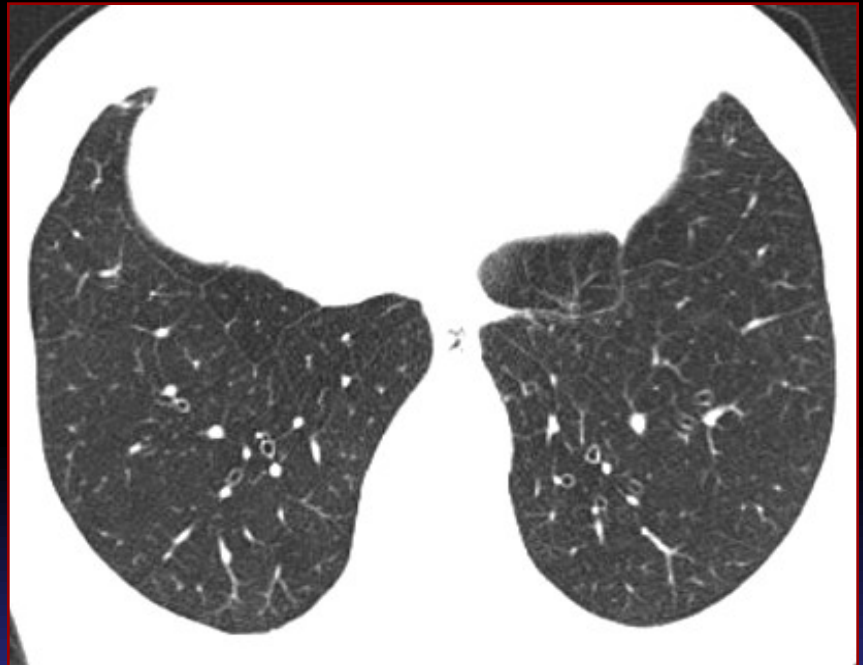
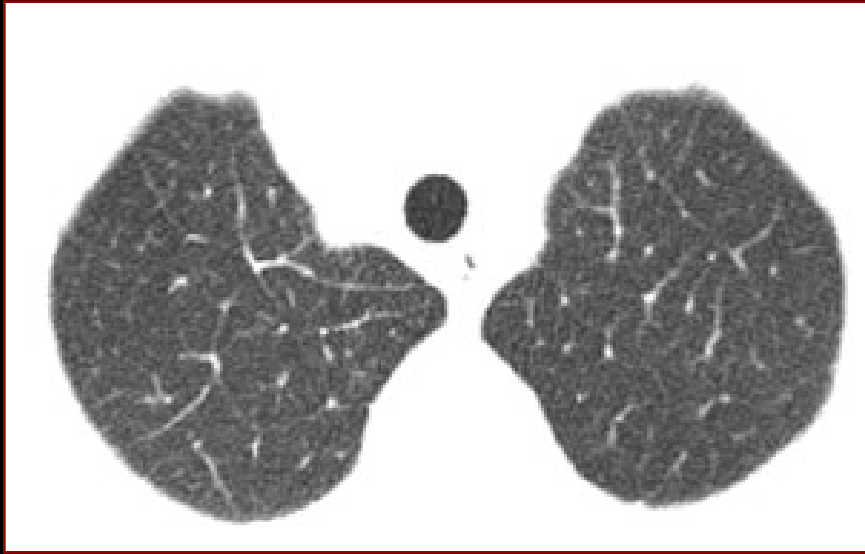
Hacimsel Çok Kesitli Spiral BT



Tek nefes tutmada
“hacimsel tarama”

İstenilen kesit kalınlığı
sonra seçilir.
İnce kesitler kullanılarak
reformat yapılabilir







Kesit kalınlığı 5 mm



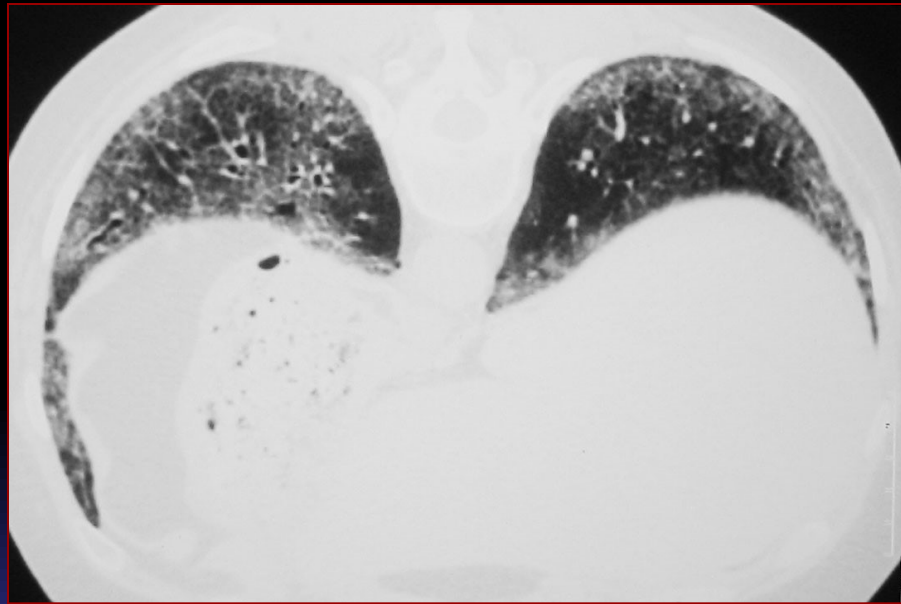
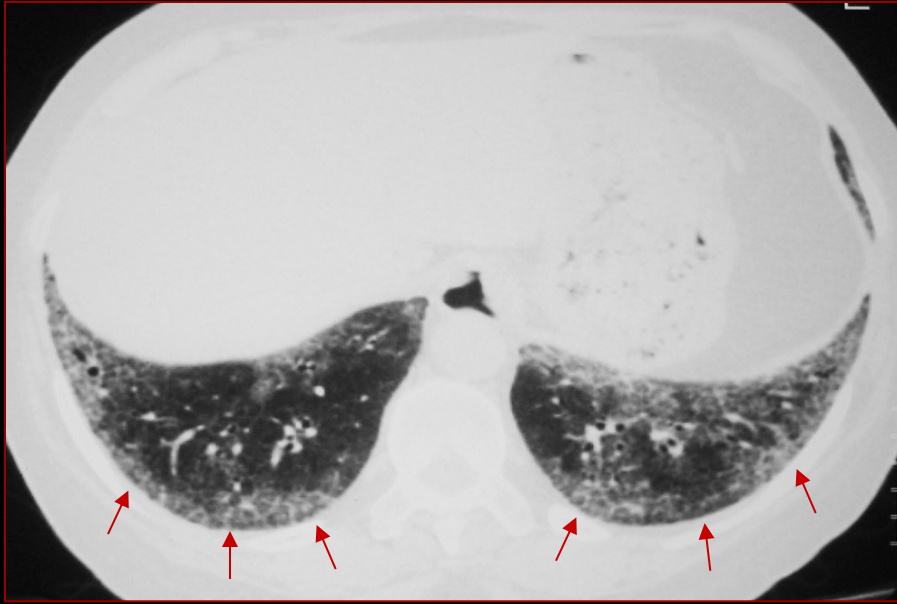
Kesit kalınlığı 1 mm

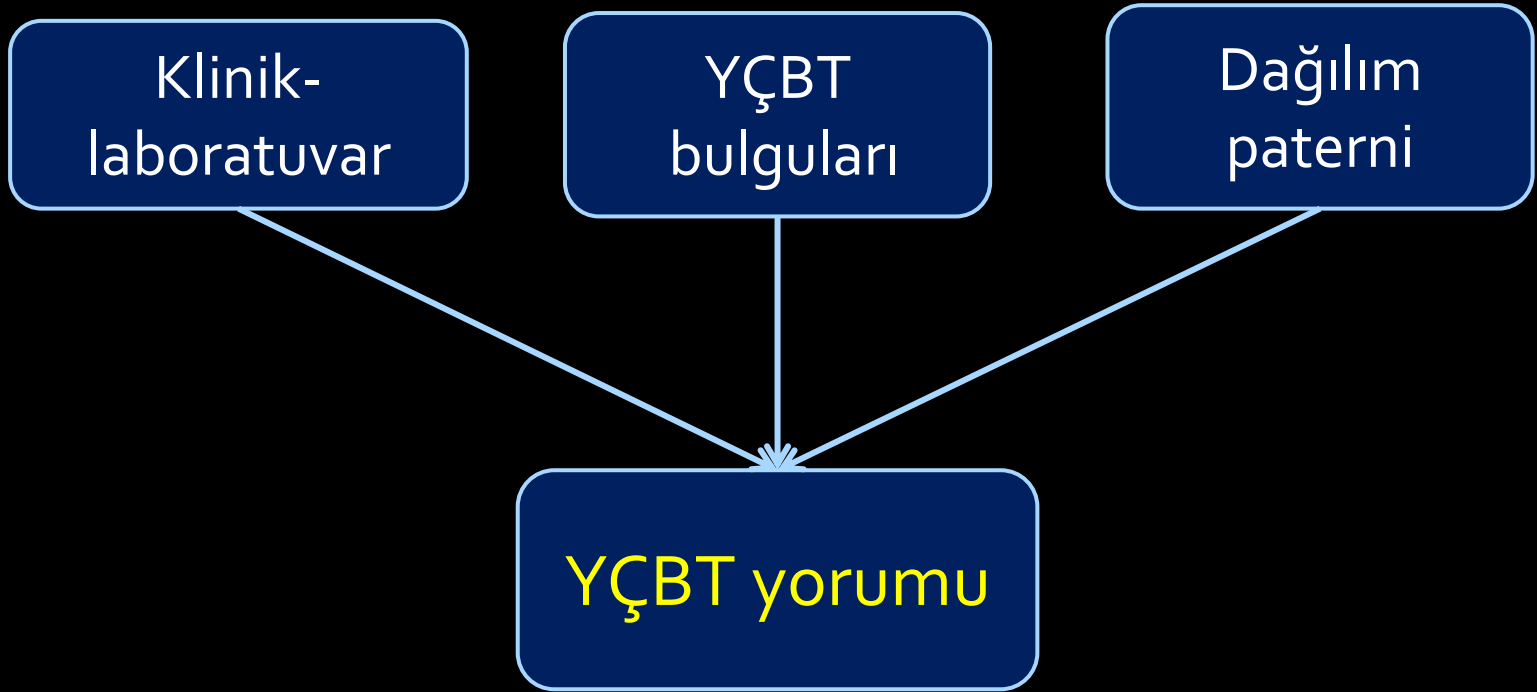


Yumuşak doku filtresi



Kemik filtresi





YÇBT vs AC grafisi

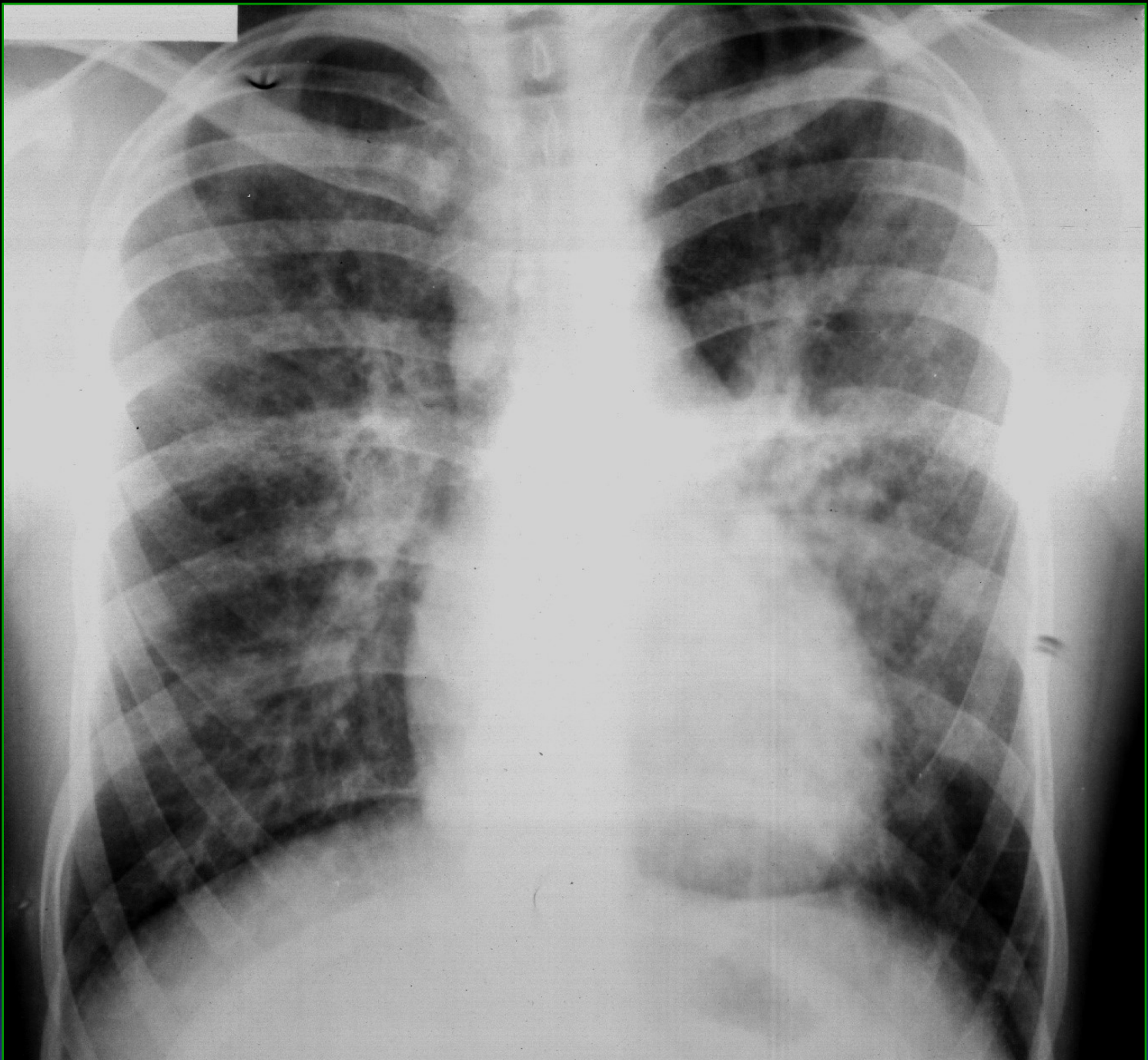
	Duyarlılık	Doğruluk
AC grf	%80	%27
YÇBT	%94	%53

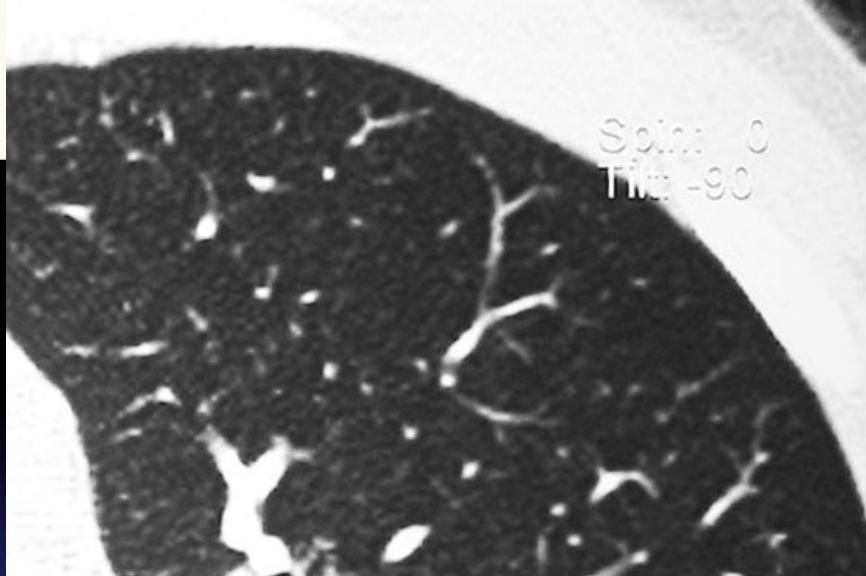
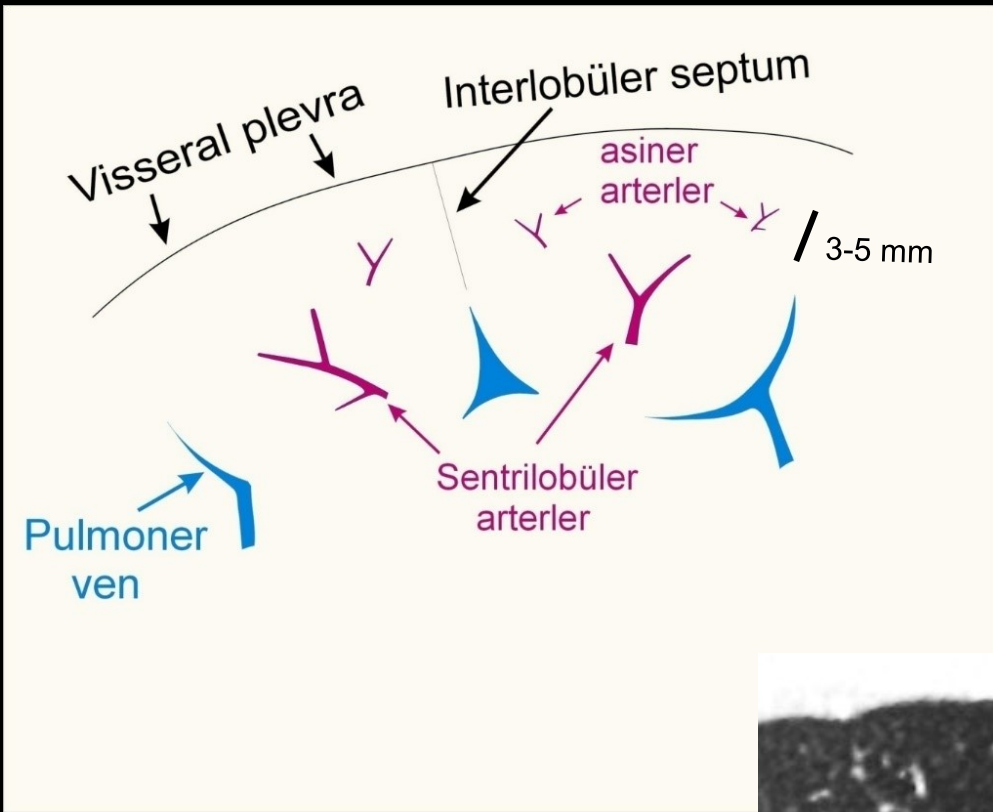
YBÇT'de İnterstisyel Hastalık Bulguları

- Çizgisel Dansiteler
- Nodüller
- Akciğer Dansitesinde Artış: Buzlu cam,
konsolidasyon
- Akciğer Dansitesinde Azalma: Kistler

Çizgisel ve Retiküler Dansiteler

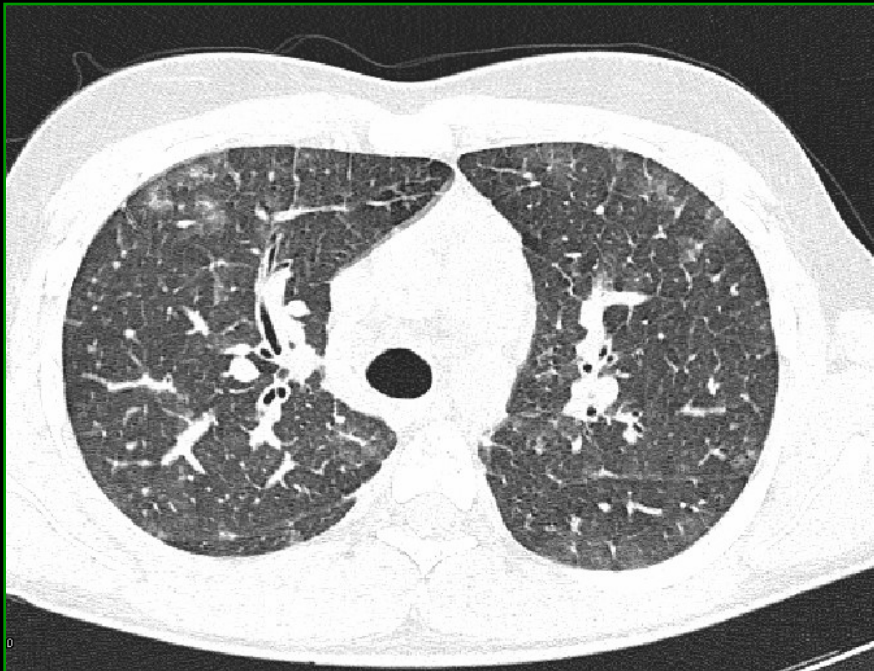
- İnterstisyel kalınlaşmalar:
 - Peribronkovasküler
 - İnterlobüler septal
 - İntralobüler septal
 - Subplevral
- Subplevral çizgiler
- Parenkimal bantlar
- Balpeteği



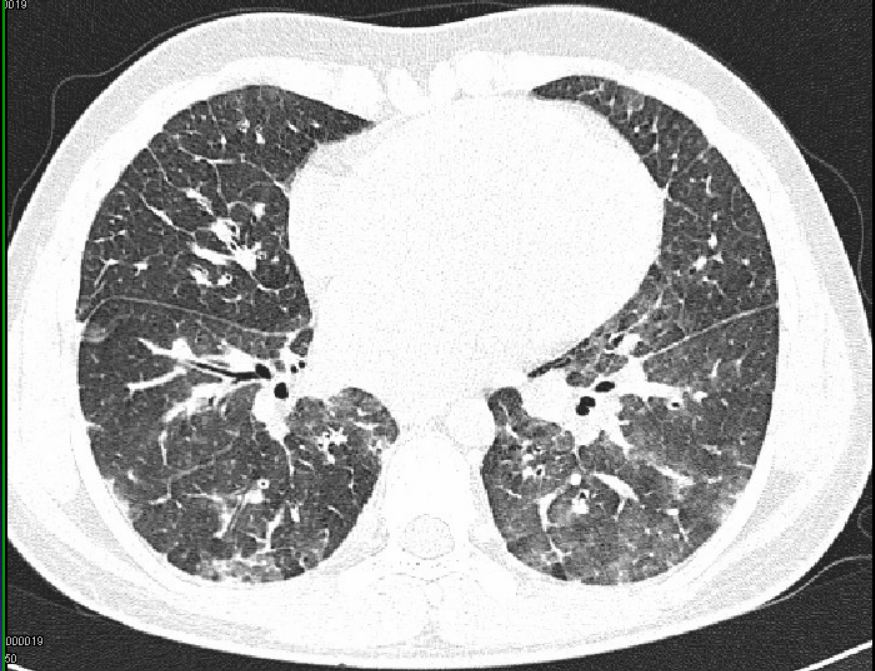




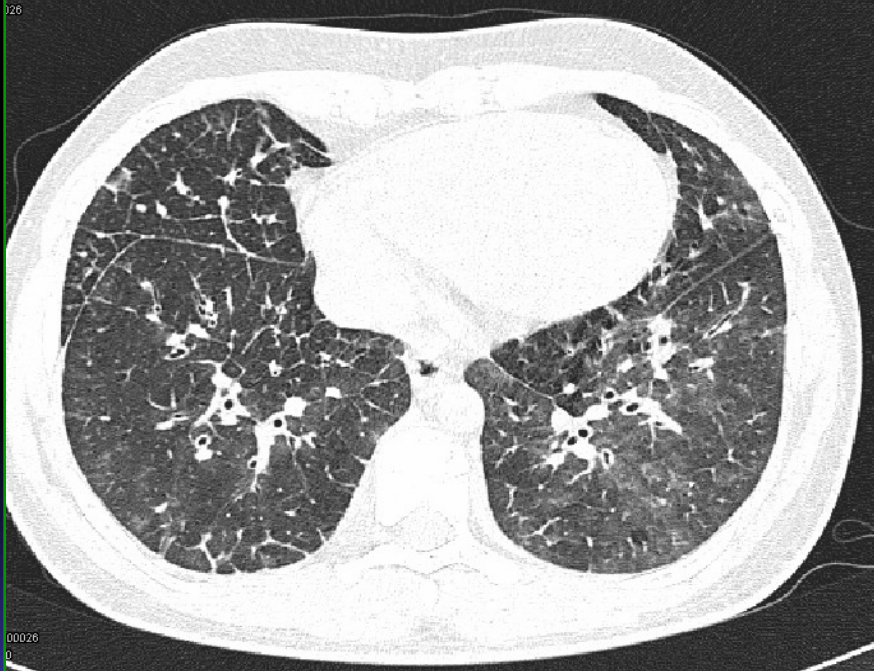
11/2004
3:37 PM
019



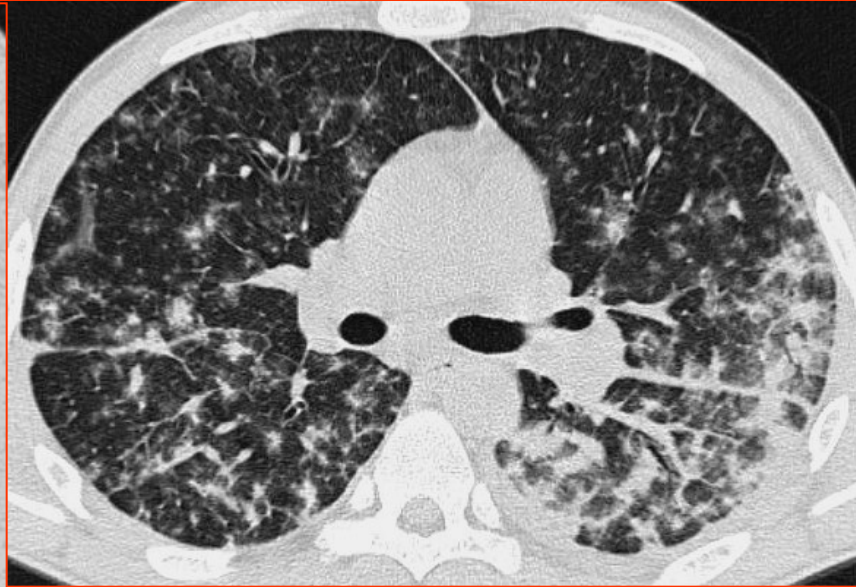
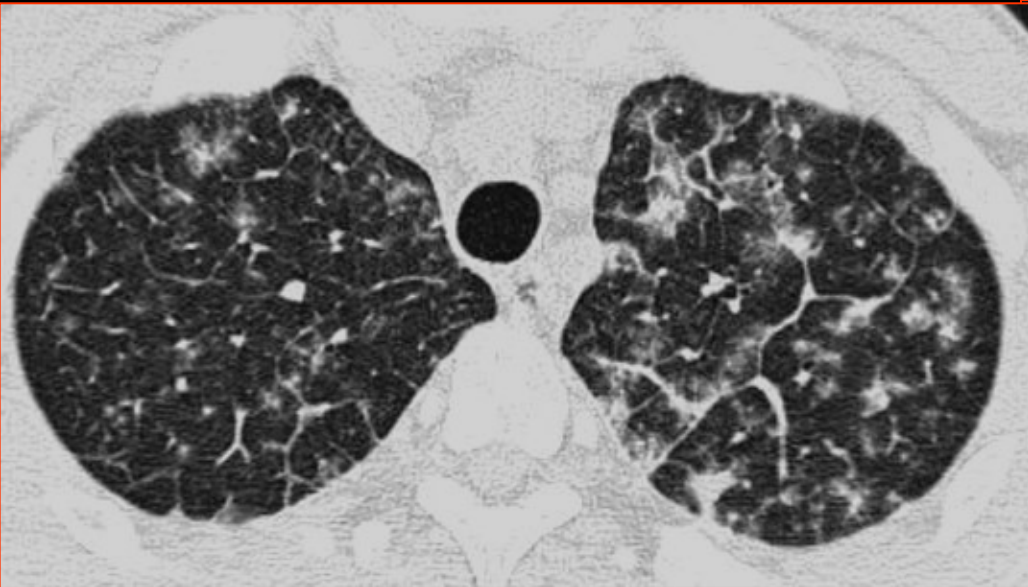
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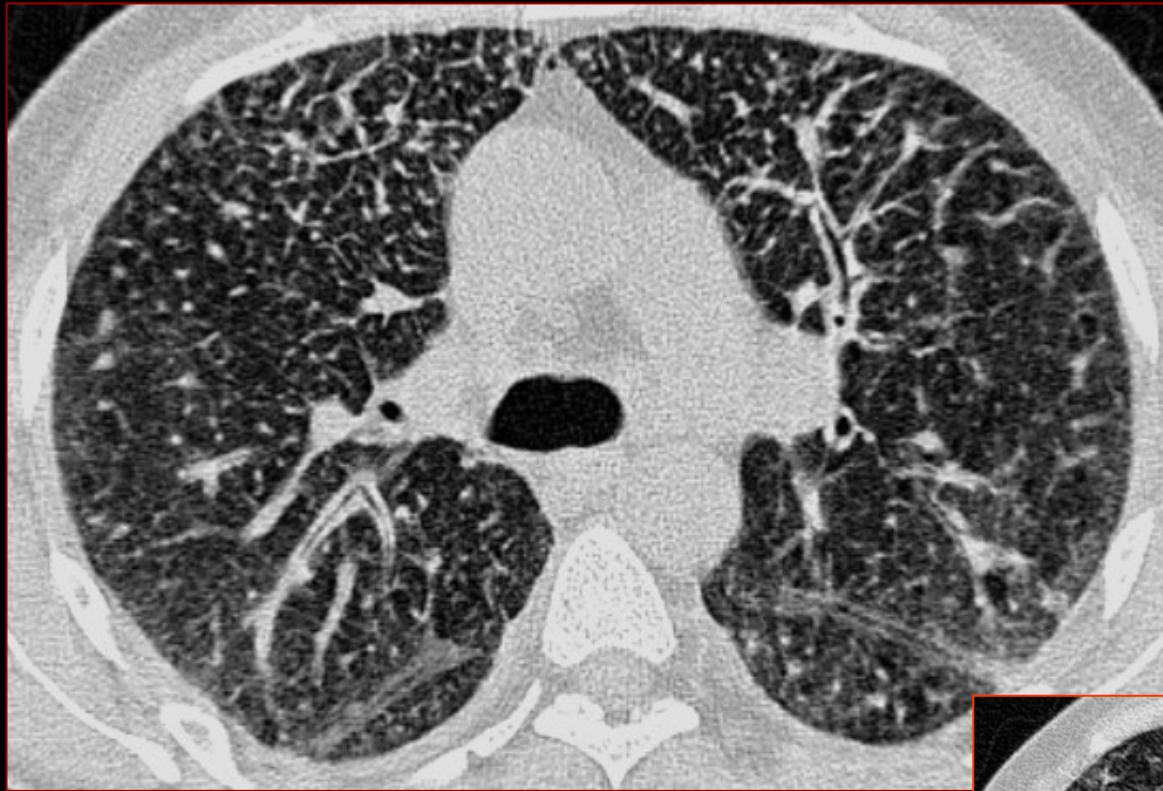
000019
20



000026
26



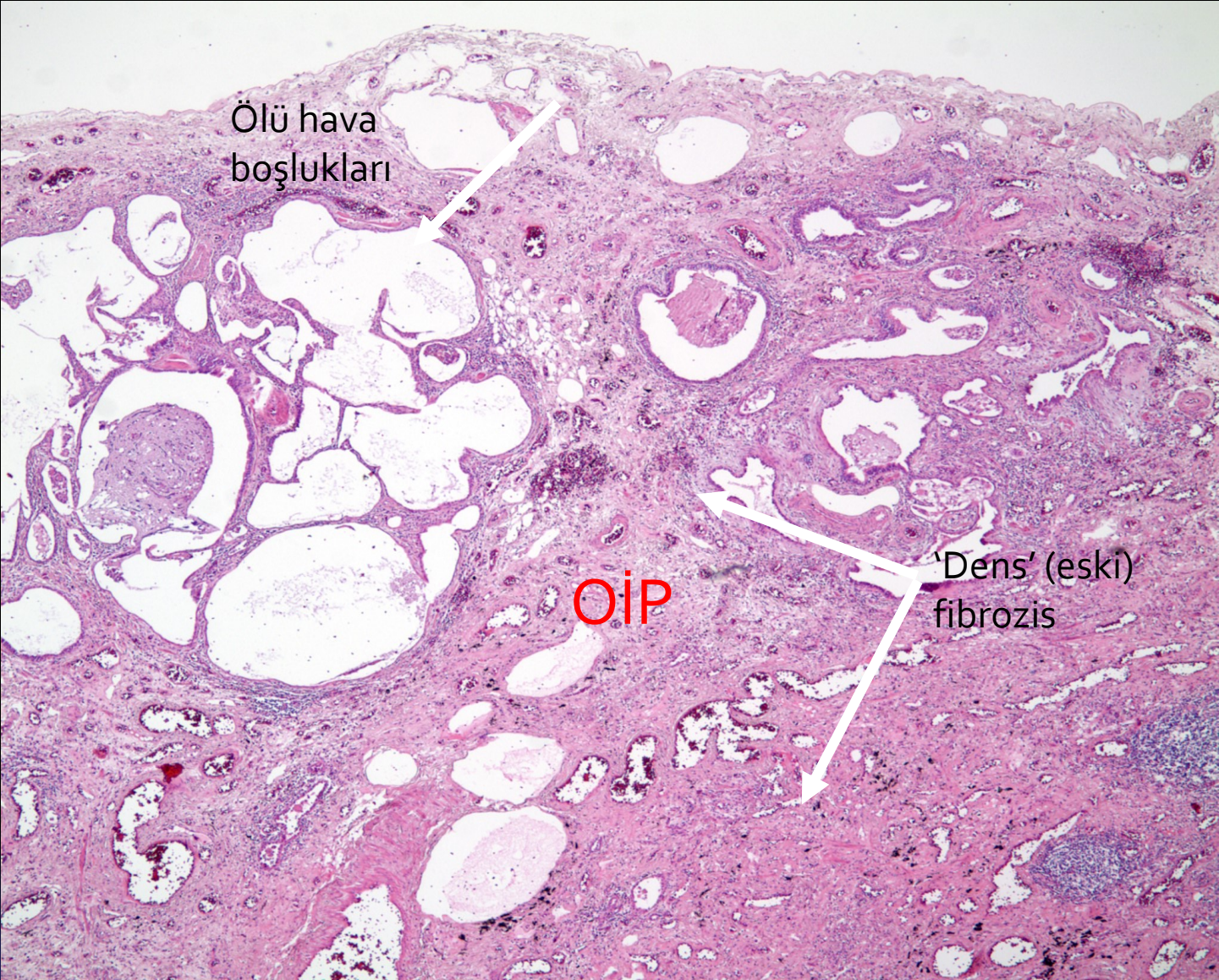
PJP



Bal Peteđi Bulgusu

- Tipik olarak 3-10 mm apında, kalın fibrotik duvarlı, kistik hava boşluklarıdır.
- apları 25 mm'ye kadar olabilir.
- İleri metaplastik bronşolar epitel ile dşelidir.





Ölü hava boşlukları

OİP

'Dens' (eski) fibrozis

Bal Peteđi

Subplevral, posterior,
Alt loblarda daha
fazla

IPF (%60)

Kollajen doku hast.

Asbestoz

İlaç fibrozisi

Hipersensitivite P

Sarkoidoz (nadir)

Santral, üst lob

Sarkoidoz (sık)

Hipersensitivite p.

Radyasyon

Son dönem ARDS

Plöroparenkimlal
fibroelastozis

Kollajen doku hast.

İlaç fibrozisi

Akciğer fibrozisi nedenleri

- Olağan interstisyel pnömoni (İPF veya kollajen doku hastalıklarına sekonder)
- İnorganik toz inhalasyonu (asbestozis, berillozis, silikozis)
- Granülomatöz hastalıklar (sarkoidoz, TB, LHH)
- Hipersensitivite pnömonisi
- İlaça bağlı interstisyel pnömoni
- Diffüz alveolar hasar (toksik inhalasyon, oksijen, enfeksiyon, radyasyon)

İdyopatik Pulmoner Fibrozis (İPF)

- İPF nedeni bilinmeyen, kronik, ilerleyici fibrozan bir interstisyel hastalık.
- Histopatolojik ve/ veya radyolojik olarak **olağan interstisyel pnömoni (OİP)** paterni ile karakterize.
- Ort >50 yaş, E>K
- **Patoloji:** İnterstisyel inflamasyon, yapısal bozulma, bal peteği ile birlikte fibrozis
- Tutulum heterojen ve yama paterninde olup normal alanlarla patolojik alanlar birbirini takip eder.
- **Dağılım:** bazal %70
periferik, subplevral %80-95



OİP paterni için YÇBT kriterleri

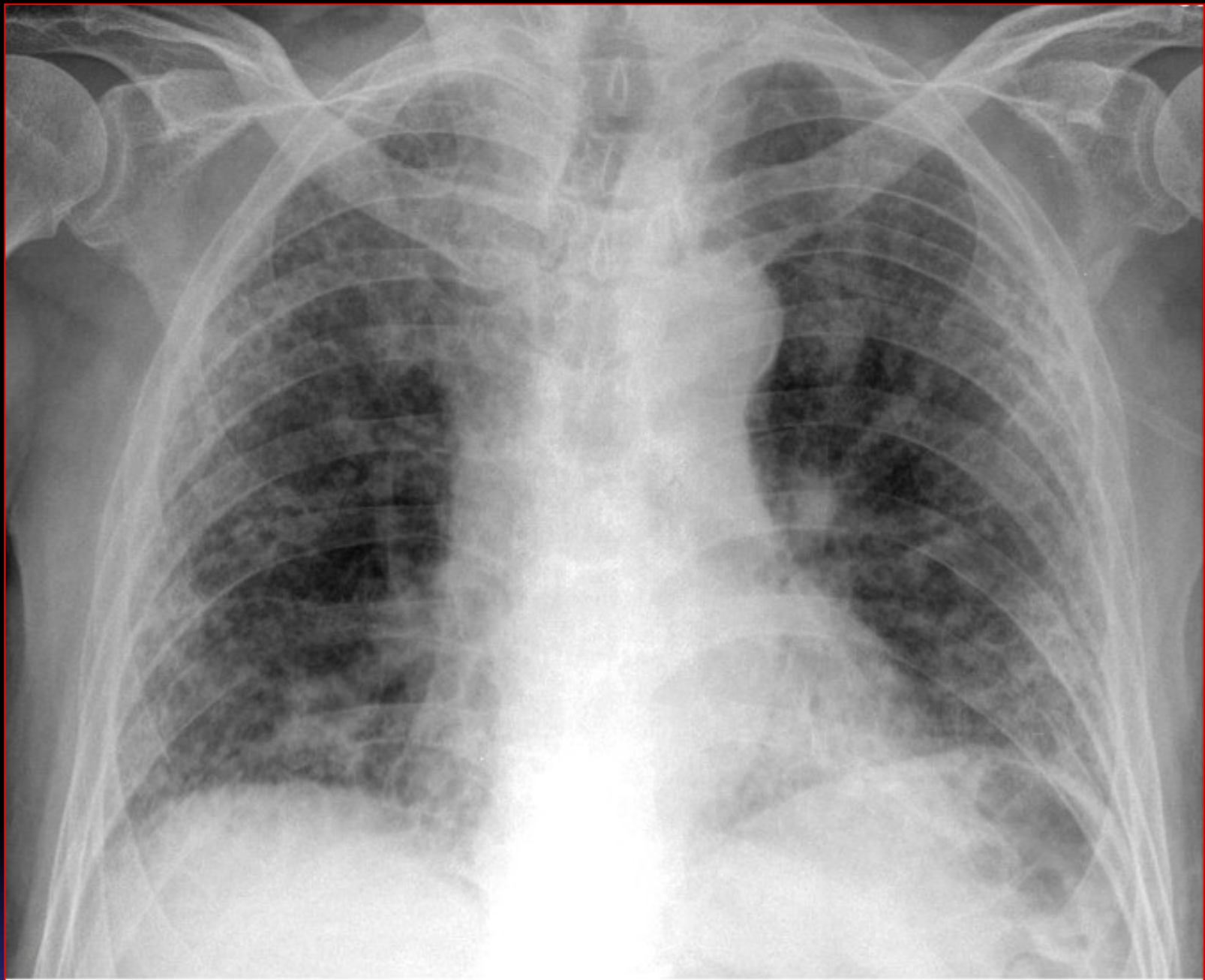
- Retiküler opasiteler
- Subplevral, bazal ağırlıklı, genellikle heterojen dağılım
- Balpeteği \pm periferik traksiyon bronşektazileri-bronşiolektazileri

Diagnosis of Idiopathic Pulmonary Fibrosis

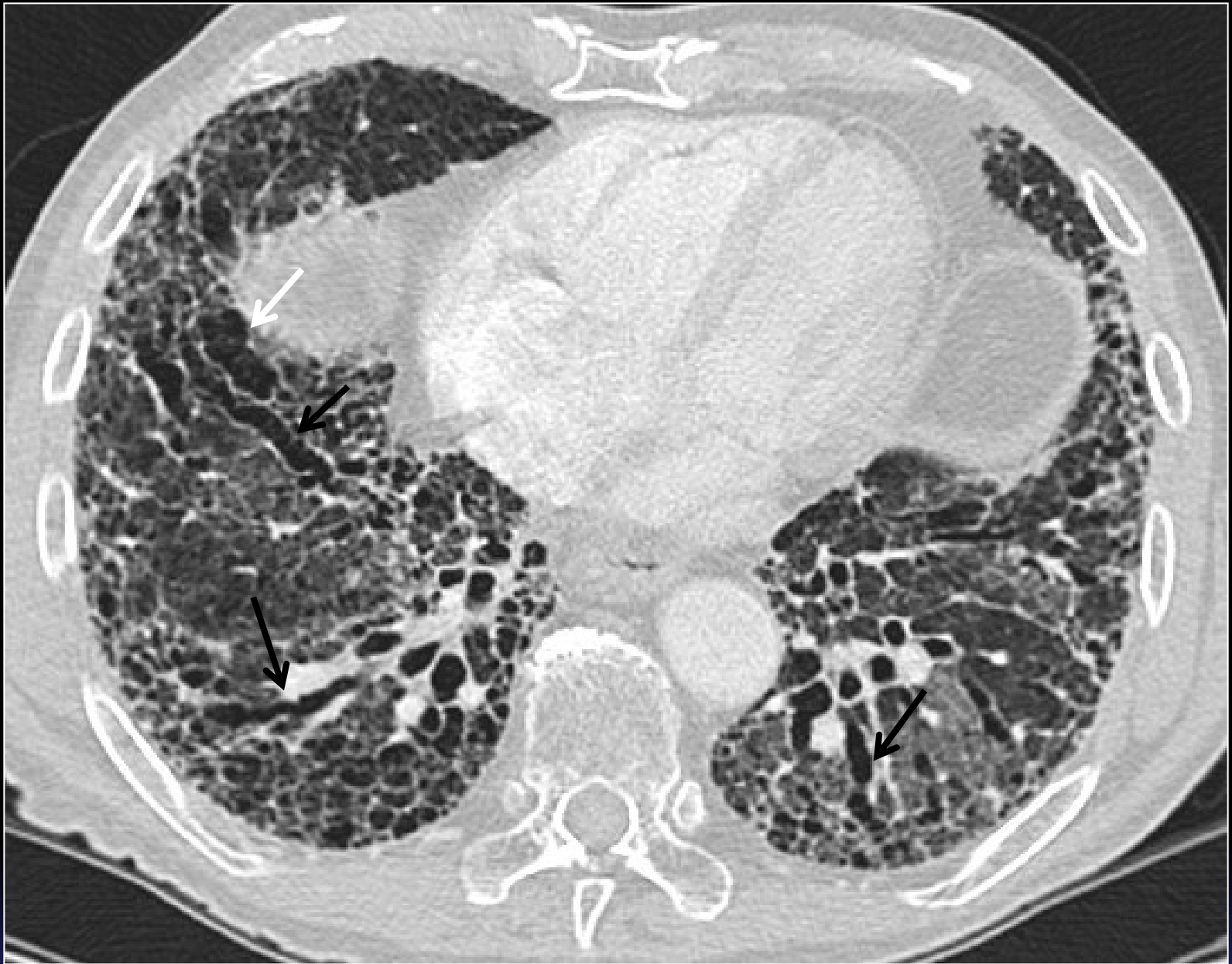
An Official ATS/ERS/JRS/ALAT Clinical Practice Guideline

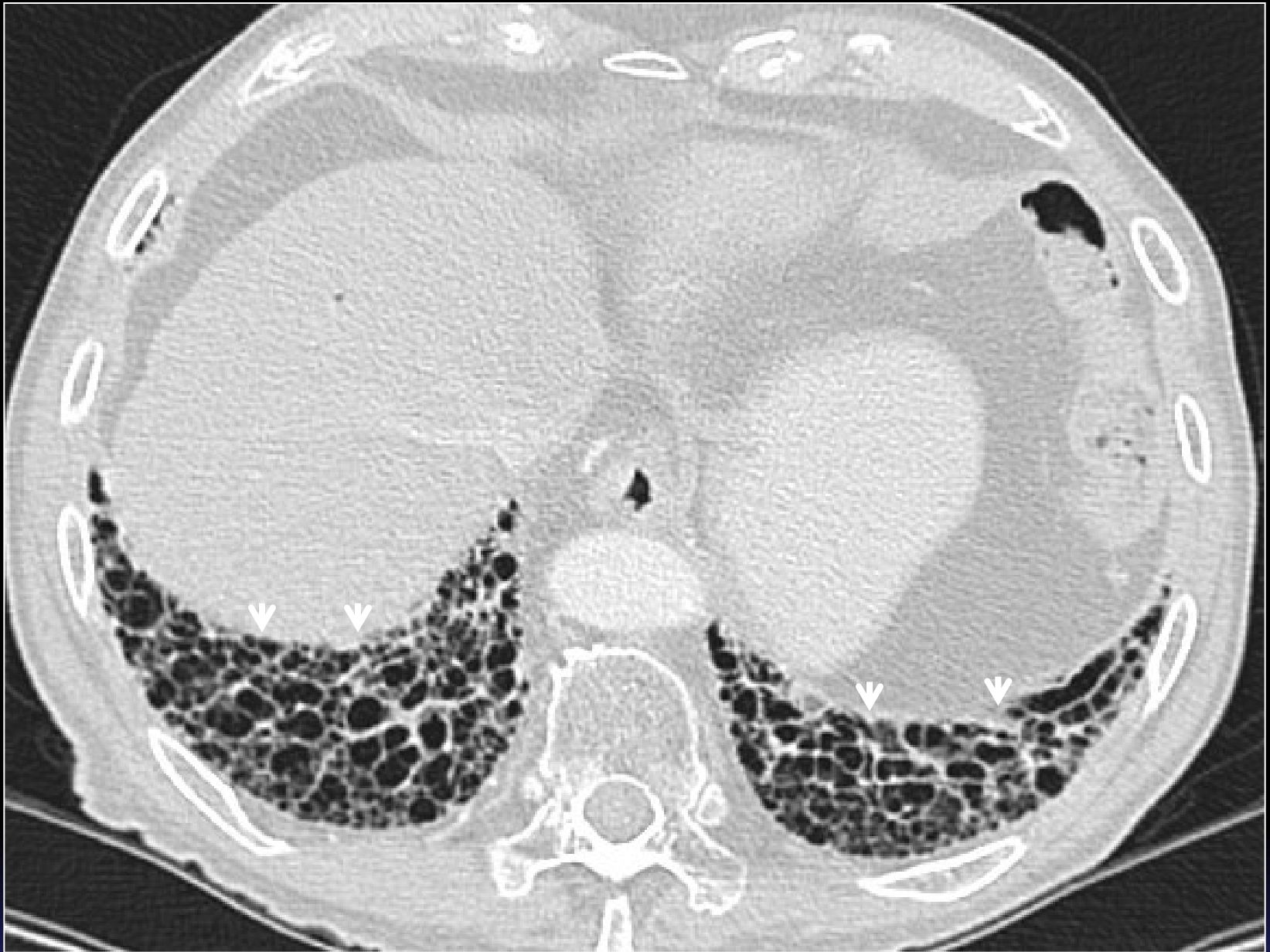
Table 4. High-Resolution Computed Tomography Scanning Patterns

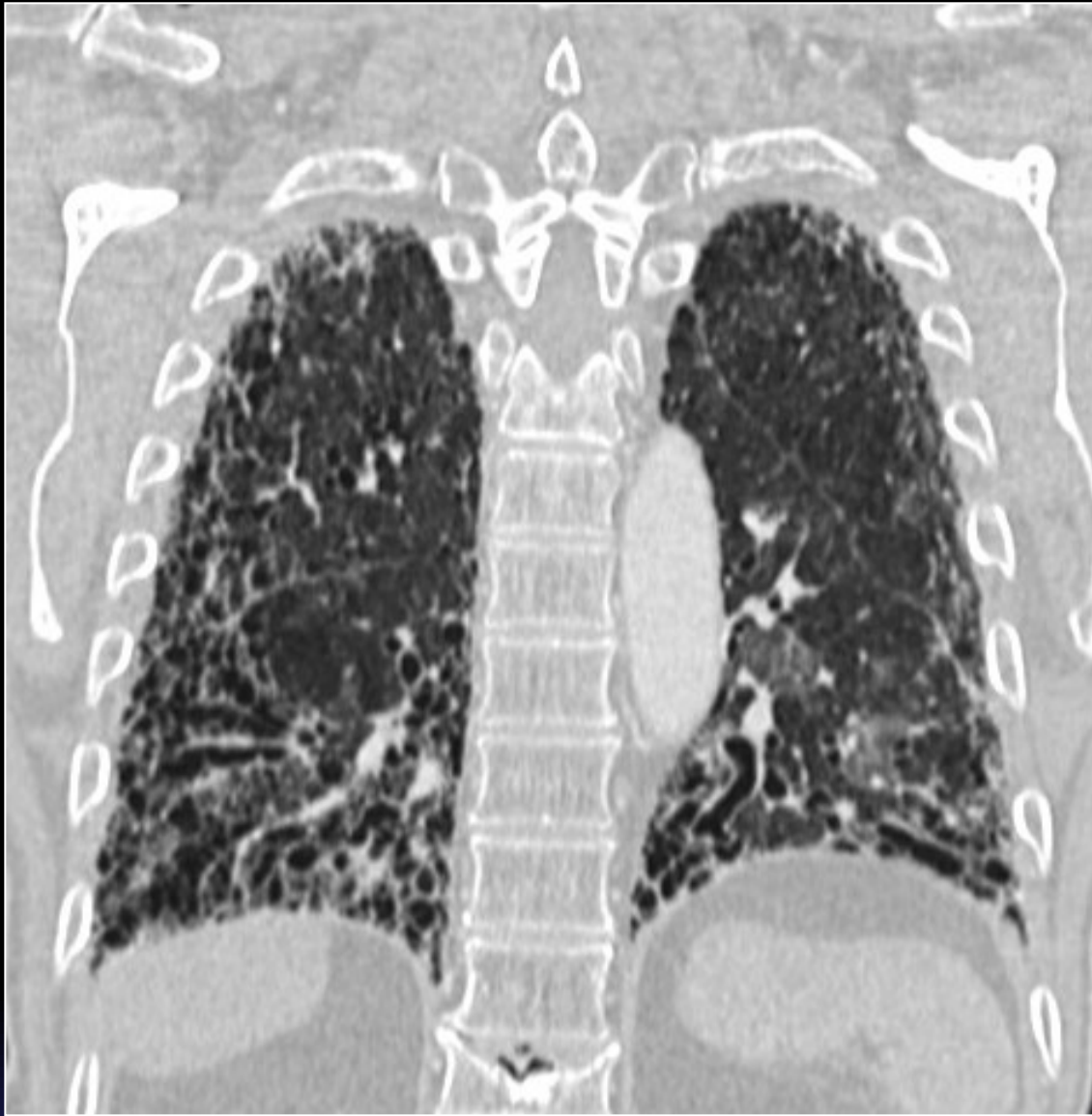
UIP	Probable UIP	Indeterminate for UIP	Alternative Diagnosis
Subpleural and basal predominant; distribution is often heterogeneous*	Subpleural and basal predominant; distribution is often heterogeneous	Subpleural and basal predominant	Findings suggestive of another diagnosis, including: <ul style="list-style-type: none"> • CT features: <ul style="list-style-type: none"> ◦ Cysts ◦ Marked mosaic attenuation ◦ Predominant GGO ◦ Profuse micronodules ◦ Centrilobular nodules ◦ Nodules ◦ Consolidation • Predominant distribution: <ul style="list-style-type: none"> ◦ Peribronchovascular ◦ Perilymphatic ◦ Upper or mid-lung • Other: <ul style="list-style-type: none"> ◦ Pleural plaques (consider asbestosis) ◦ Dilated esophagus (consider CTD) ◦ Distal clavicular erosions (consider RA) ◦ Extensive lymph node enlargement (consider other etiologies) ◦ Pleural effusions, pleural thickening (consider CTD/drugs)
Honeycombing with or without peripheral traction bronchiectasis or bronchiolectasis†	Reticular pattern with peripheral traction bronchiectasis or bronchiolectasis May have mild GGO	Subtle reticulation; may have mild GGO or distortion (“early UIP pattern”) CT features and/or distribution of lung fibrosis that do not suggest any specific etiology (“truly indeterminate”)	



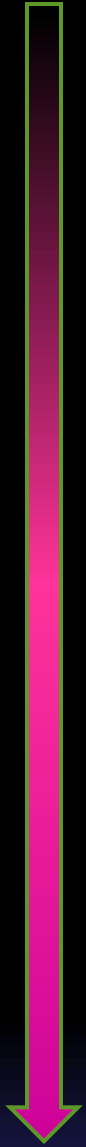


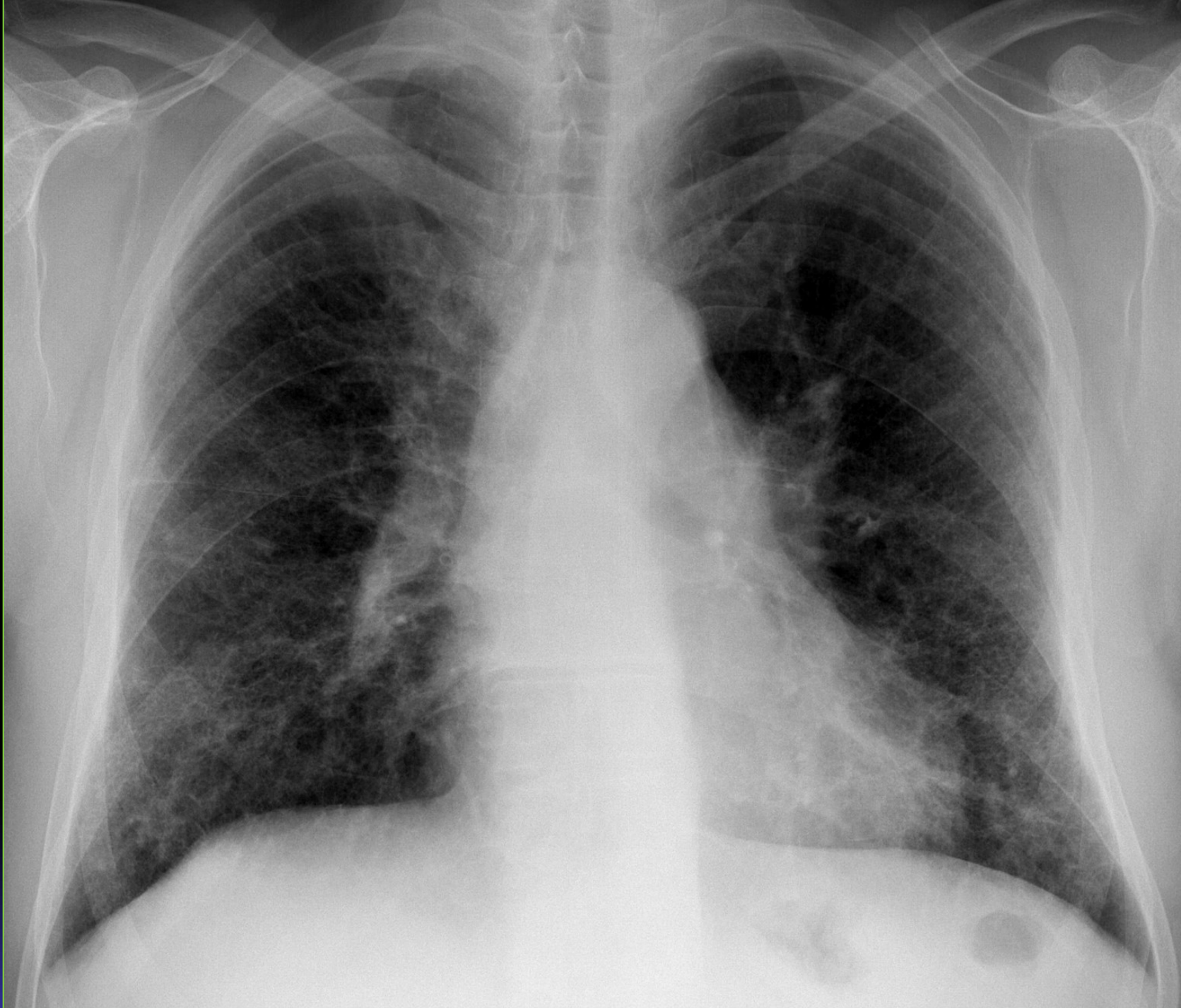




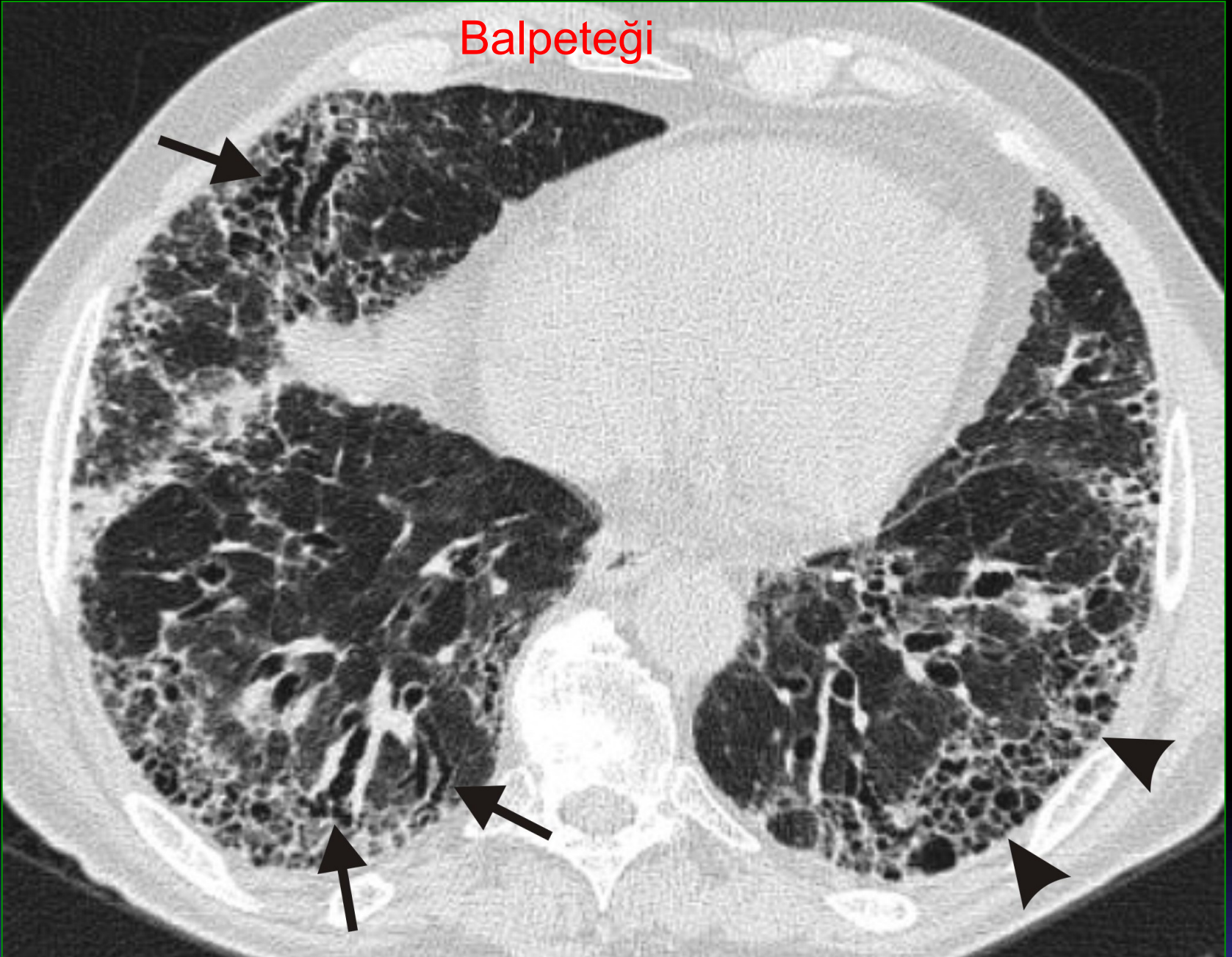


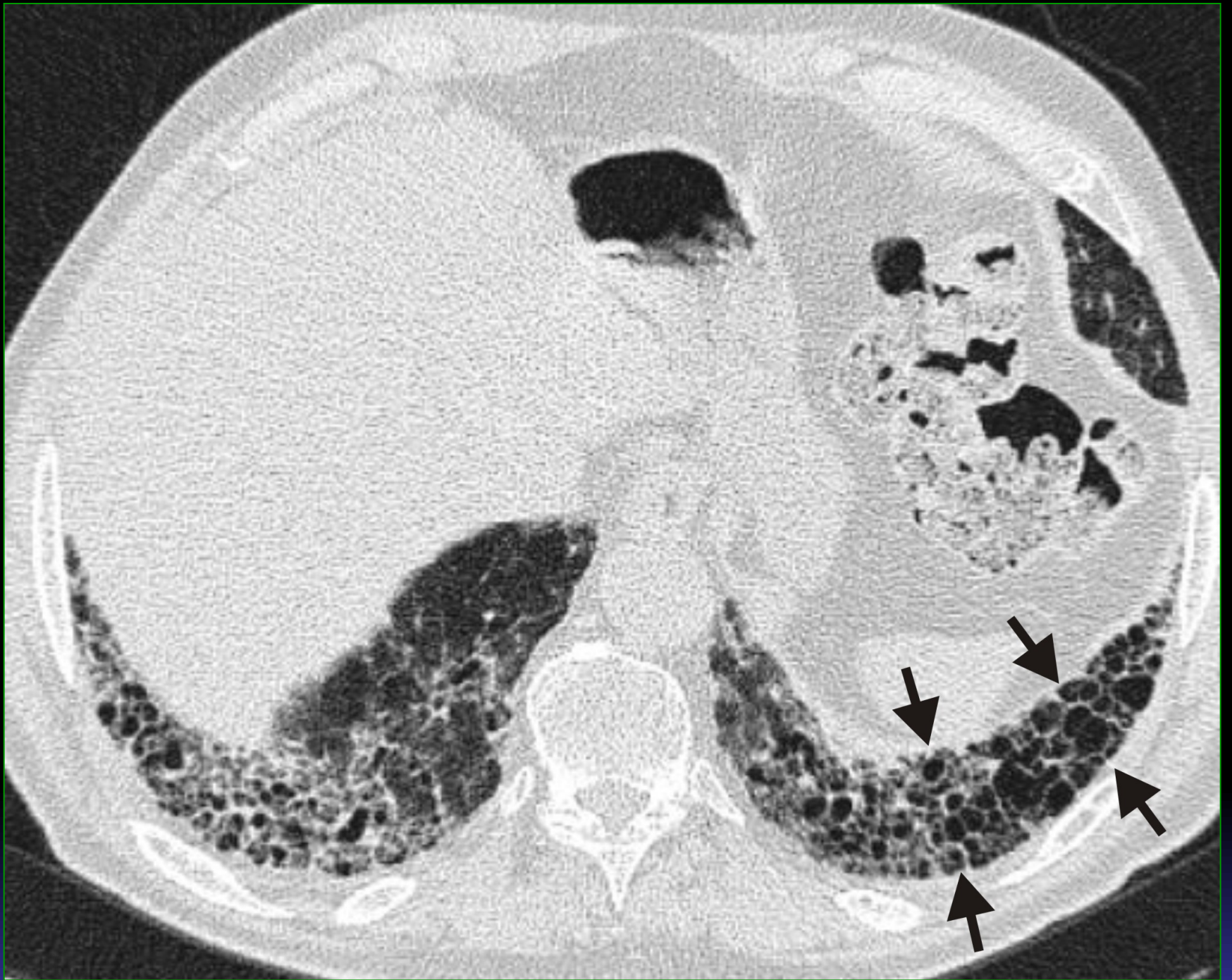
OIP paterni

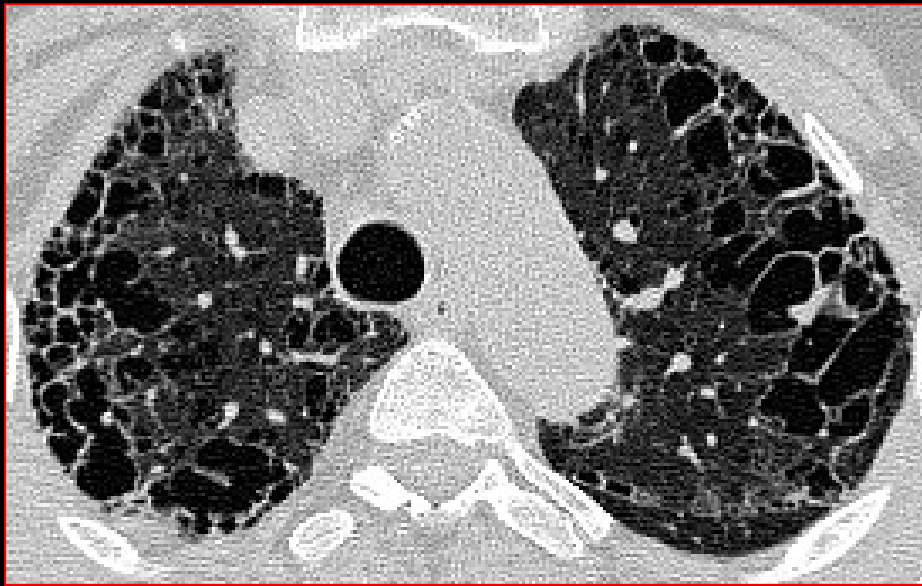




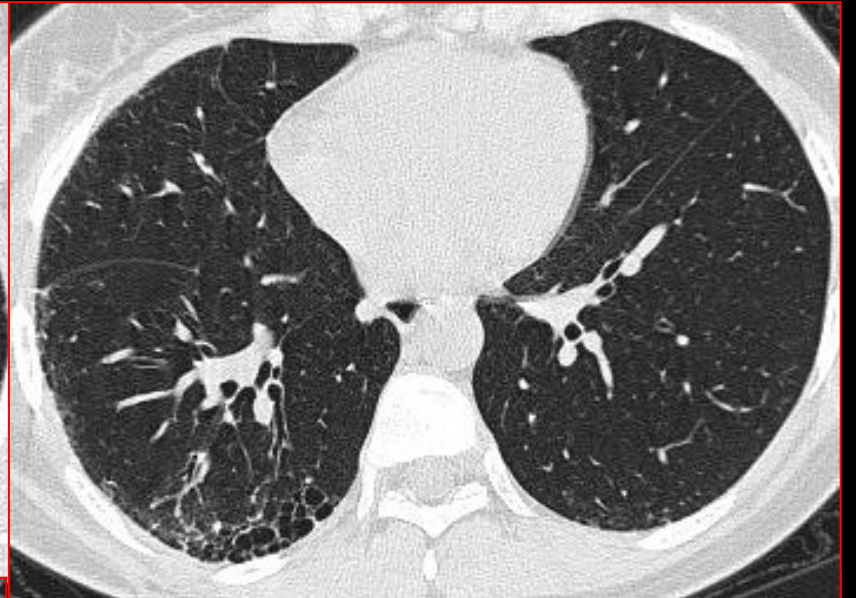
Balpeteği







Patoloji: OİP



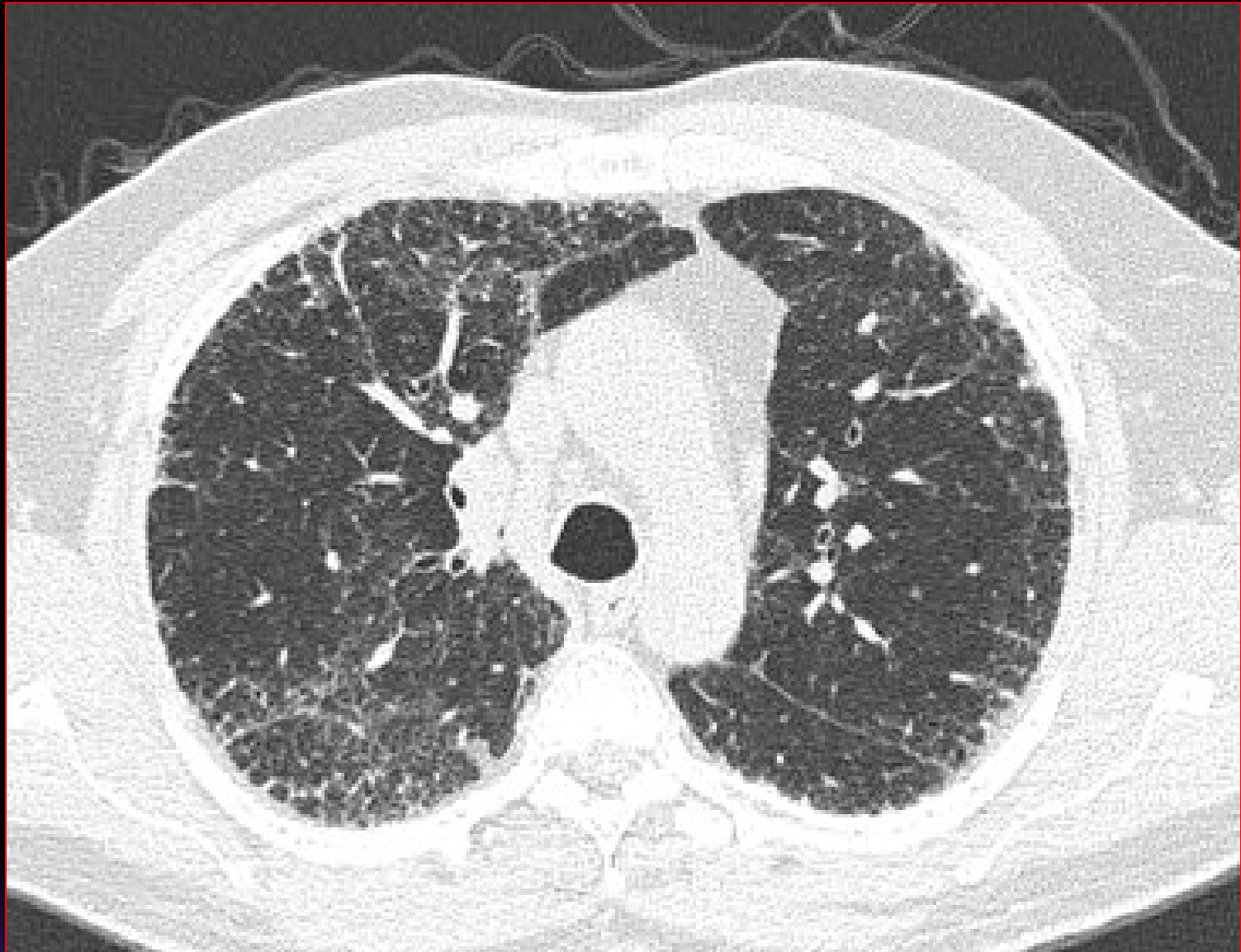
Pat: OIP

Olası OİP paterni için YÇBT kriterleri

- Subplevral, bazal ağırlıklı, genellikle heterojen dağılım
- Retiküler patern + periferik traksiyon bronşektazileri-bronşiolektazileri
- Hafif buzlu cam opasiteleri olabilir

% 82- 91'inde patoloji: OİP



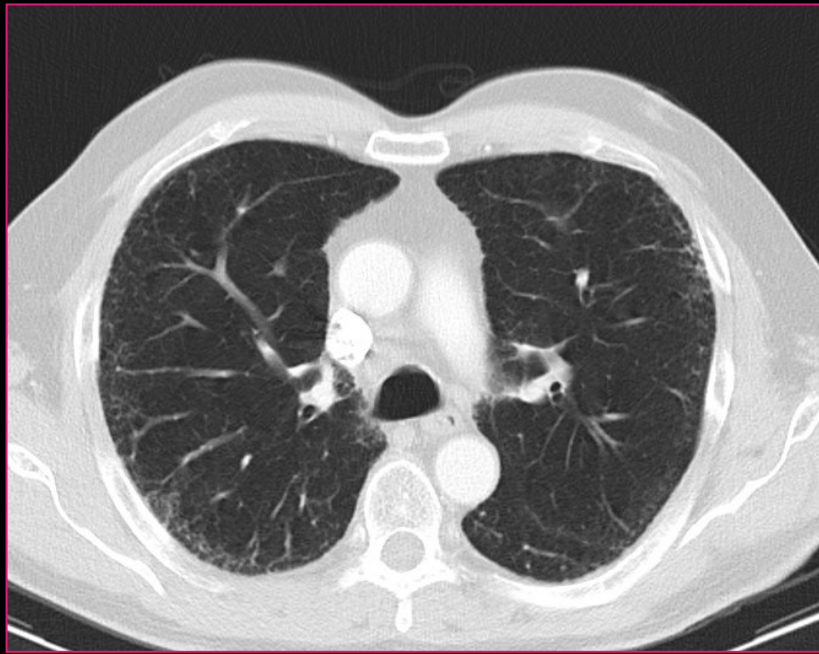




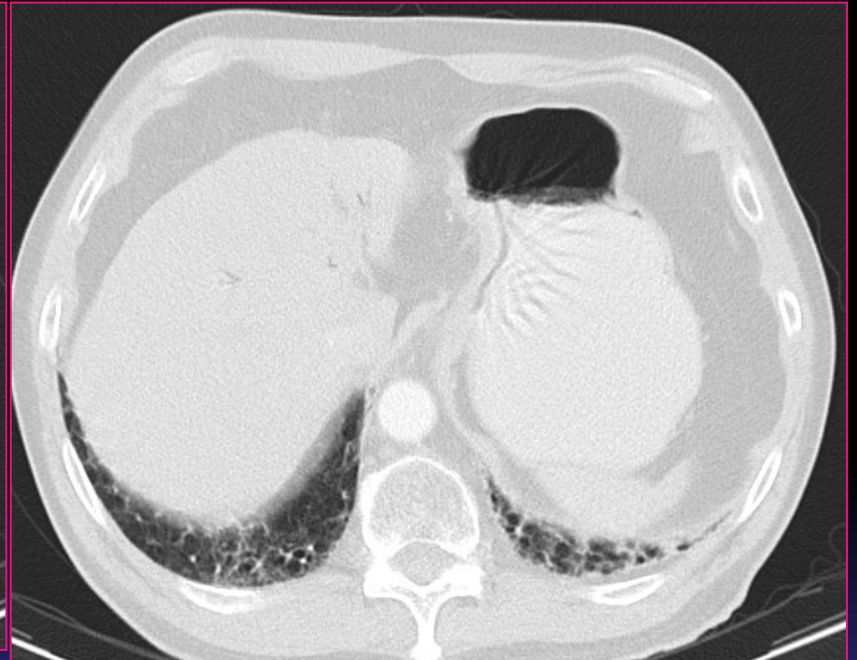
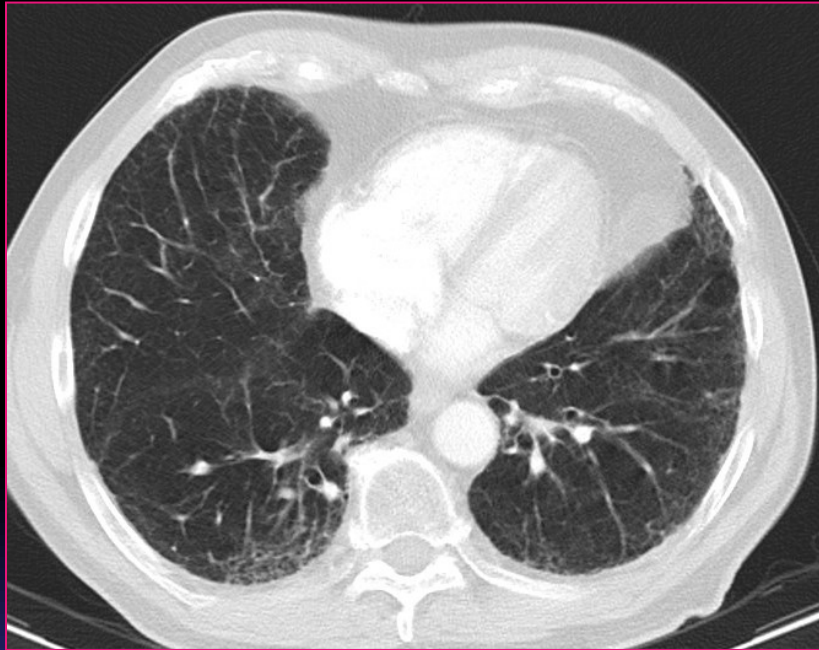




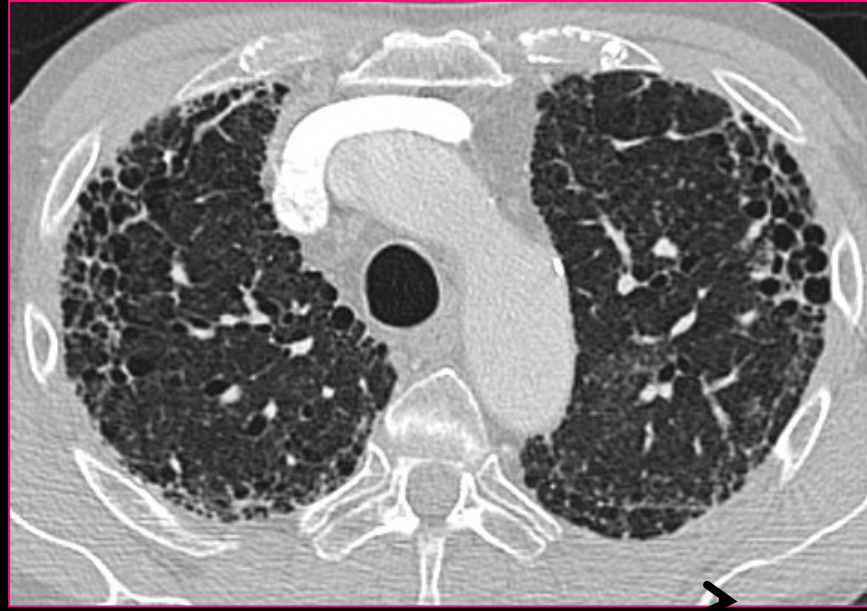
**Olası OİP
paterni**



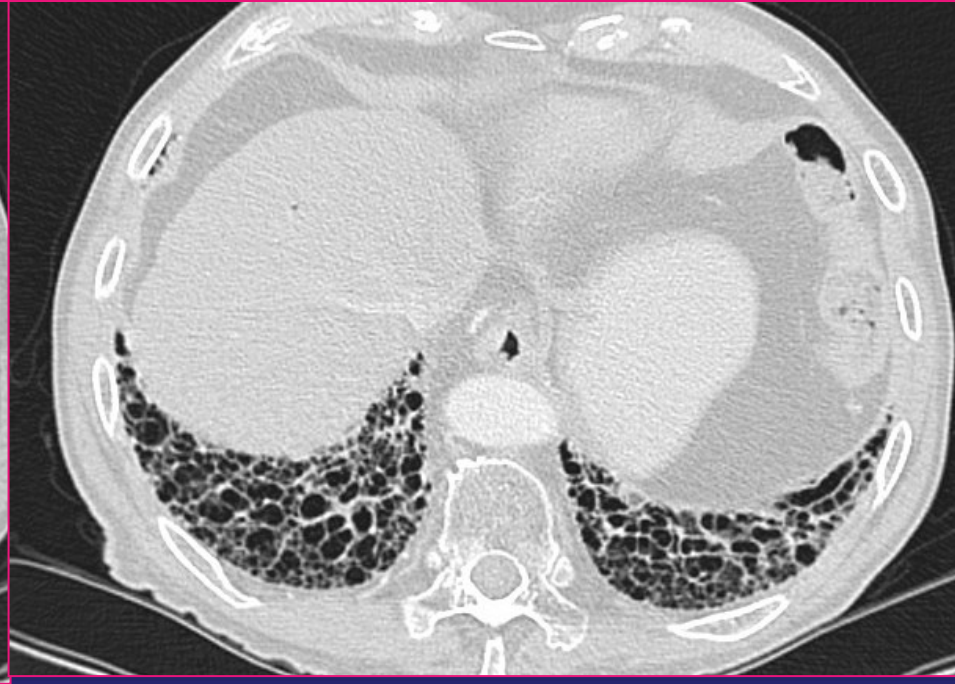
**Olası OİP
paterni**



5 yıl
sonra



OİP Paterni
Klinik tanı: İPF



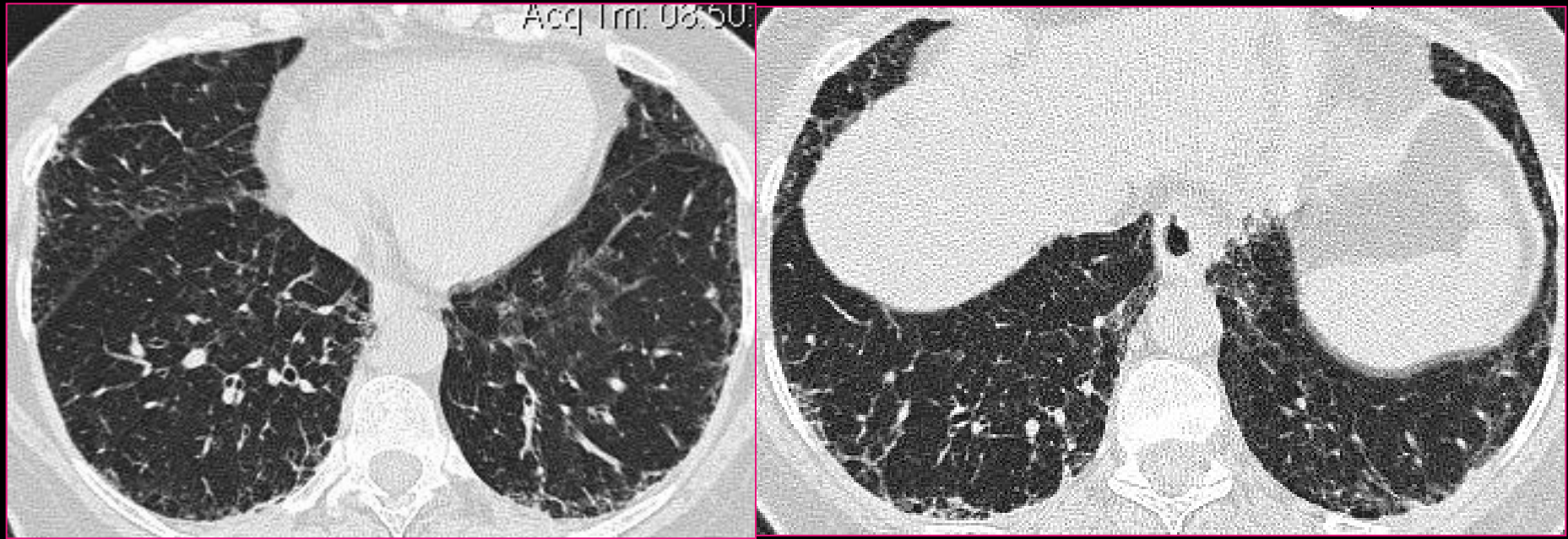
OİP için belirsiz

- Subplevral ve bazal ağırlıklı
- Zor seçilen retikülasyon; hafif buzlu cam veya distorsiyon olabilir ("erken OİP paterni")
- Spesifik bir etyolojiyi işaret etmeyen fibrozis ("gerçekten belirsiz ")

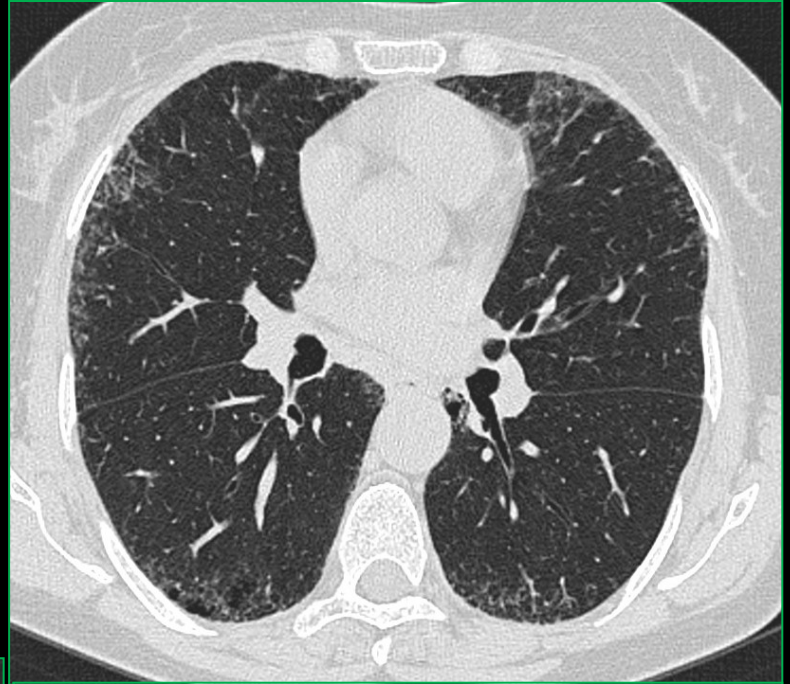
%54- 71'inde patoloji: OİP



OİP için belirsiz



Pat: OIP



52 yaşında, kadın
OİP için belirsiz

Alternatif Tanı (OİP paterni ile uyumsuz bulgular)

BT özellikleri

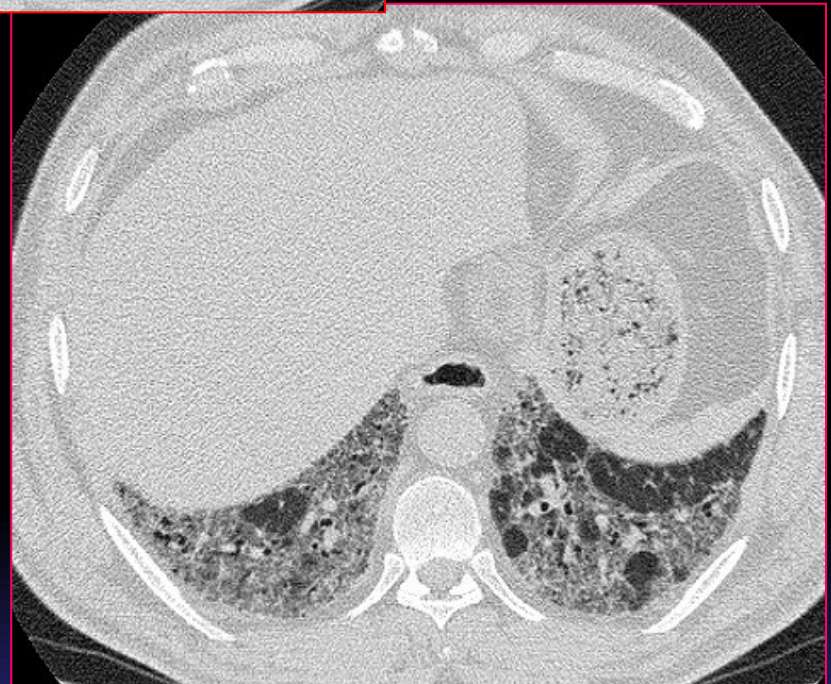
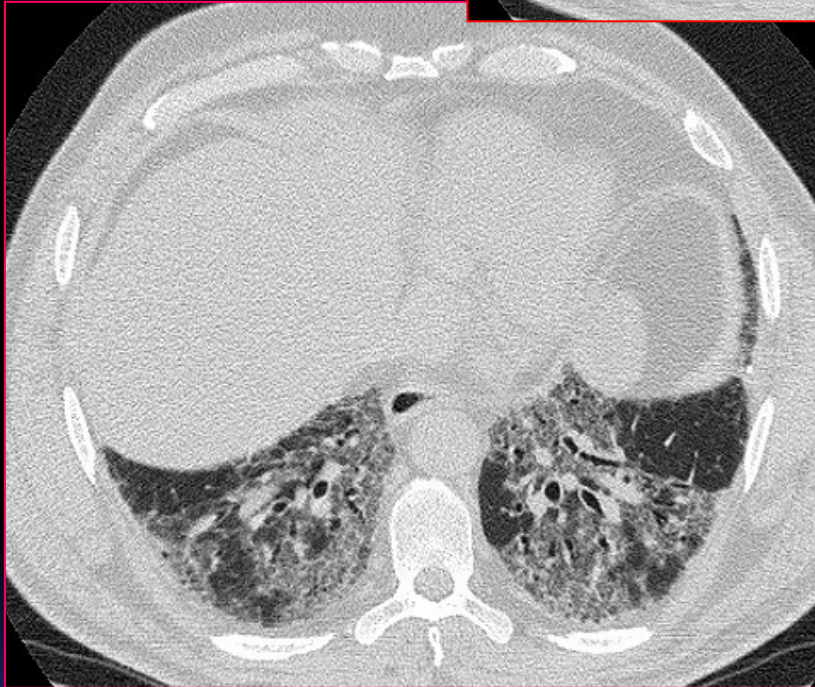
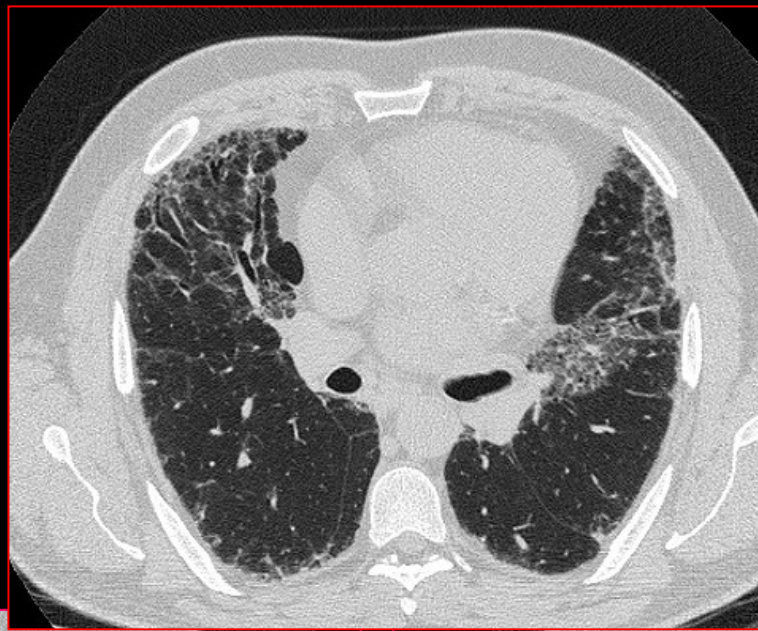
- Kistler
- Belirgin mozaik perfüzyon
- Ağırlıklı buzlu cam dansiteleri
- Yaygın mikronodüler
- Sentrilobüler nodüller
- Nodüller
- Konsolidasyon

Dağılım

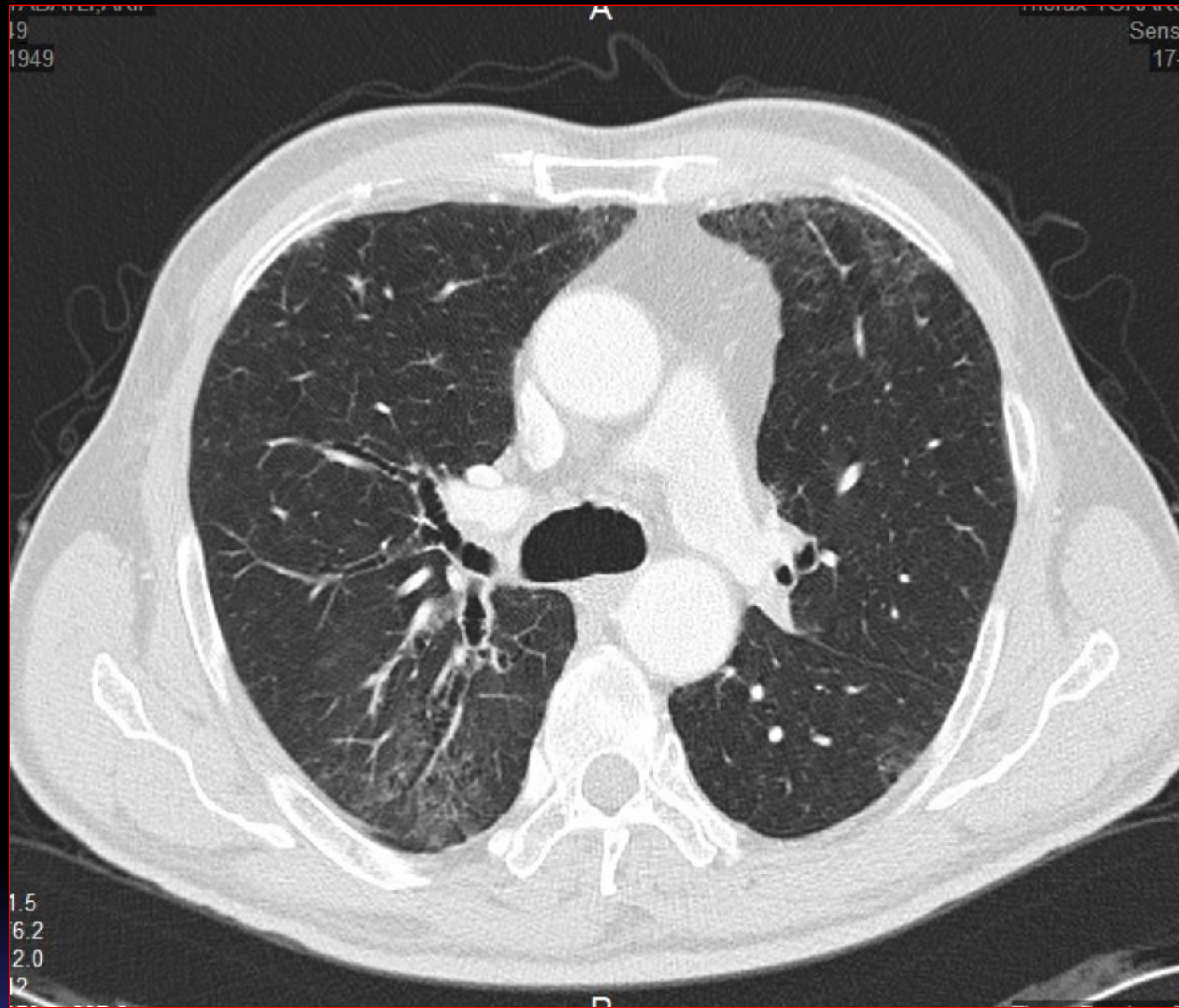
- Peribronkovasküler
- Perilenfatik
- Üst veya orta- zonlar

Diğer

- Plevral plaklar (asbestozis)
- Dilate özefagus (Kollajen doku h.)
- Distal klaviküler erozyon
- Yaygın LAP'ler
- Plevral efüzyon- kalınlaşma (kollajen doku h./ ilaç)



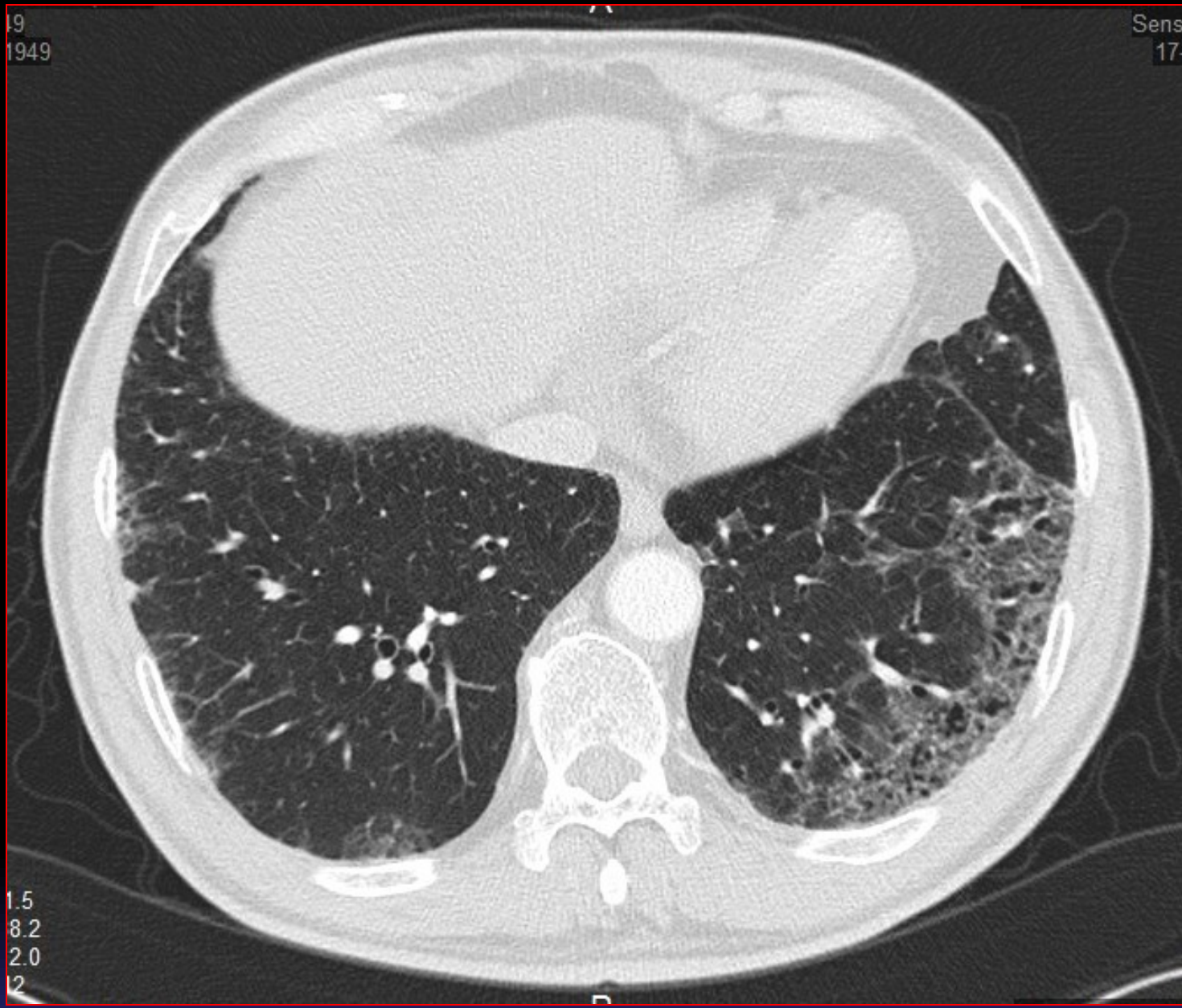
Patoloji: OİP



19
1949

Sens
17

1.5
8.2
2.0
12



3556649
20-08-1949
31
17:02

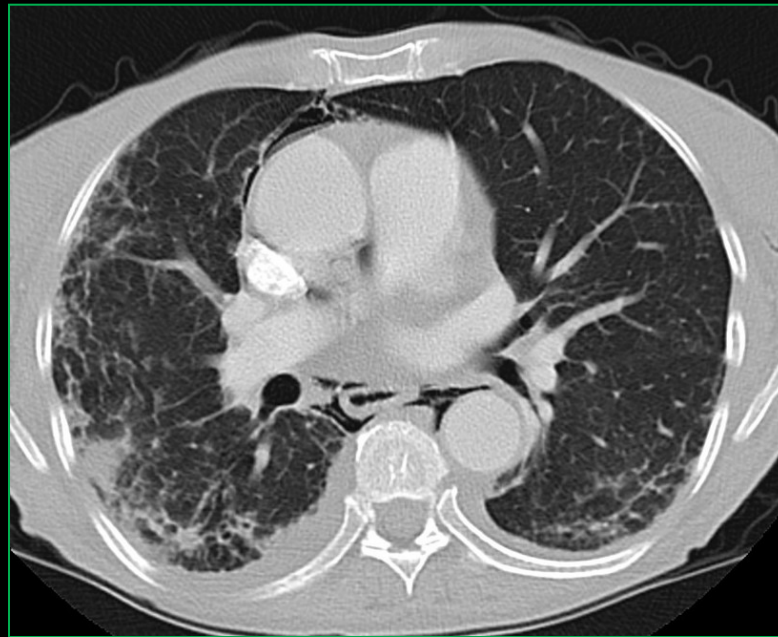
Sensation 1
17-05-201
13:2

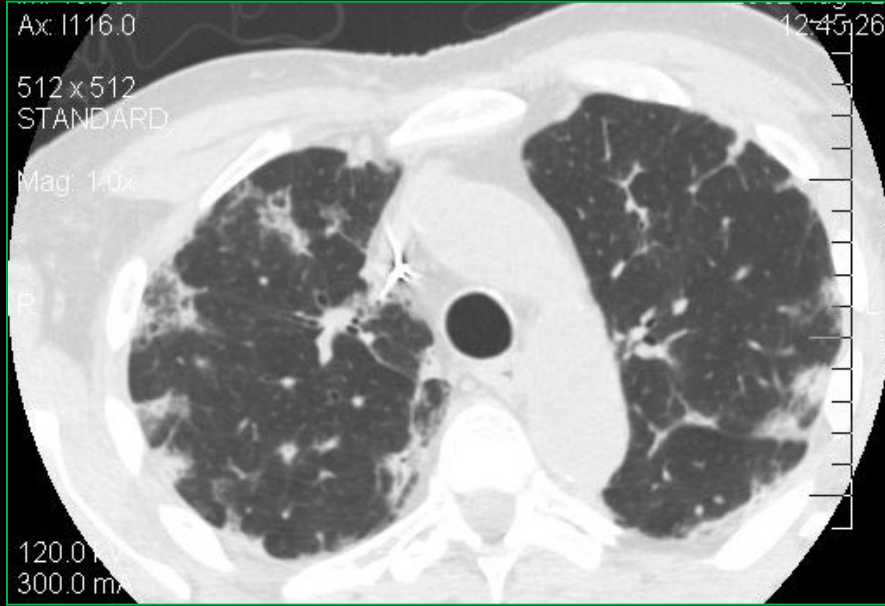
13:2



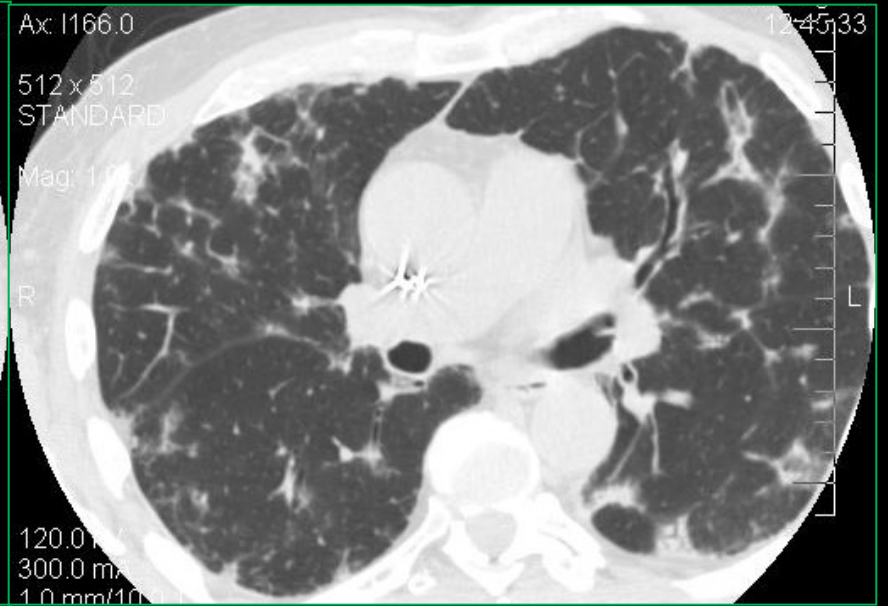
Pat: OIP

**Kemoterapi
etkisi**





Uyumsuz bulgular

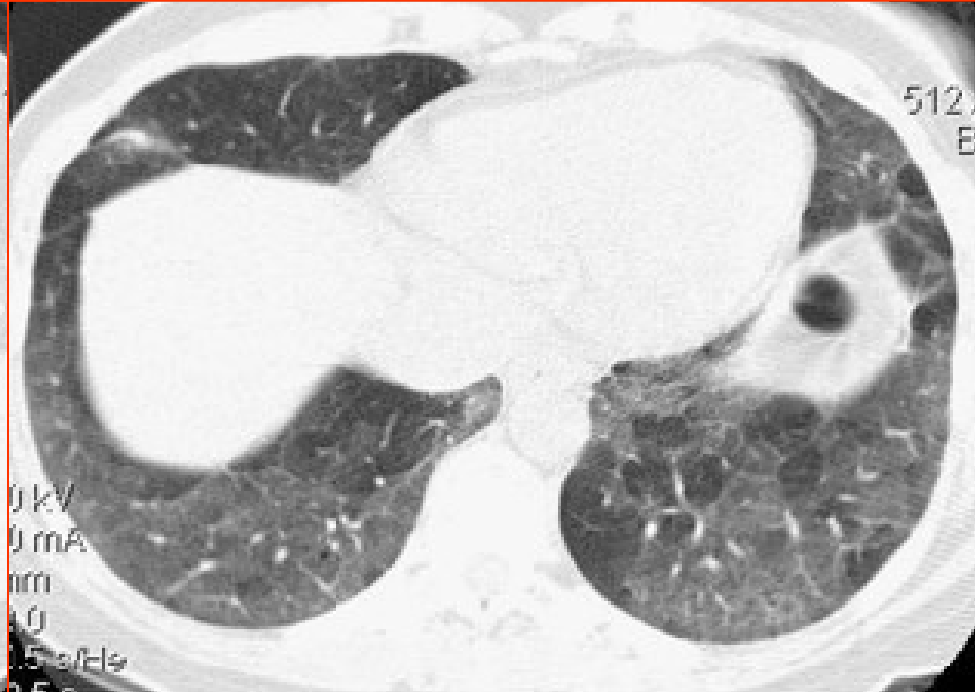


Organize Pnömoni

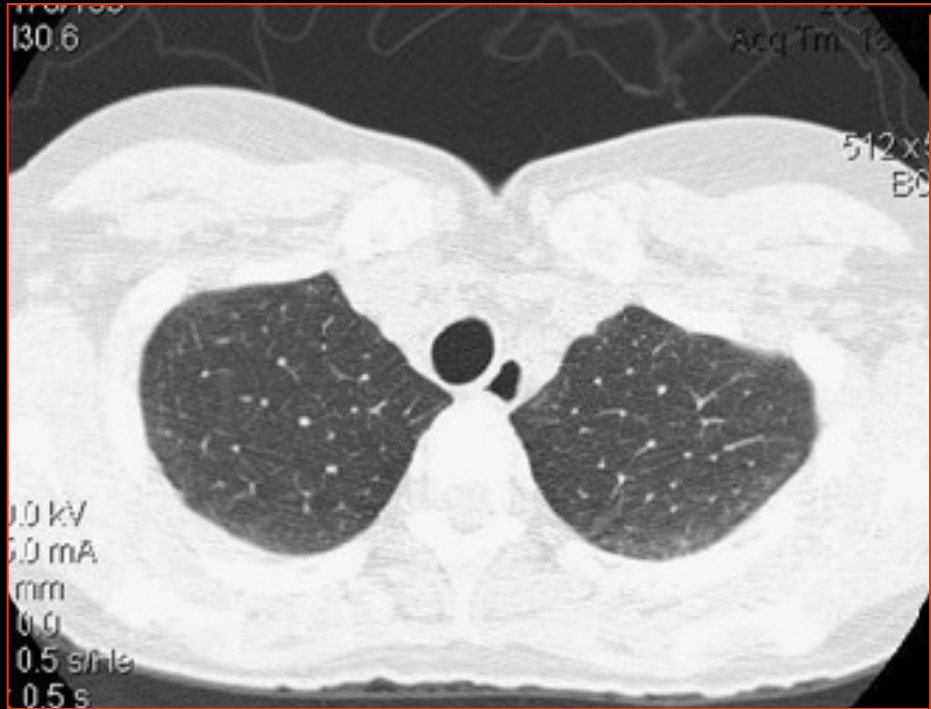
Nonspesifik İnterstisyel Pnömoni

- Buzlu cam dansiteleri
 Dağılım: Çoğunlukla bazal, bazen rastgele- diffüz, nadiren santral
- Subplevral alanlar korunur
- İrregüler çizgisel, retiküler dansiteler
- Bronşiektazi-bronşiolektazi
- Balpeteği ve konsolidasyon sık değil
- **Fibrozan NSİP:** balpeteği, traksiyon bronşektazileri ve intralobüler retiküler opasiteler.





Sellüler NSİP

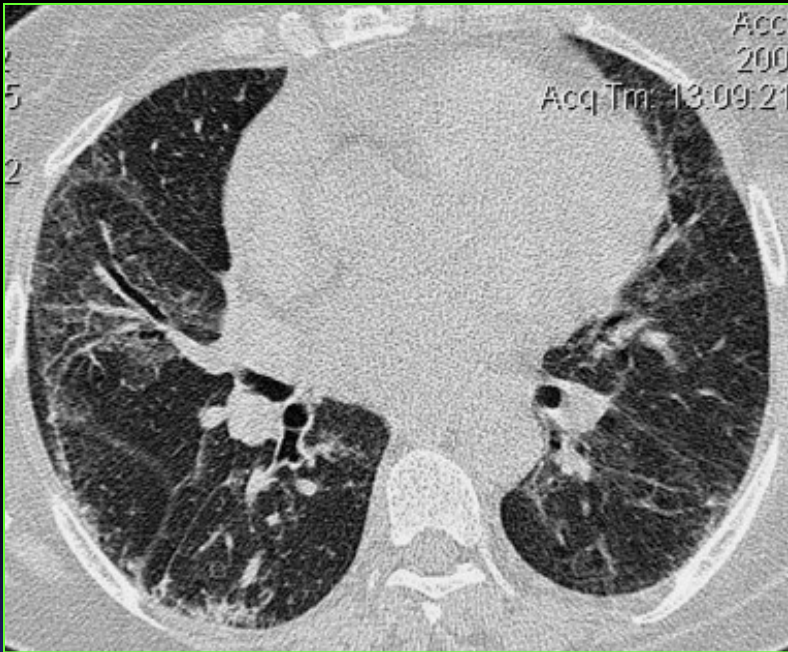
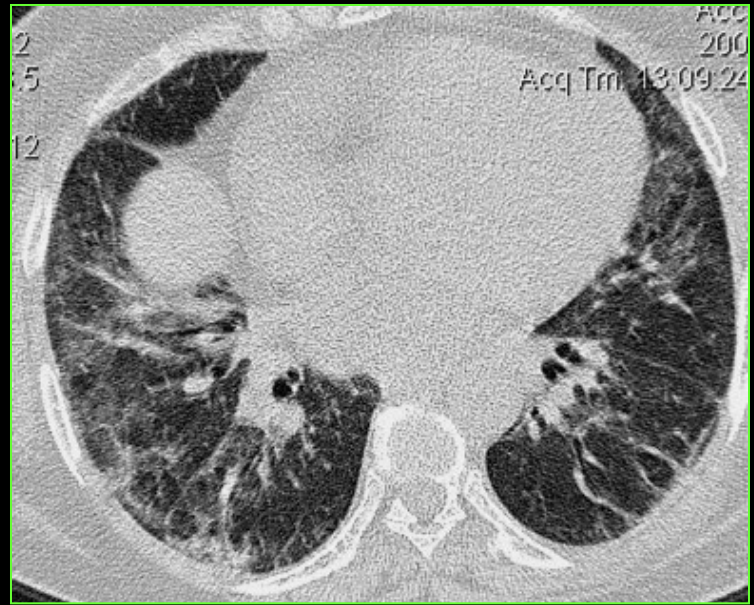
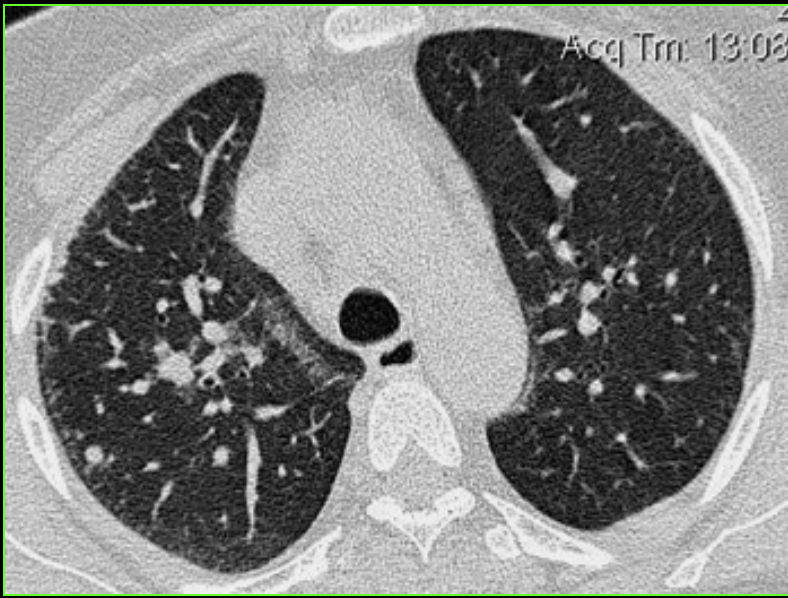


Fibrozan NSiP

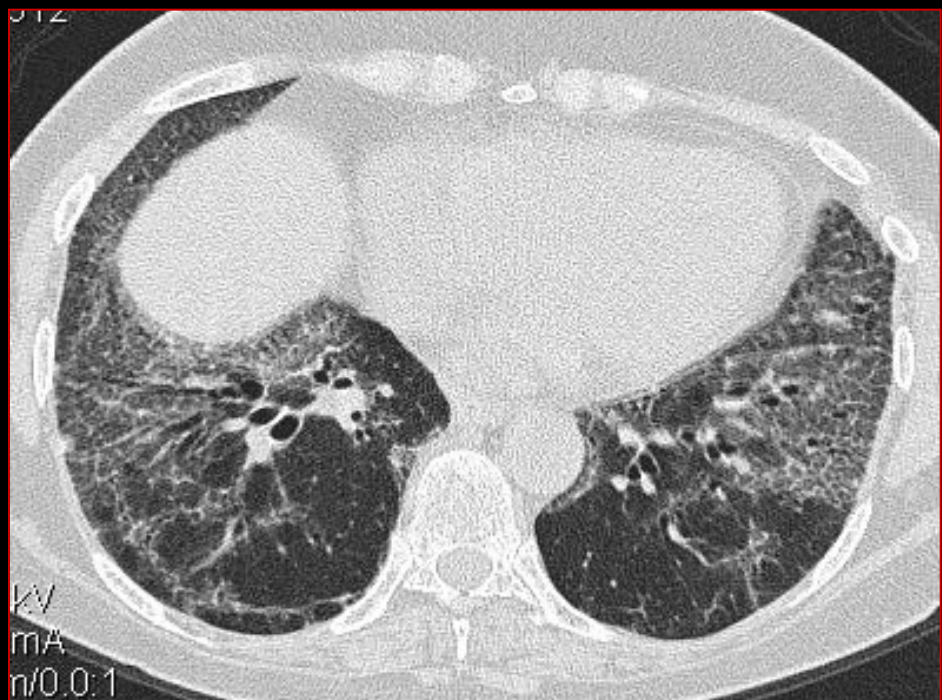
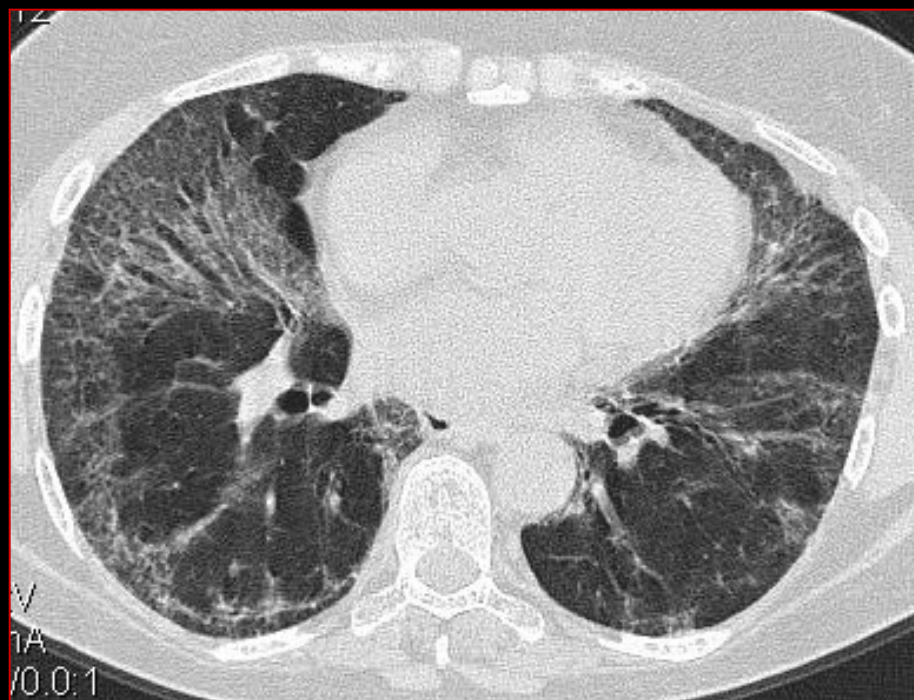
OİP vs NSİP

NSİP lehine olan anahtar YÇBT özellikleri:

- Yaygın buzlu cam dansiteleri
- Akciğerin homojen tutulumu, belirgin apikobazal gradient olmaması
- Retiküler dansitelerin olmaması veya hafif olması
- Bal peteğinin olmaması veya hafif olması
- Subplevral alanların korunması



NSIP





İdyopatik Plöroparenkimal Fibroelastozis

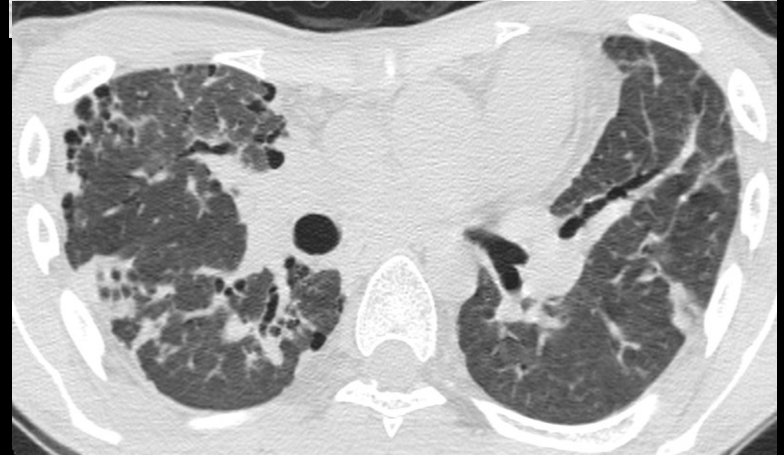
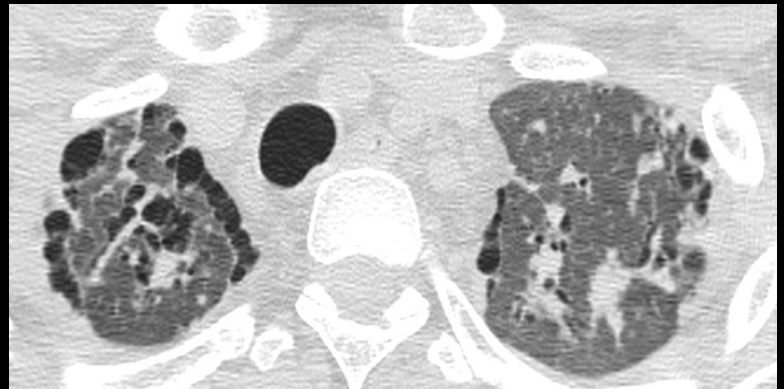
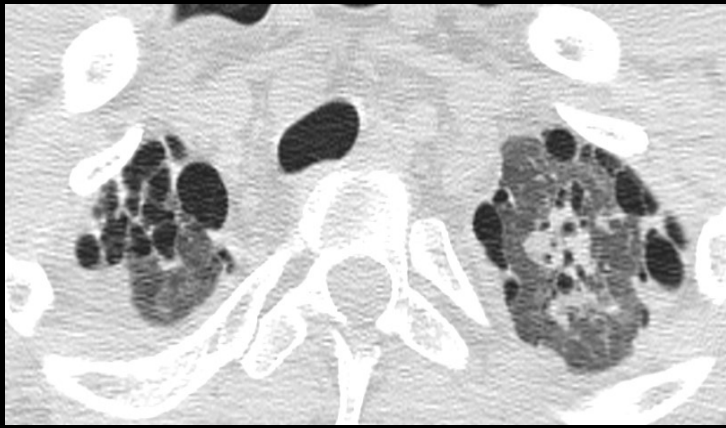
- Özellikle üst lobları ilgilendiren plevral ve parenkimal fibrotik kalınlaşma ile karakterize bir hastalıktır.

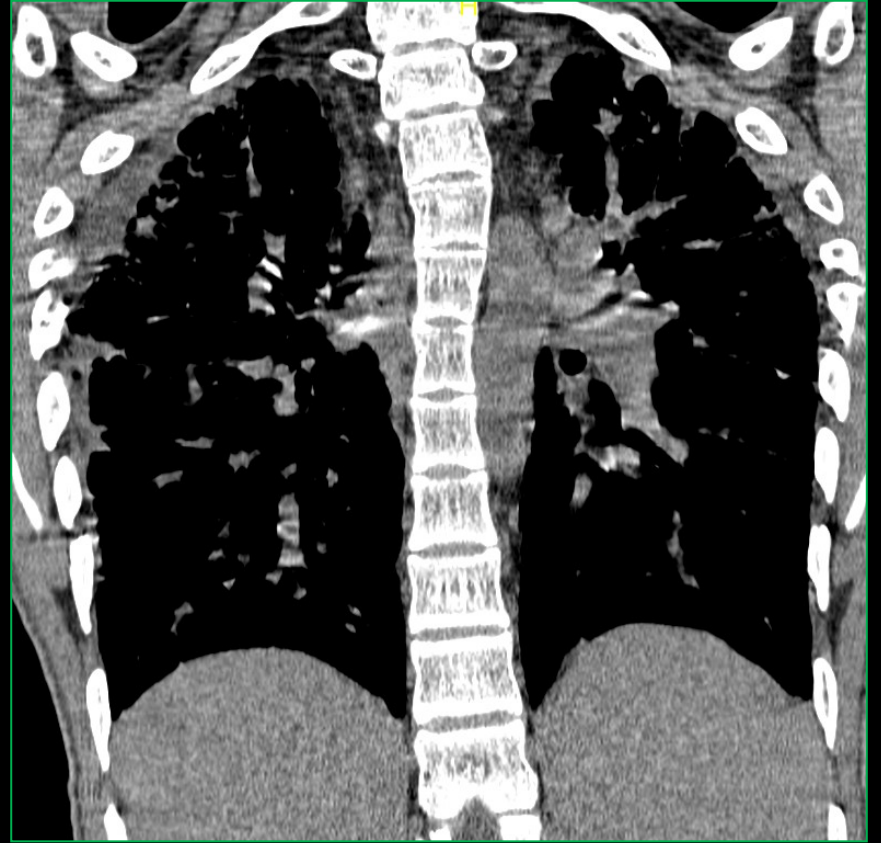
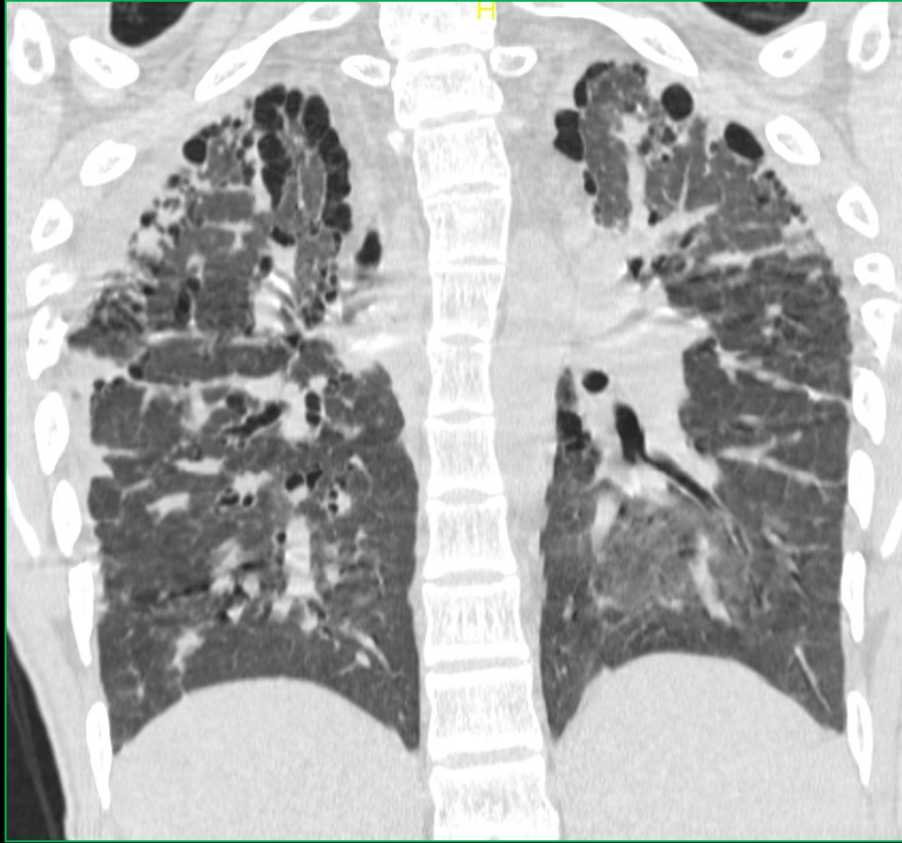
Akciğer grafisi:

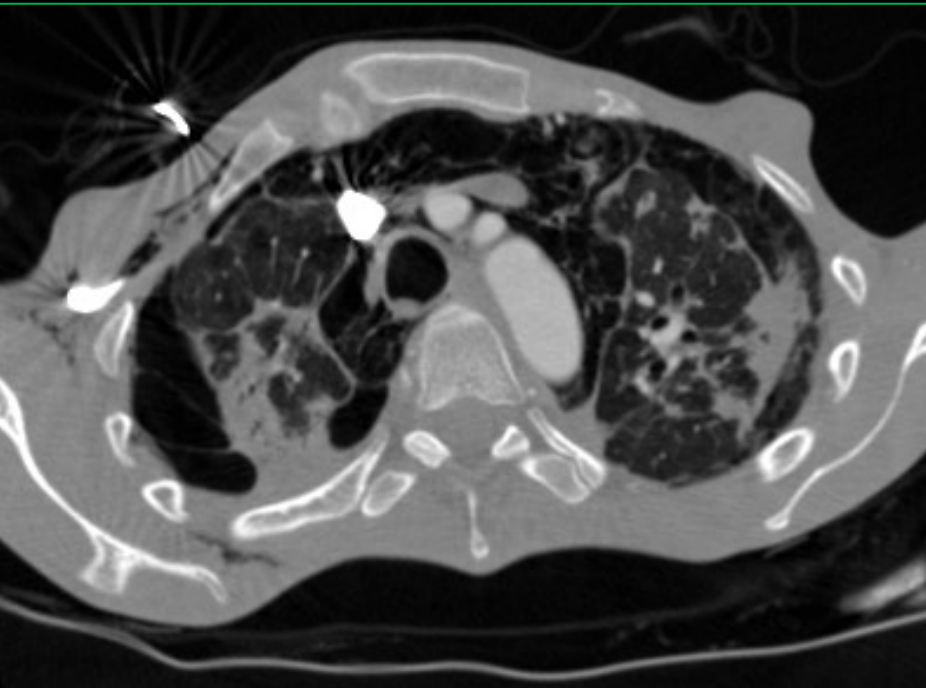
- Apikal plevral kalınlaşma (apikal kep), üst loblarda hacim kaybı, hiluslarda yukarı çekilme, diafragmada yükselme

BT:

- Bilateral apikal plevral kalınlaşmalar
- Subplevral konsolidasyonlar
- Retiküler dansiteler: interlobüler septal kalınlaşmalar, traksiyon bronşektazileri, bal peteği
- Pnömotoraks
- Lenfadenopati: Mediastinal/ aksiller







İdyopatik plöroparenkimal fibroelastozis

Fibrosis yapan Kollajen Doku Hastalıkları

- Skleroderma
- Dermatomyozit/ Polimiyozit: Antisentetaz send.
- Romatoid artirit

- Ankilozan Spondilit
- Sjögren send.
- Sistemik lupus E.

Sistemik Skleroz

- Deri ve viseral organlarda kollajen birikimi
- Akciğer tutulumu en önemli mortalite ve morbidite nedeni
- İAH ve pulmoner HT en sık görülen akciğer tutulumu
- YÇBT aktif alveoliti göstermede BAL'dan daha başarılı (%90.6 vs %70)
- NSİP paterni > OİP paterni
- Alt – periferik alanlarda
- Tutulum İPF'den daha az yaygın, buzlu cam dansiteleri İPF'den daha fazla

512 x 512
B60s

R

130.0 kV
32.0 mA
1.0 mm/0.0:1
Tilt 0.0

Acq. no. 11.55.55.000500

512
s

130.0 kV
32.0 mA
1.0 mm/0.0:1

512

130.0 kV
32.0 mA
1.0 mm/0.0:1
Tilt 0.0

512

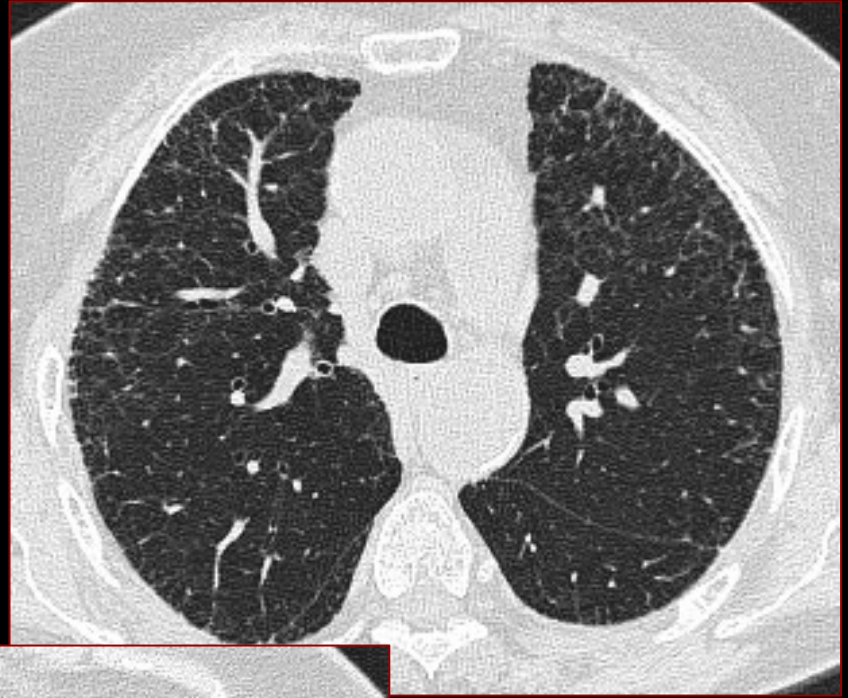
130.0 kV
32.0 mA
1.0 mm/0.0:1
Tilt 0.0

ICM/11m55CM/1d1G





Skleroderma

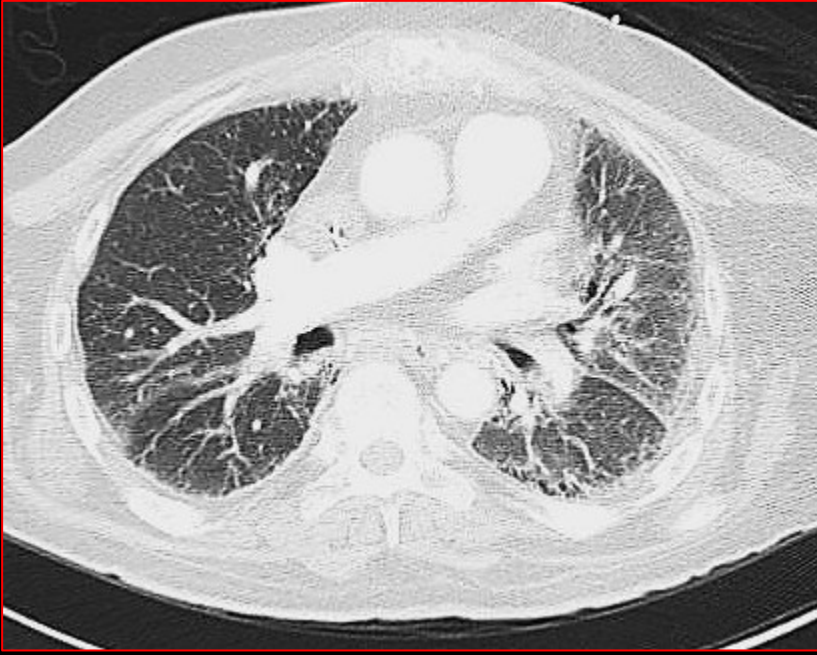


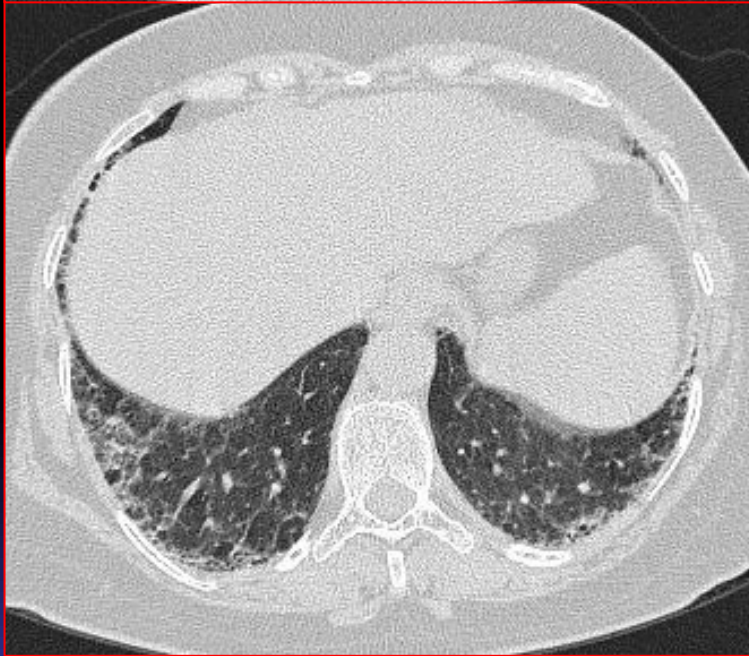
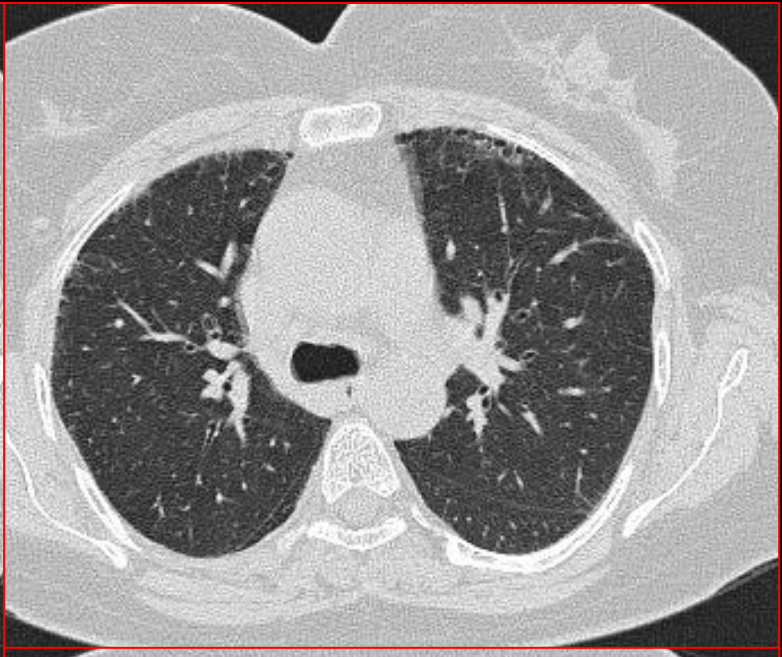
Skleroderma



Romatoid Artirit

- Akciğer tutulumu %10-20
- İAH % 2-9, E> K
- Alt – periferik alanlarda septal kalınlaşmalar
- İleri dönemde balpeteği nadir
- OİP/İPF'den prognozu daha iyi



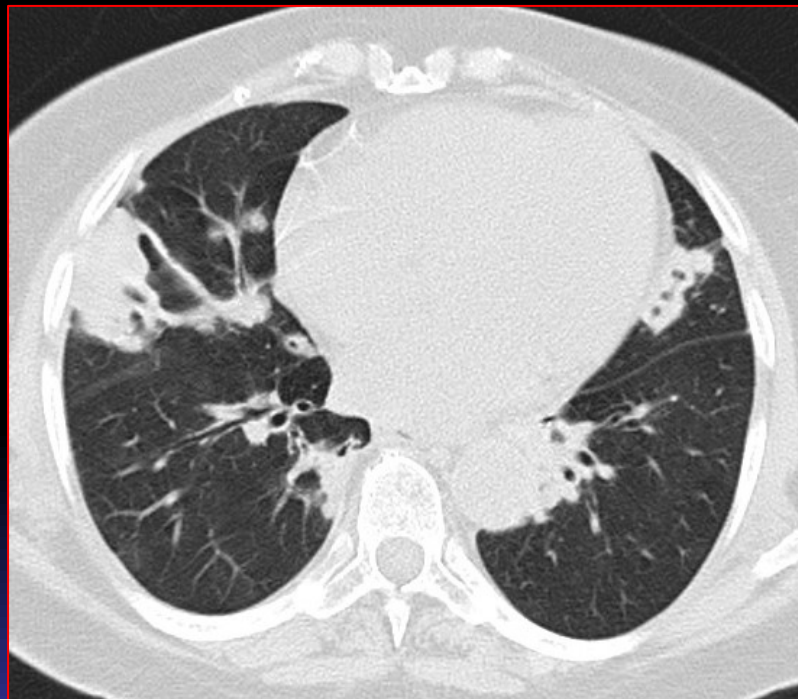
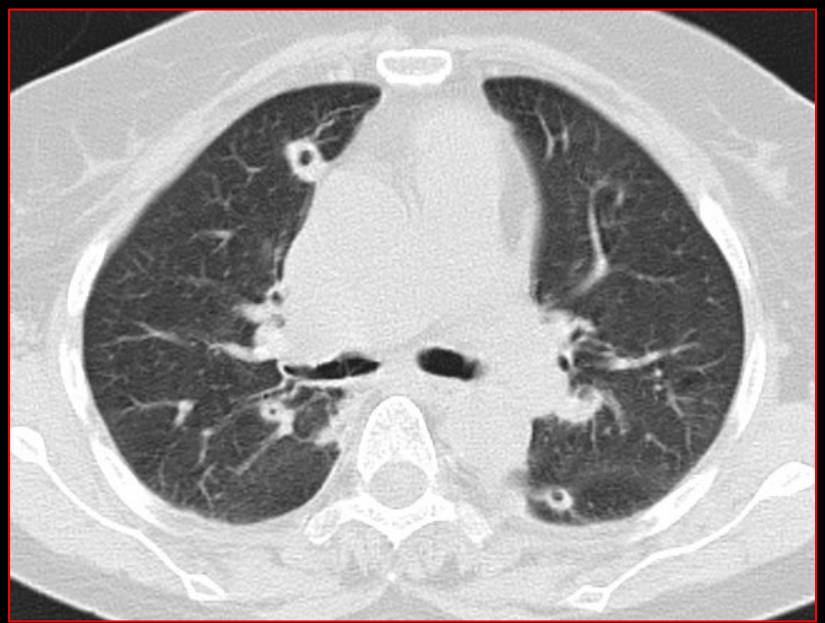






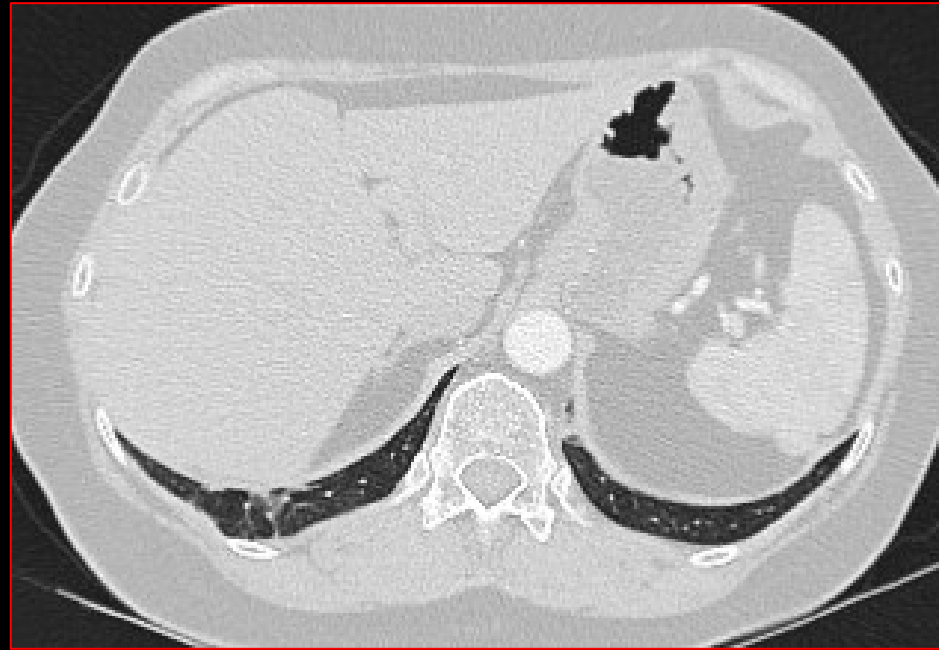
RA

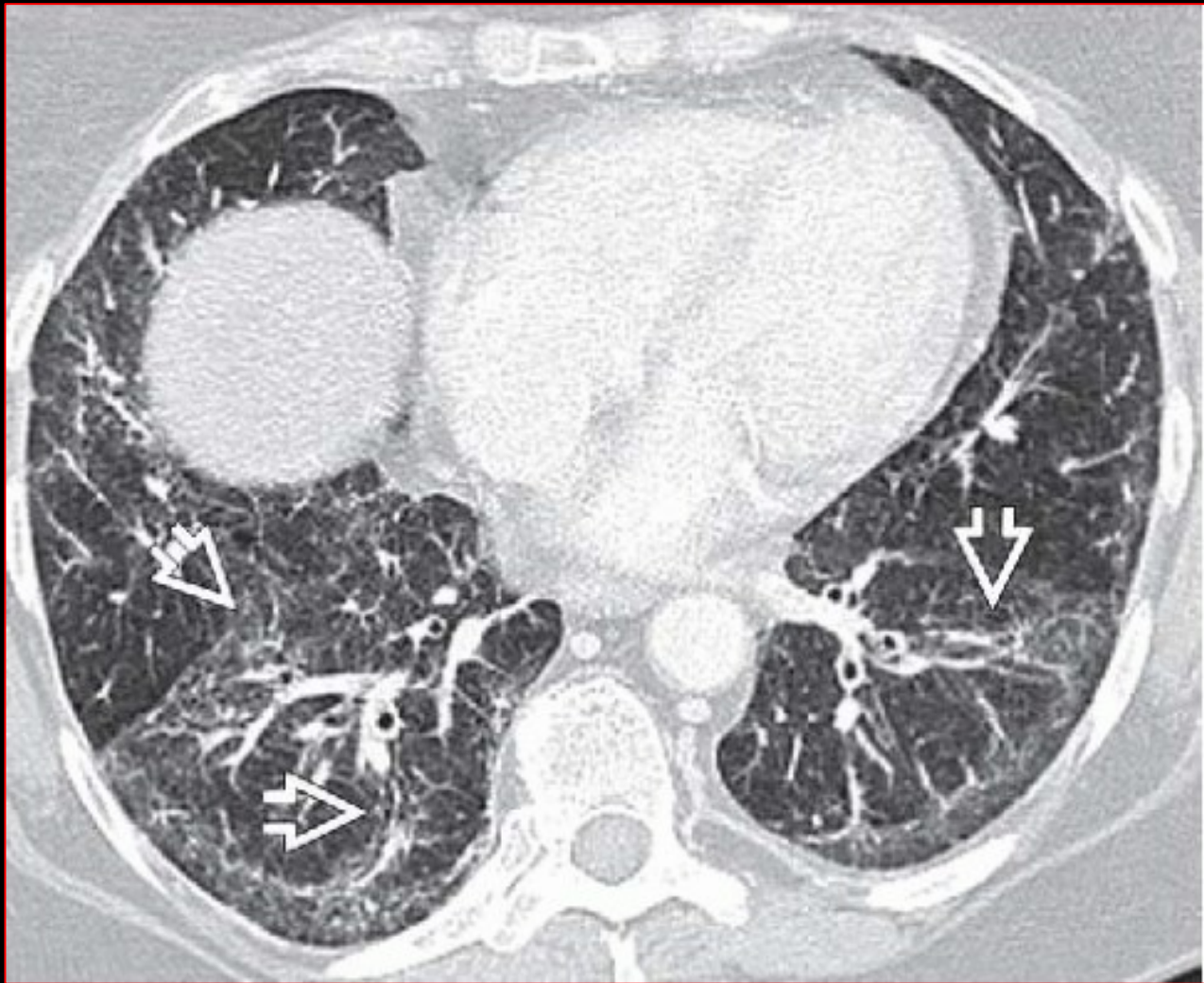
RA 3216192



Dermatomyozit/ Polimiyozit: Antisentetaz sendromu

- Tutulum sık, RA ve SS'a benzer
- En sık NSİP paterni
- OİP, KOP, DAH paterni de görülür
- KOP paterni olanlarda prognoz OİP paterni olanlardan daha iyi



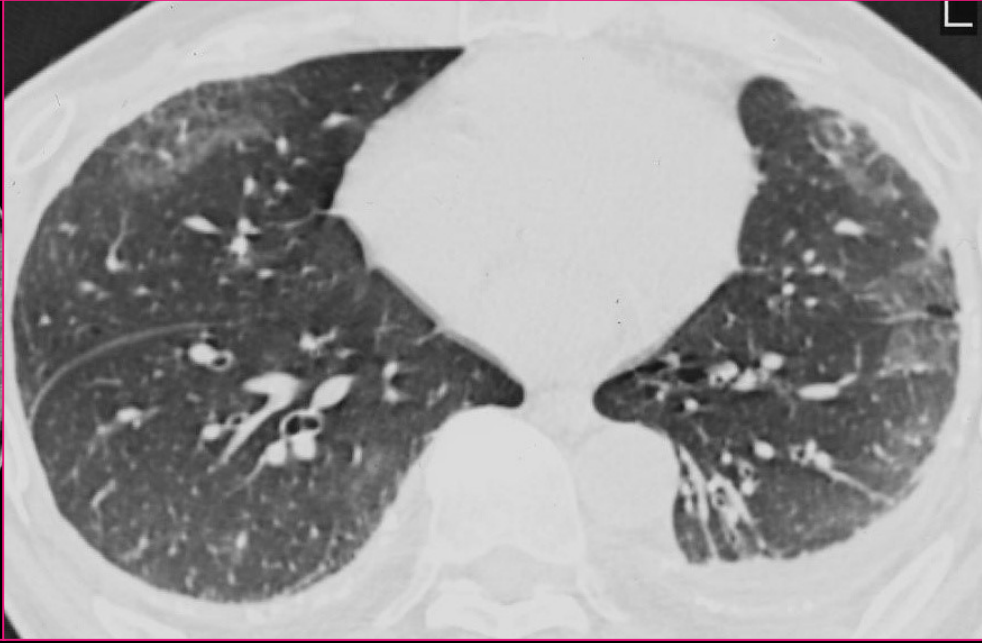
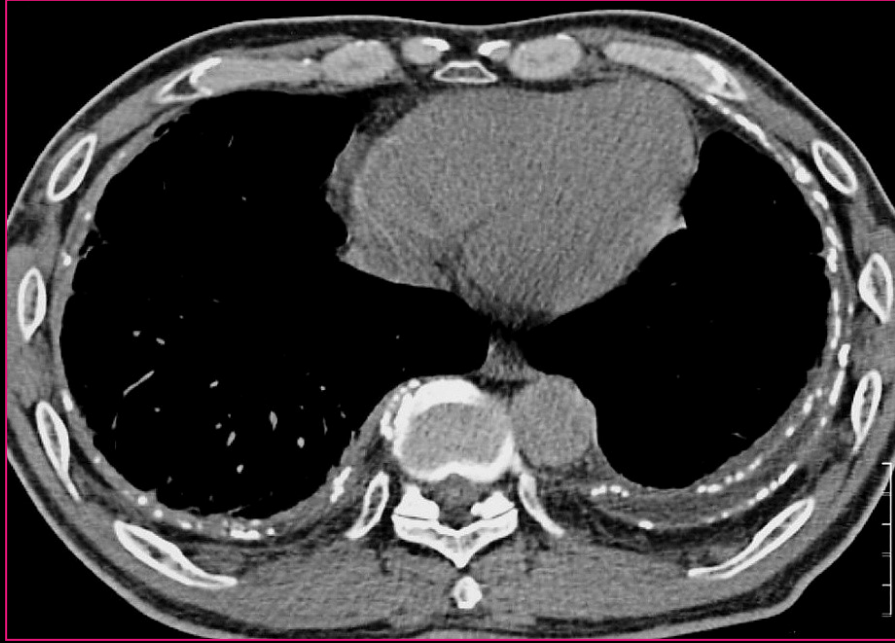


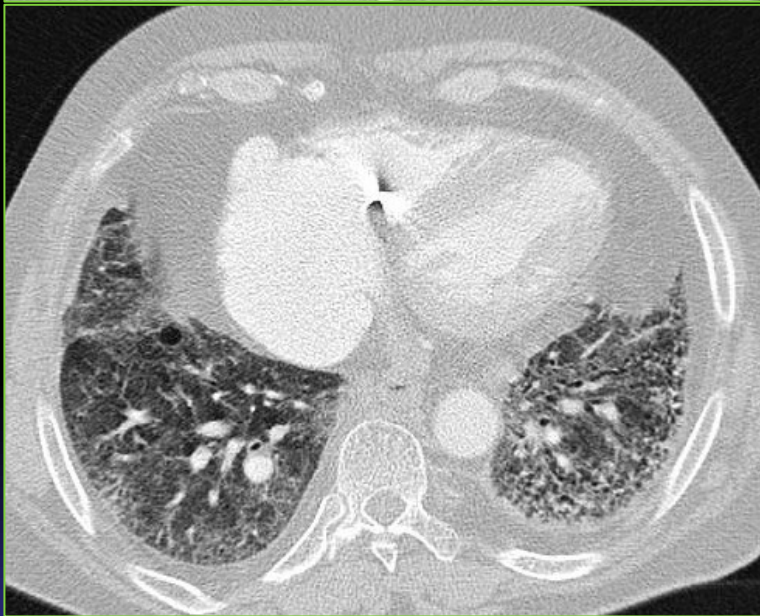
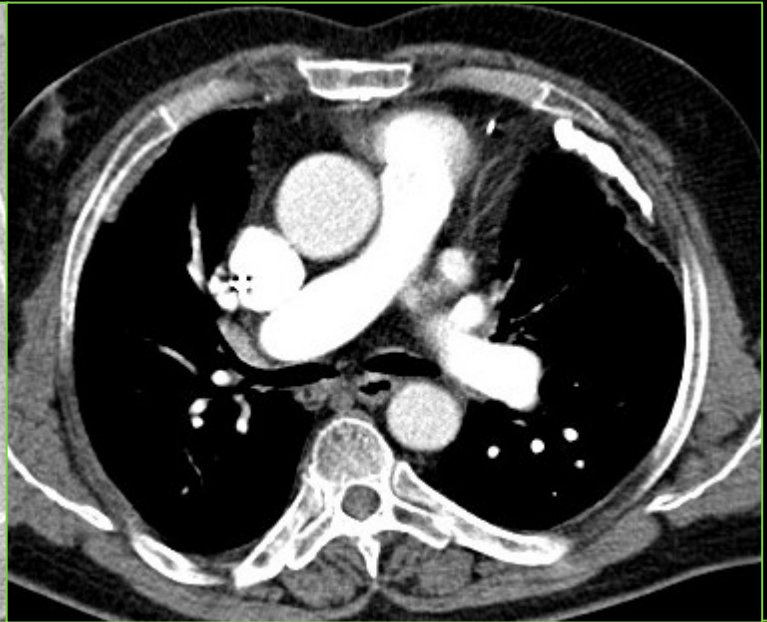
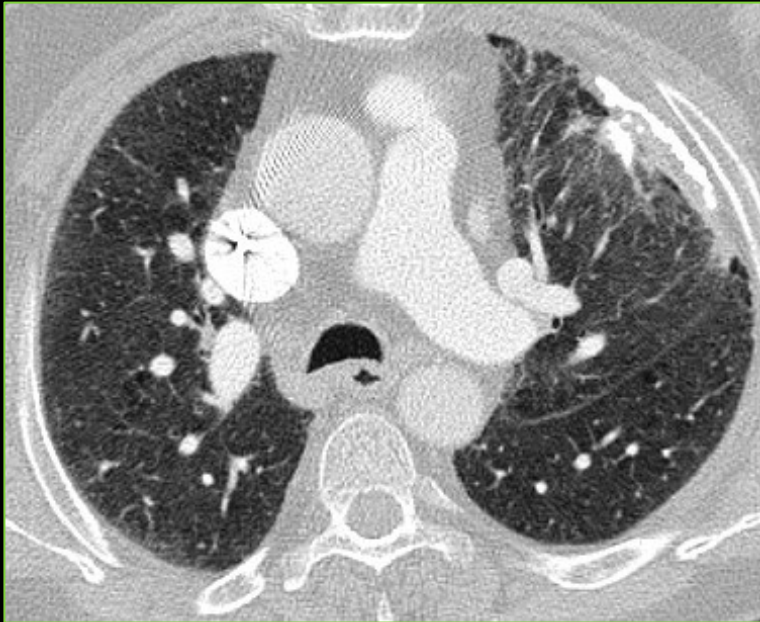
NSIP paterni

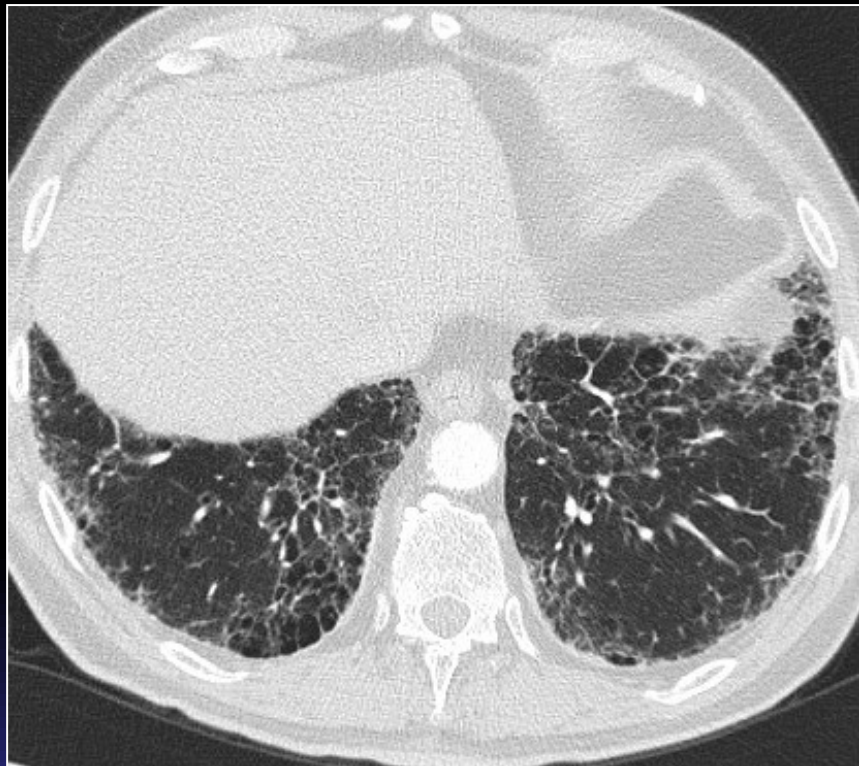
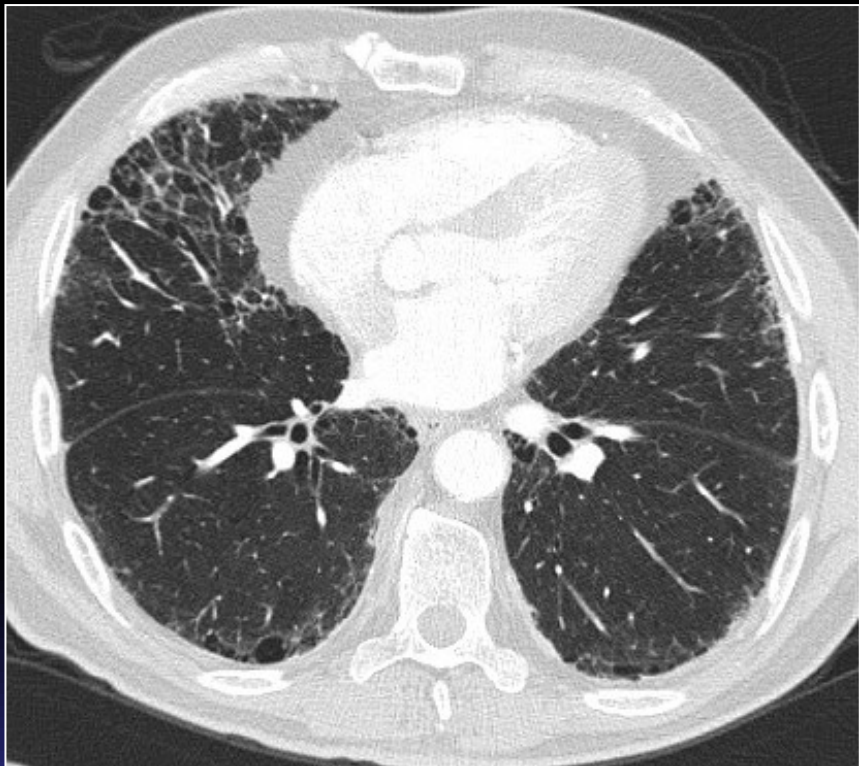
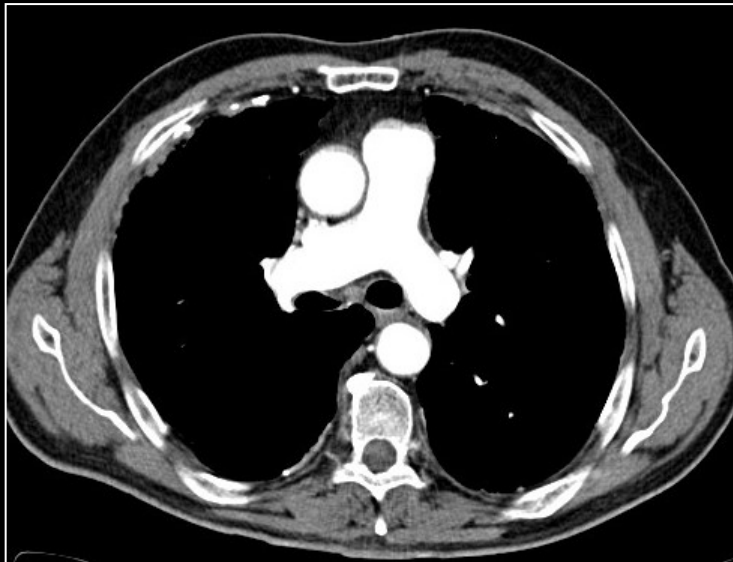
Asbestoz

- Erken bulgular bazal ve posterior kesimlerde
- İnterstisyel fibrozis respiratuvar bronşiollerden başlayıp komşu alveollere yayılır: **subplevral noktasal opasiteler**
- **Subplevral çizgiler**
- **Yamalı buzlu cam dansiteleri** (alveol duvarlarında ödem – fibrozis)
- **Fibrozis bulguları:** intra- interlobüler interstisyel kalınlaşmalar, bal peteği
- Plevral kalınlaşma ve plakların varlığı asbestoz lehine
- Plevral kalınlaşma ile ilişkili parenkimal bantlar, **yuvarlak atelektazi**











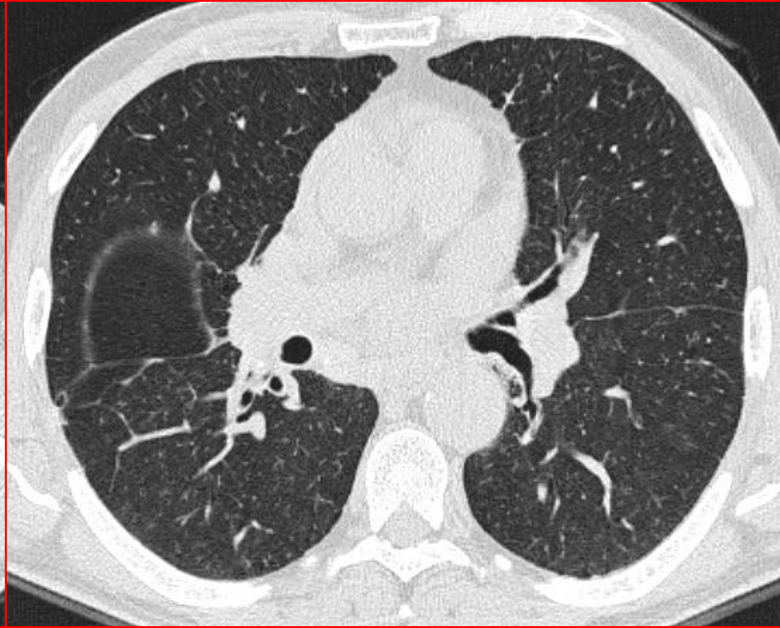
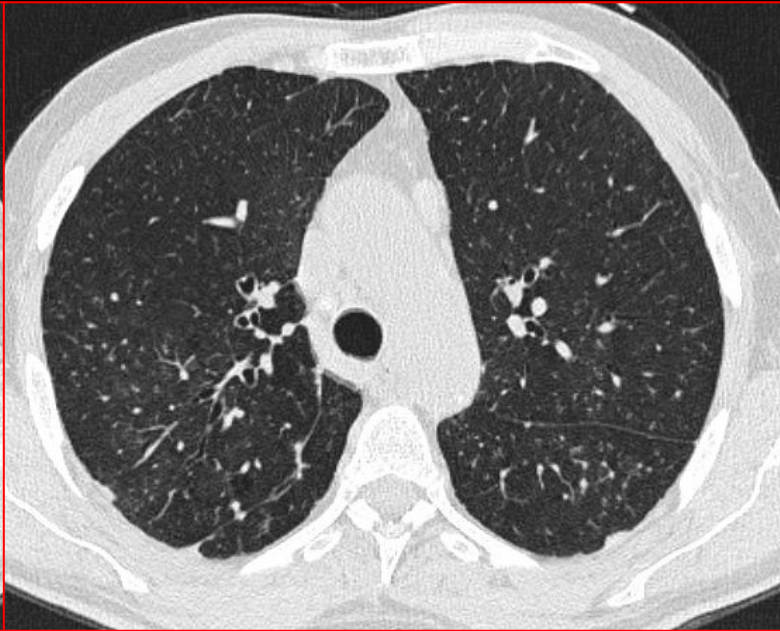
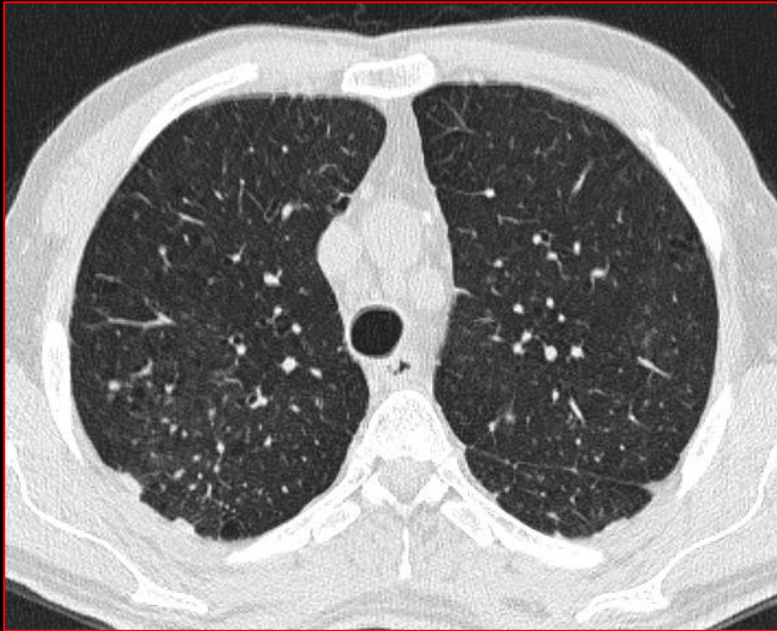
Silikozis/ Kömür İşçileri Pnömonyozu

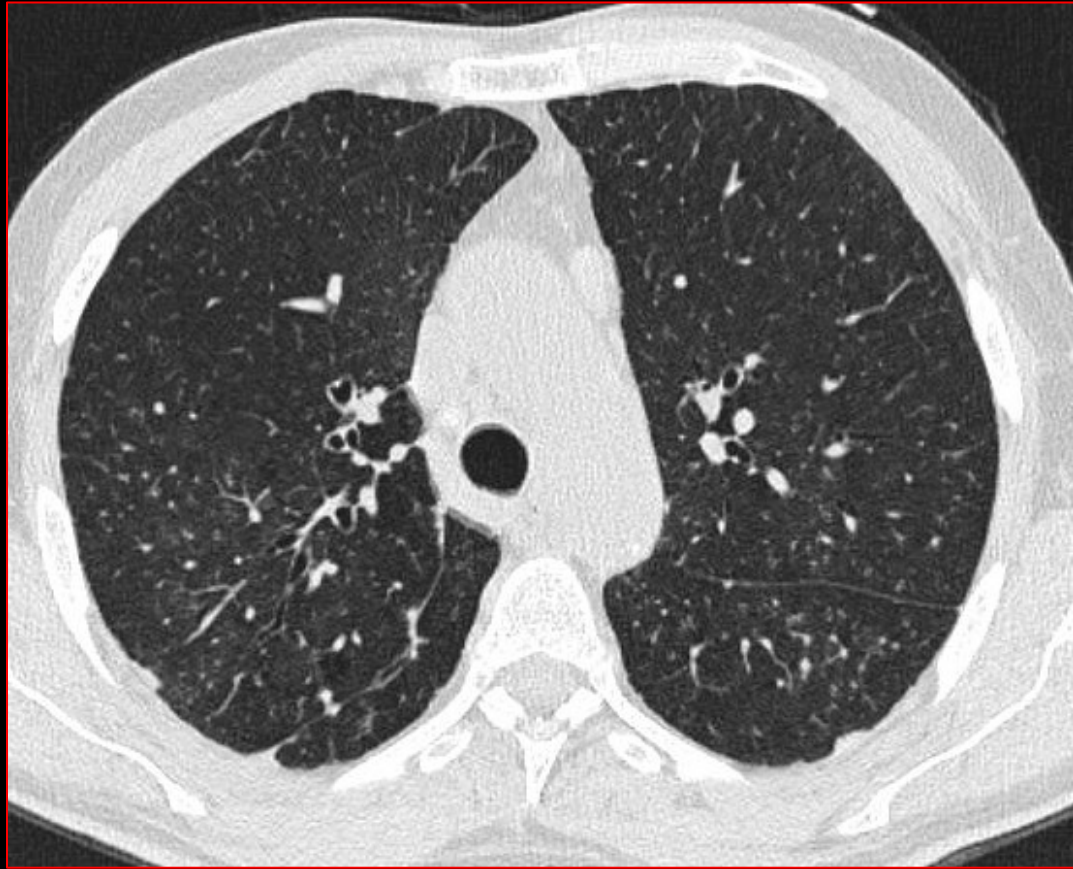
Erken Dönemde:

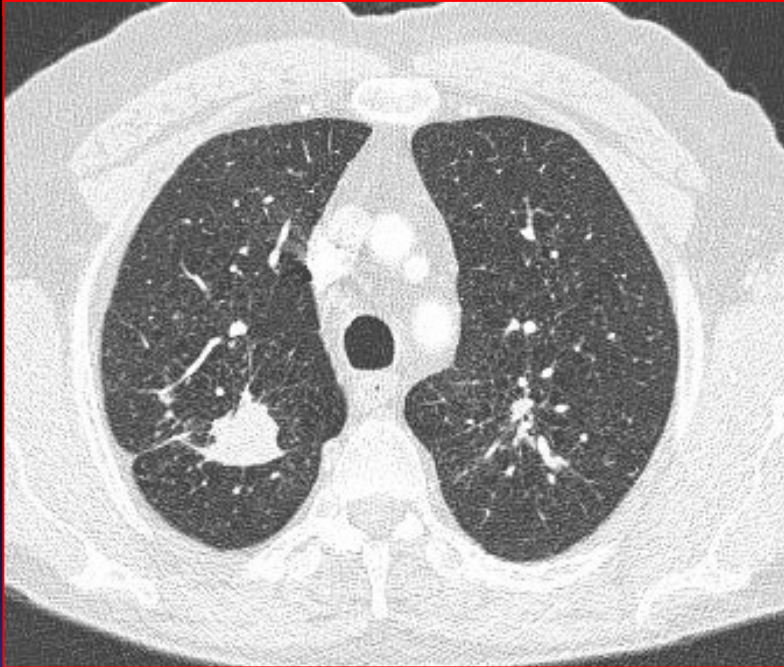
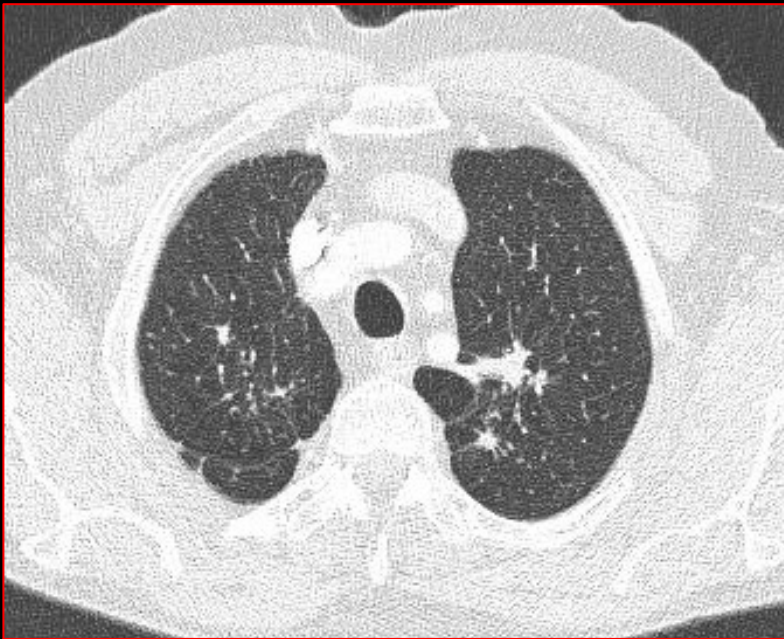
- 2-5 mm çapında keskin sınırlı nodüller (nadiren daha büyük)
- Üst ve arka zonlarda daha fazla

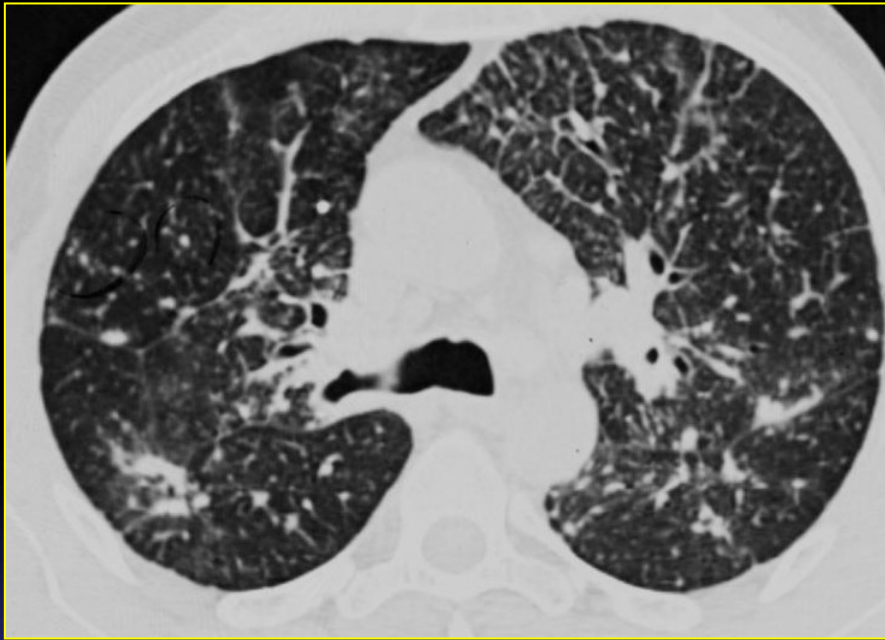
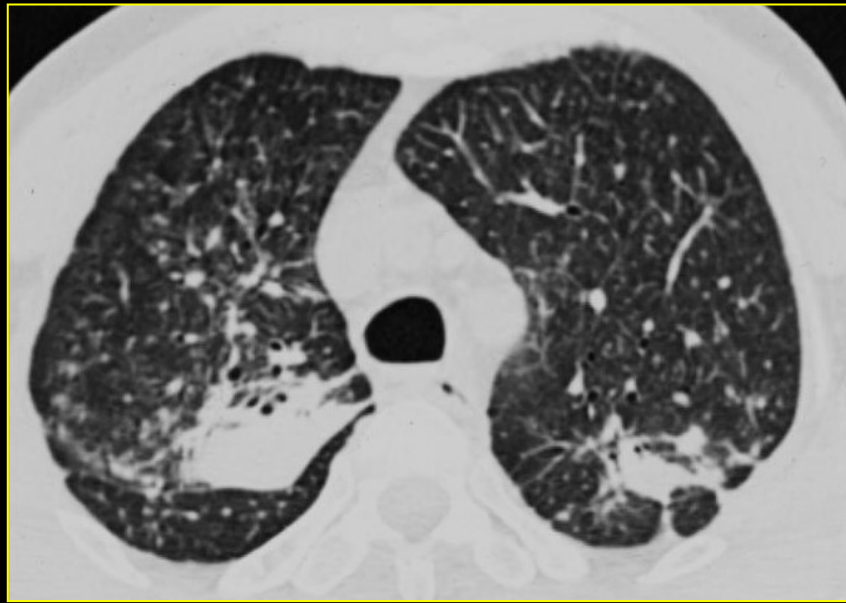
Geç dönemde:

- Nodüllerin birleşmesi sonucunda daha büyük nodüller (>1 cm)
- Büyük, irregüler kenarlı konglomere kitleler
- Kitleler üst zonların orta kısmında veya periferinde başlayıp hilusa doğru ilerlerler
- Paraskatrisyel amfizem pulmoner masif fibrozisi işaret eder



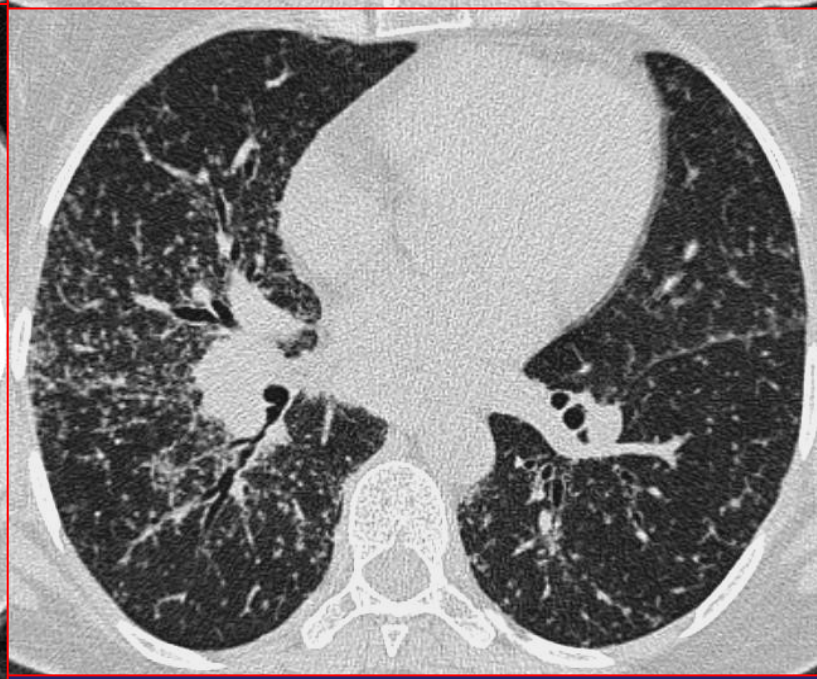
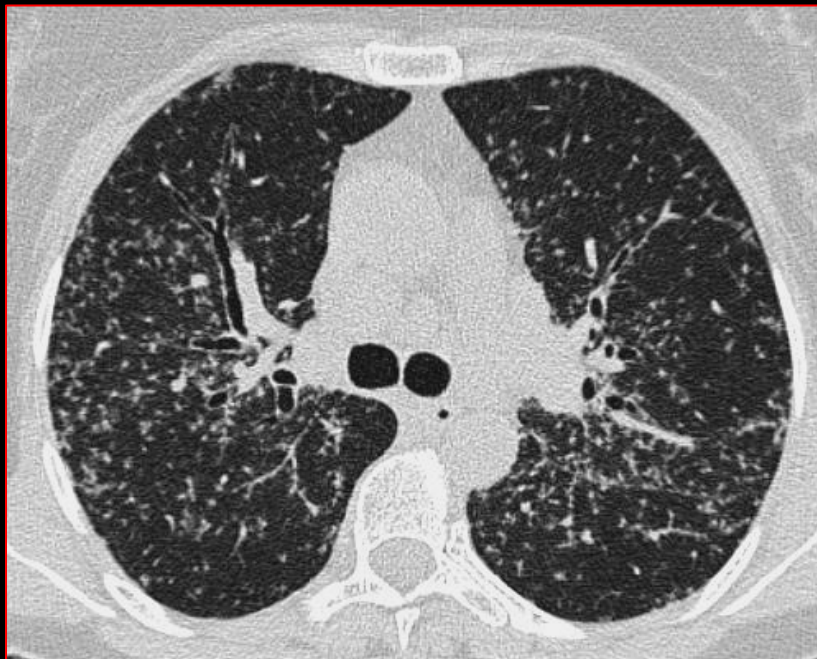


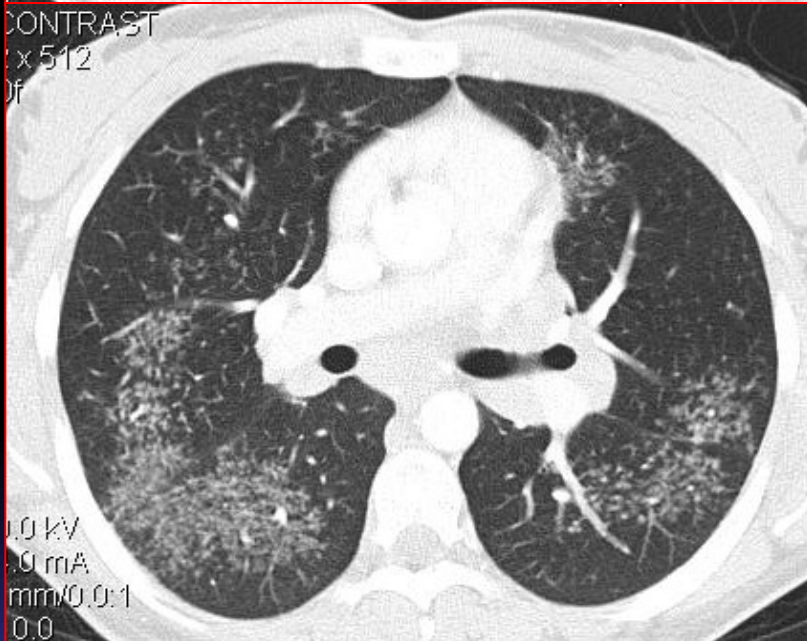
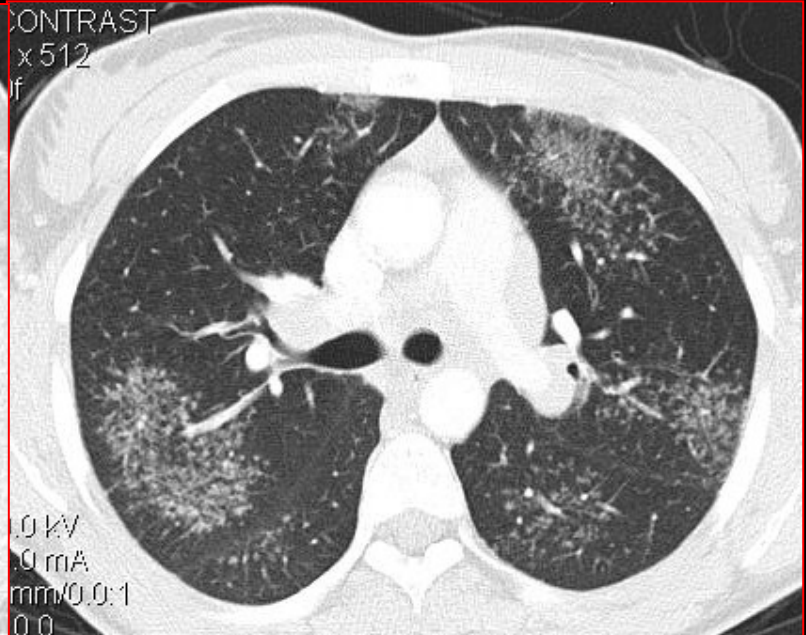
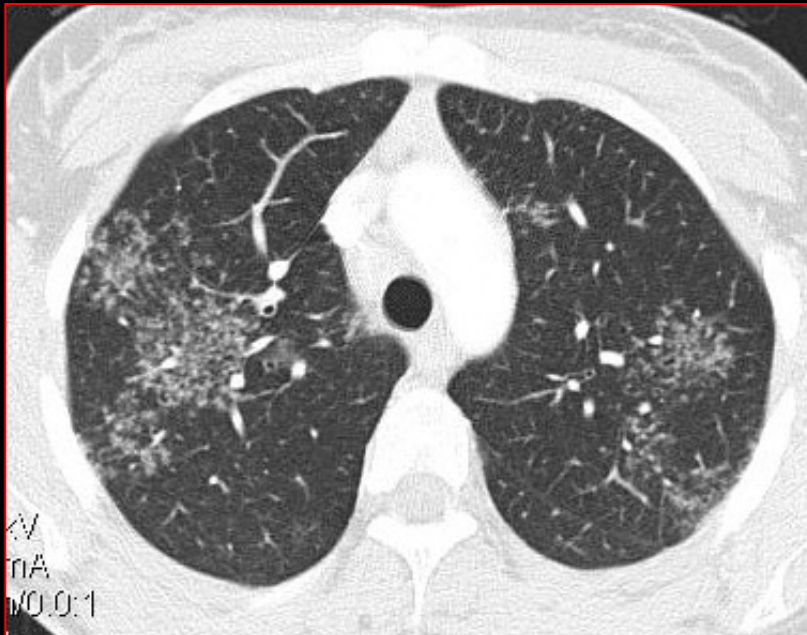


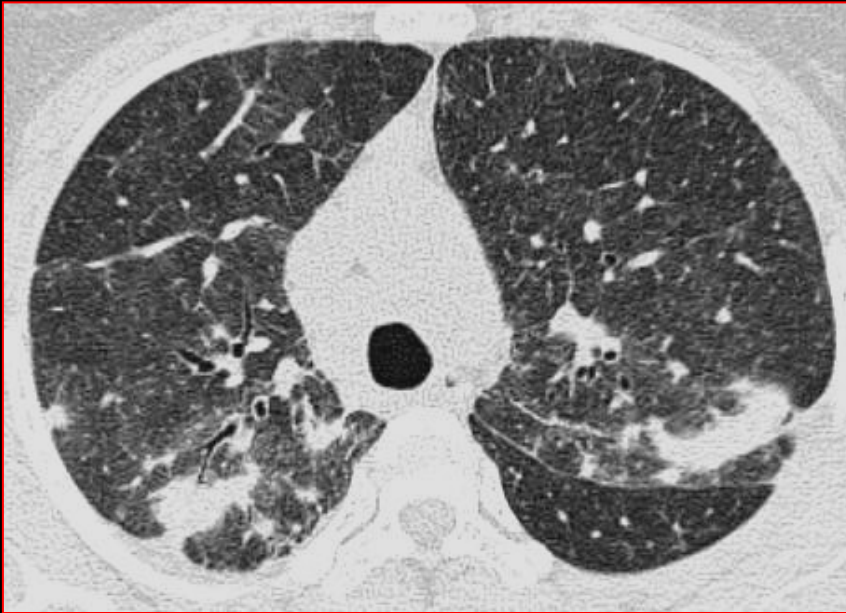


Sarkoidoz: Parenkim Tutulumu

- Perilenfatik küçük, keskin sınırlı nodüller (1-5 mm)
- Büyük (>1 cm) nodüller
- Yama tarzında buzlu cam dansiteleri, konsolidasyonlar
- İnterstisyel kalınlaşma
- Dağılım: Peribronkovasküler, santral



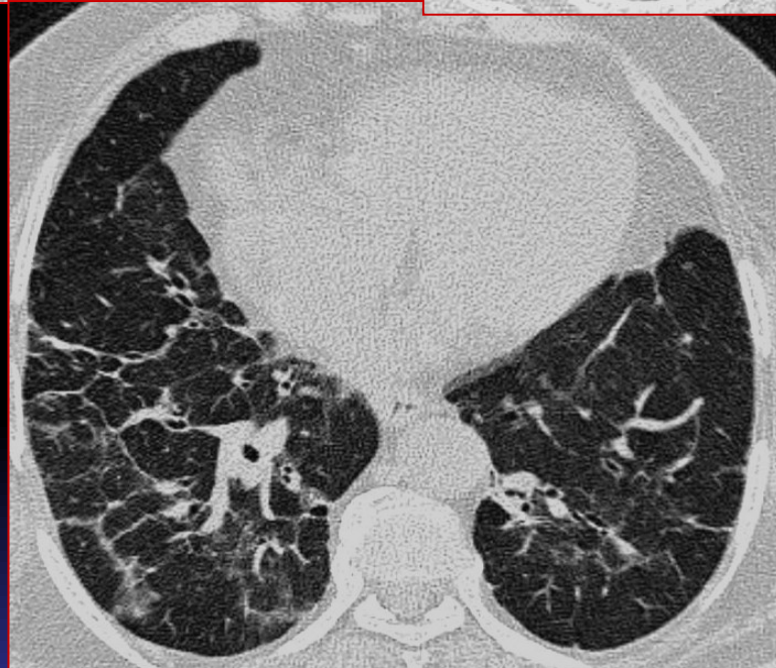
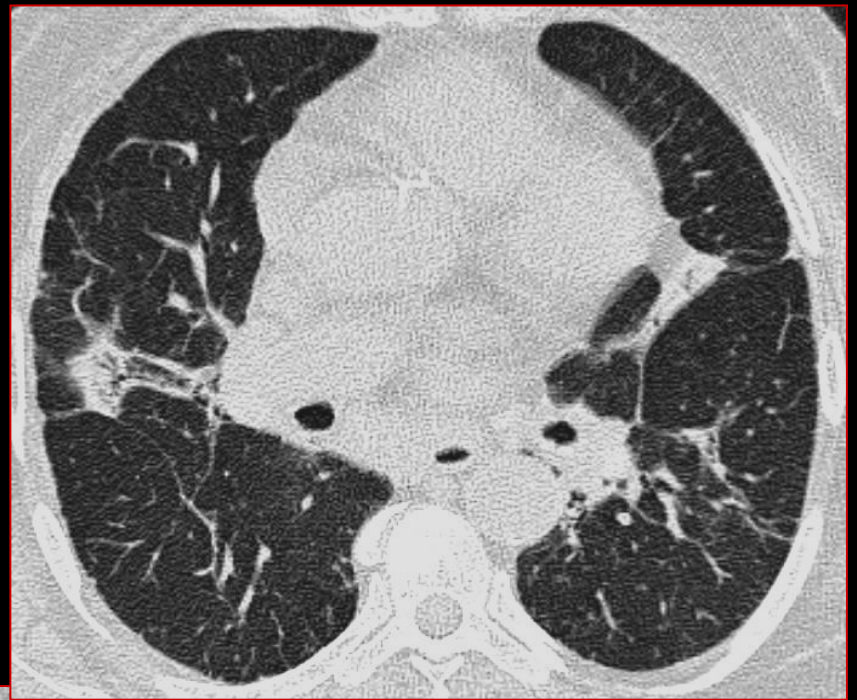
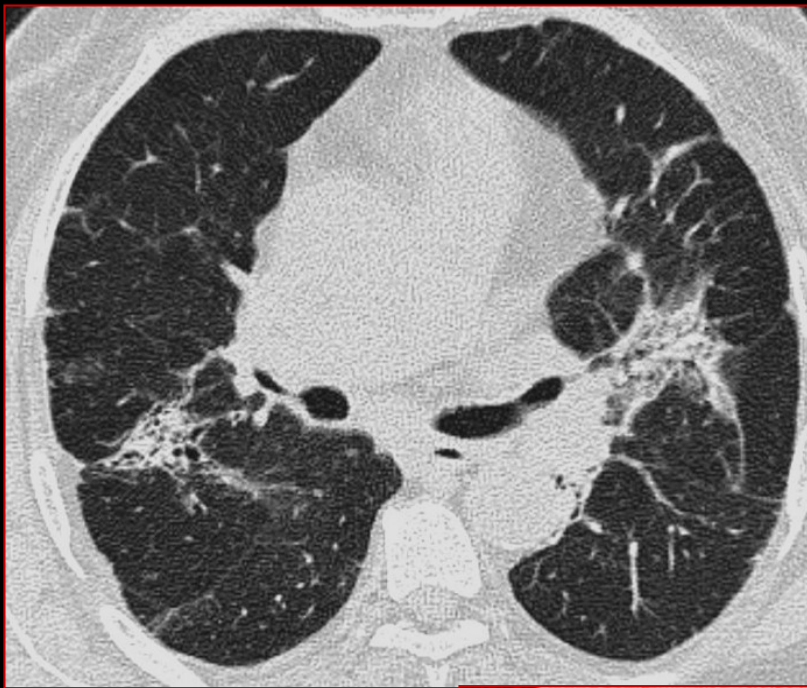


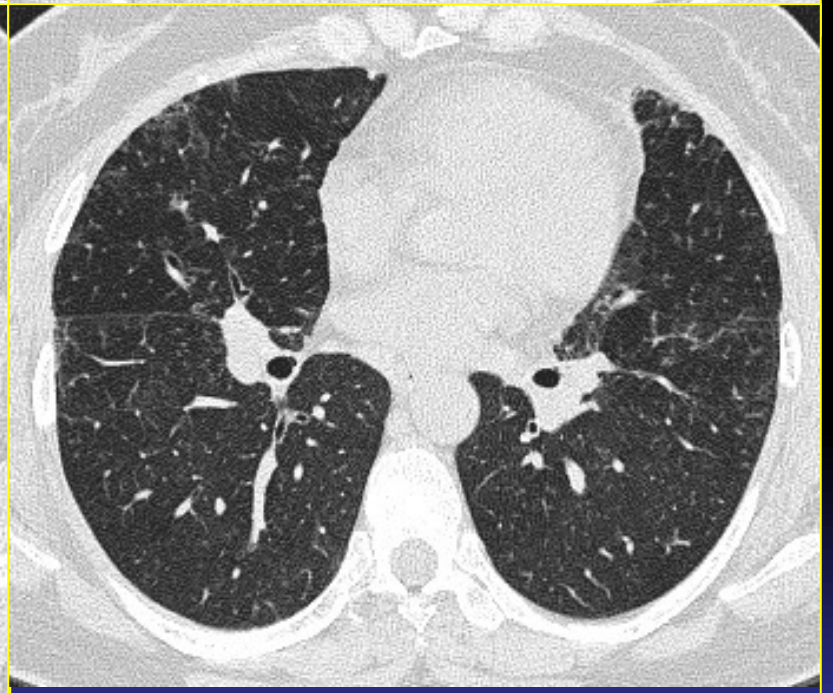
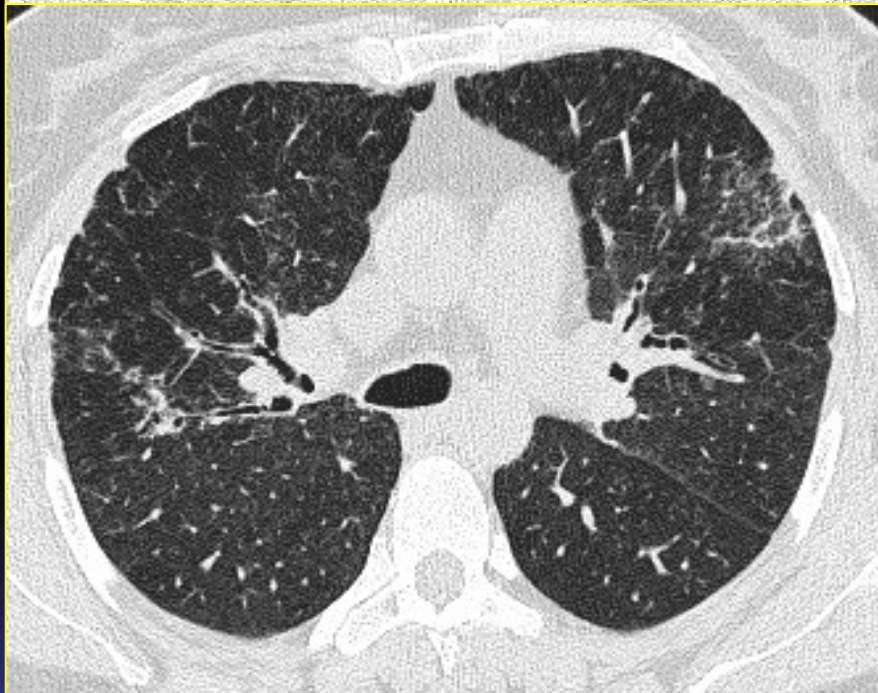
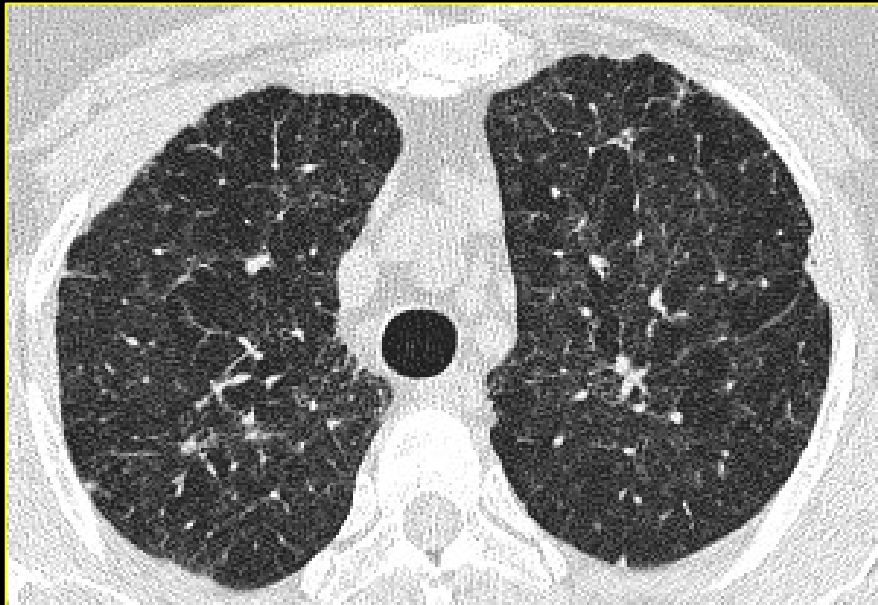


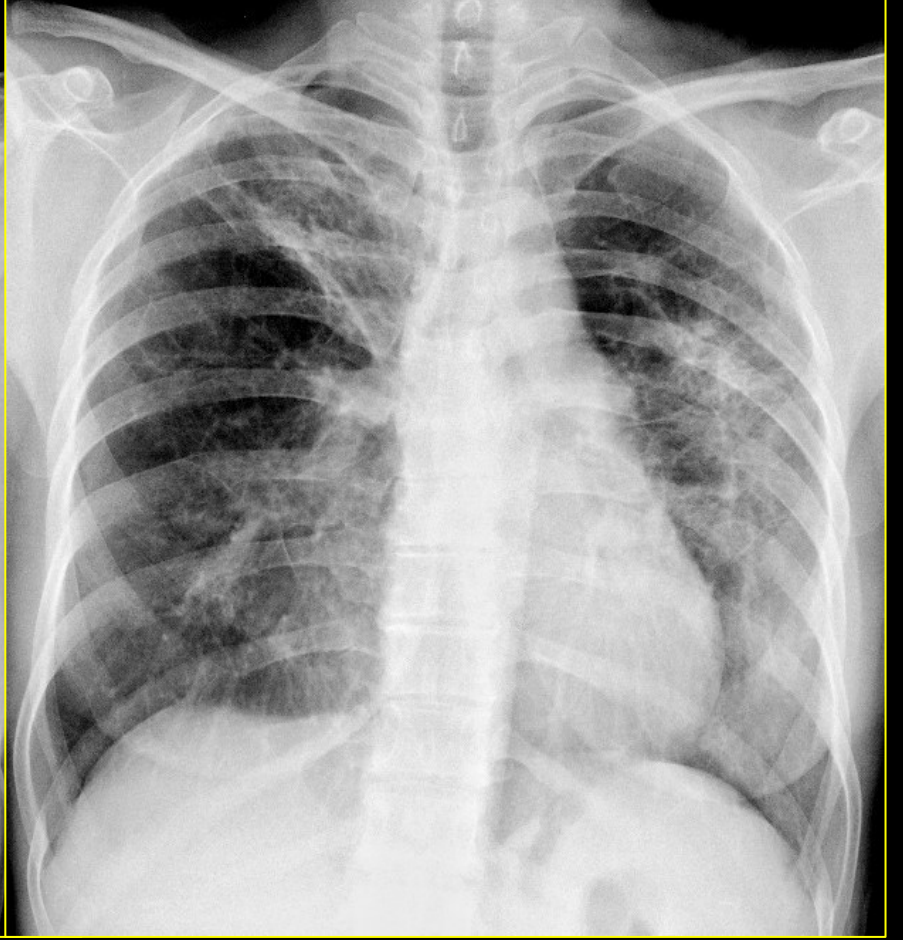


Sarkoidoz: Fibrozis

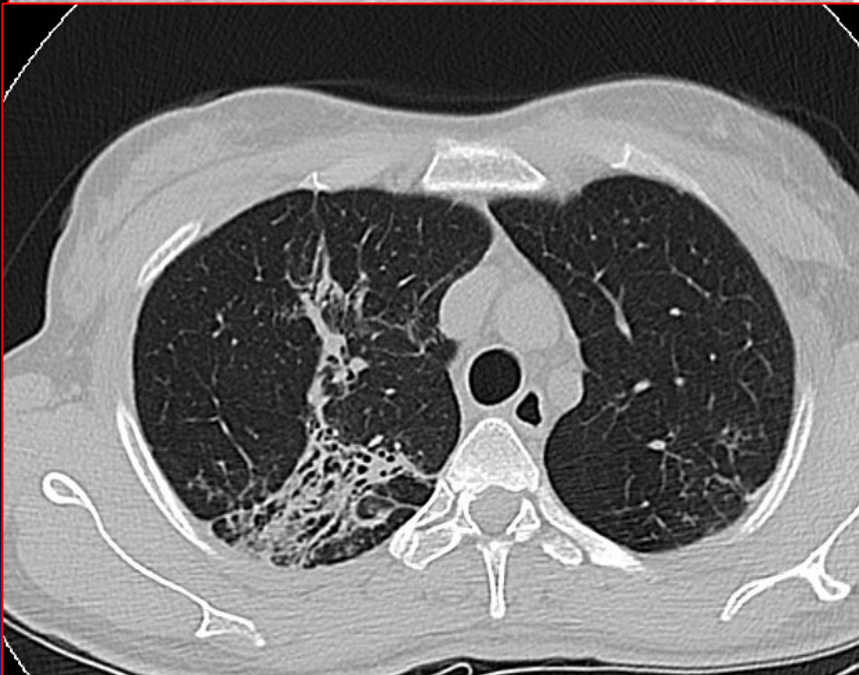
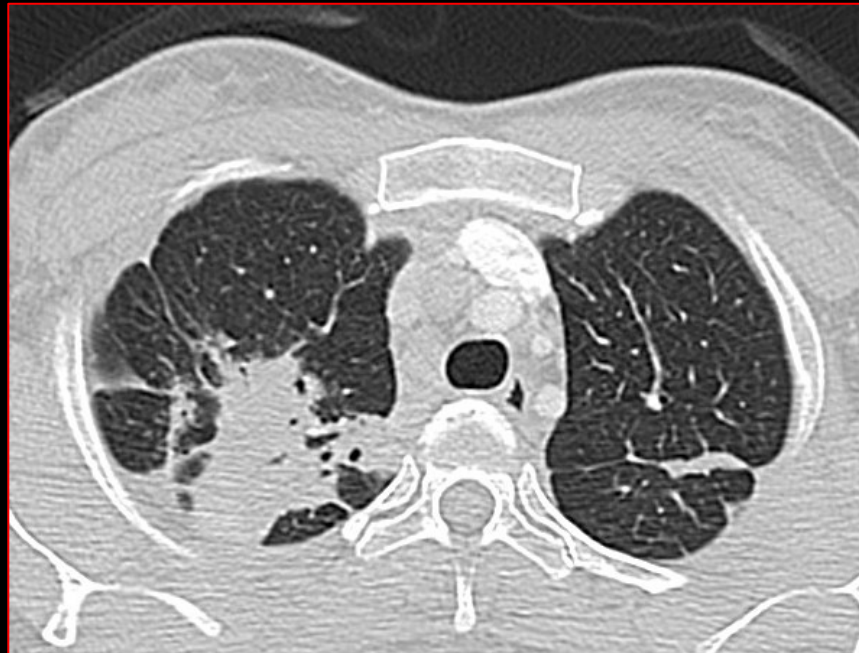
- Parenkim distorsiyonu ve ana bronş- üst lob bronşlarında arkaya doğru çekilme
- Perihiler damar ve bronşlarda santral konglomerasyon ve fibröz kitleler
- Fibröz kitleler içinde traksiyon bronşektazileri
- Nadiren bal peteği veya akciğer kistleri

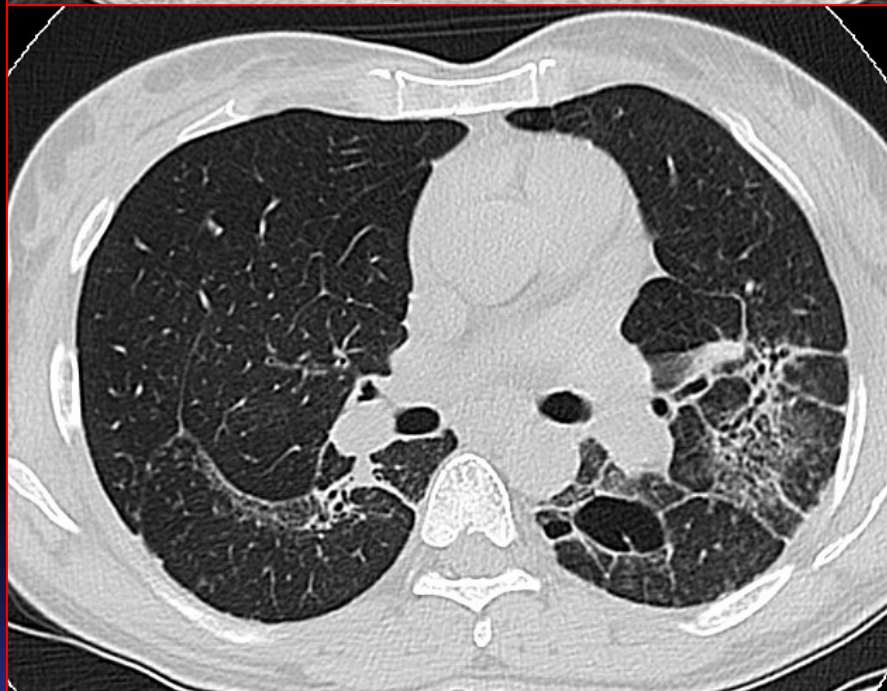
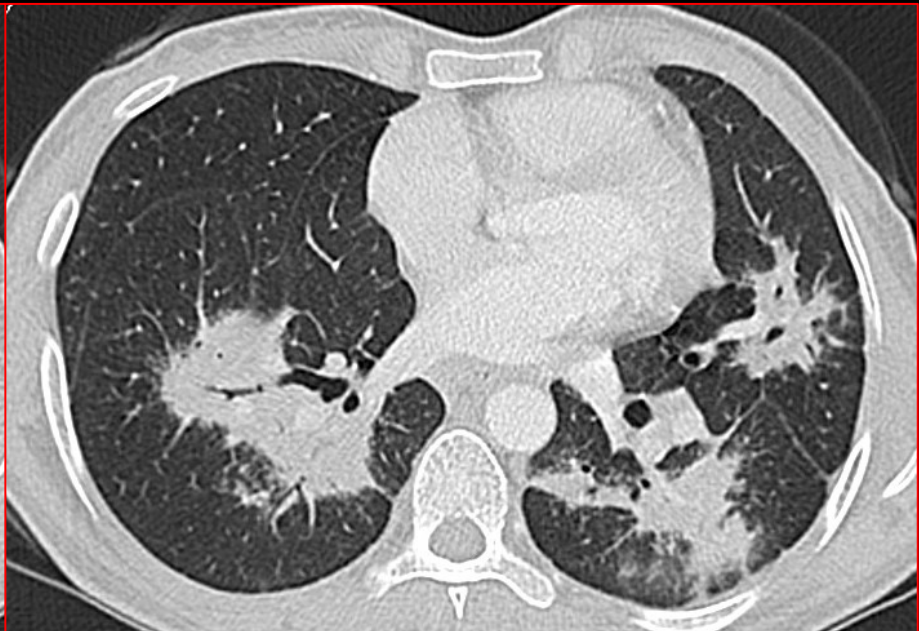
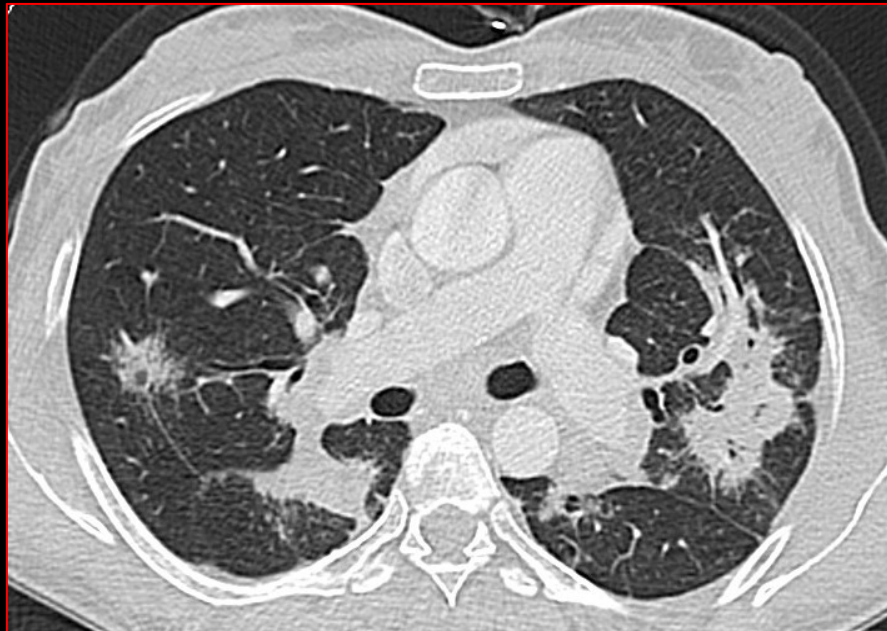




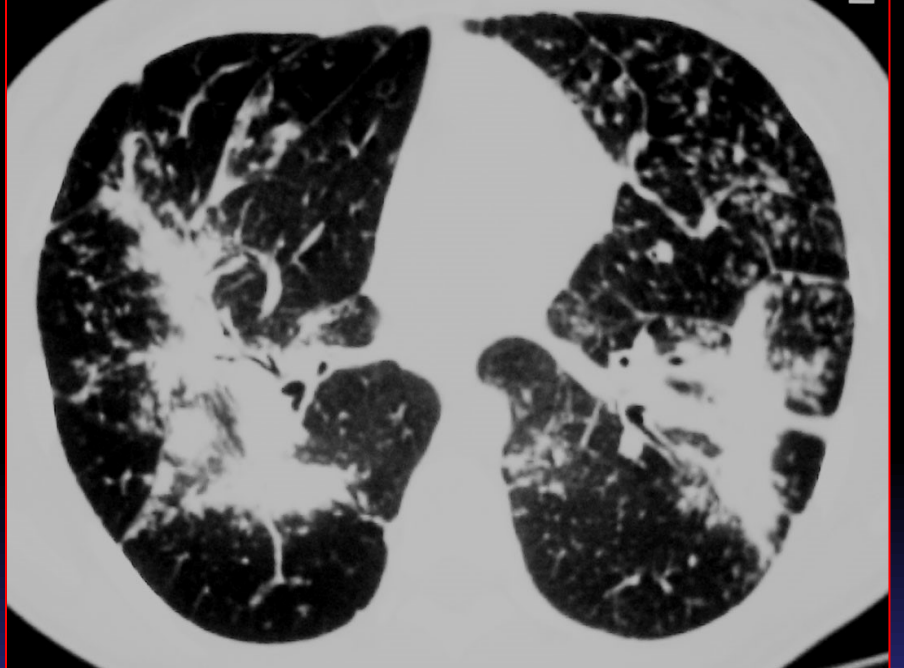
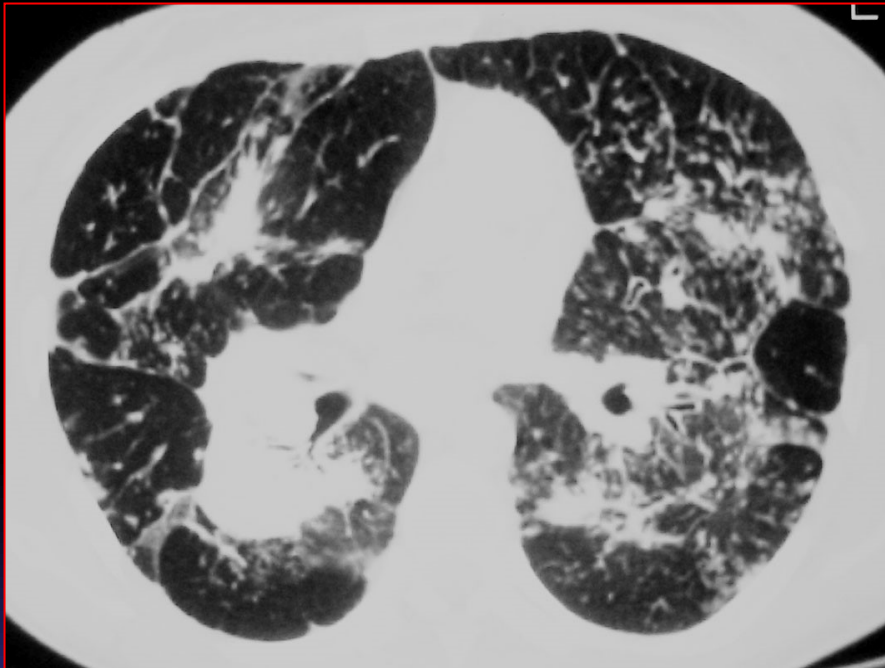
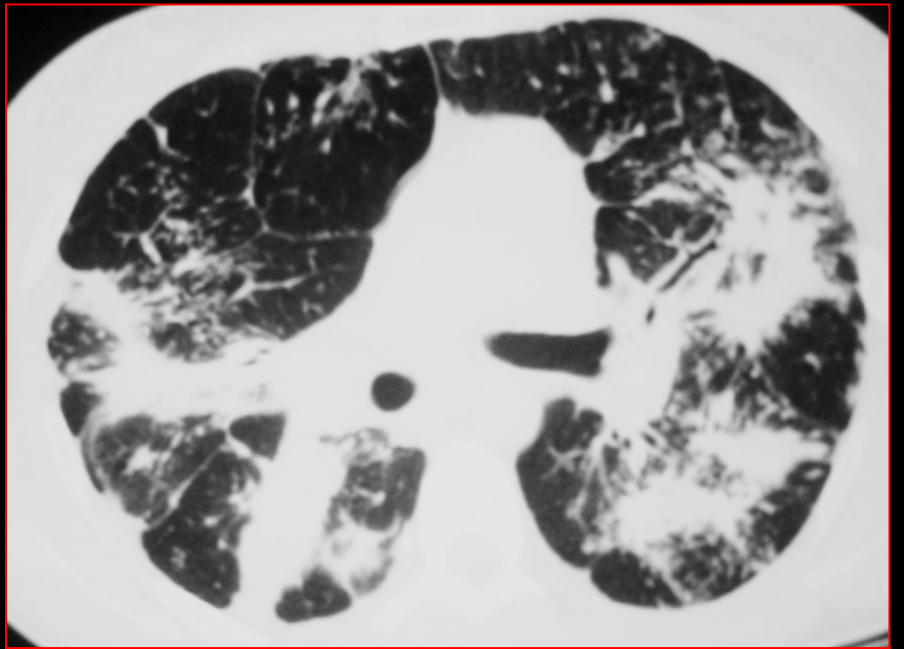
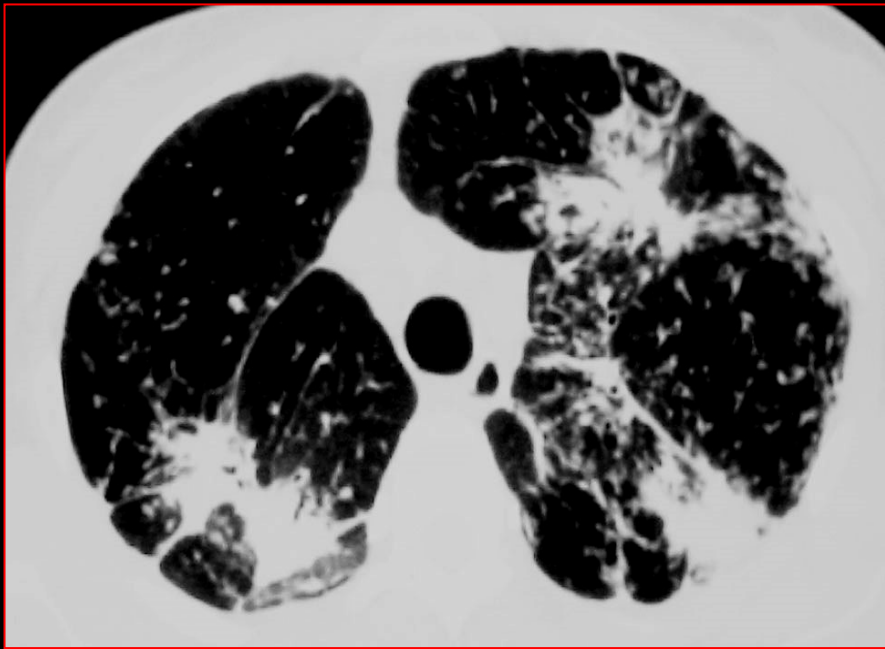


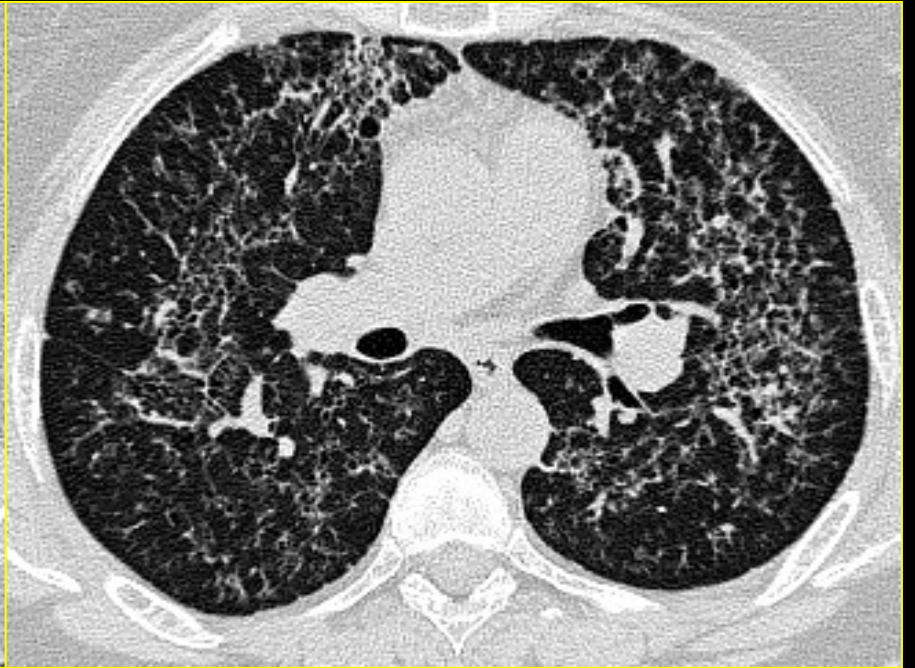
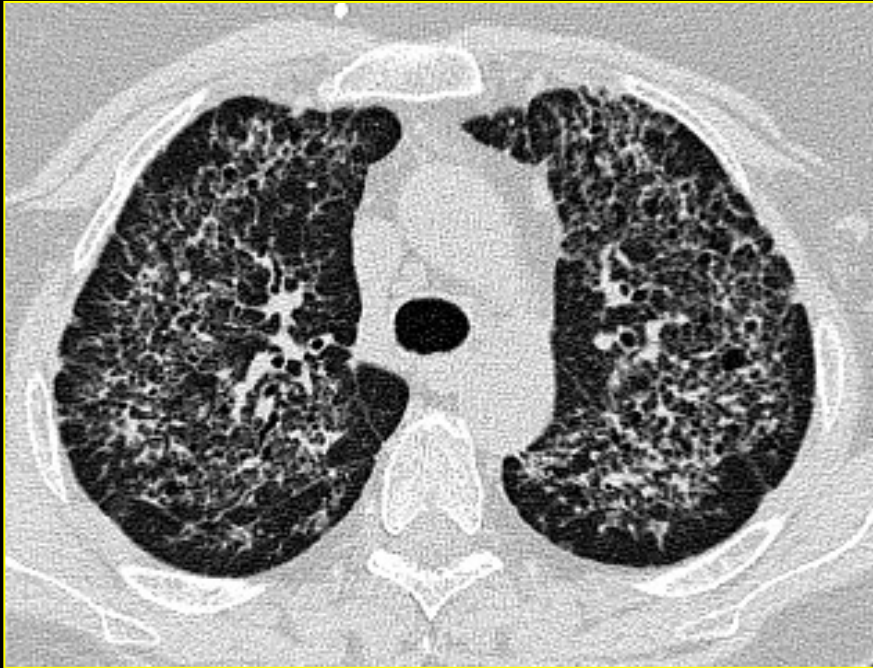
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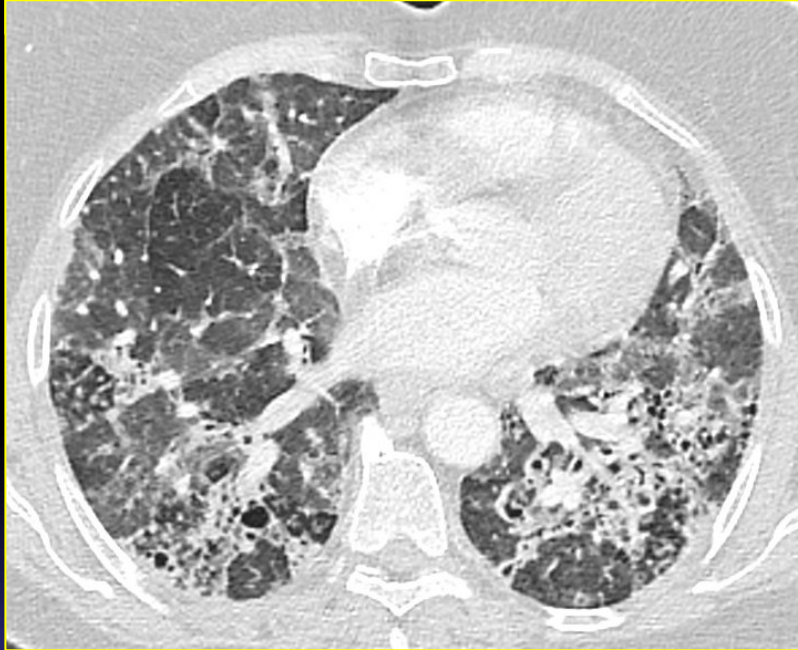
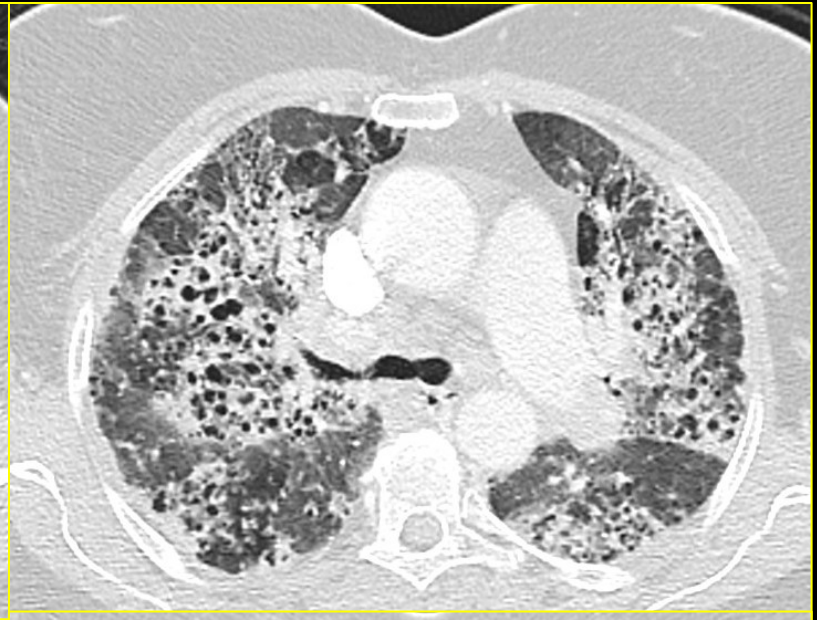


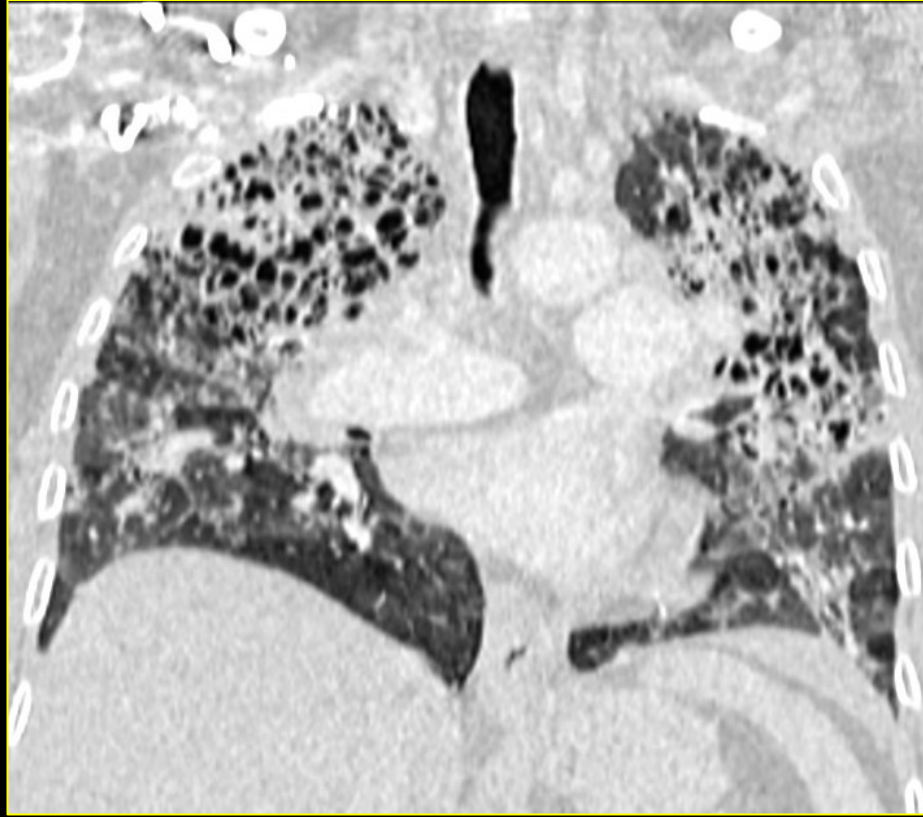


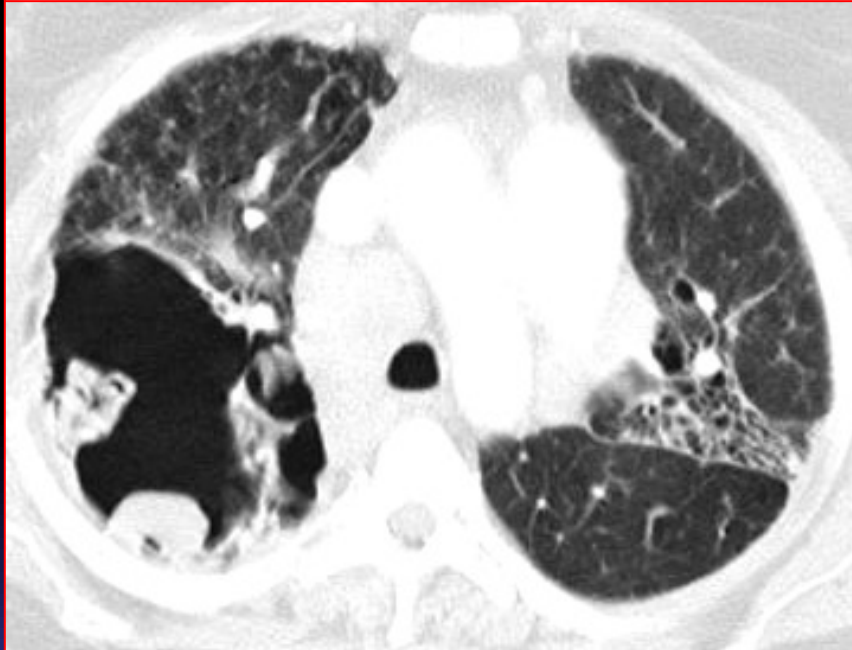
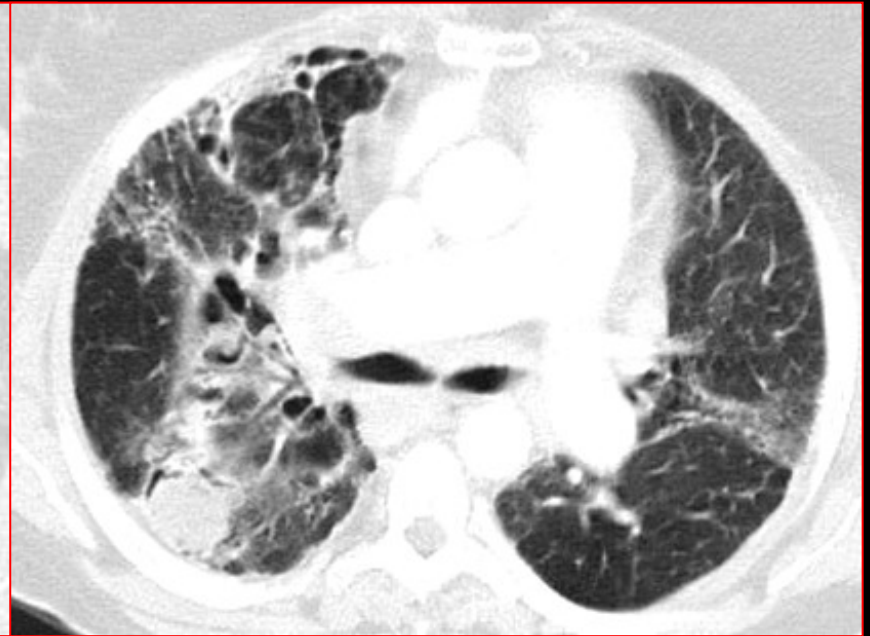










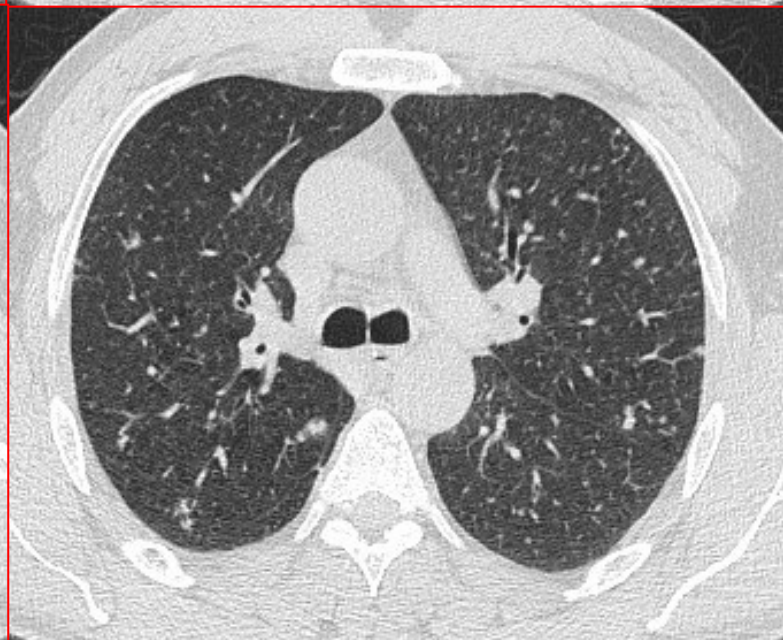
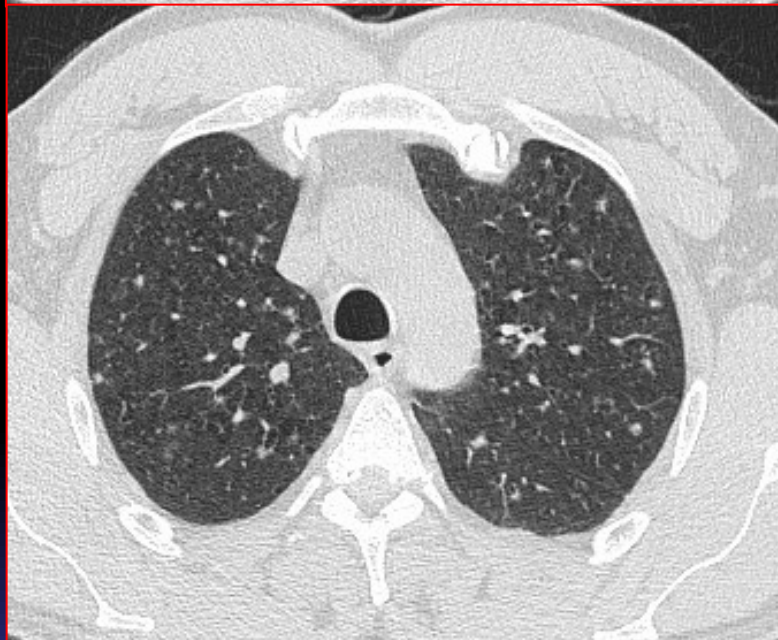
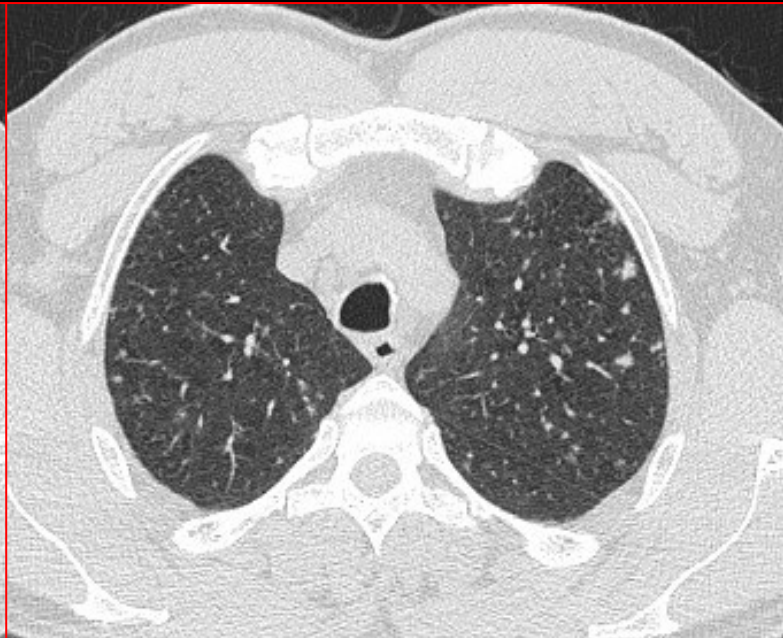


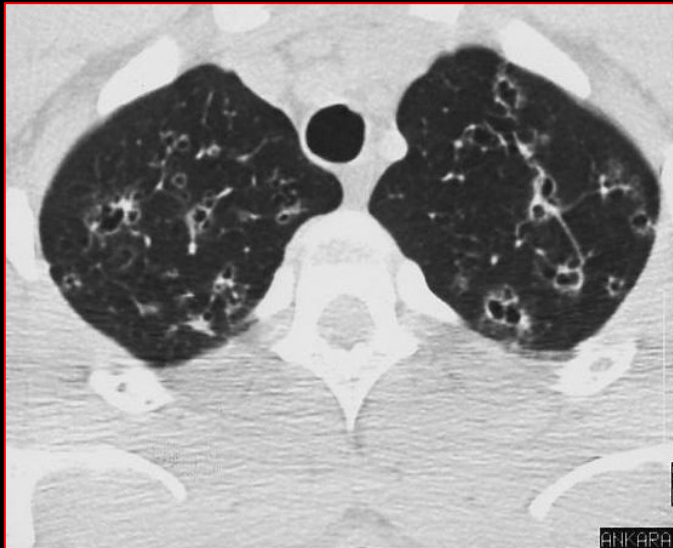
Langerhans H.li Histiositozis

- Bronş duvarlarında ve komşu damarlarda Langerhans' histiositleri ve eozinofillerinden oluşan granulomatöz reaksiyon

Erken dönem:

- Sentrilobüler nodüller , genellikle <5mm, daha az olarak 10 mm'den büyük
- Solid veya lüsent merkezli
- “ kavitasyon” : dilate bronş + çevresindeki granülomlar ve interstisyel kalınlaşma
- Kaviter nodüller, hava kistlerine dönüşür
- Tutulum üst loblarda daha fazla, akciğer bazalleri ve kostofrenik sinüsler korunur
- Akciğer hacmi artar





W1719
-682

512+512
MAG#1.7

ANKARA AKADEMI

HF/S
120KV
125MA



19 YAS

ANKARA

10:55:55

EM KORKUT
S 1.5 1.95
P -246.0
A 0.0
B 292
F 6
HF/S
120KV
125MA



W1501
-742

512+512
MAG#1.2

ANKARA AKADEMI

YAS

KEREM KORKUT
S 1.5 1.95
P -246.0
A 0.0
B 292
F 6
HF/S
120KV
125MA



19 YAS

ANKARA AKAD

W1501
-742

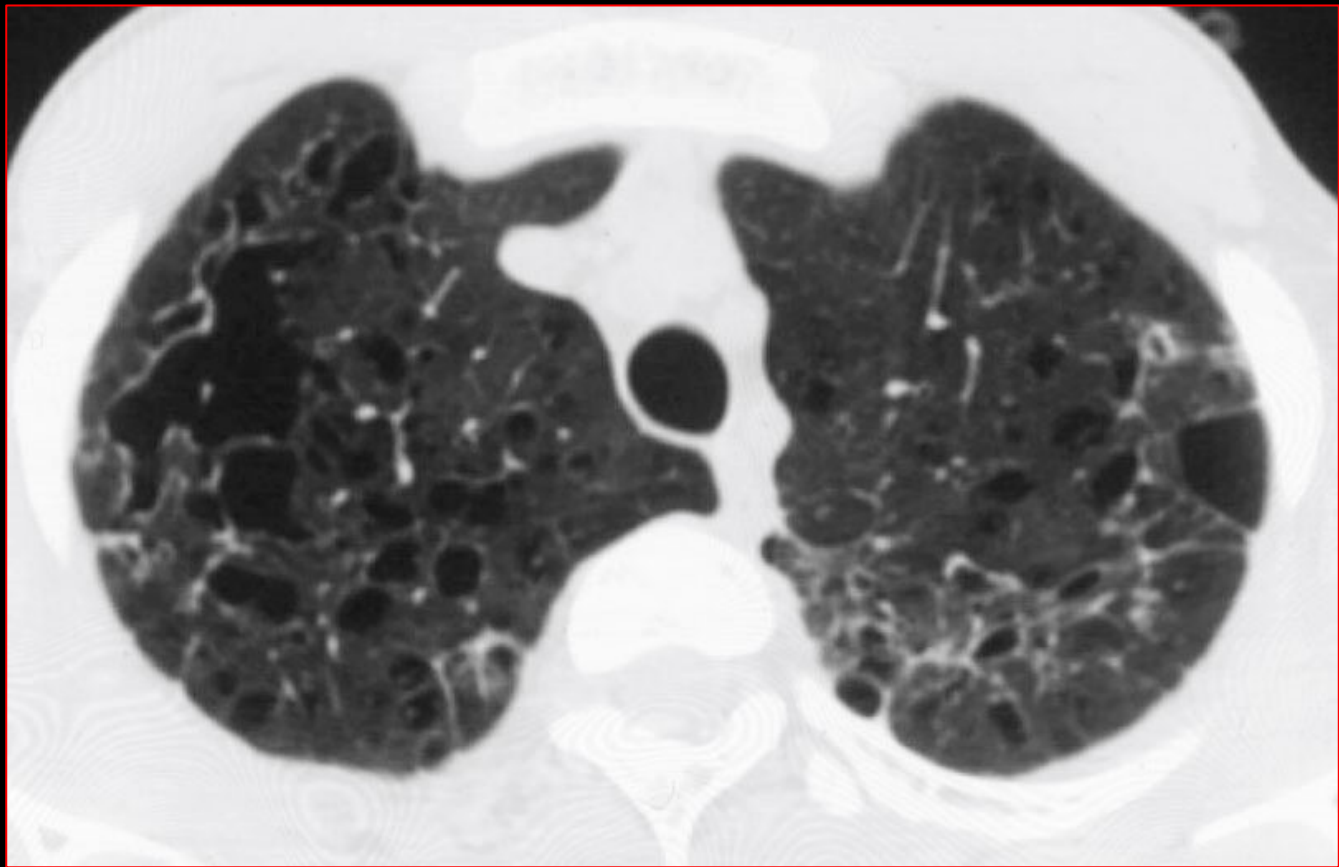
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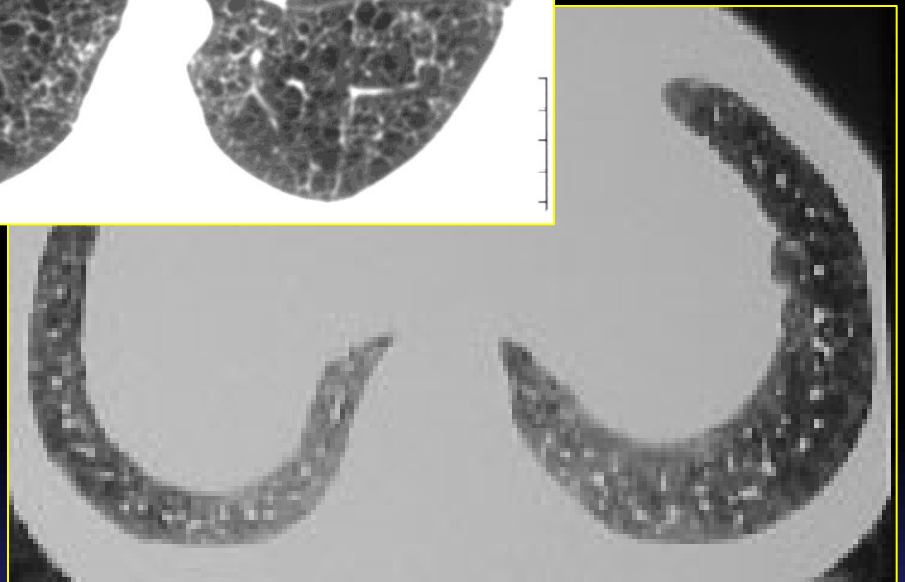
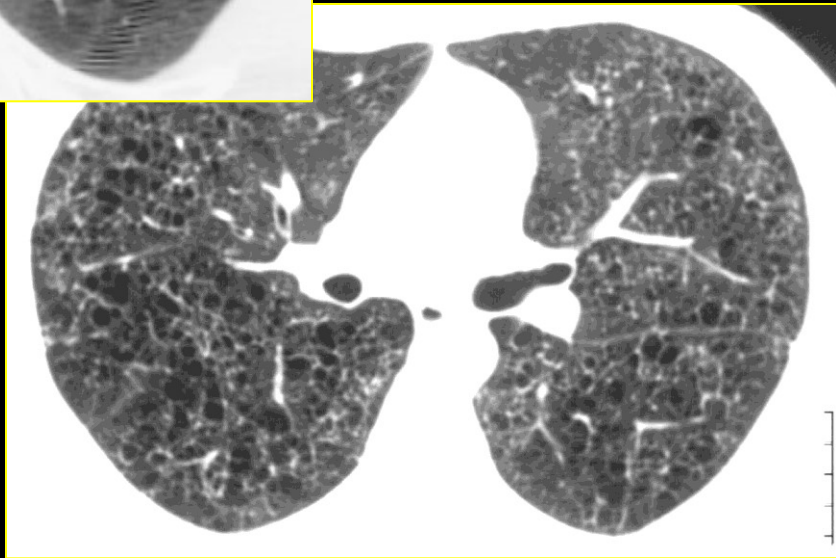
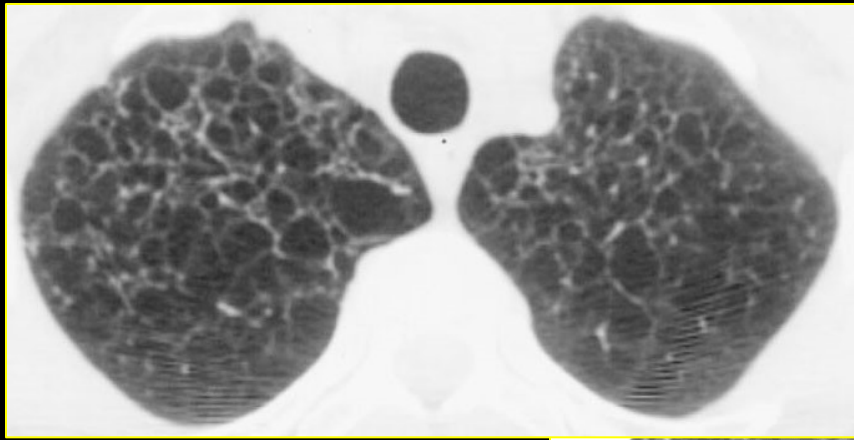
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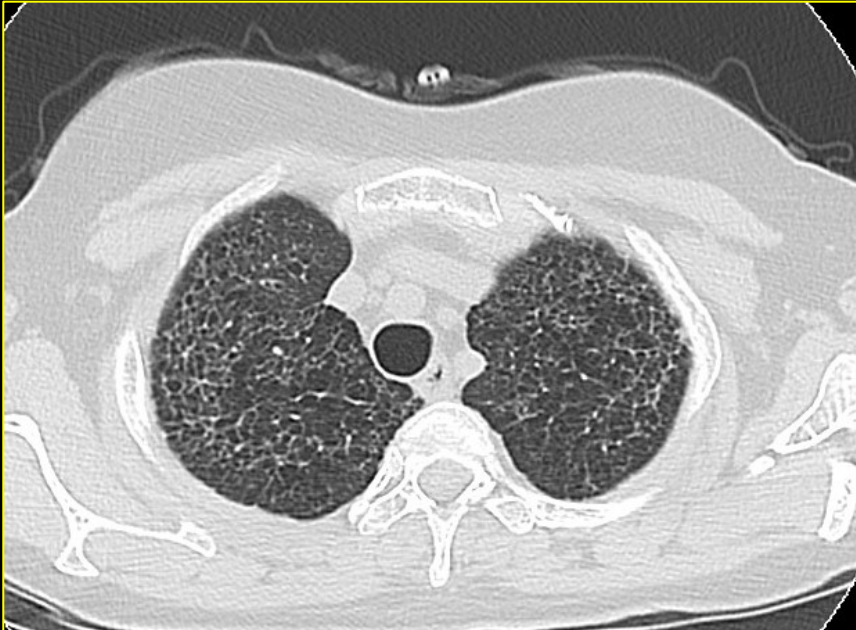
Langerhans H.li Histiositozis

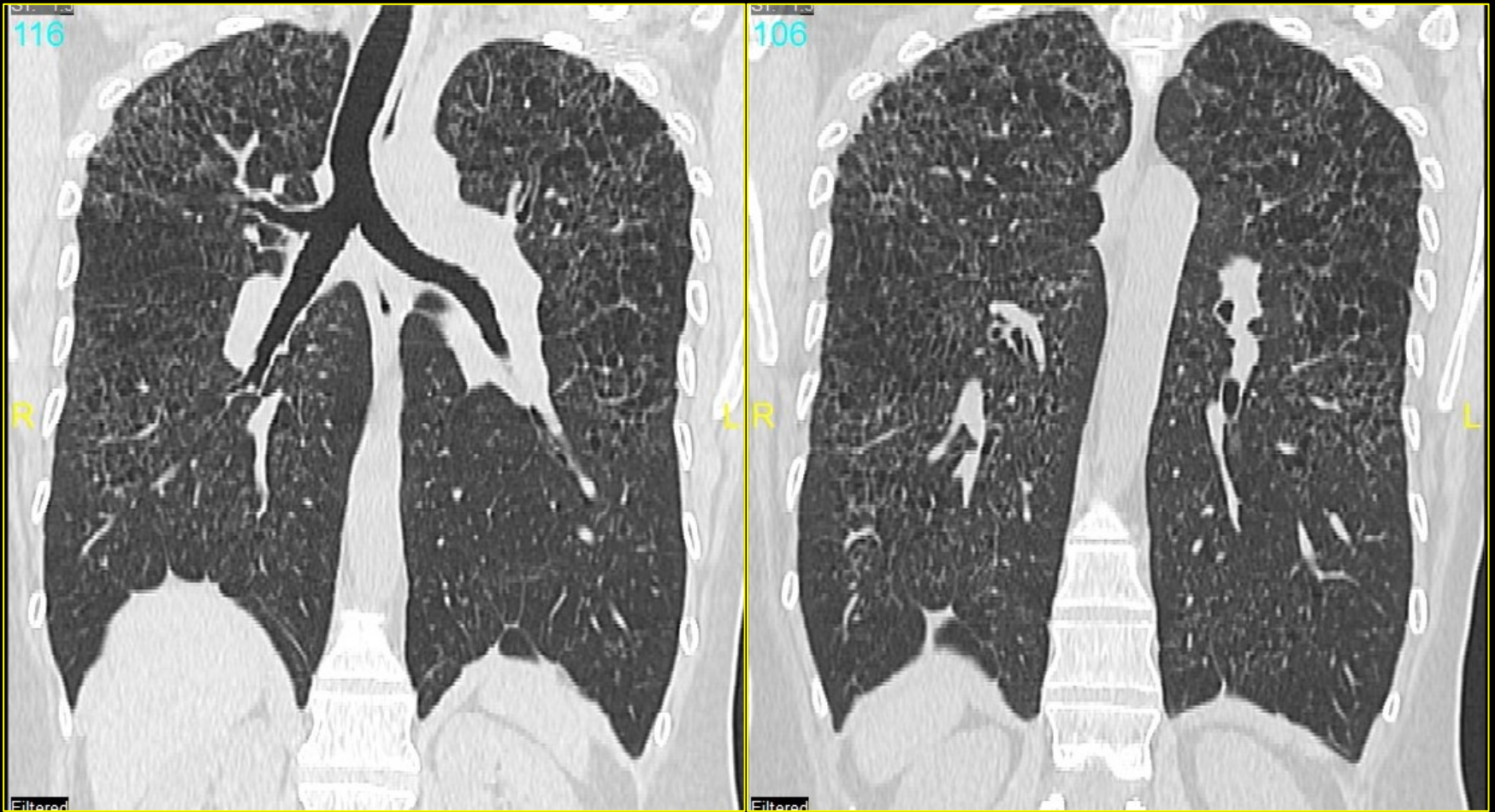
İleri dönem:

- Nodüller azalırken ince duvarlı kistler artar
- Kistler yuvarlak veya acaip şekilli olabilir
- Birleşerek 20 mm'yi geçebilirler
- Septal kalınlaşma yoktur









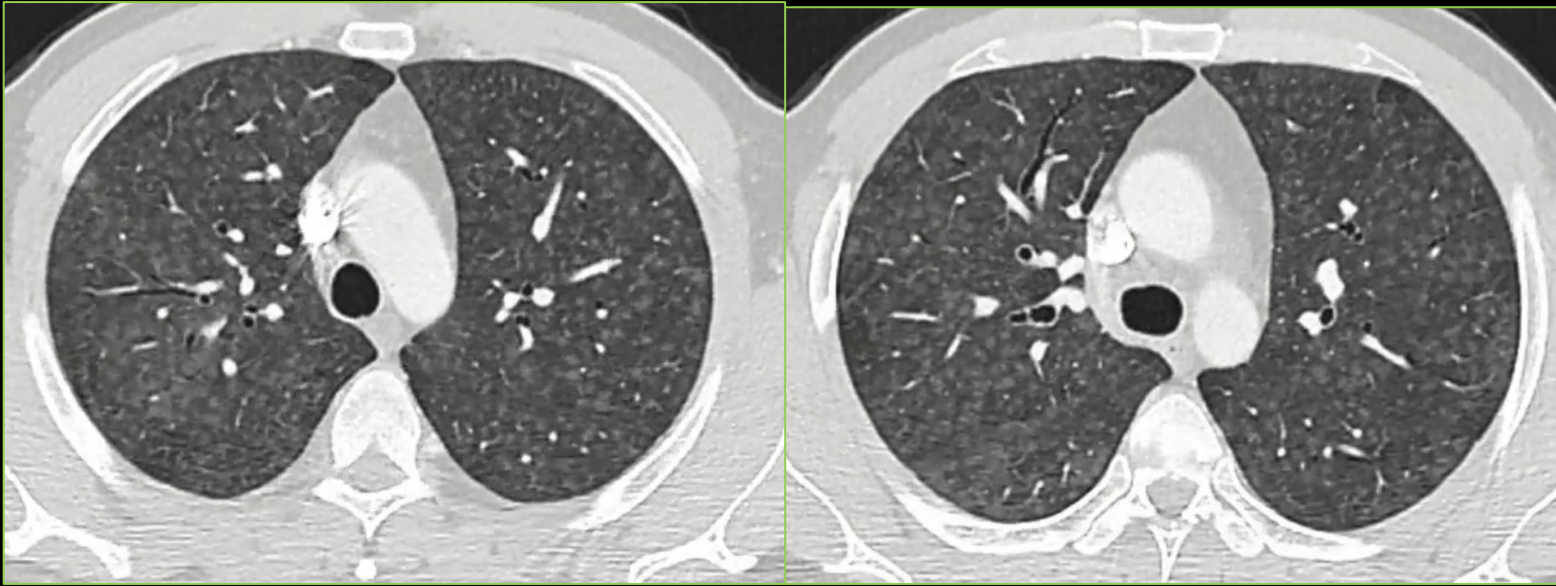
Hipersensitivite Pnömonisinin Sık Nedenleri

- Farm worker's lung: Thermophilic actinomycetes
- Winemaker's lung: *Botrytis cinerea*
- Coffee worker's lung: Coffee bean dust
- Lifeguard's lung: Aerosolized endotoxin
- Poultry worker's lung: Avian antigens
- Laboratory worker's lung: Rodent antigens
- Miller's lung: Wheat weevil
- Woodworker's lung: *Penicillium chrysogenum*
- Detergent worker's lung: *Bacillus subtilis*
- Epoxy-resin lung: Phthalic anhydride

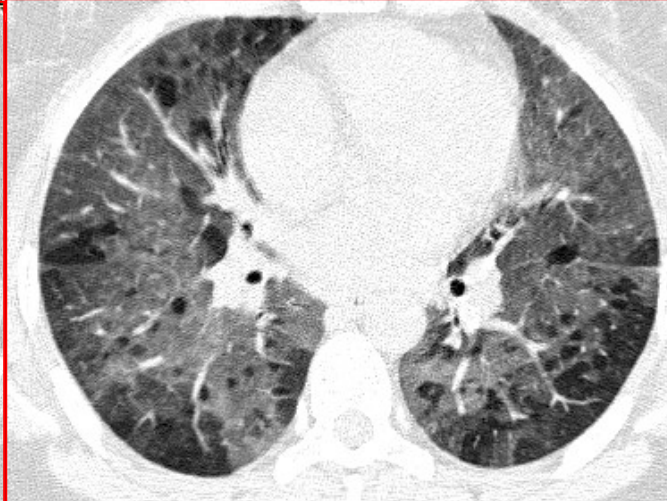
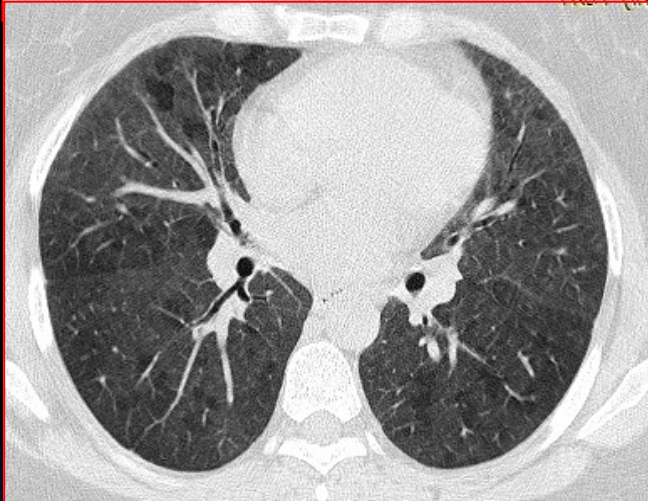
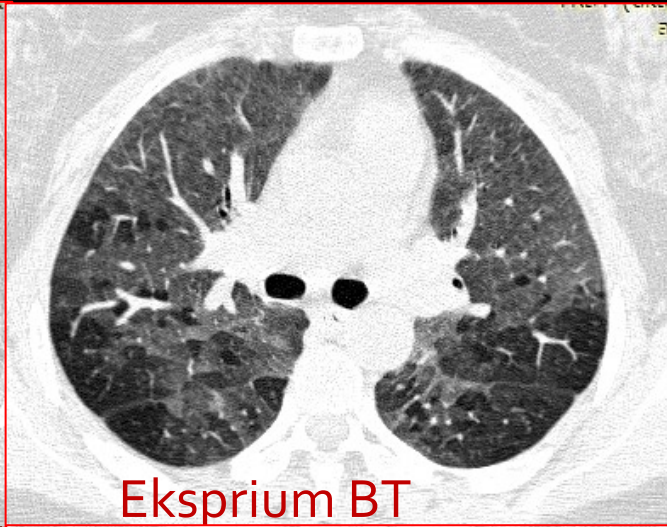
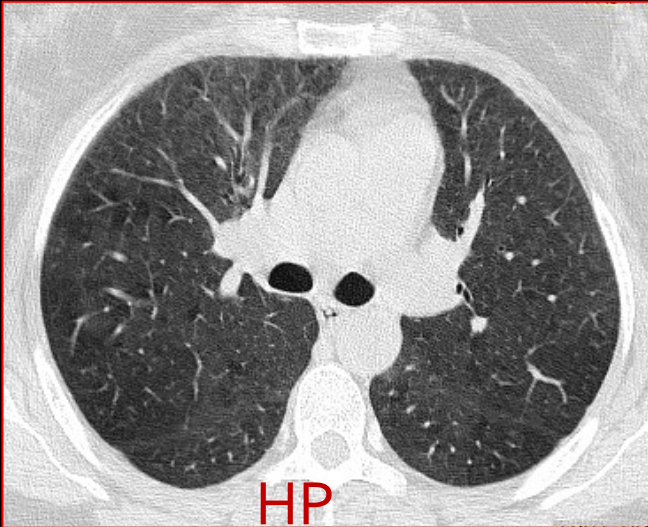
Nonfibrotik Hipersensitivite Pnömonisi

- Küçük sentrilobüler nodüler opasiteler
- Yamalı veya diffüz buzlu cam opasiteleri
- Hava hapsi- mozaik perfüzyon
- Patolojik incelemede OP, NSİP, OİP paterni görülebilir





Nonfibrotik HP



Papağan besliyor

Fibrotik Hipersensitivite Pnömonisi

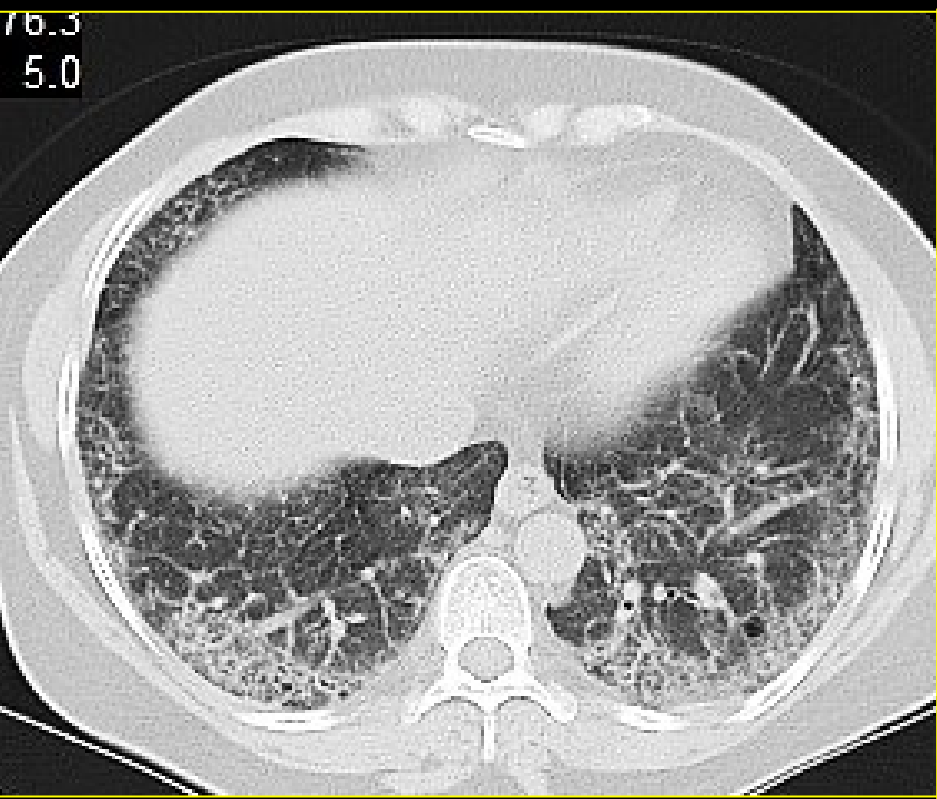
- Fibrozis bulguları
- Superimpoze buzlu cam dansiteleri-sentri lobüler nodüller
- Yamalı dağılım
- Fibrozis bulgularında zonal tercih yoktur, kostofrenik sinüsler kısmen korunur

6.3
5.0



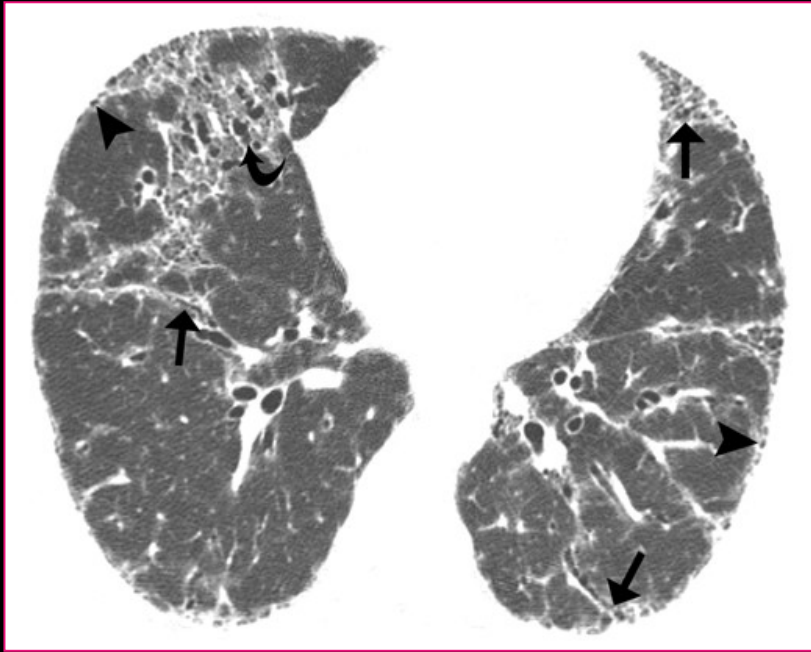
1.3
5.0



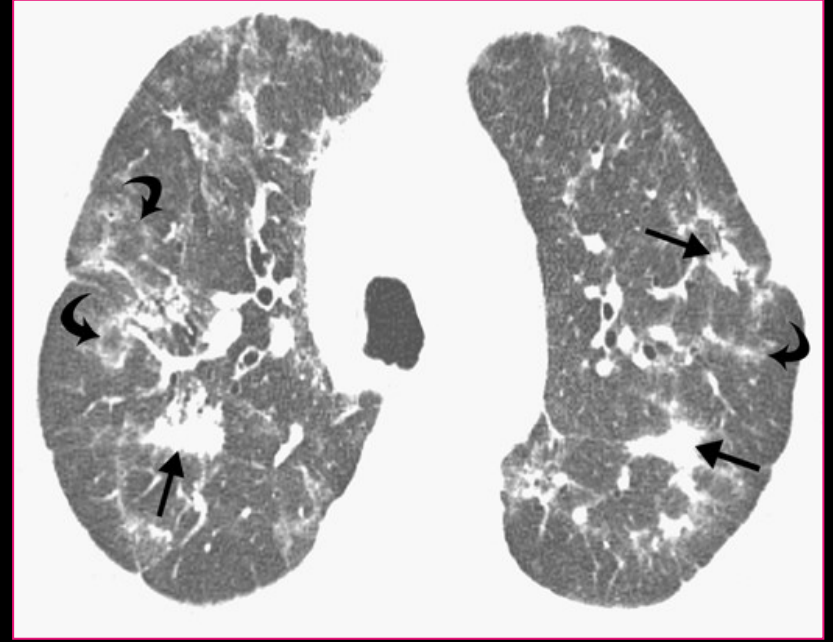








İzosianit maruziyetine bağlı



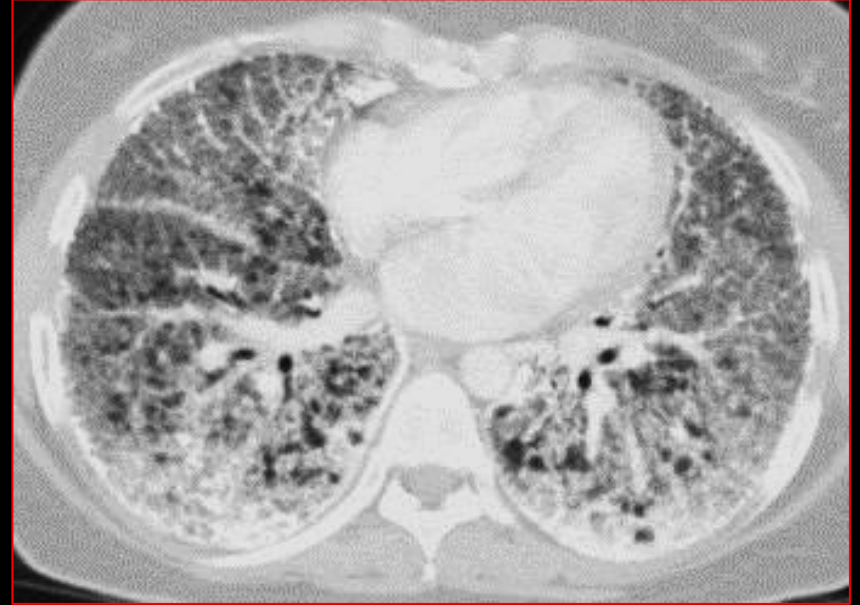
Küfe bağlı

Pulmoner Alveolar Mikrolitiazis (PAM)

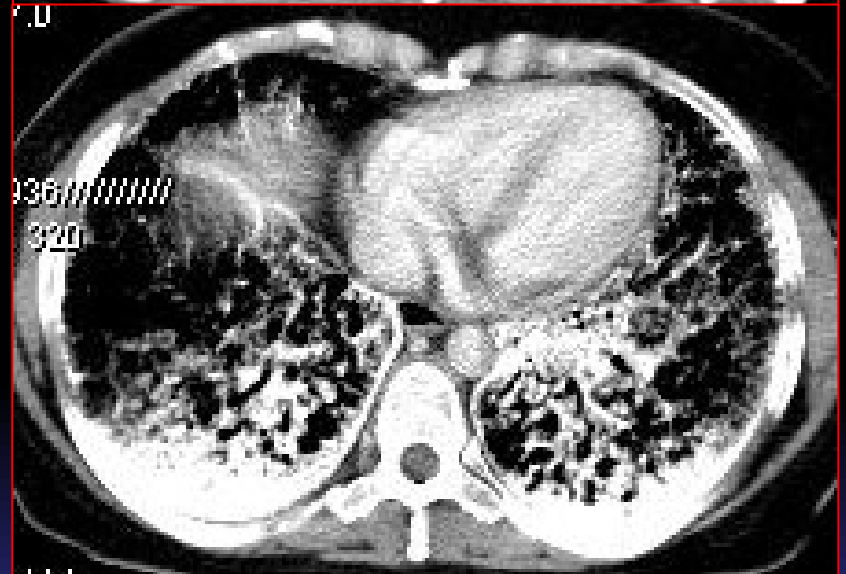
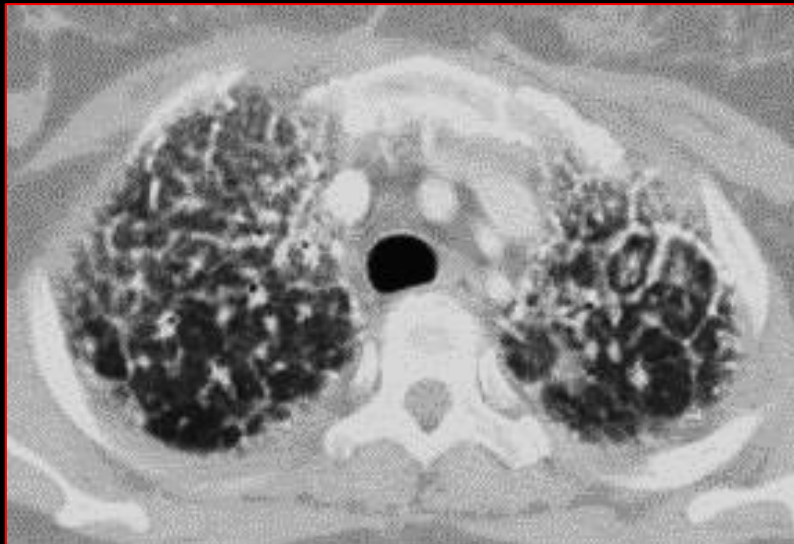
Alveolar içinde yaygın küresel kalsiyum fosfat mikrolitlerinin birikimi ile karakterizedir.

BT:

- Bütün akciğerde kum gibi kalsifikasyonlar
- Kalsifik interlobular septumlar: Arnavut kaldırımı bulgusu
- Küçük subplevral kistler
- Siyah plevra bulgusu



Pulmoner Alveolar Mikrolitiyazis (PAM)







Radyasyon pn6monisi

Akut radyasyon pn6monisi:

RT'nin bitiminden 4 hafta sonra bařlar , 4 ay sonra pik yapar

Radyasyon portalına sınırlı buzlu cam dansiteleri ve konsolidasyon vardır

Kronik radyasyon hasarı:

RT'den 9-12 ay sonra

Konsolidasyon gerilerken skar- fibrozis geliřir, hacim azalır,

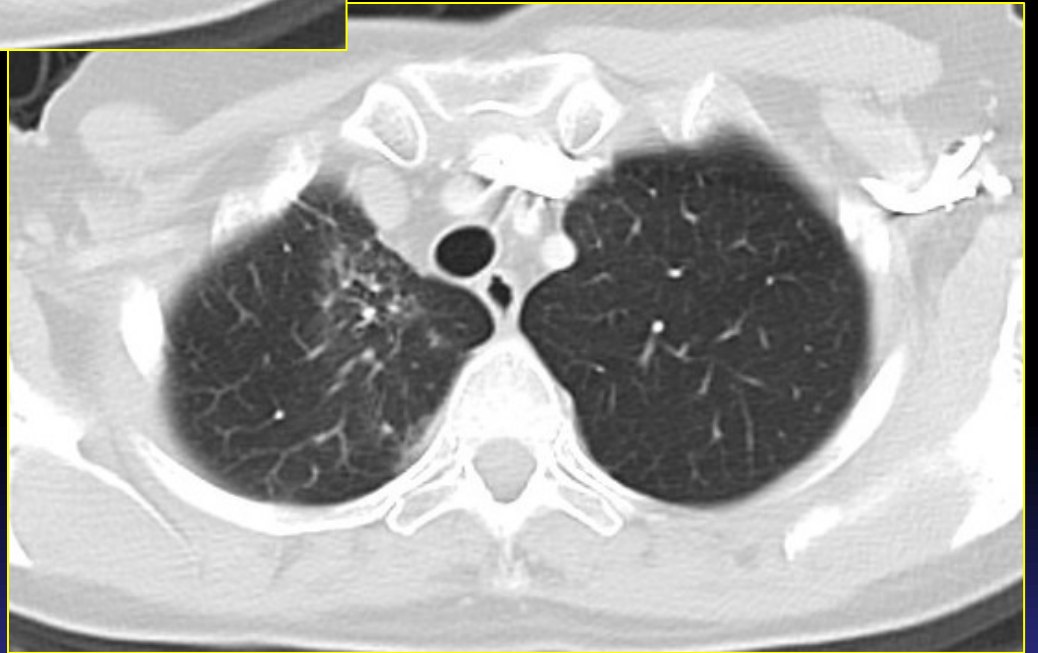
Fibrozis içinde traksiyon bronřektazileri saptanır



Meme CA,
RT sonrası



Meme CA





H. U. RA

0114 53/01/01 F PHILIPS SB-
VAK1 10
S T -10.0

TOPOSC



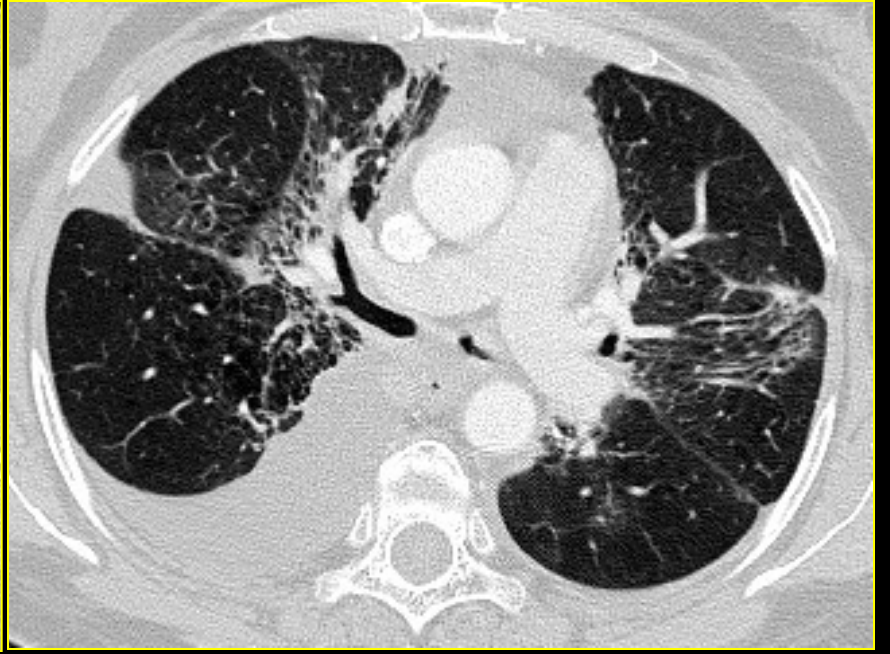
H. U. RA

0112 53/01/01 F PHILIPS SB-
VAK1 10
S T -10.0

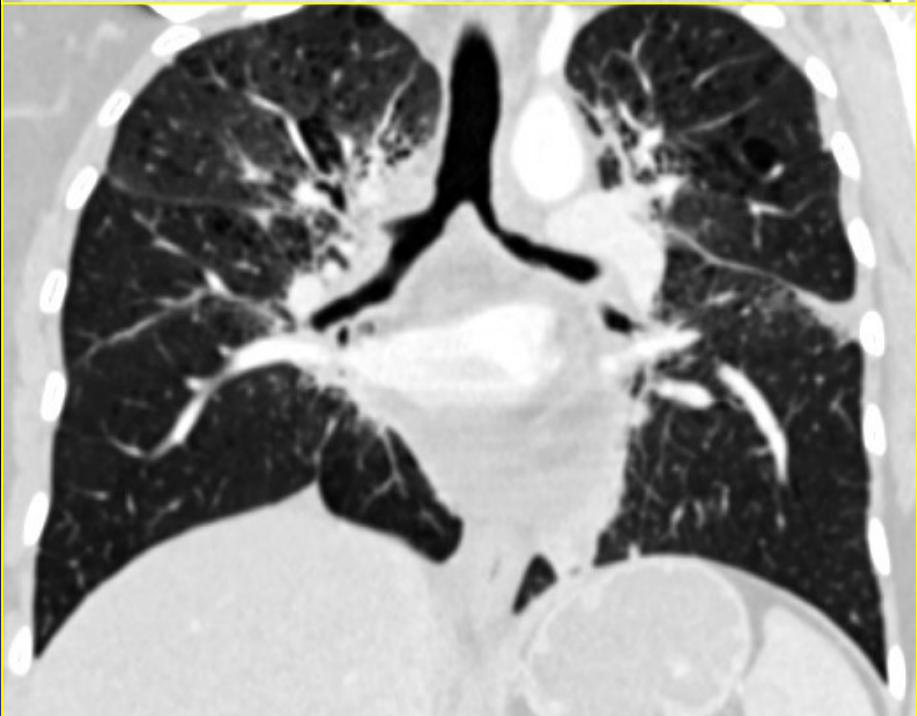
TOPOSC



HH, RT etkisi



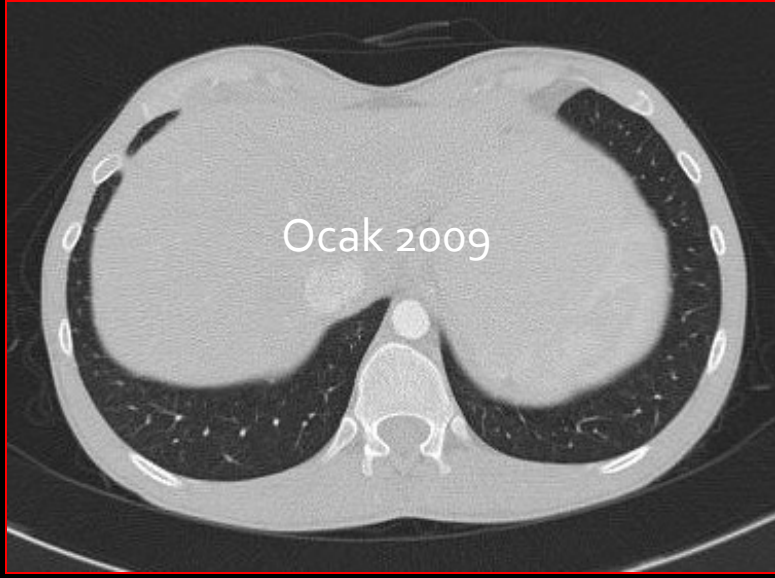
ACCA, RT etkisi



İlacı bađlı akciđer hasarı

Patoloji:

- Diffüz alveolar hasar
- NSİP
- Organize pnömoni
- Eosinofilik pnömoni
- Pulmoner hemoraji

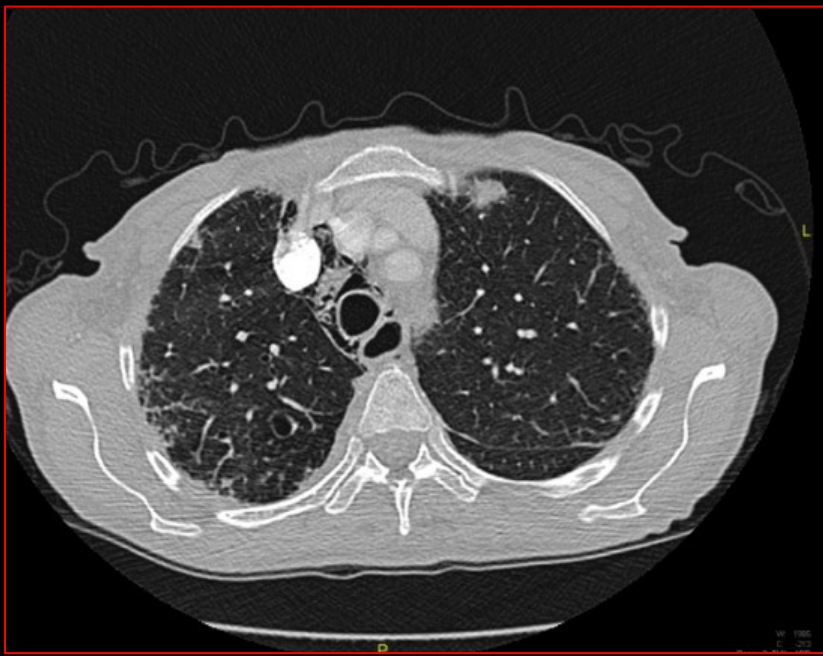


Testis tümörü, Bleomisin



Nisan 2009

Kasım 2009



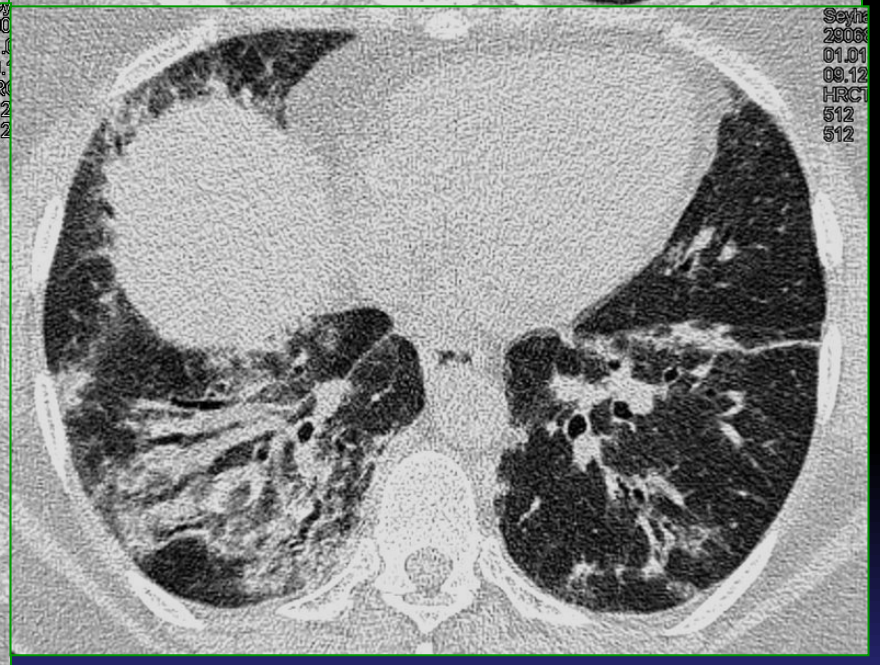
Germ H.li Tumor, bleomisin etkisi



290
01.01
09.12
HRCT
512
512

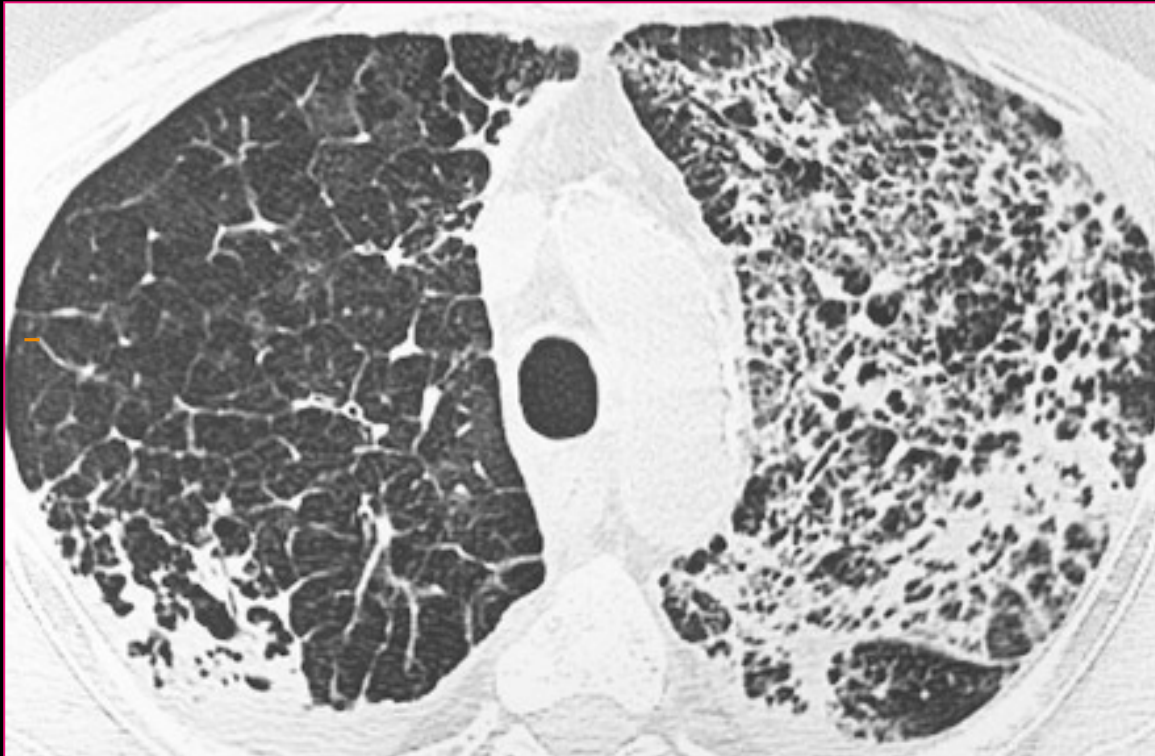


Sayı
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01.01
09.12
HRCT
512
512

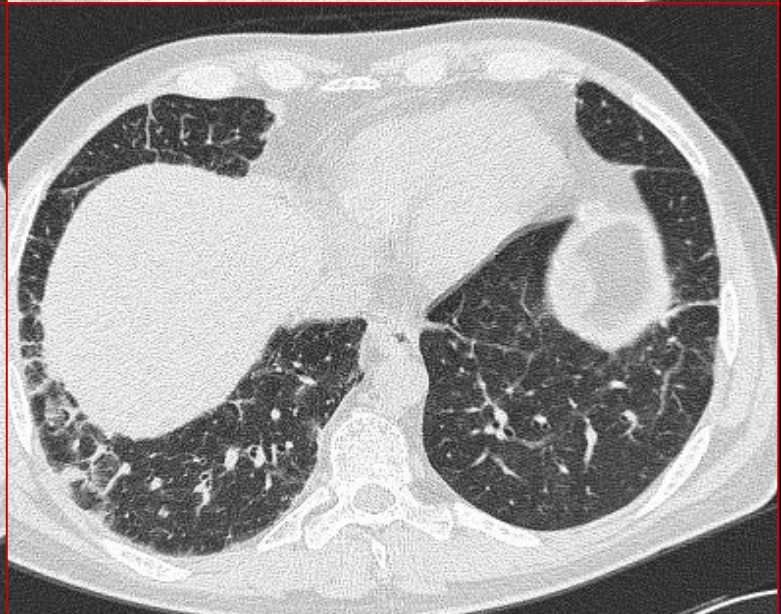
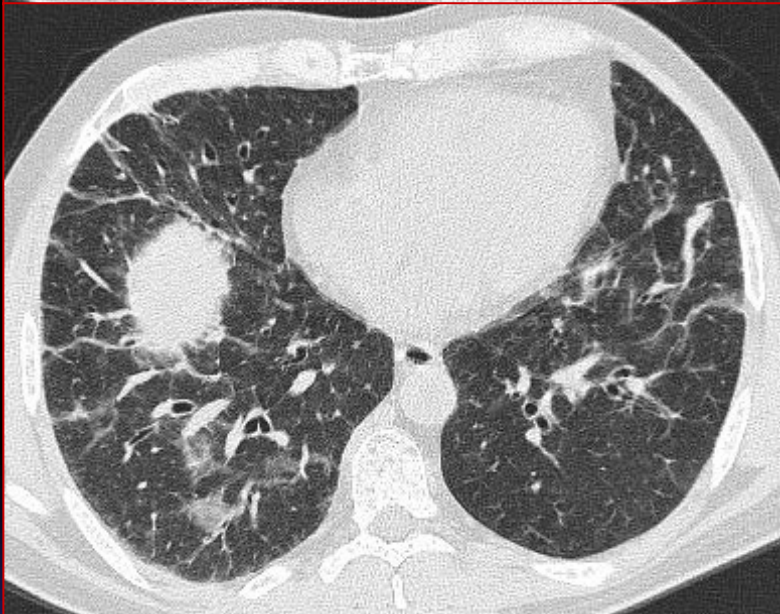
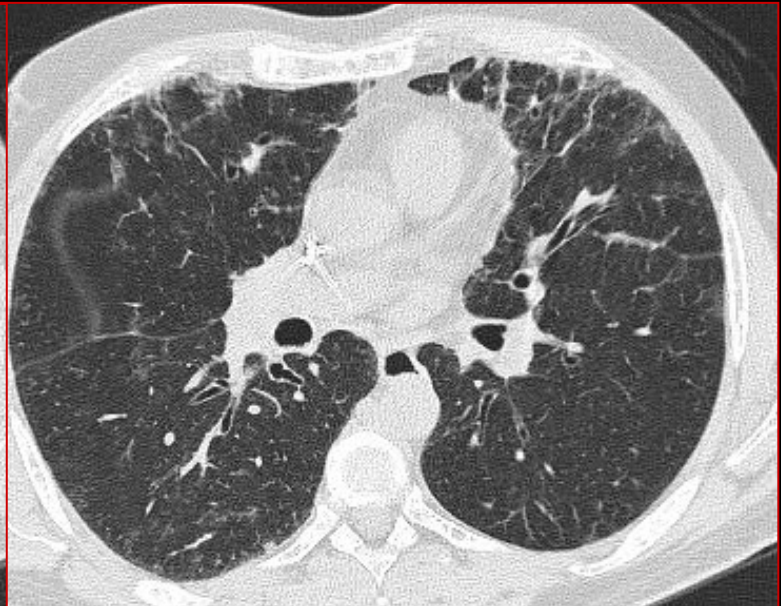
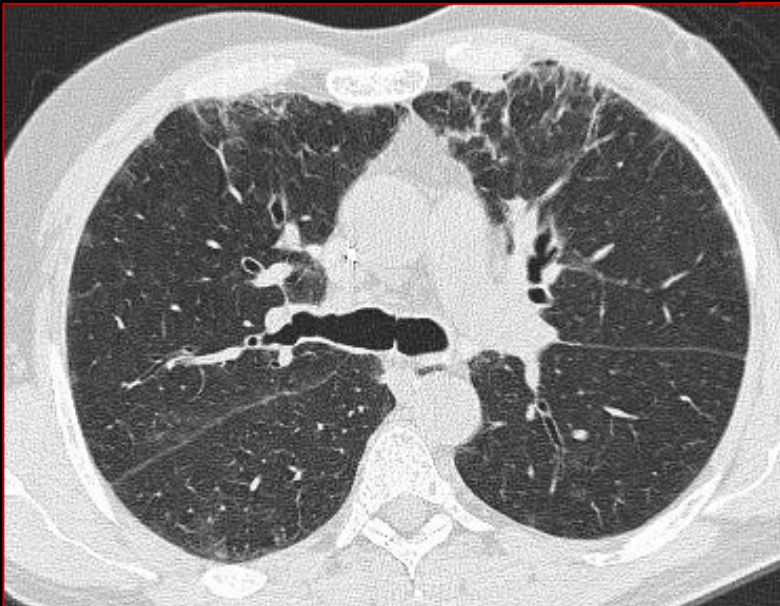


Sayı
290
01.01
09.12
HRCT
512
512

İlaç reaksiyonu



Carbotaxol



GVHD

Post COVID-19

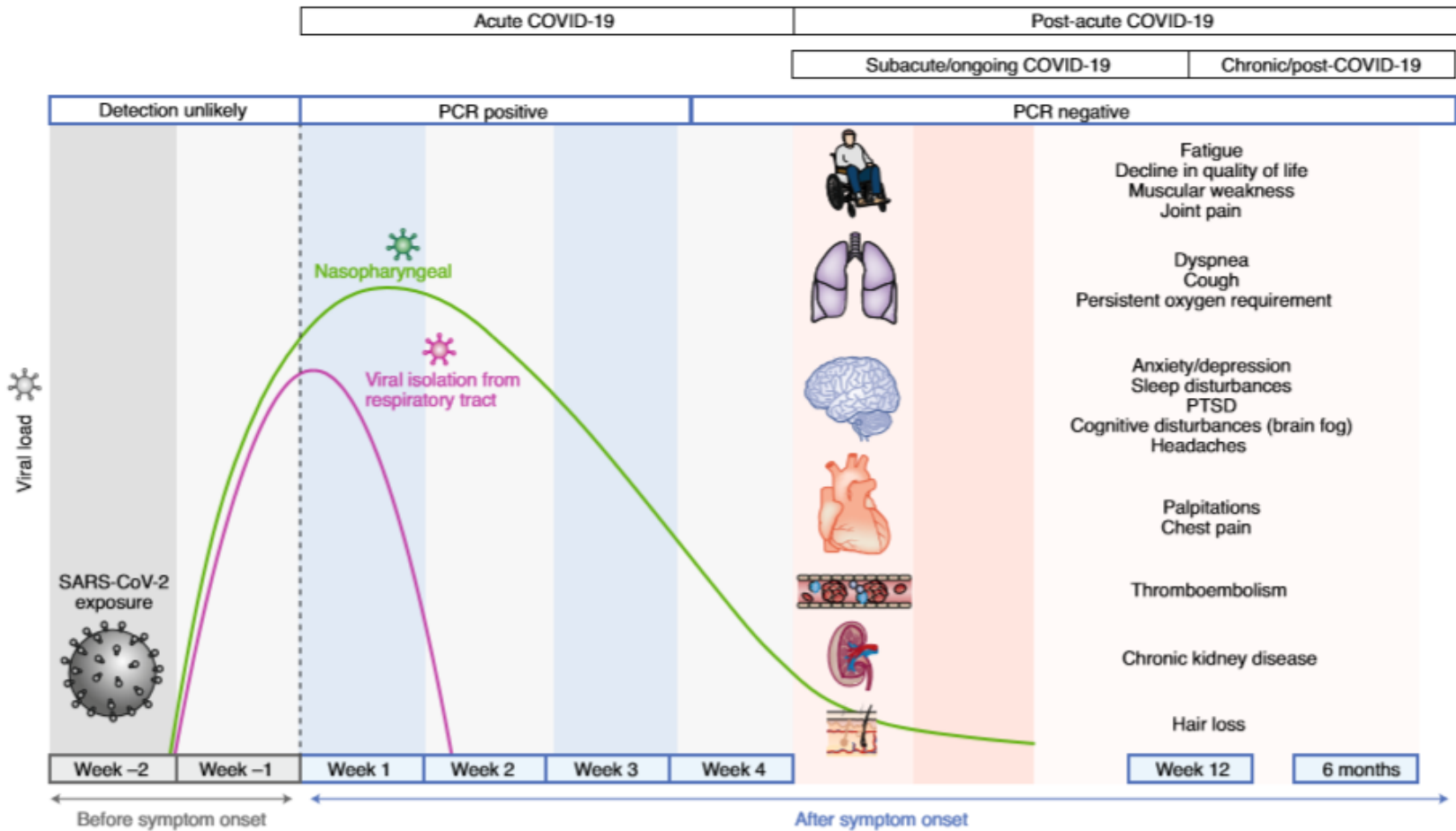
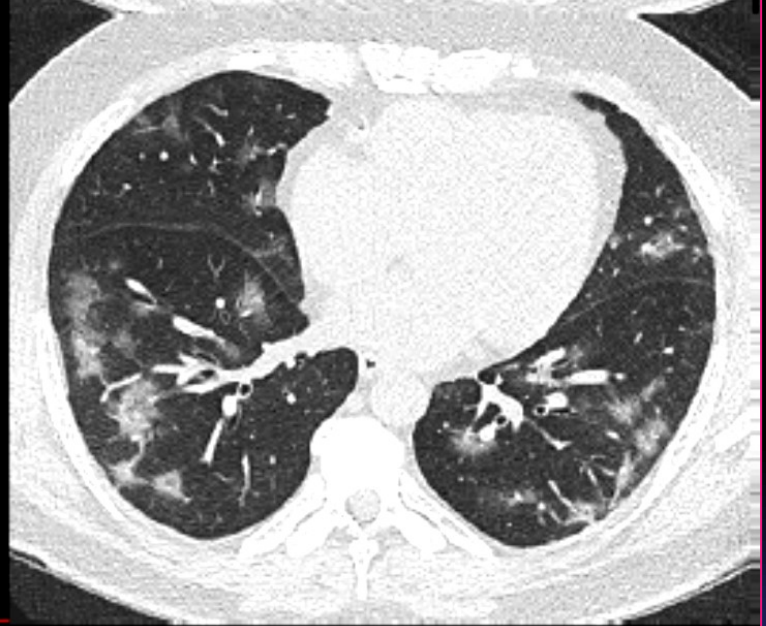
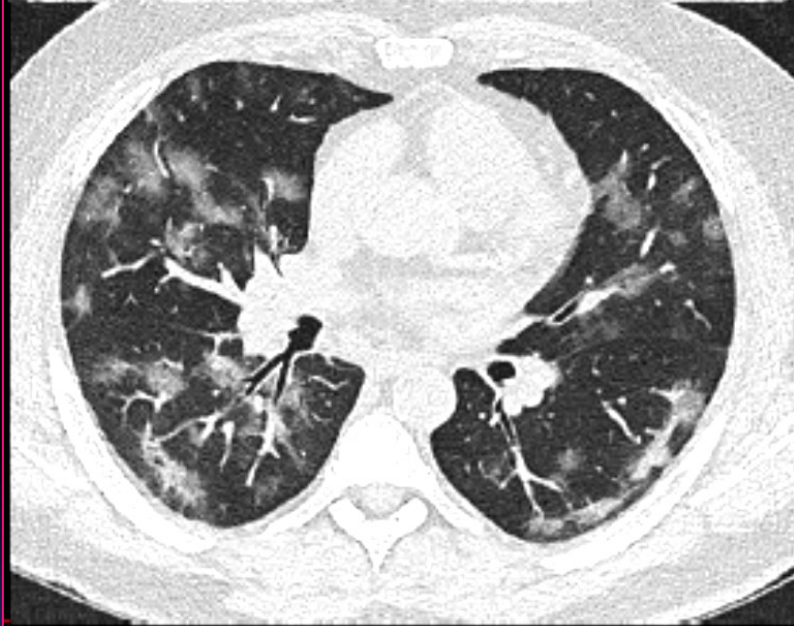
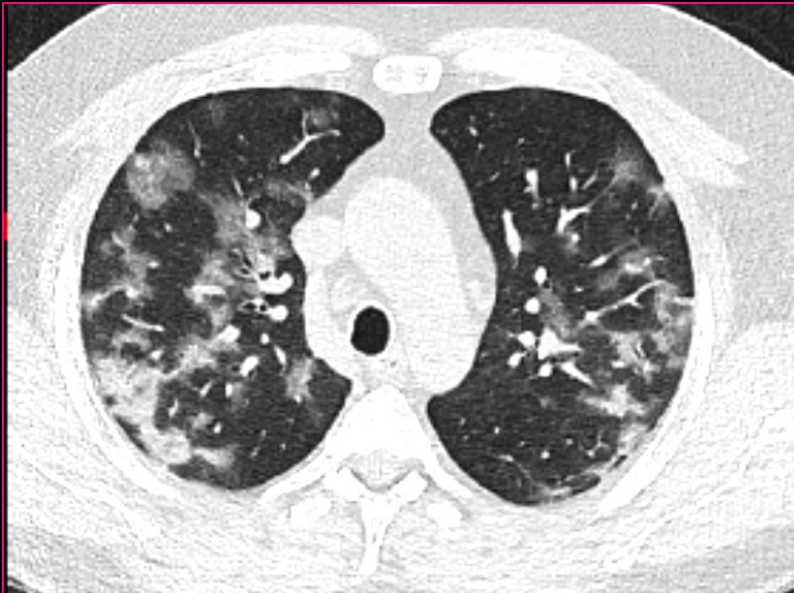
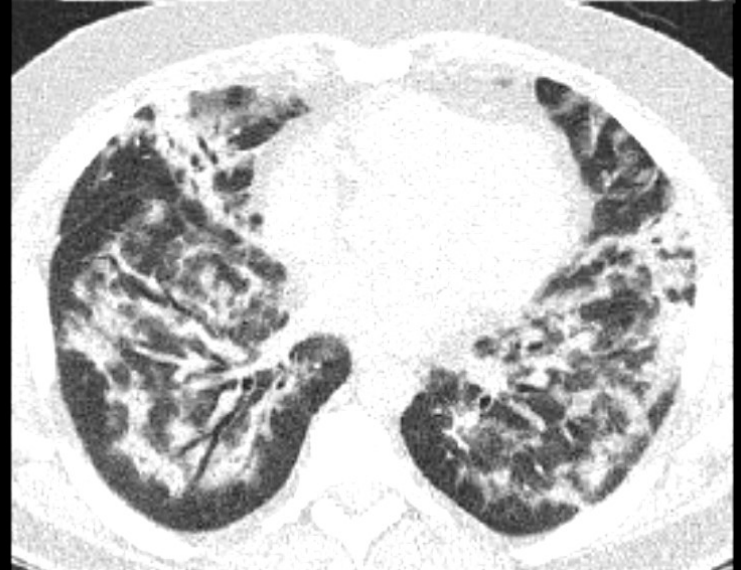
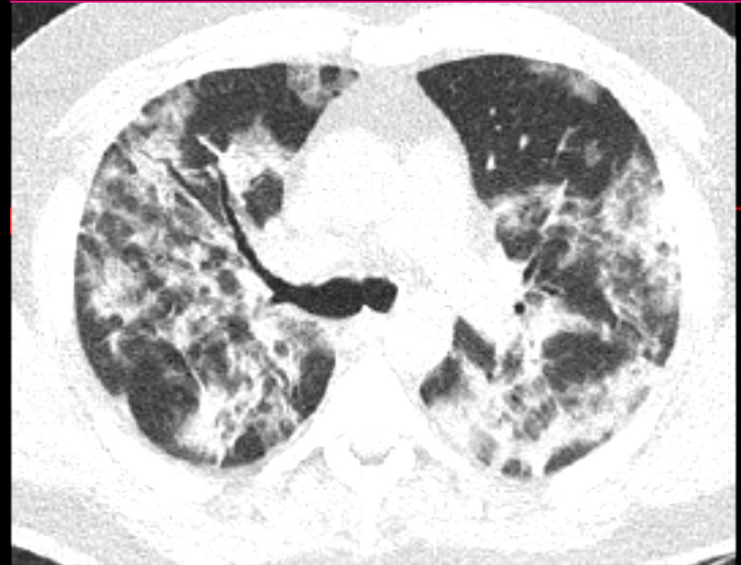
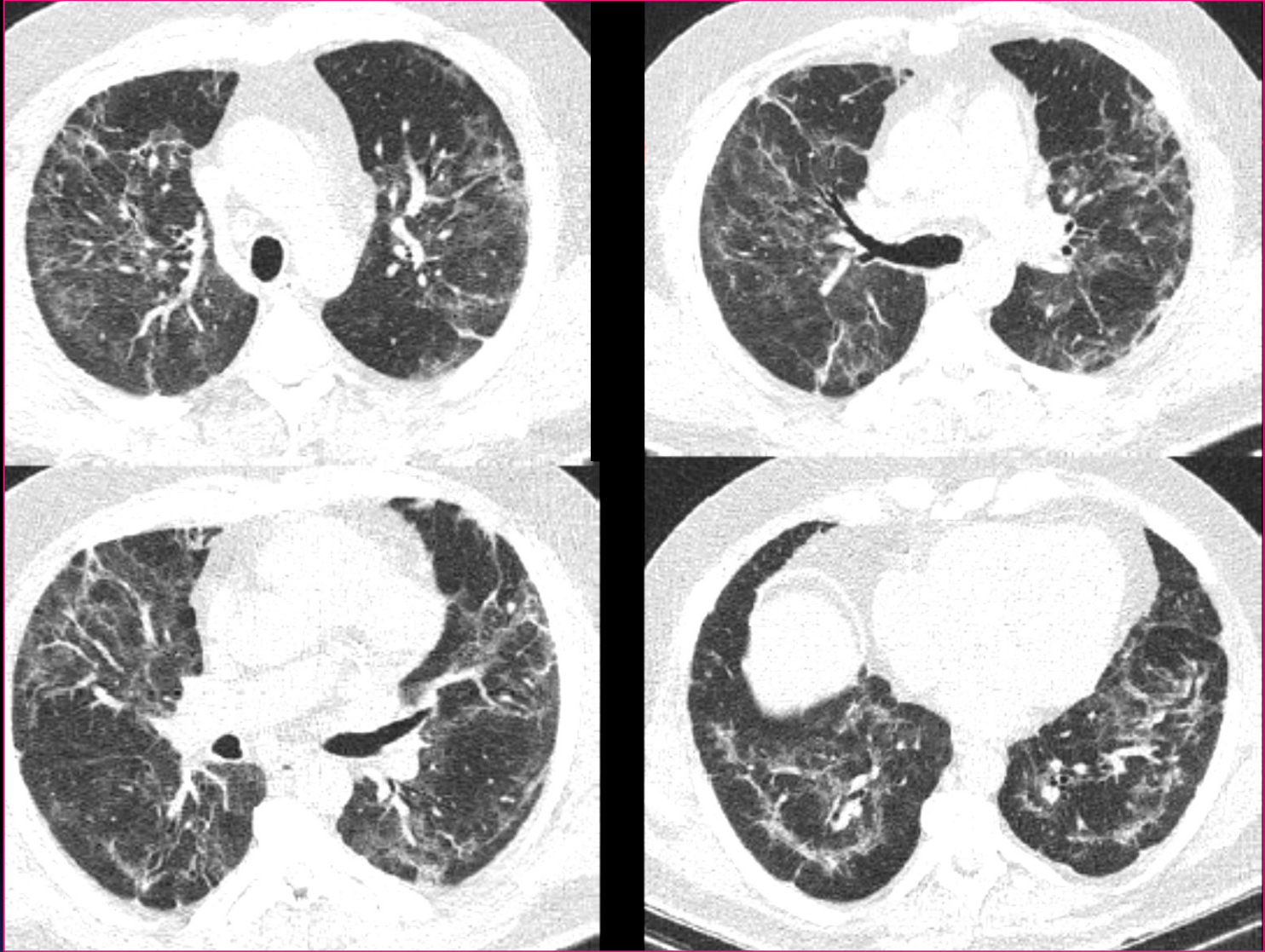


Fig. 1 | Timeline of post-acute COVID-19. Acute COVID-19 usually lasts until 4 weeks from the onset of symptoms, beyond which replication-competent SARS-CoV-2 has not been isolated. Post-acute COVID-19 is defined as persistent symptoms and/or delayed or long-term complications beyond 4 weeks from the onset of symptoms. The common symptoms observed in post-acute COVID-19 are summarized.

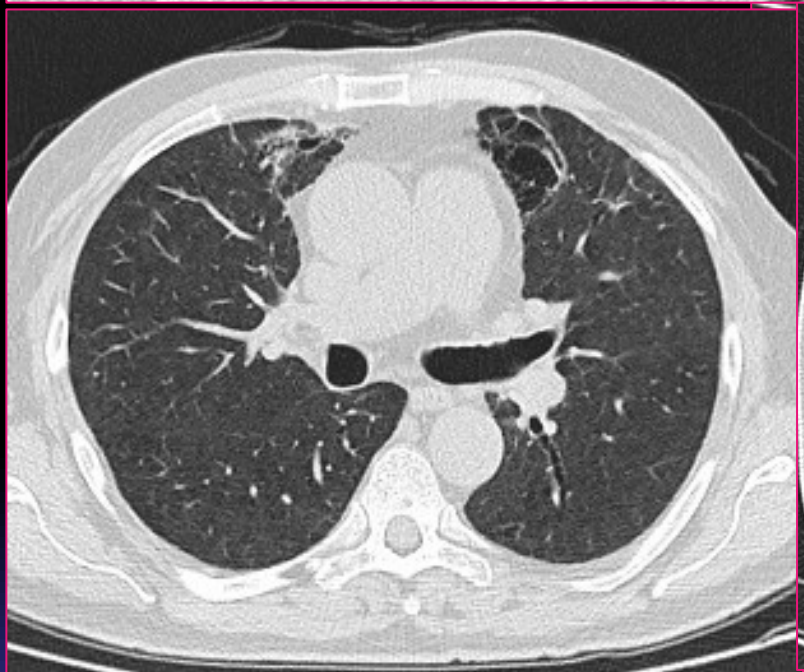
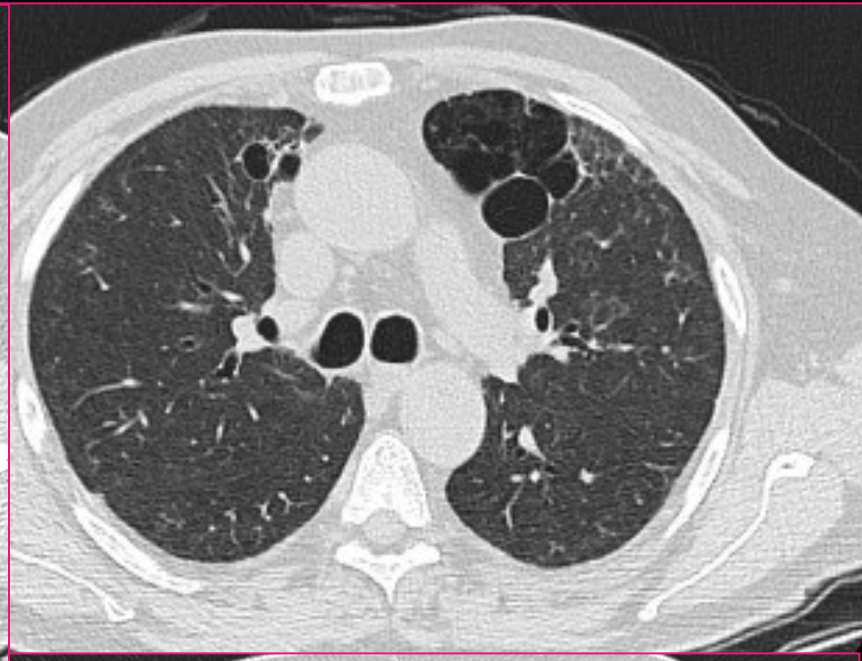
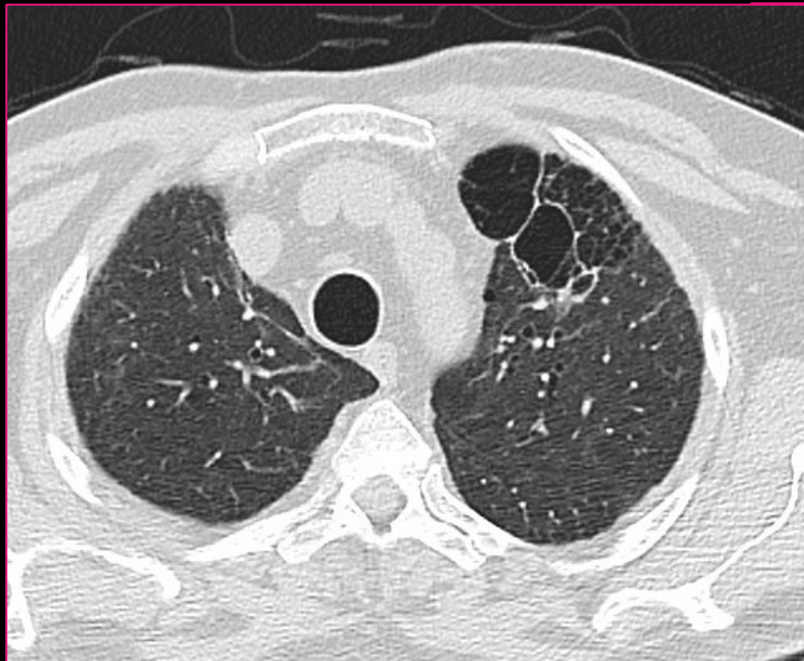


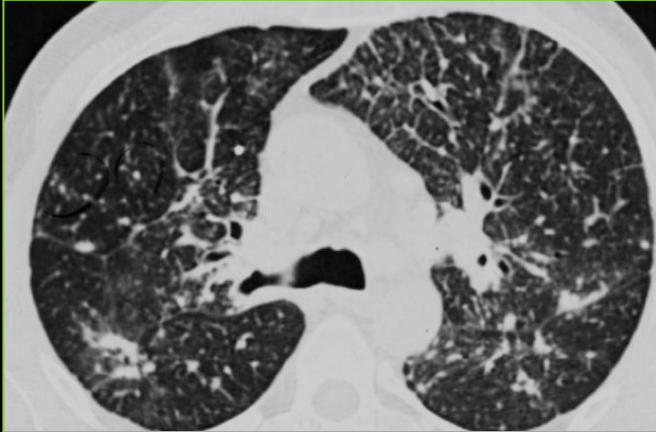
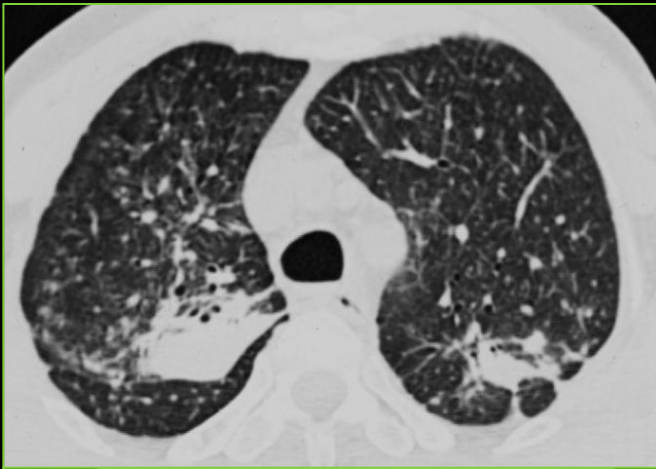


9 gün sonra



42 gün sonra





Üst Zonlar

- Silikozis
- Kömür işçileri P.
- Sarkoidoz
- Langerhans HH
- Ankilozan spondilit



Alt Zonlar

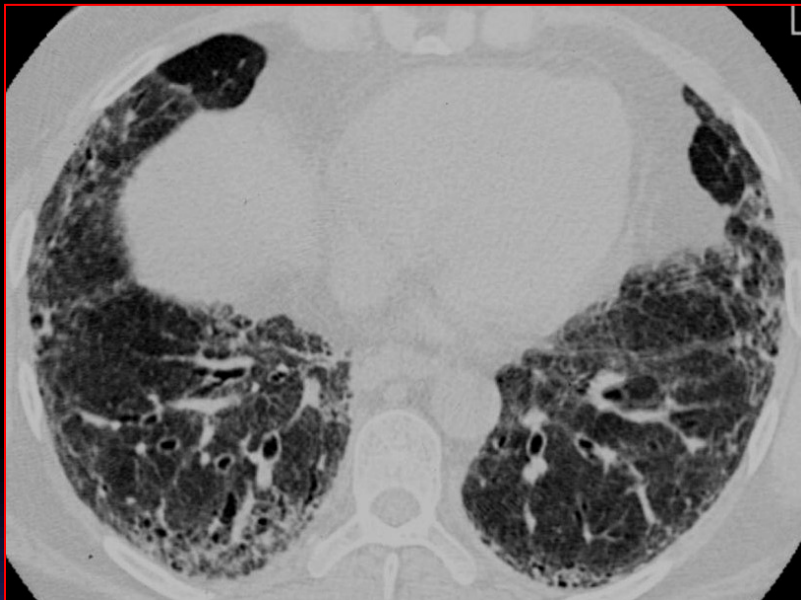
- İdyopatik PF
- Asbestoz
- Kollajen doku h. PF
- İlaç etkisi

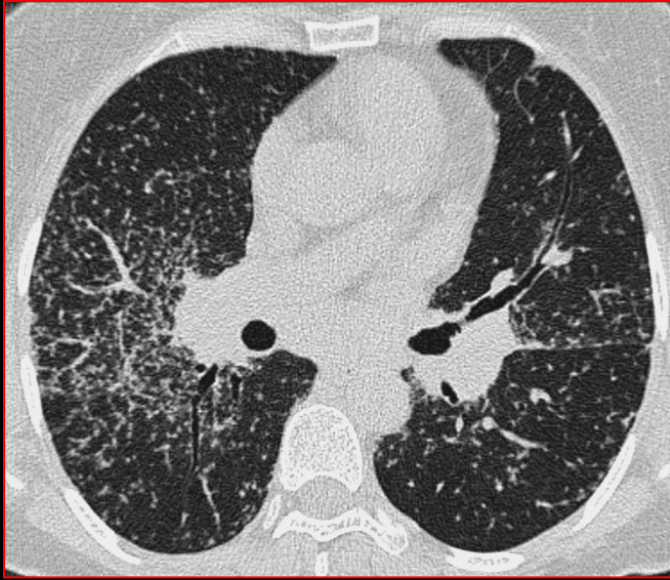
Skleroderma



Periferik

- İdyopatik PF
- Kriptojenik OP
- Kronik eozinofilik p.





Santral

- Akciğer ödemi
- Pulmoner alveolar proteinozis
- Sarkoidoz
- Bazı lenfanjitik tümörler (Kaposi sar)
- Lenfoma

