

# Toraks Radyolojisi

## TORAKS BT: NASIL OKURUM? ÖRNEKLERİ İLE TEMEL PATERNLER

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Ege Üniversitesi Tıp Fakültesi Radyoloji AD, İzmir

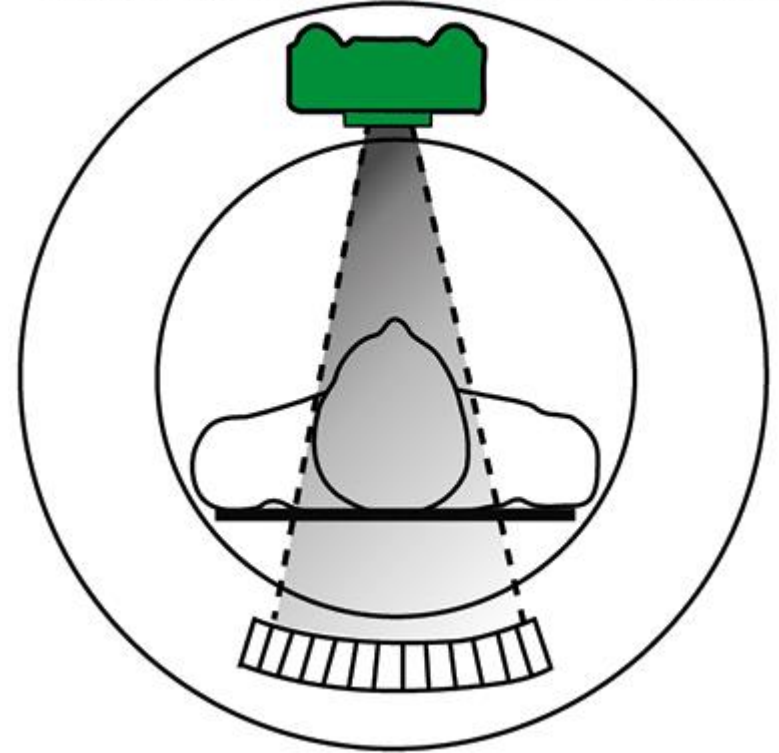
# BİLİNMESİ GEREKEN OLMAZSA OLMAZLAR

## ASİSTAN OLARAK NELERİ BİLMELİYİM?

- BT'de görüntü oluşumu nasıldır?
- DICOM görüntü nedir?
- BT görüntü özellikleri, dansite, pencereleme, kesit kalınlığı..
- Lokalizasyon, BT paternleri ve işaretler ile yaklaşım...

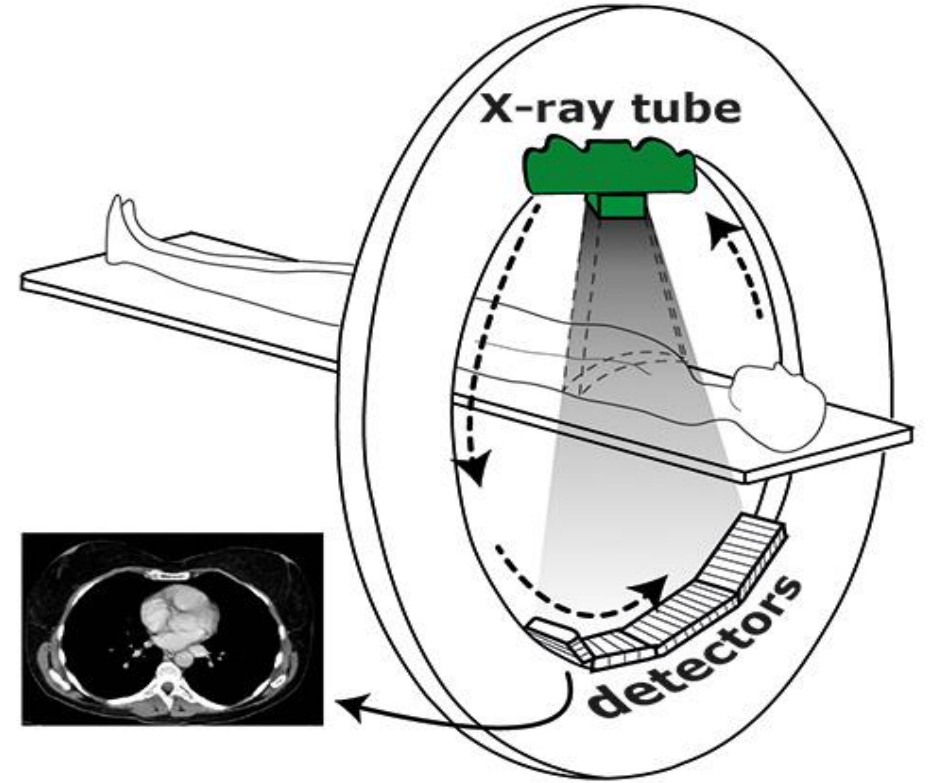
# BT GÖRÜNTÜ oluşumu:

Organizmayı geçen X ışınlarının attenuasyon değerleri sayısal olarak saptanır.

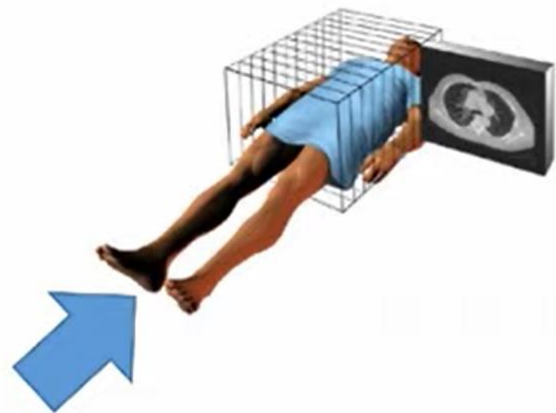


# BT GÖRÜNTÜ oluşumu:

- Her görüntü elemanının bir sayısal karşılığı vardır.
- Görüntüler siyah, beyaz ve ara gri renklerden oluşur.



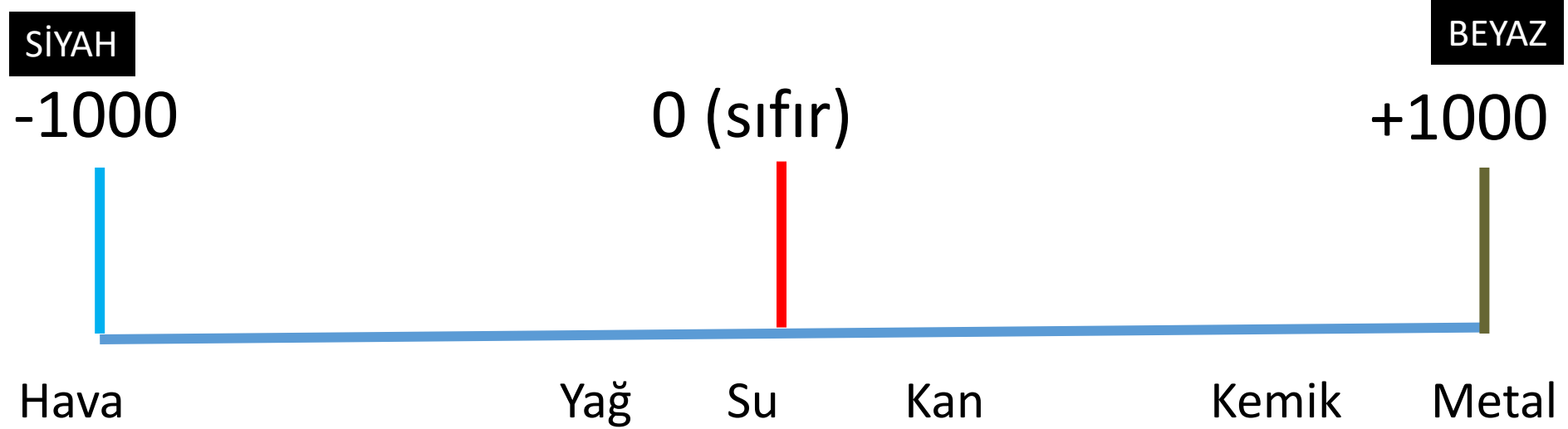




# BT'de renkler neyi ifade eder?

- Renkler DANCİTE'yi işaret eder.
  - Siyah: Hava ve yağ
  - Beyaz: Kemik, kalsifikasyon
  - Ara renkler: Yumuşak dokular (nodülden kitleye, buzlu camdan konsolidasyona)
- Dansite: HU ile ifade edilir
- Su 0 HU olarak kabul edilmiş

# 2000 renk var



+ 1000'den – 1000 'e kadar uzanan bu skalaya *Hounsfield skalası*, bu skaladaki sayılara da *Hounsfield üniti (HÜ)* adı verilir.

# PENCERELEME:

- BT ile elde edilen 2000 renk var.
- Ama gözümüz 2000 adet siyah ve beyaz rengi göremiyor.
- En iyi göz 25-30 gri renk tonunu ayırtedebiliyor.
- Gözümüzün görebilmesi için akciğere ayrı pencerede, mediastene ayrı pencerede ve kemiklere ayrı pencerede bakmak zorunda kalıyoruz.



CHEST



\*\*\* (68y) - 4/29/2019 4:10:54 PM - HiRes HD Stnd VS40 +DMPR

Im: 206/472  
Se: 2

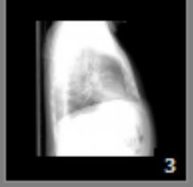
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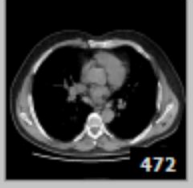
8/12/1950 M  
EGE UNV. HASTANESI, RADYOLOJI ABD.  
0  
2623 Yuksek Rezolusyonlu Akciger BT (Inspiryum) /// 3091 BT 3 Bo  
HiRes HD Stnd VS40 +DMPR

4/29/2019 4:09:18 PM  
2623 Yuksek Rezolusyo  
CT: 4 series

Scout

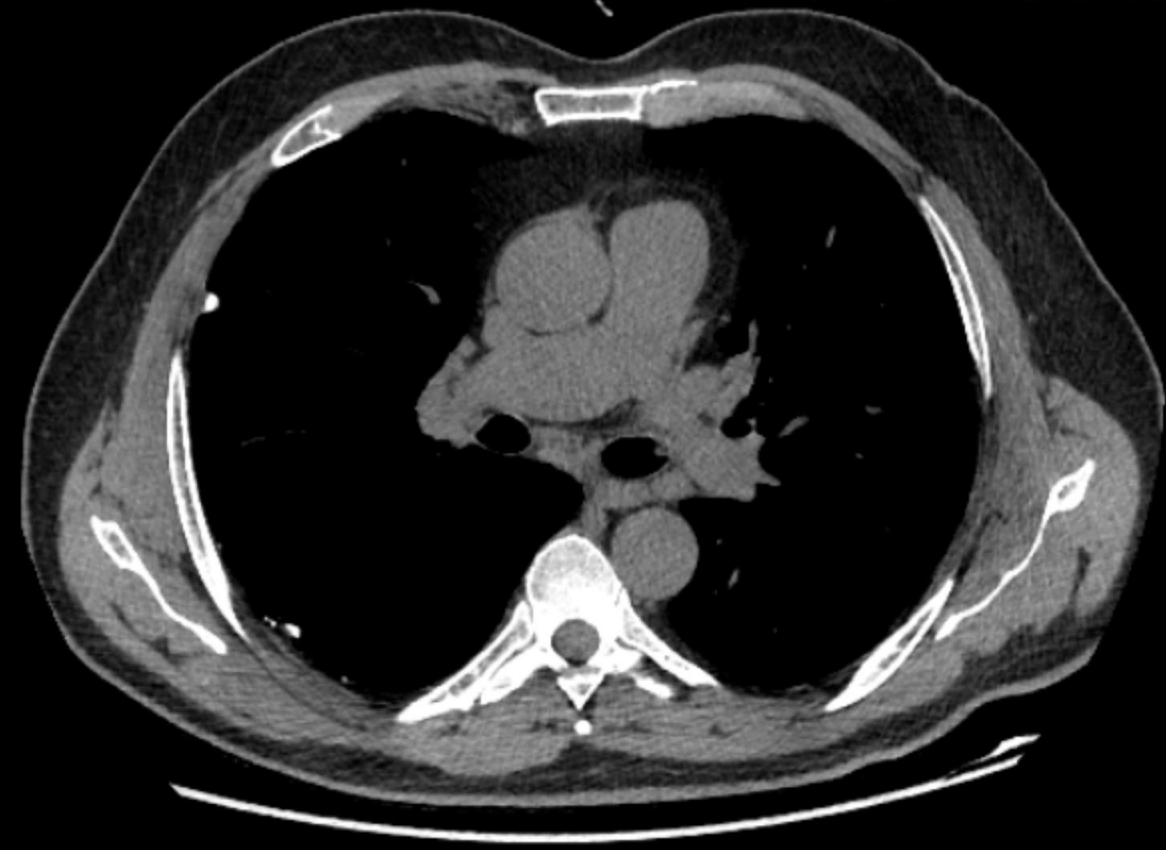


HiRes HD Stnd VS40 +D



R

L



WL: 60 WW: 400 [CT Abdomen]  
T: 0.6mm L: -159.8mm

282mA 120kV  
4/29/2019 4:10:54 PM

0.625 HD Bone



Dose Report

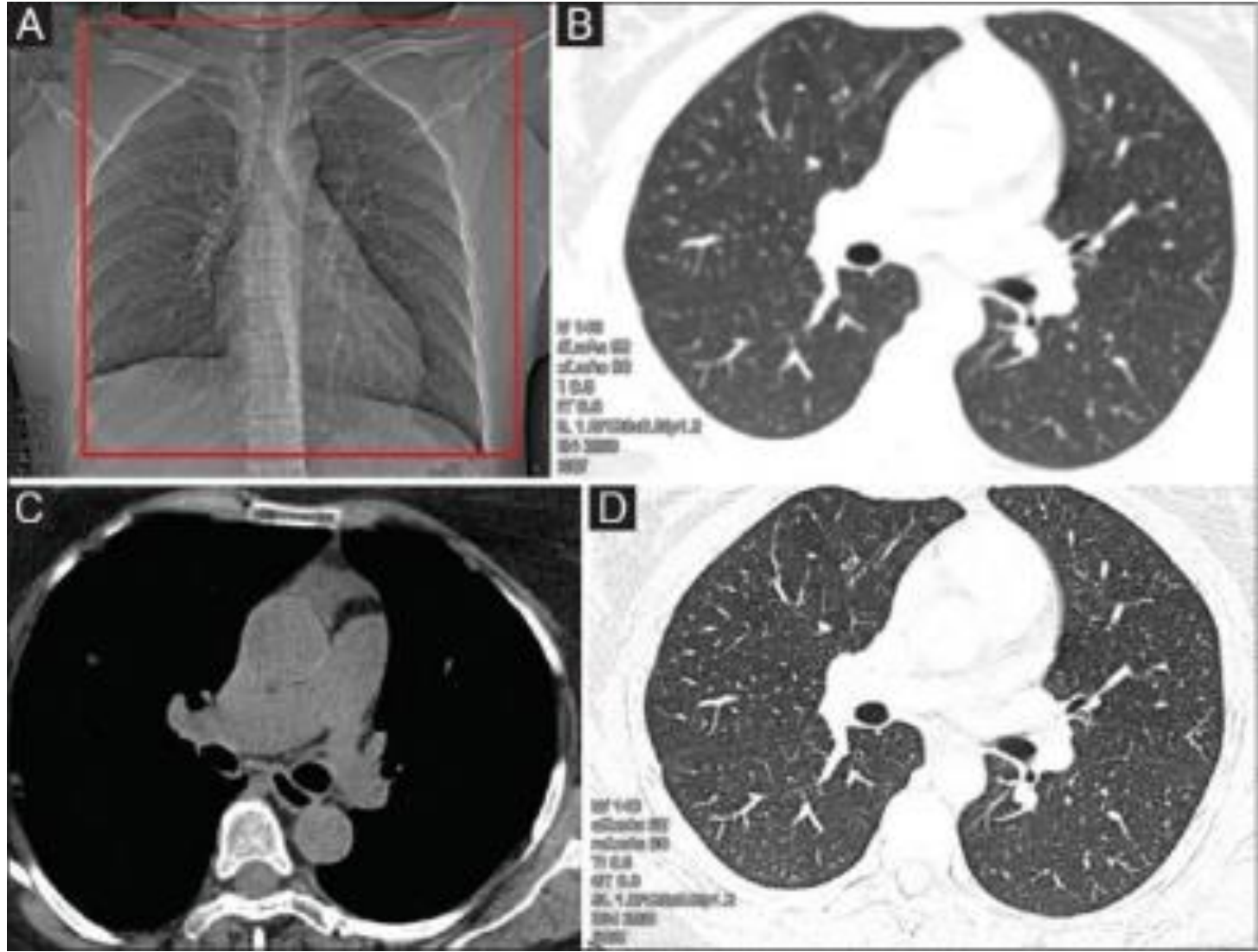
Area	Volume	CTDIvol	DAP
Head			
Neck			
Chest			
Abdomen			
Pelvis			
Total			



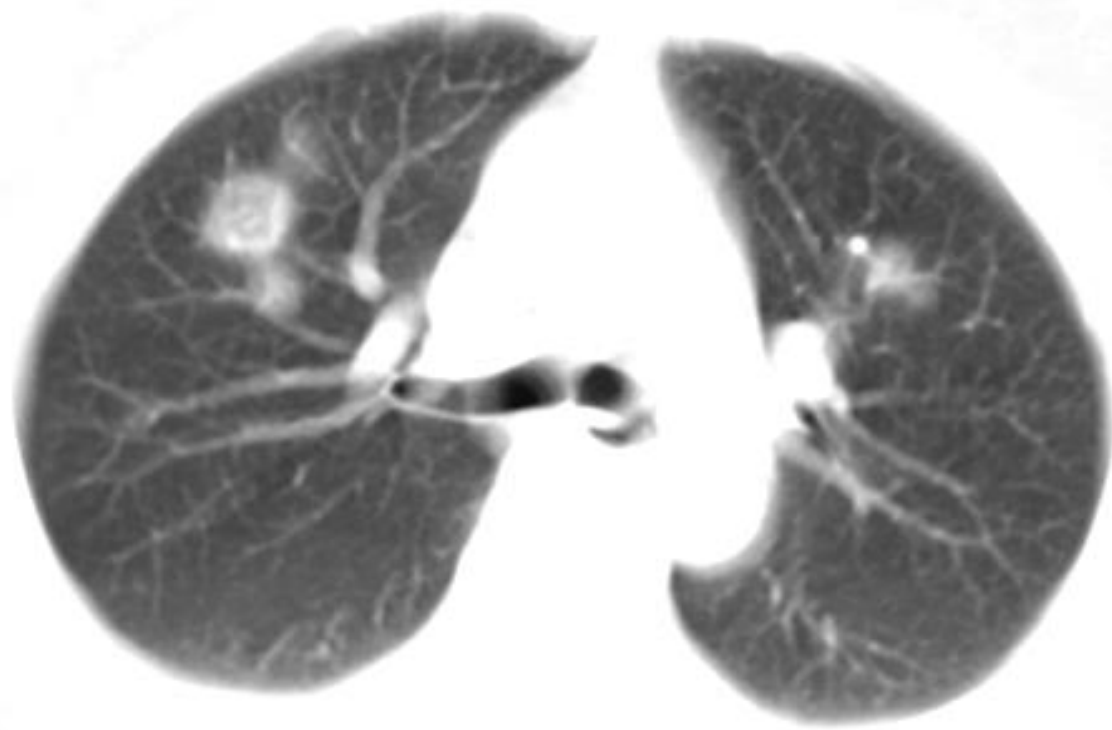
# BT GÖRÜNTÜ ÖZELLİKLERİ

- Görüntüler ince kesitlerle alınmalıdır. Kesit kalınlığı 1 mm veya daha ince olması değerlendirmeyi çok farklılaştırır.
- Tarama spiral ve volümetrik yapılmalıdır.
- DICOM olarak saklanmalıdır.
- YRBT ise mutlaka yüksek rezolüsyon algoritması kullanılmalıdır.

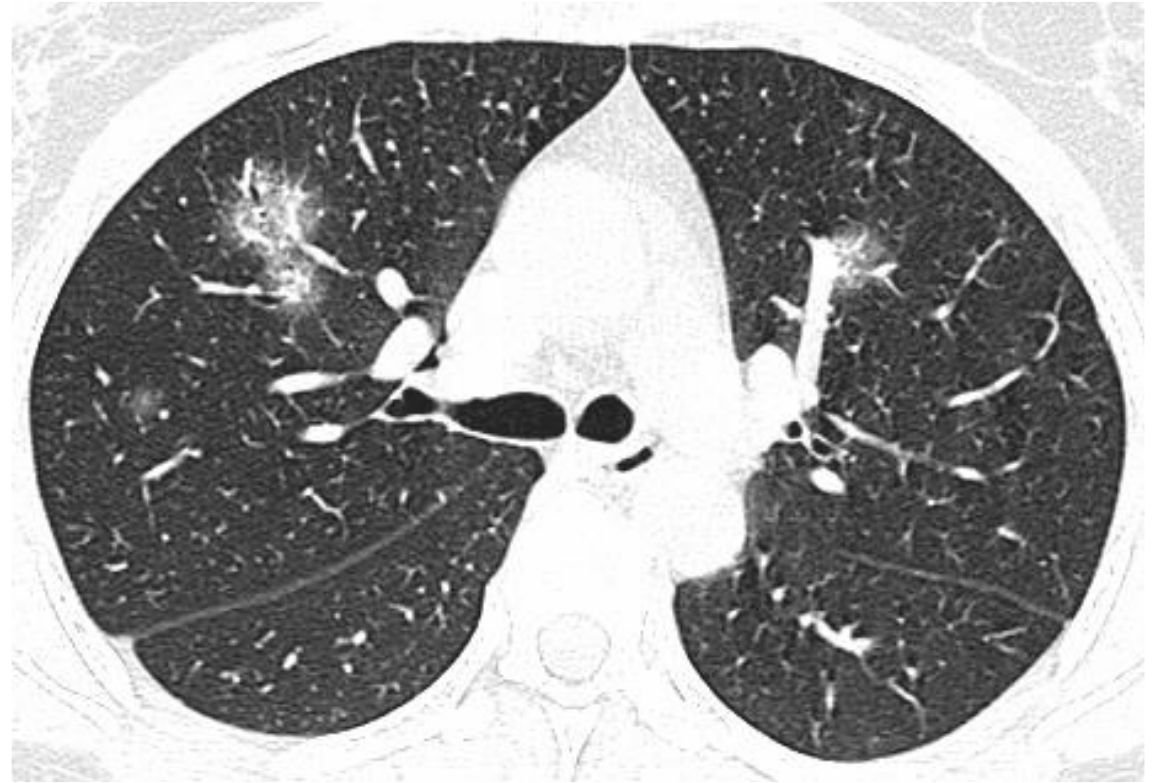








10 mm



1 mm

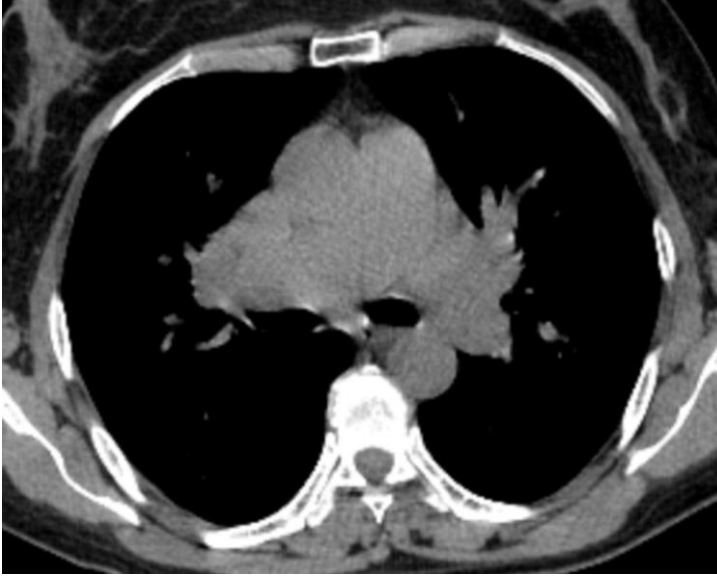


Yumuşak doku algoritması



Yüksek rezolüsyon algoritması

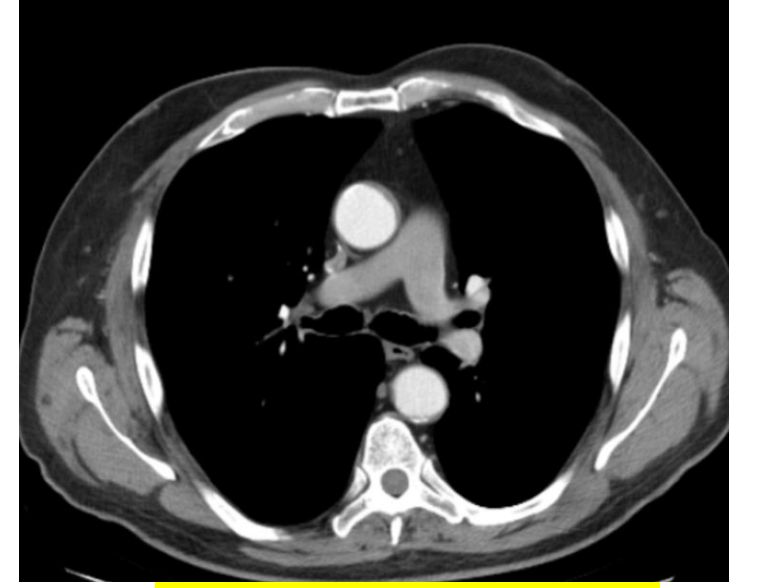
1 mm



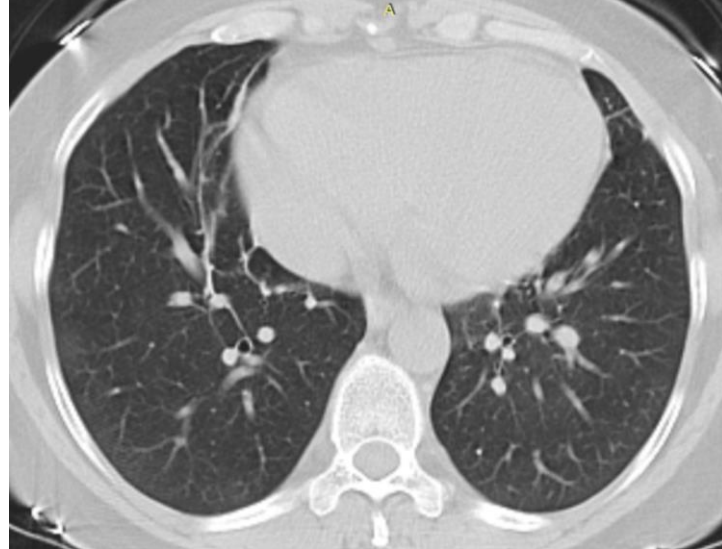
KONTRASTSIZ



KONTRASTLI -PULMONER ARTERE  
YÖNELİK



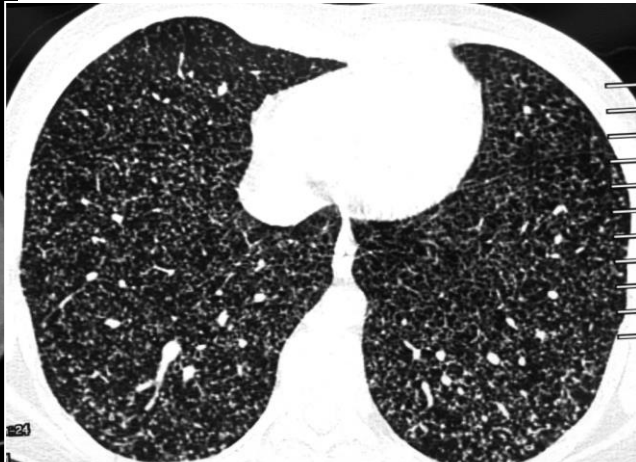
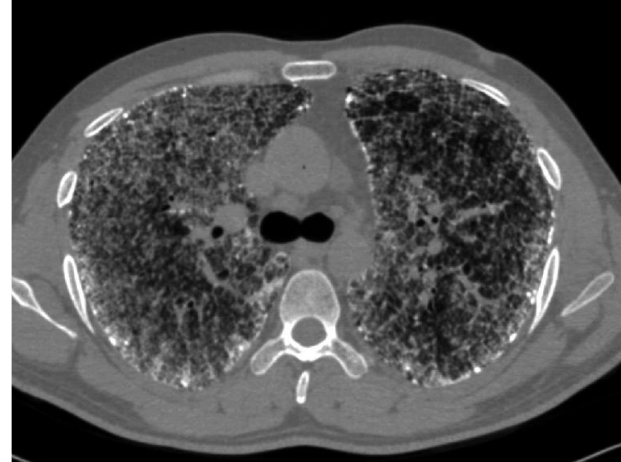
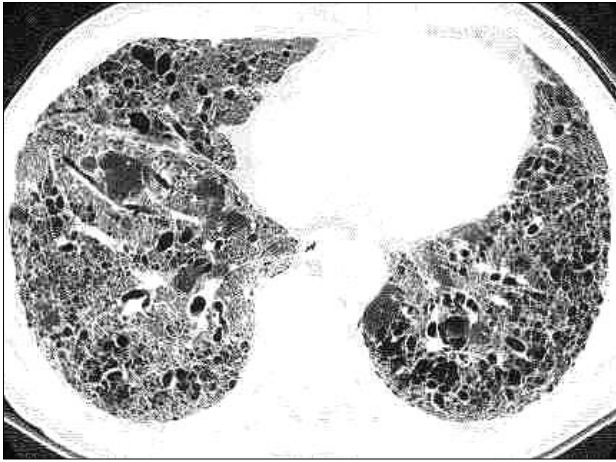
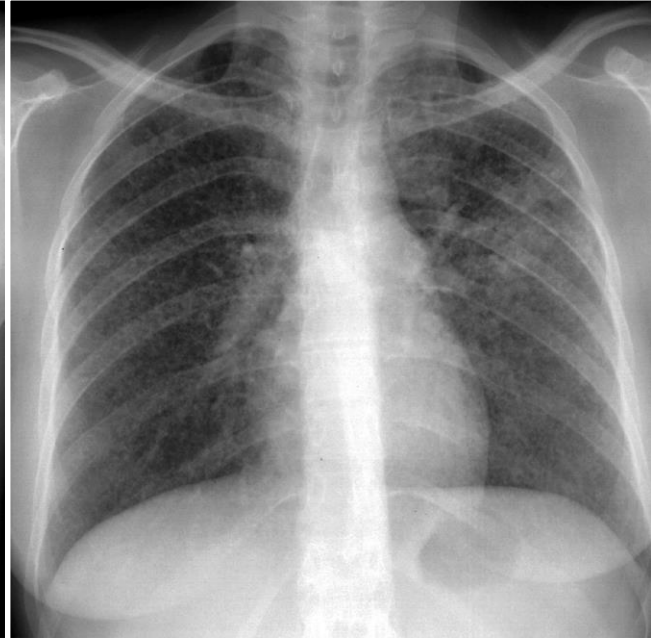
KONTRASTLI -AORTAYA  
YÖNELİK



# RADYOLOJİK İPUÇLARI

- HASTA – yaşı, cinsiyeti, mesleği, geçirdiği hastalıklar, aile öyküsü....
- Anatomi ve fizyoloji
- Hastalıkların yerleşim özellikleri
- Lezyonların dansitesi
- Direkt grafi ve BT'de paternler, işaretler
- Hastanın eski filmleri
- Tetkikin tipi ve kalitesi (kesit kalınlığı, kontrast kullanımı vb..)
- .....

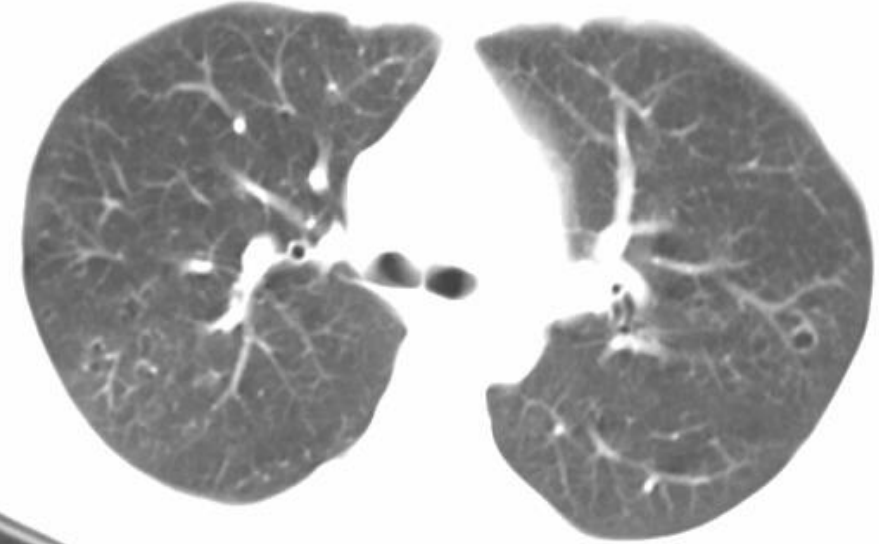
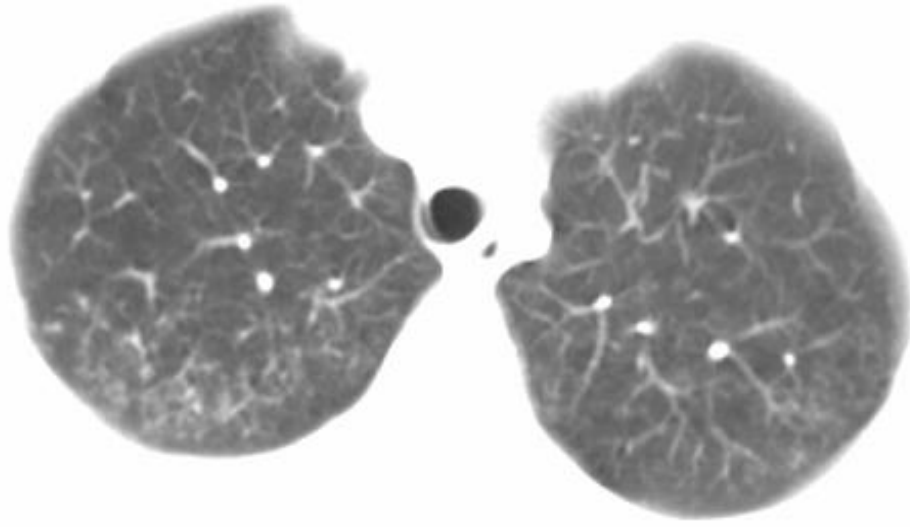




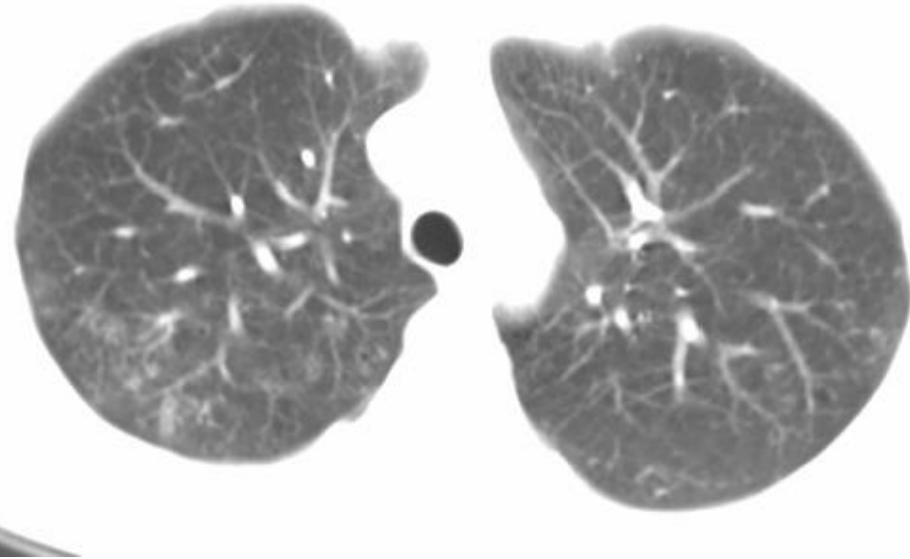
İPF Balpeteği akciğer

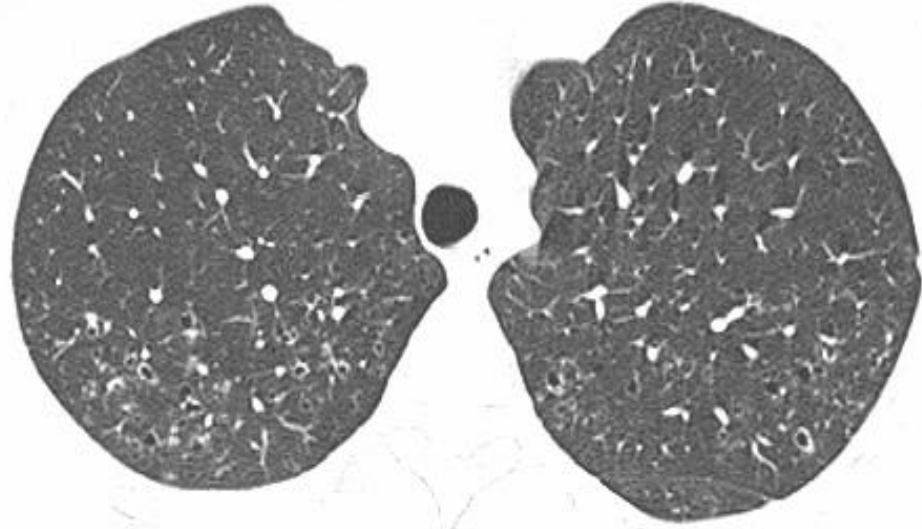
Alveoler mikrolitiazis

Miliyer tüberkülozis

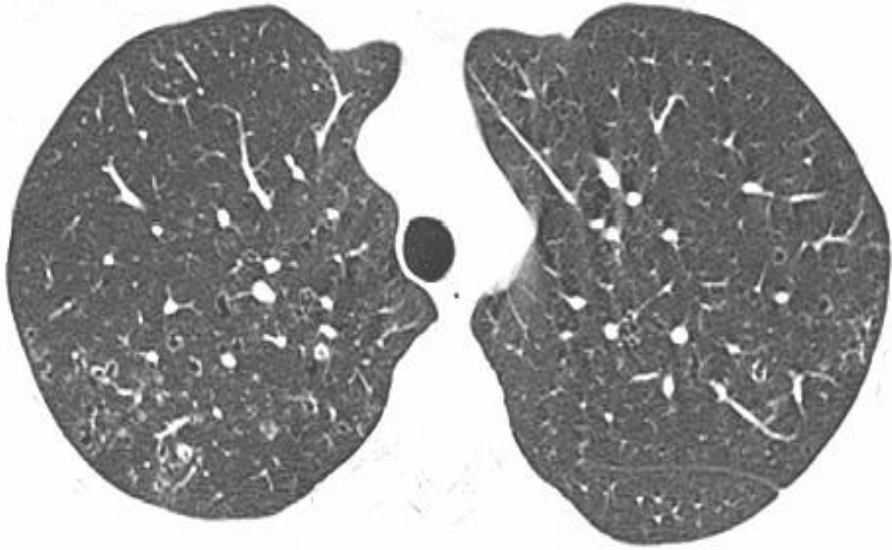


10 MM KESİT KALINLIĞI





1 MM KESİT KALINLIĞI



# DANSİTE VE AKCİĞER

- Akciğerin dansitesi havadan daha yüksektir (içinde kan ve doku içermesi nedeniyle)
- Akciğerin normal dansitesi kişiden kişiye değişmekle birlikte **-500 ila -900 HU** arasında değişir
- Lezyonlar:
  - DANSİTE ARTIŞI yapan,
  - DANSİTE AZALTAN ve
  - her ikisini de barındıran (MİKST)olmak üzere üç grupta toplanabilir.



# BT'DE PARANKİM DENSİTESİNDE ARTIŞ

- Alveol ve diğer hava yollarında havanın azalması ve/veya bu alanlarda madde birikimi ( püy, kan, protein, hücre, kalsiyum vb)

**-Hava azalması** – volüm kaybı

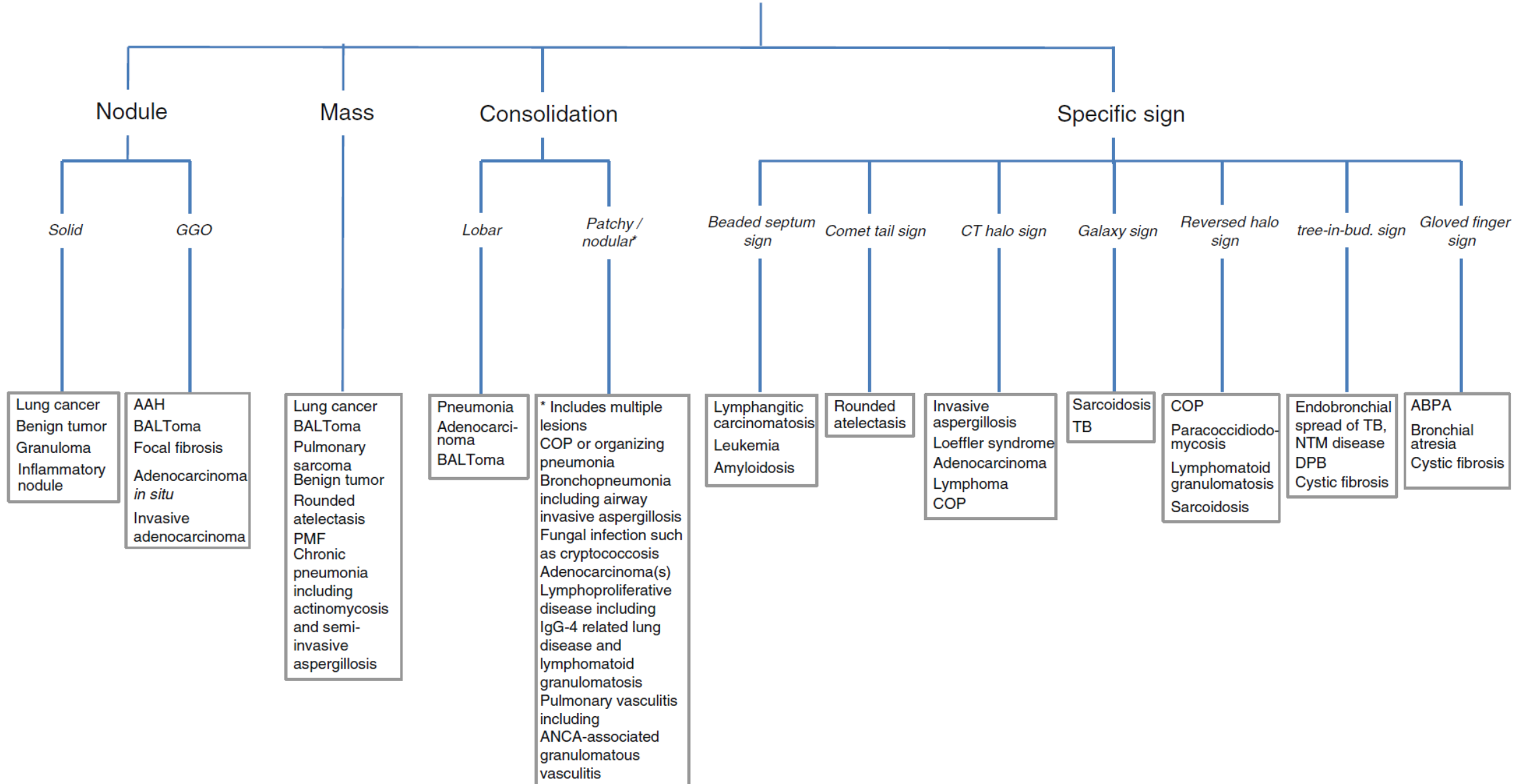
**-Madde birikimi** – volüm artışı

# DANSİTE ARTIŞI (parankimal)

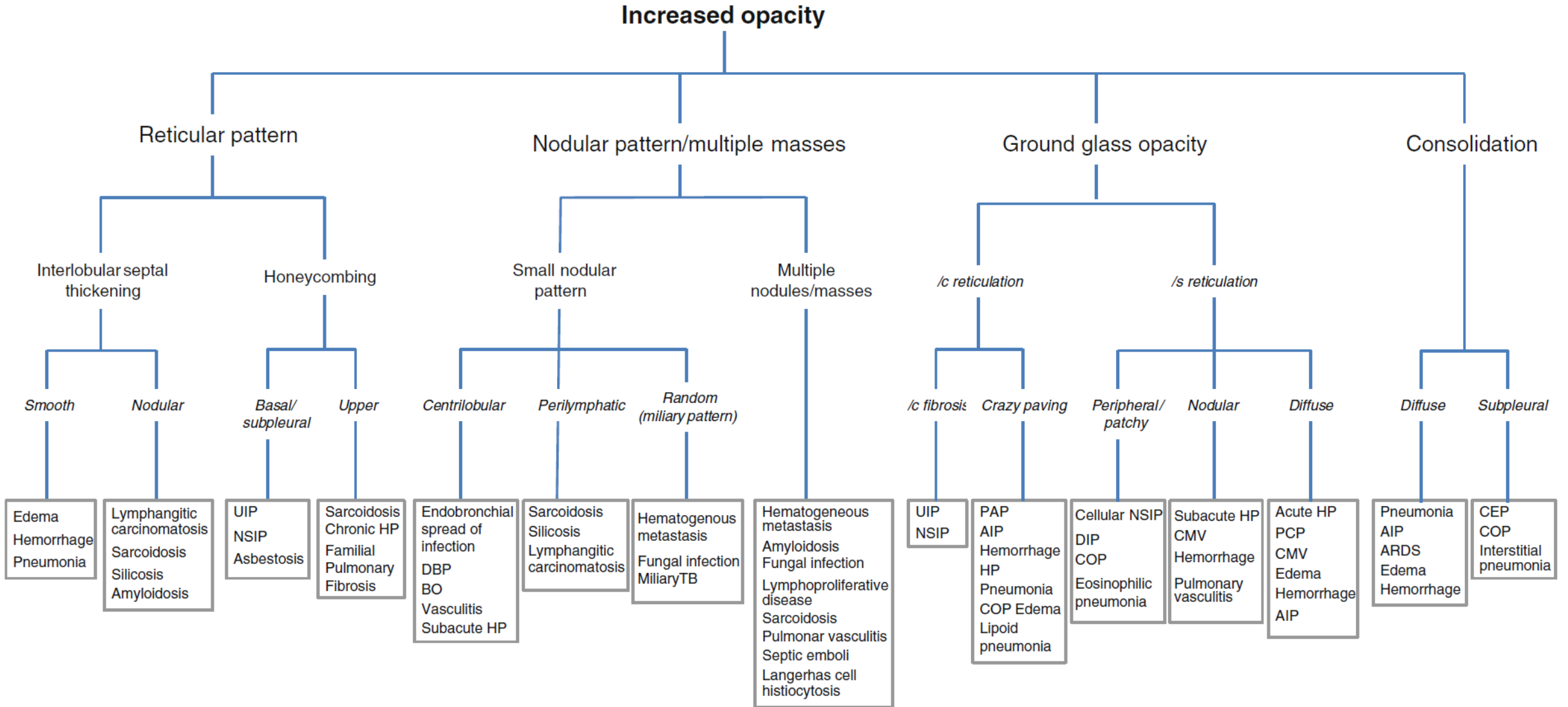
- Buzlu cam ve konsolidasyon
- Nodül ve kitleler
- Atelektazi
- Vasküler lezyonlar
- Retiküler ve retikülonodüler görünüm yapan lezyonlar
- Yüksek dansiteli lezyonlar (kalsifikasyon, iyod birikimi vb)
- Hiler, mediastinal veya göğüs duvarı lezyonlarının akciğere uzanımı.....

# FOKAL ARTMIŞ OPASİTE

## Increased opacity

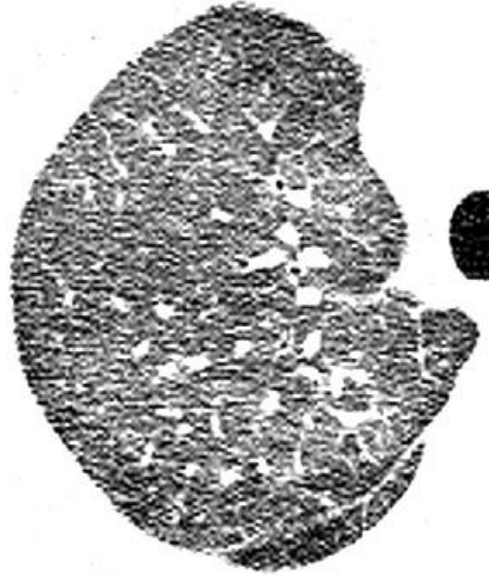


# DİFFUZ ARTMIŞ OPASİTE

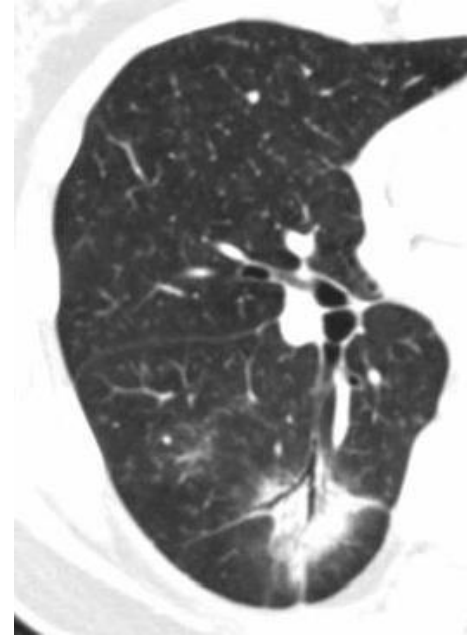


# BUZLU CAM / KONSOLİDASYON

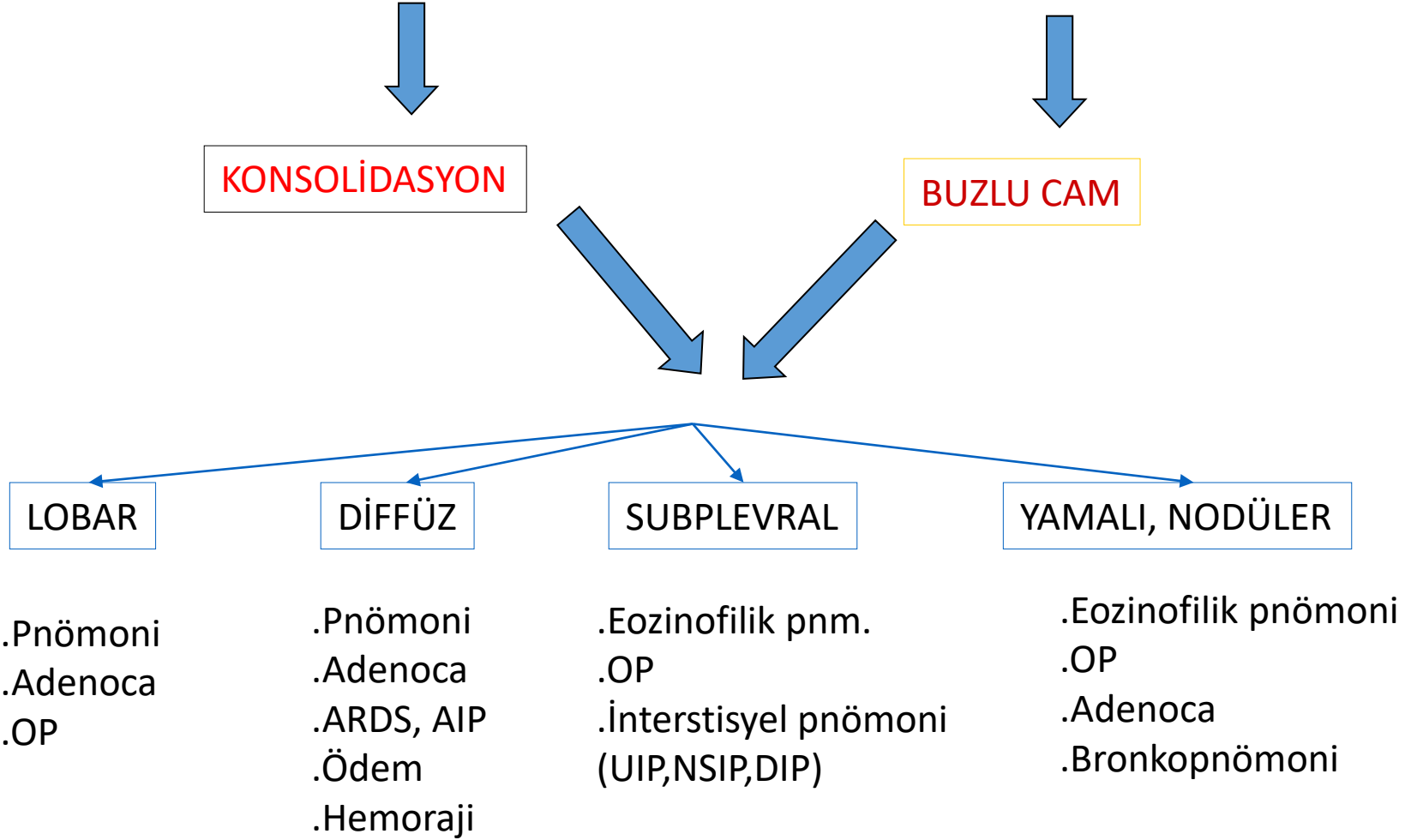
- Altta geçen damar yapılarını bozmayan dansite artışı BUZLU CAM

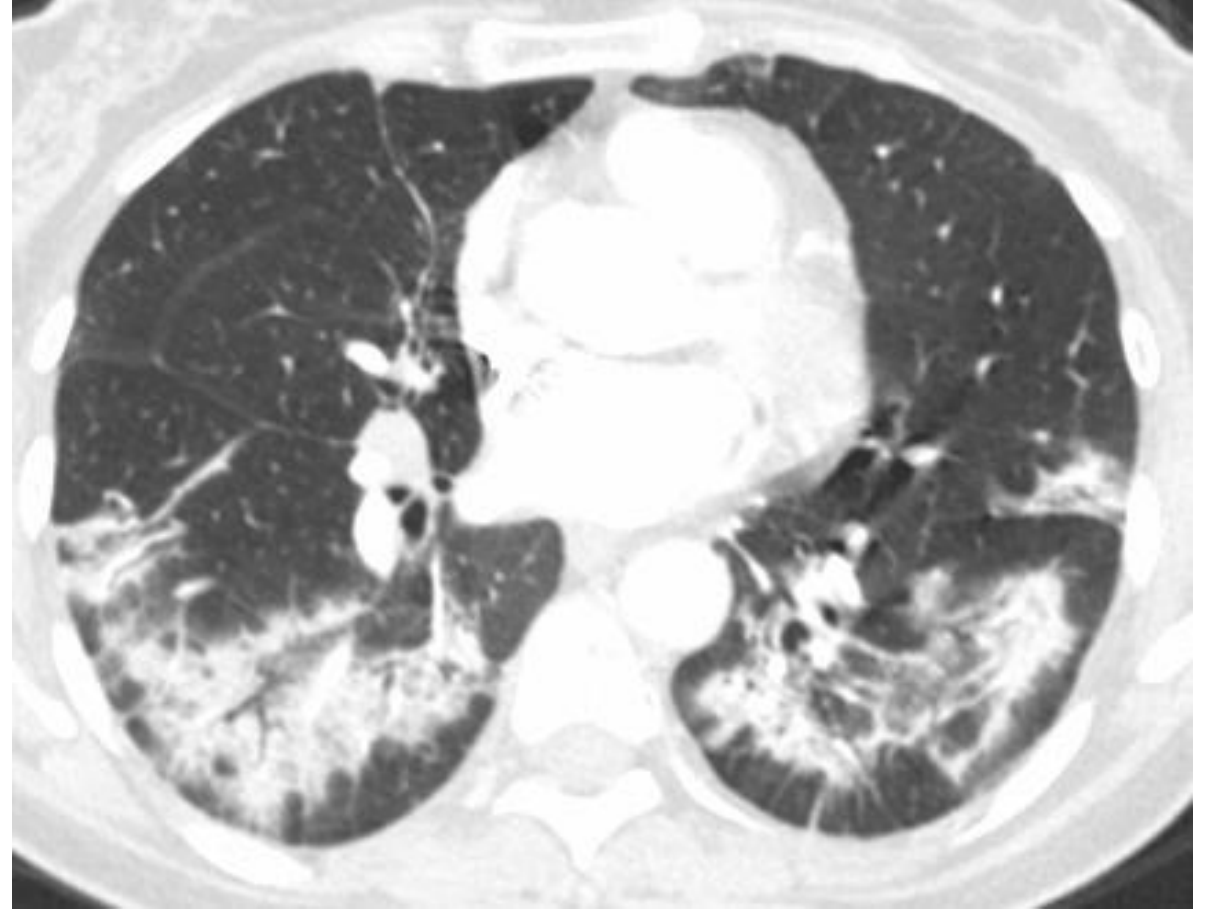


- Damar yapılarını silen dansite artışı KONSOLİDASYON

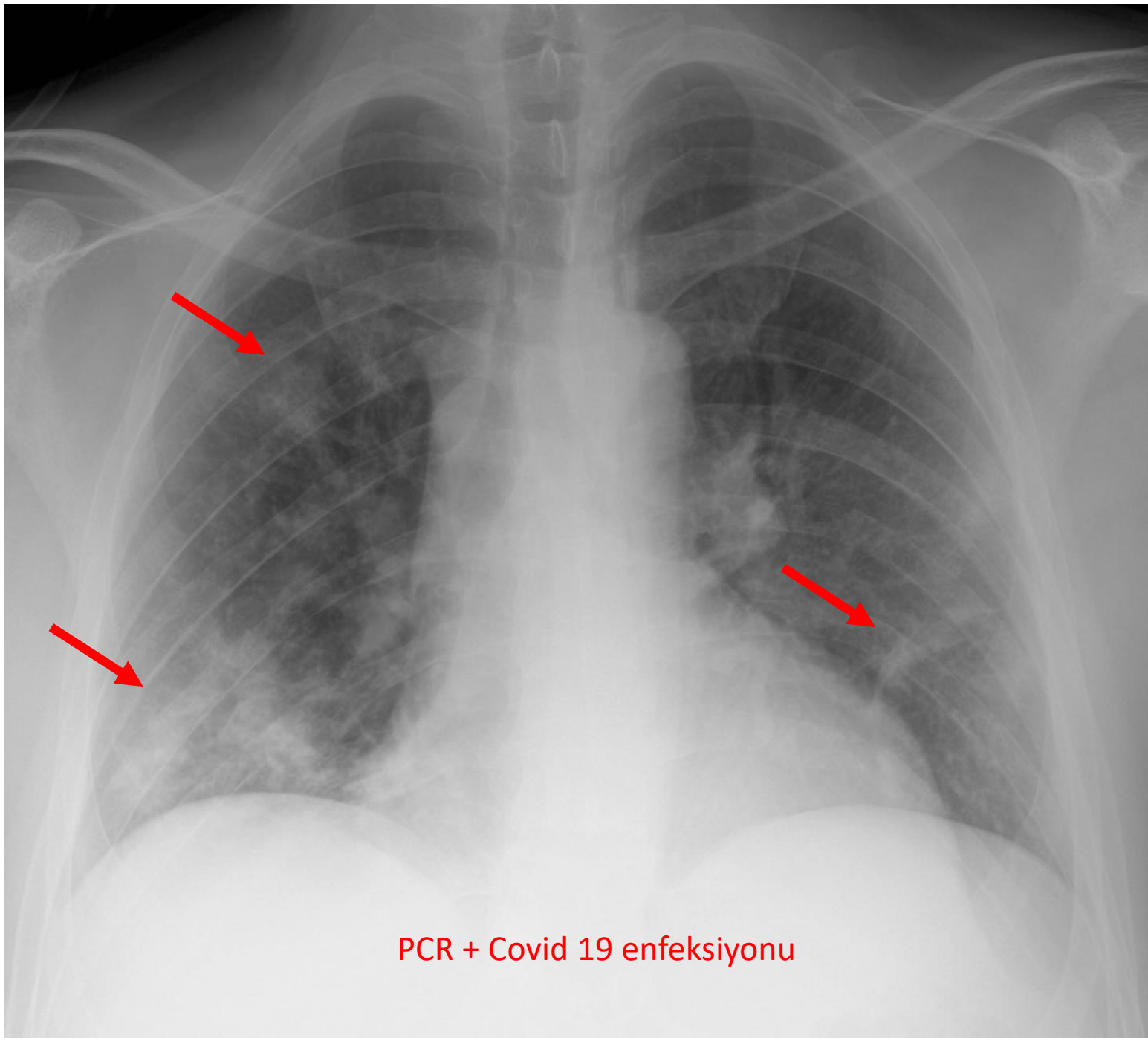


# ARTMIŞ AKCİĞER OPASİTESİ



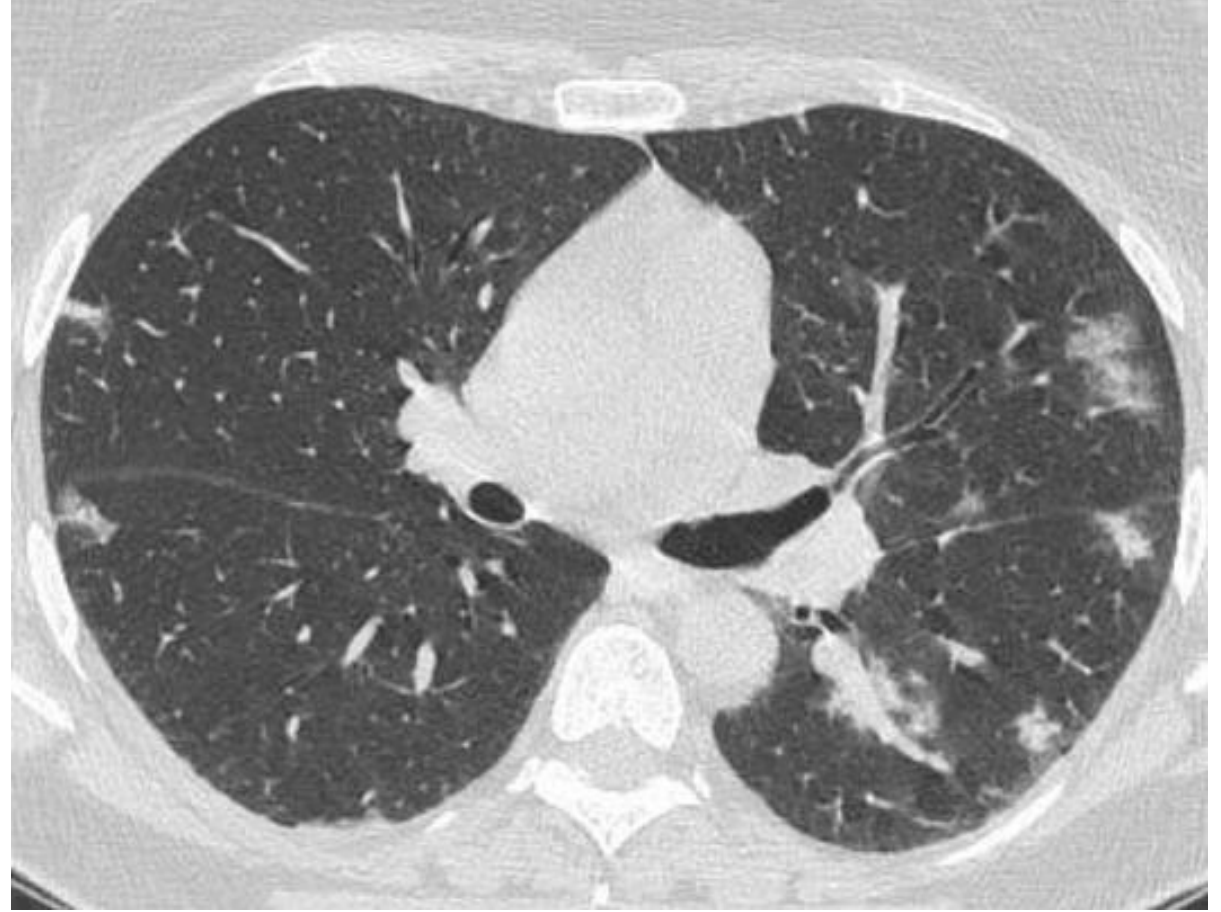
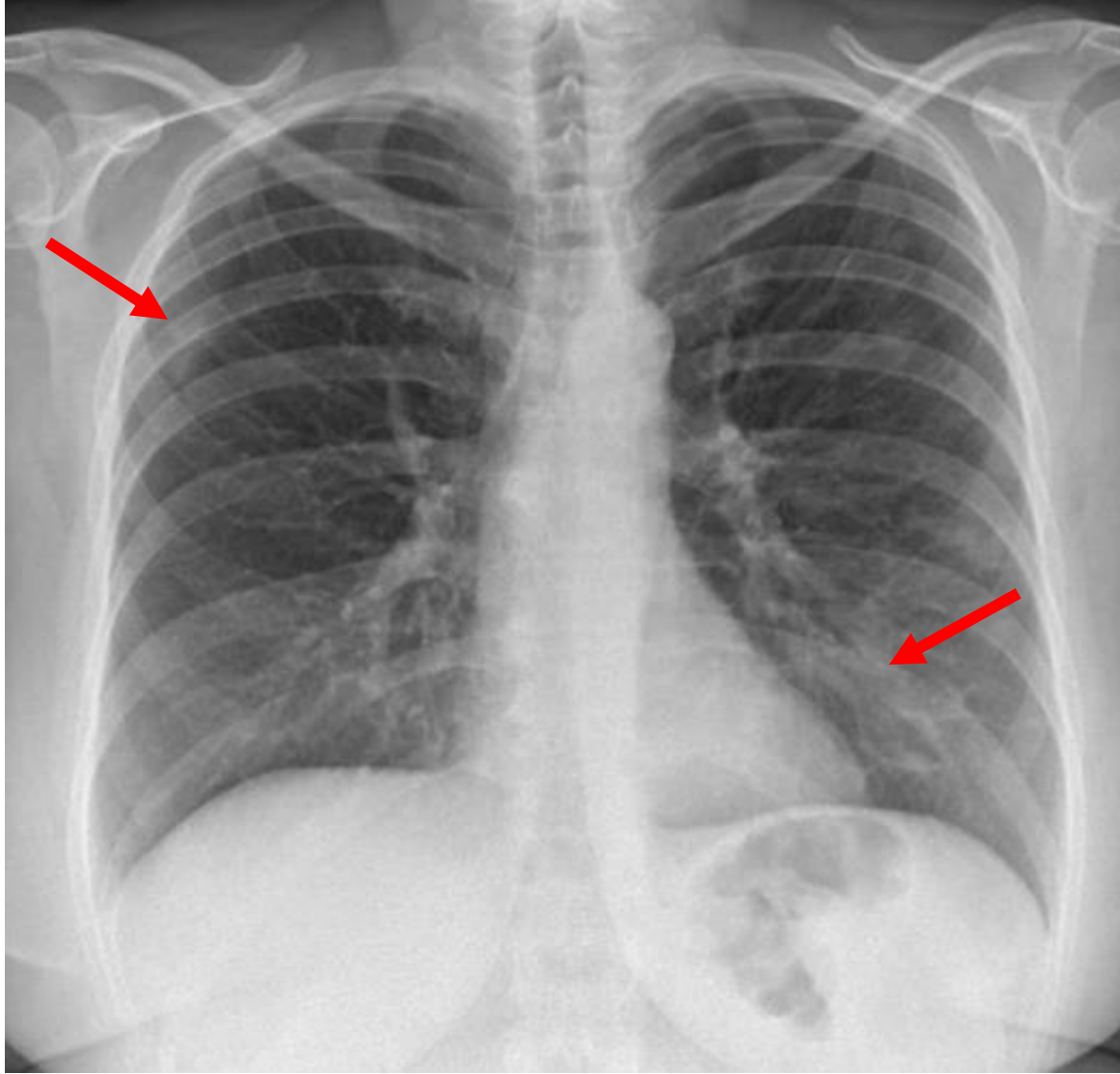


KONSOLIDASYON Pnömoni

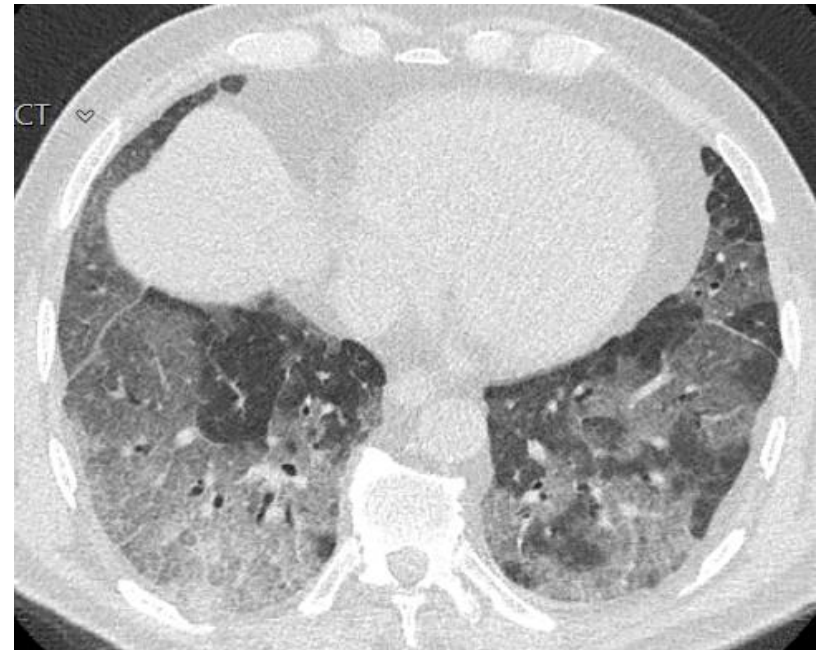
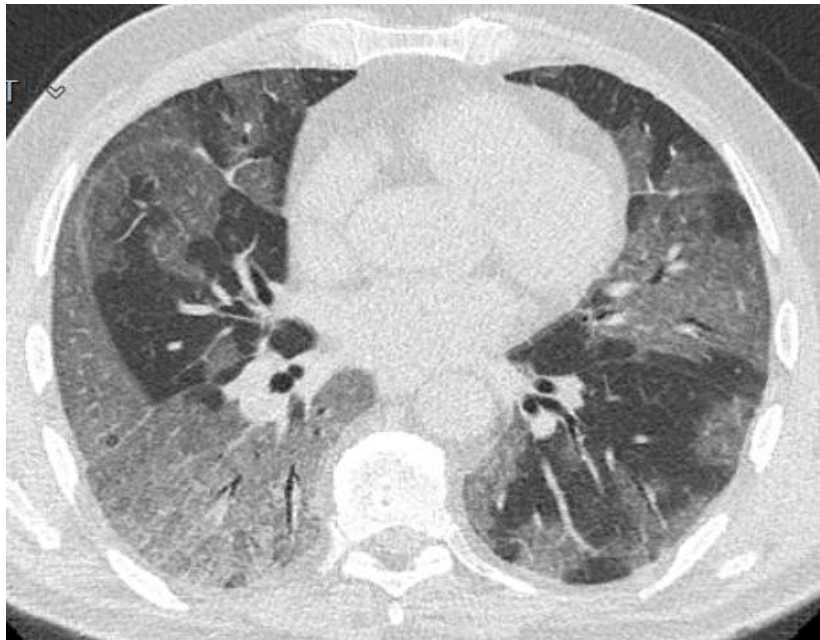
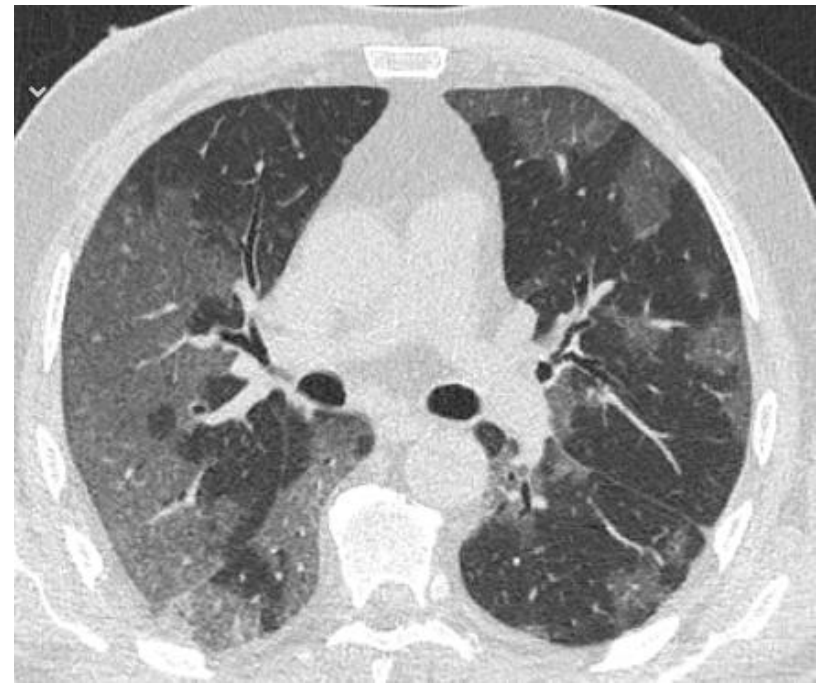


PCR + Covid 19 enfeksiyonu

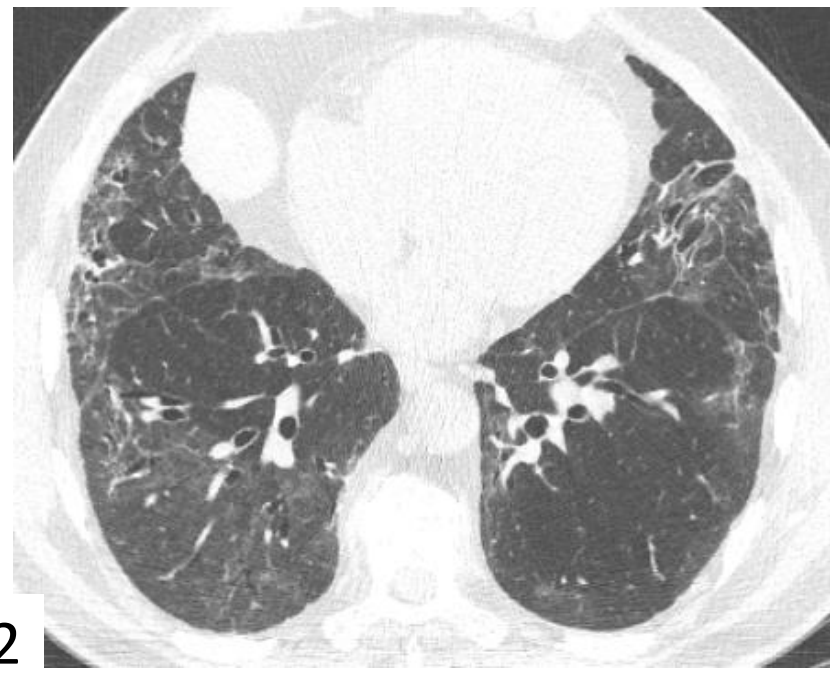
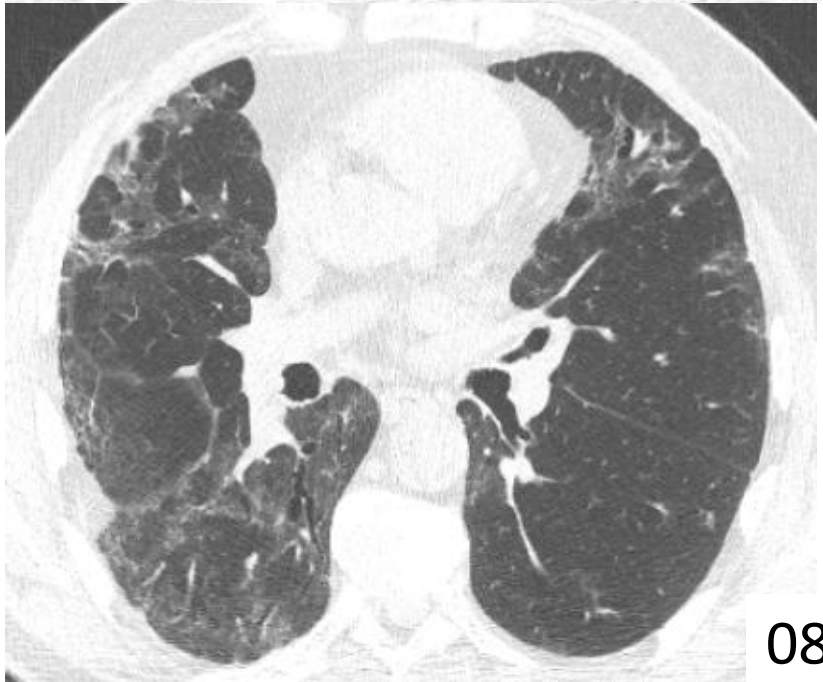
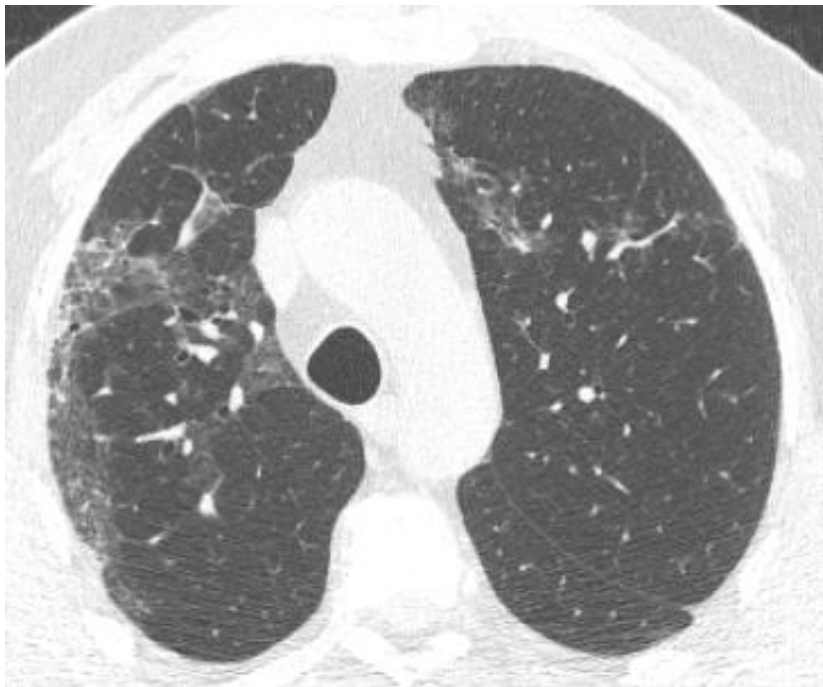




46 y K, COVID tanılı

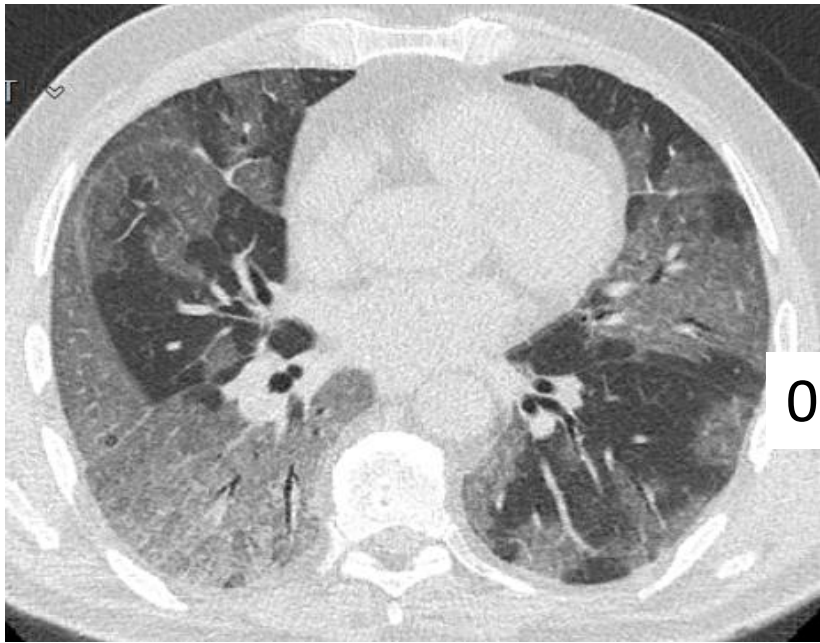


05.11.2021

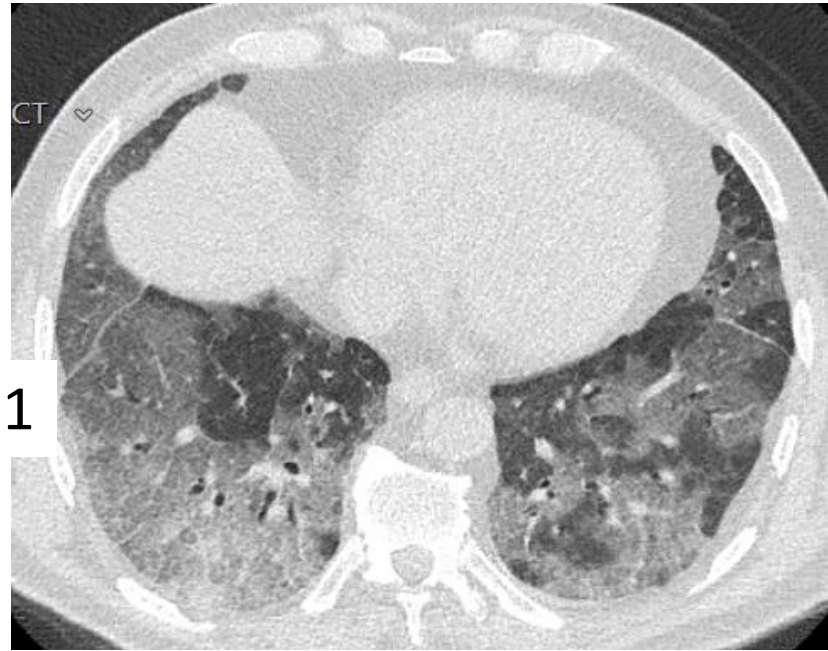


08.03.2022





05.11.2021



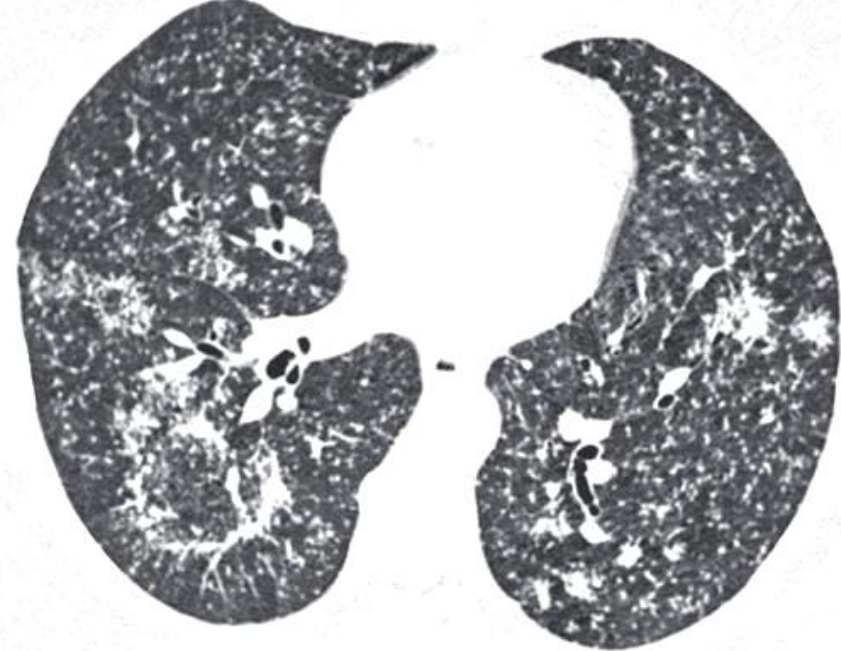
08.03.2022



TERS HALO İŞARETİ

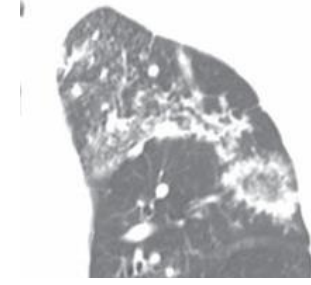


ORGANİZE PNÖMONİ



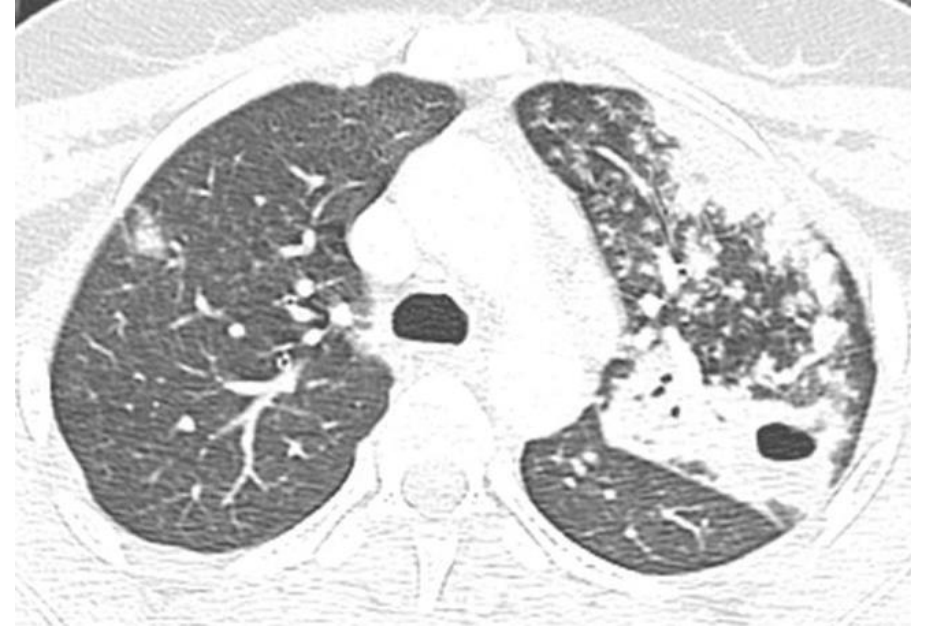
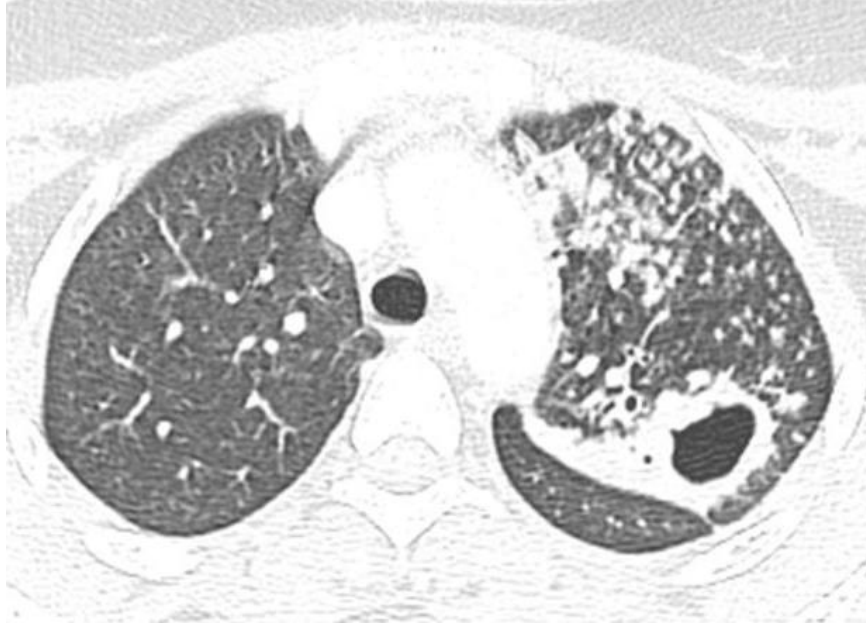
AKTİF TÜBERKÜLOZ ENFEKSİYONU

## TERS HALO İŞARETİ:

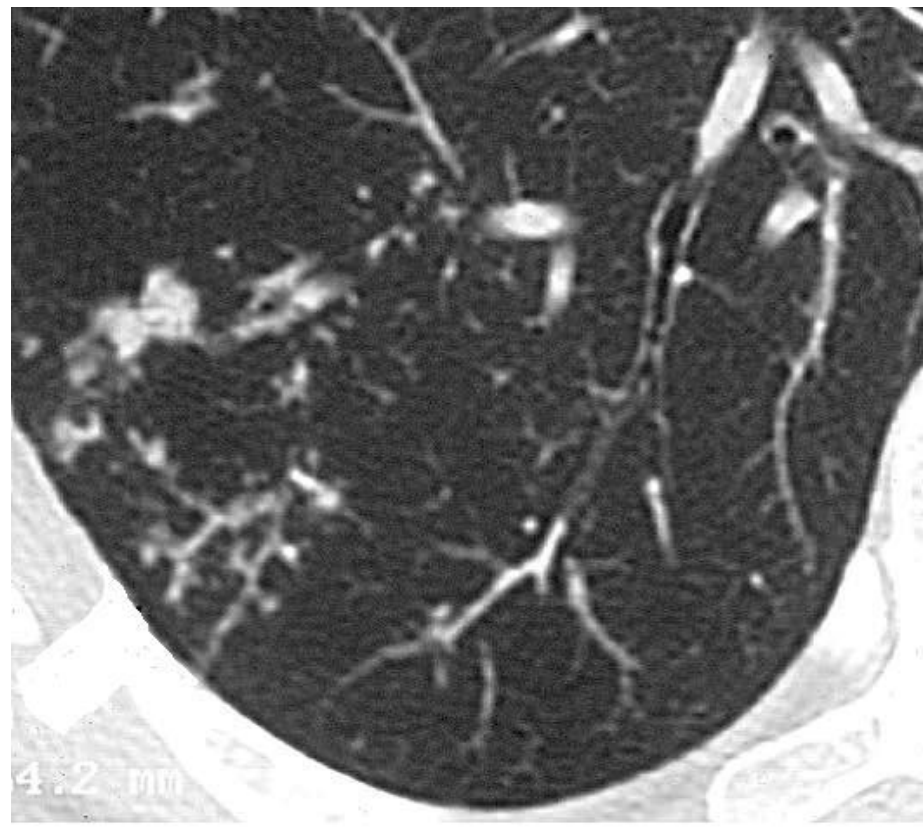
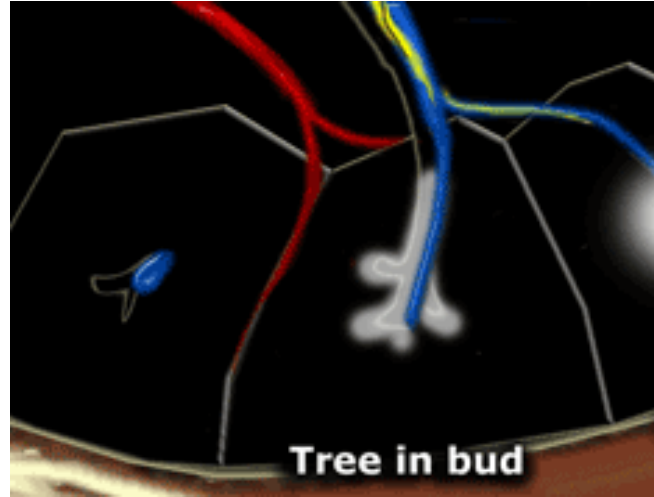


- Organize pnömoni
- Bakteriyel pnömoni
- Tüberküloz
- Sarkoidozis
- Wegener granülomatosis
- Akciğer adenokanseri
- Pulmoner emboli
- Septik emboli
- NSIP
- İnvaziv fungal pnömoni
- Endemik fungal infeksiyonlar
- PCP
- Lipoid pnömoni
- RT ve RF ablasyon
- Metastaz

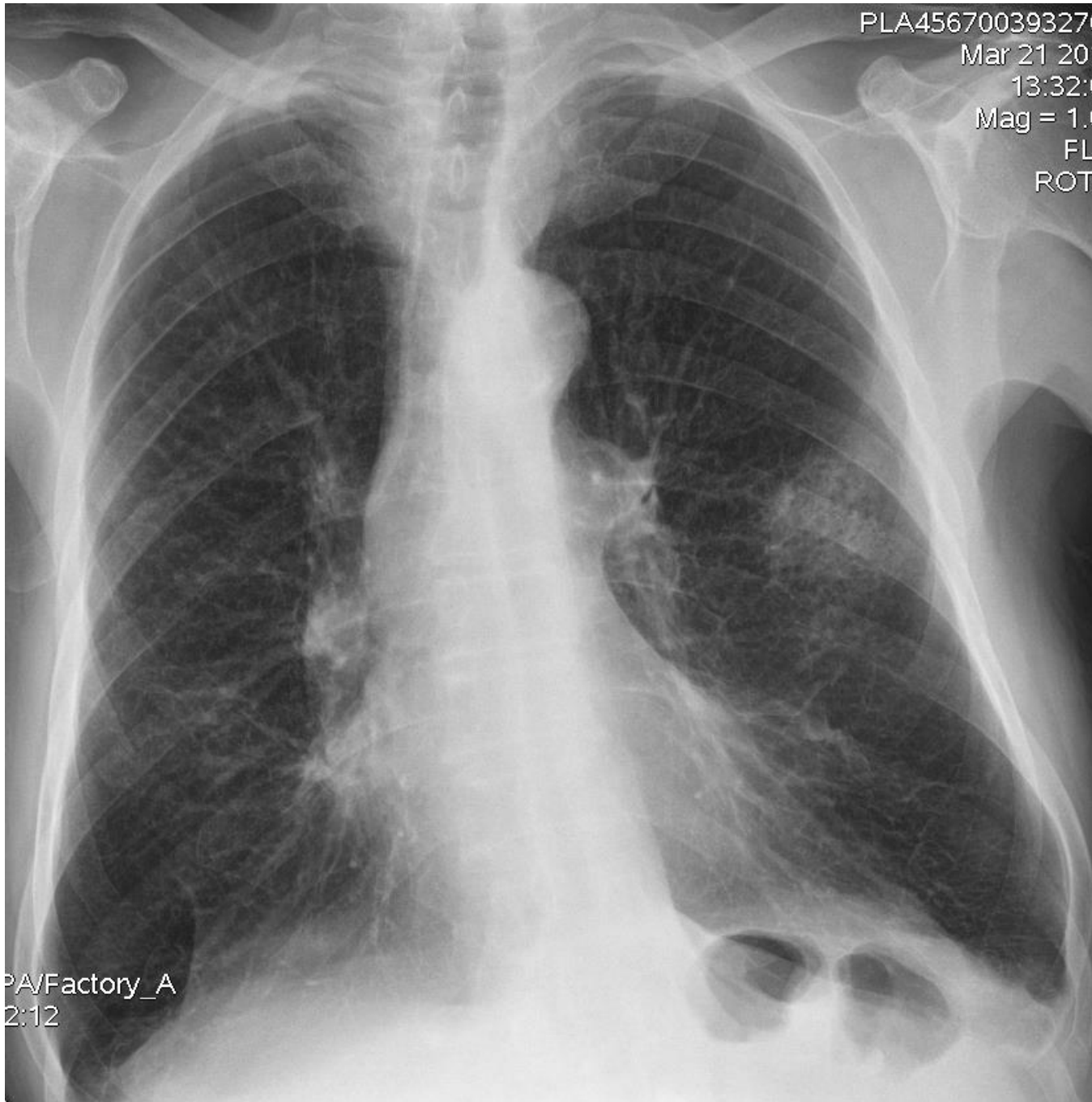




TOMURCUKLANAN AĞAÇ  
GÖRÜNÜMÜ

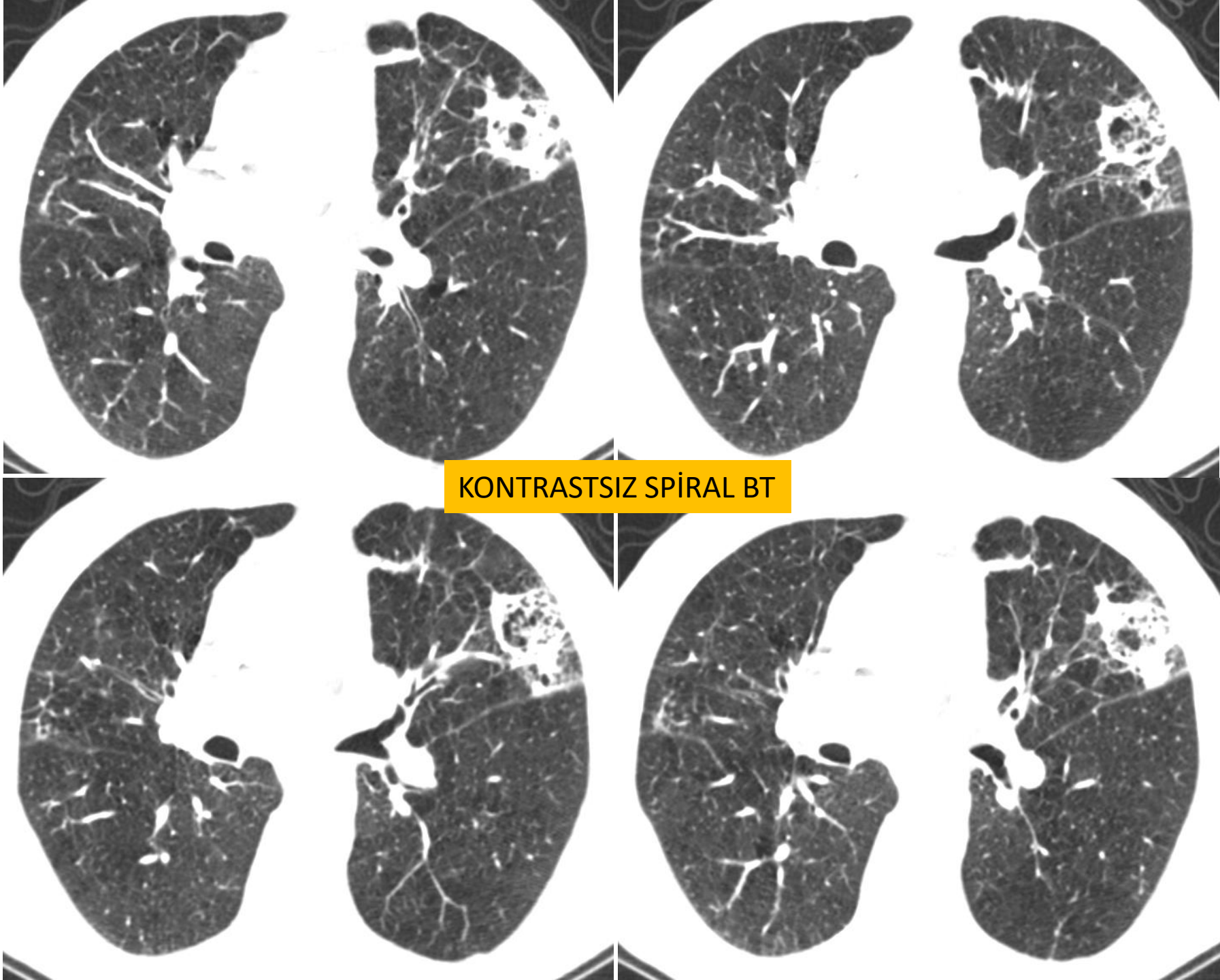




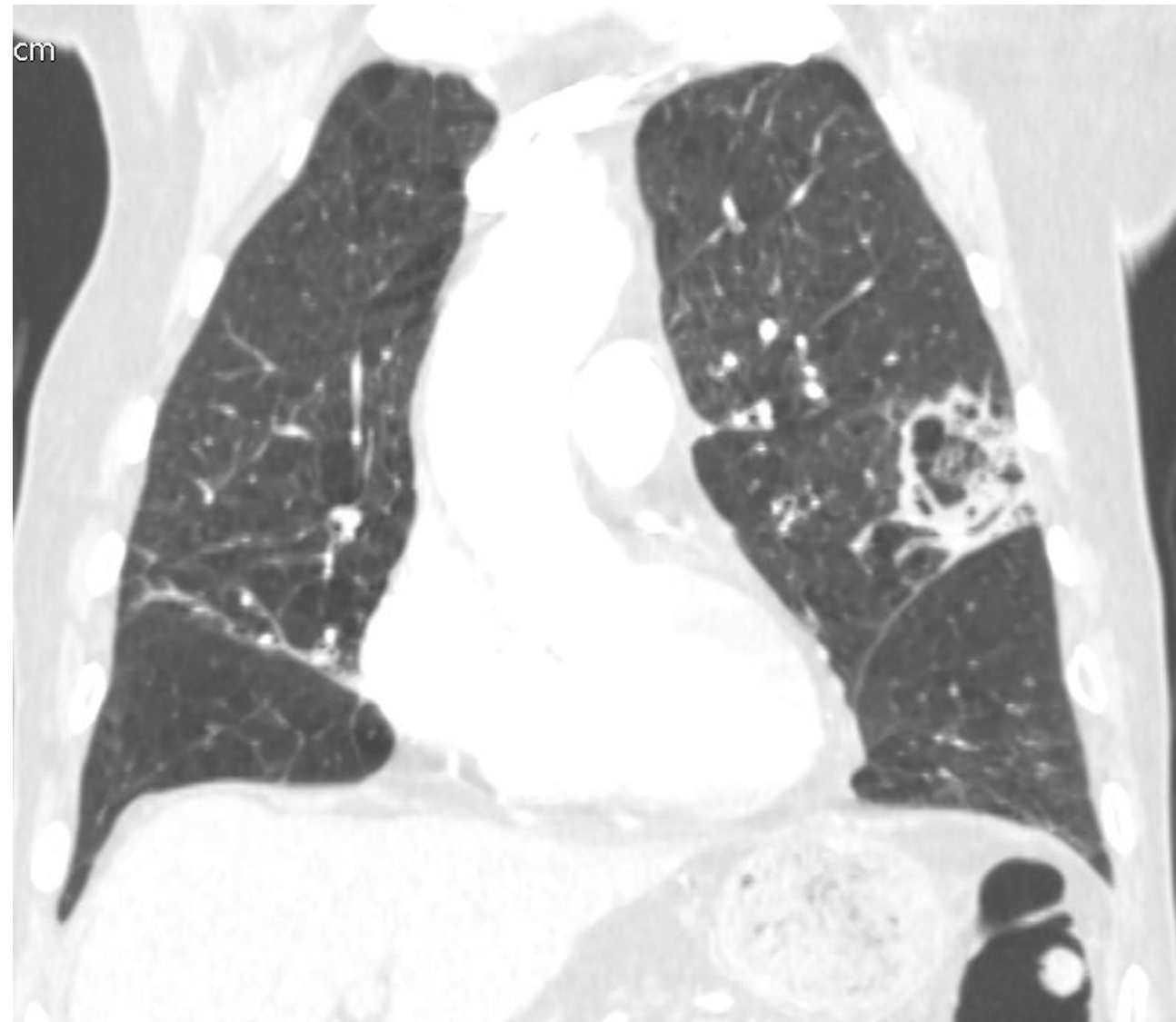


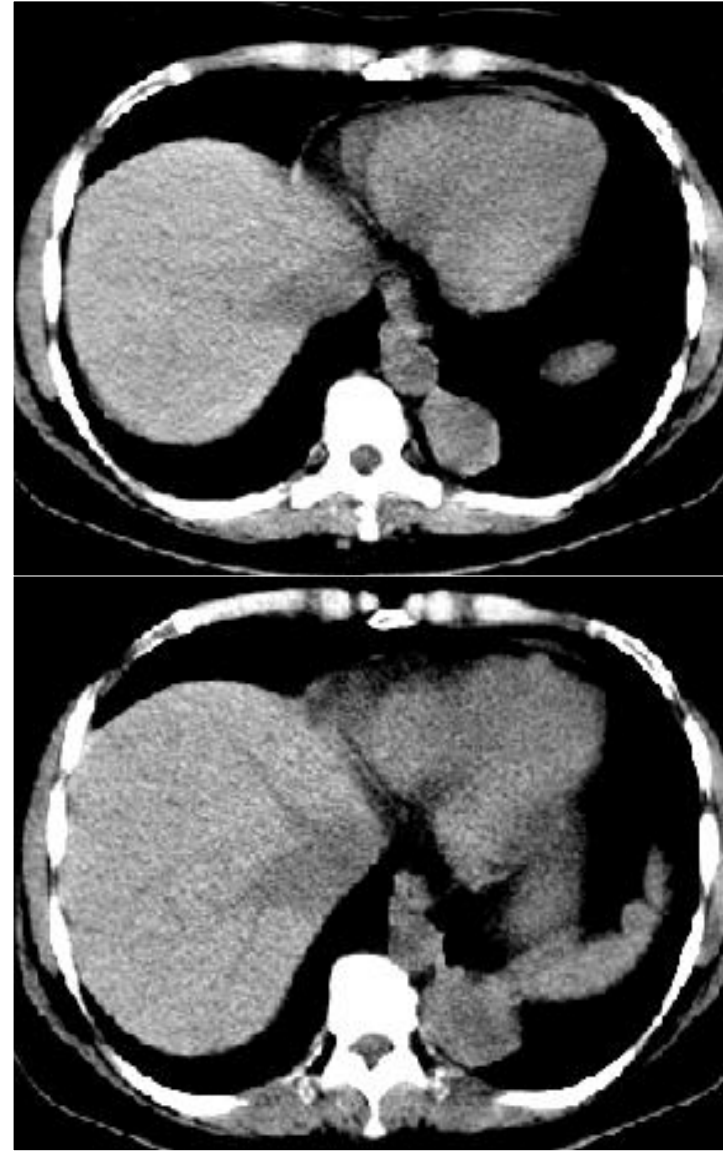
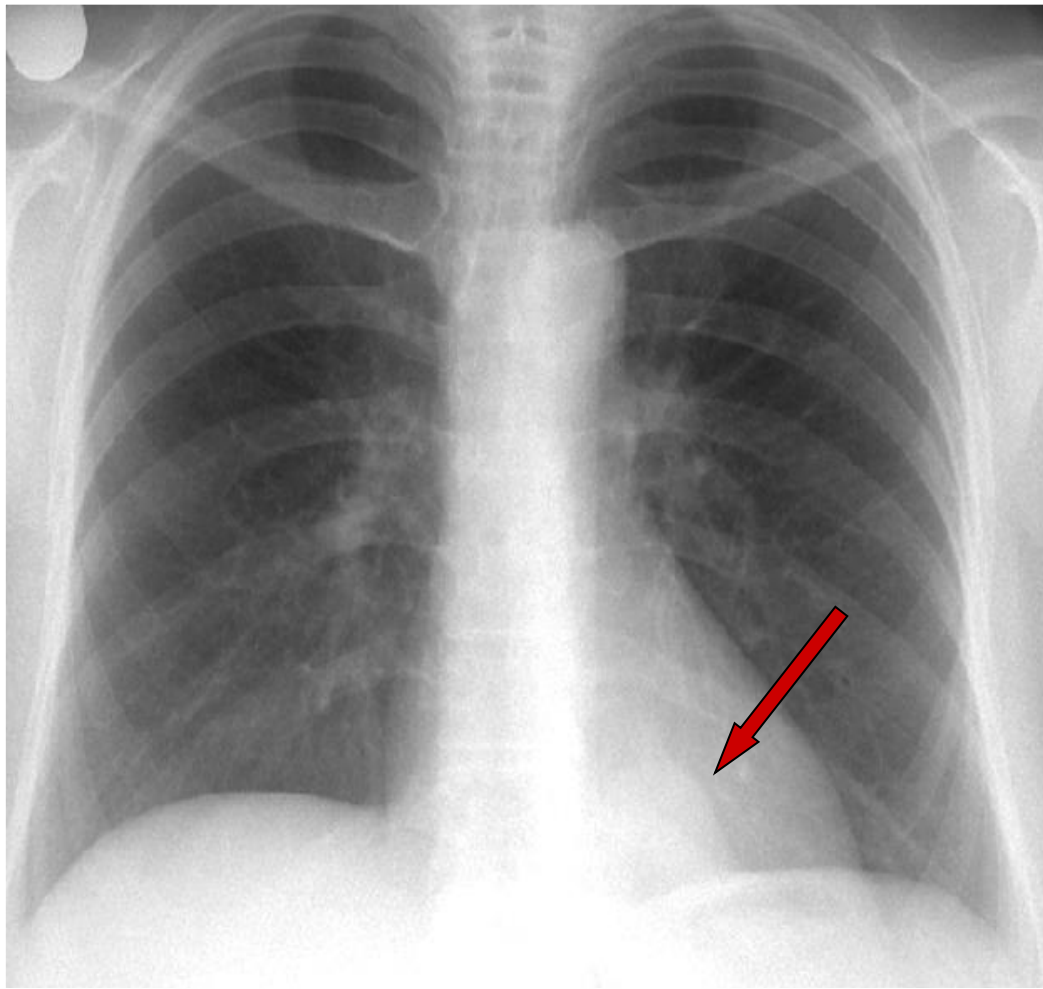
45 yaşında erkek hasta  
Öksürük ve nefes darlığı

Şimdi ne isteyelim ?

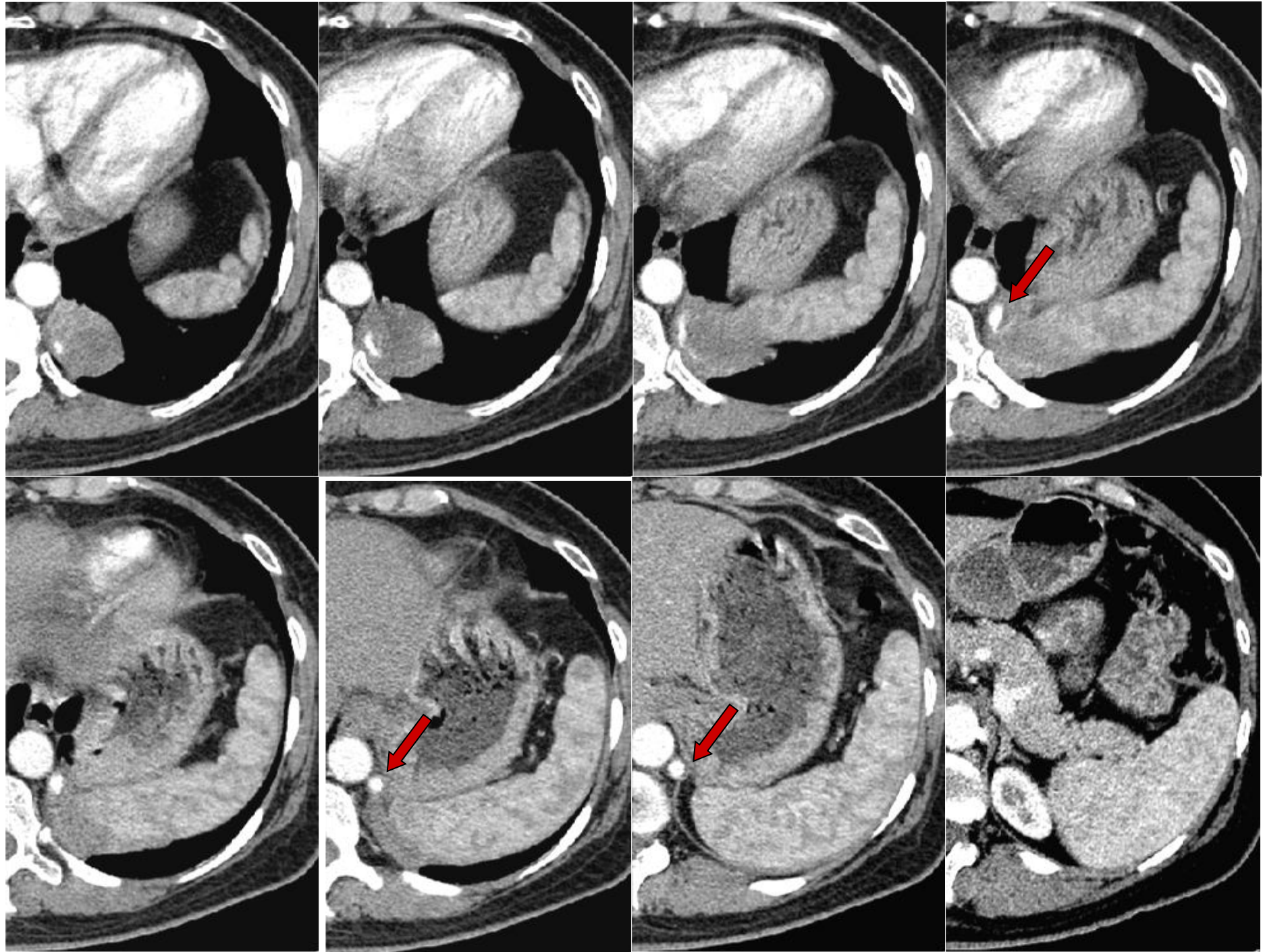


KONTRASTSIZ SPİRAL BT



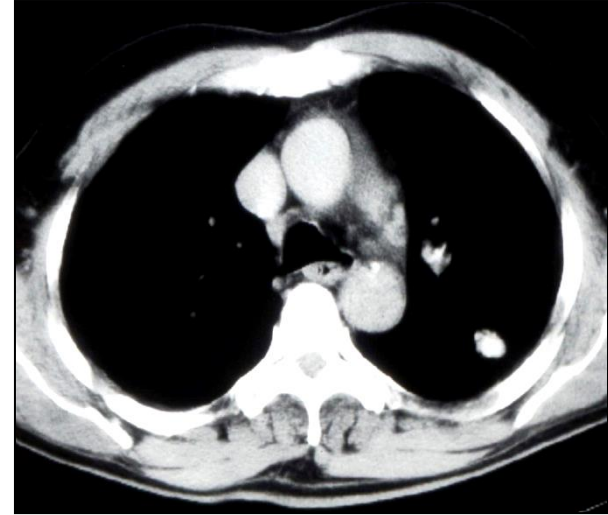
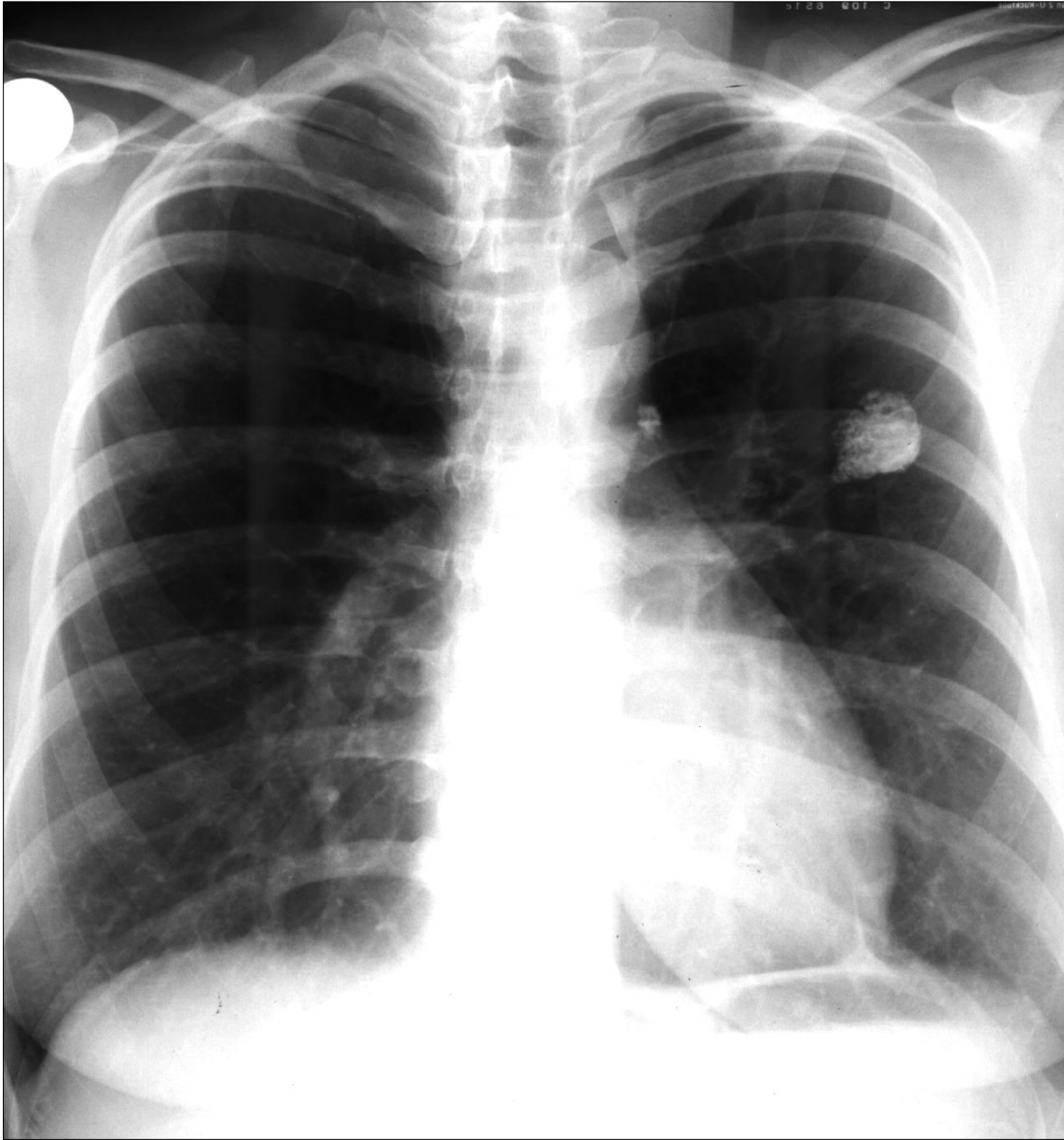






# YUMUŞAK DOKU DANSİTESİNDEN DAHA FAZLA ARTMIŞ KONSOLİDASYON

- Distrofik kalsifikasyonlar
- Amiodaron toksisitesi
- Amiloidozis
- Alveoler mikrolithiazis
- Metastatik kalsinozis

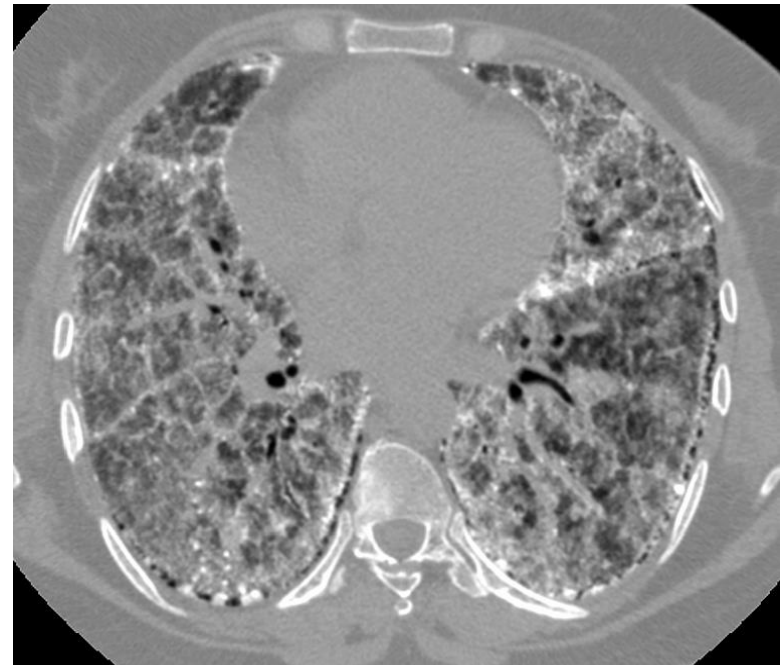
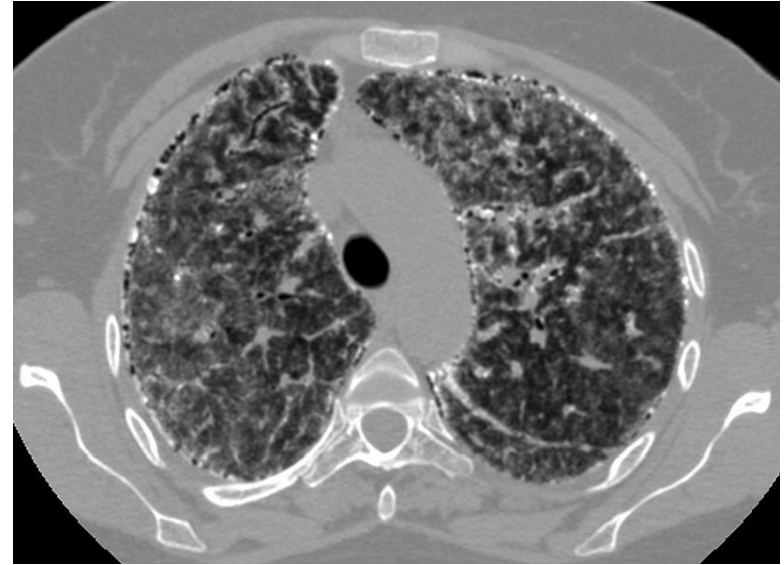


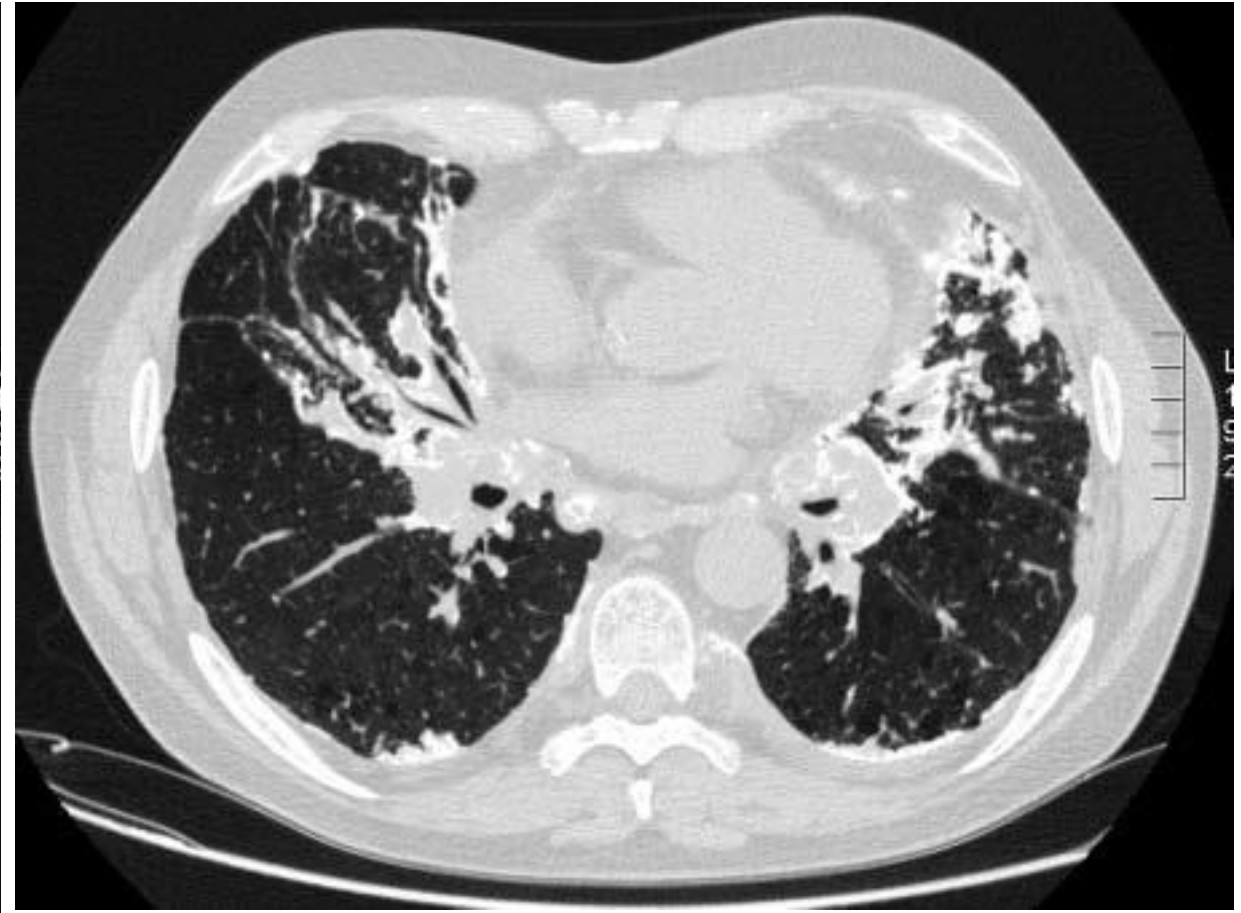
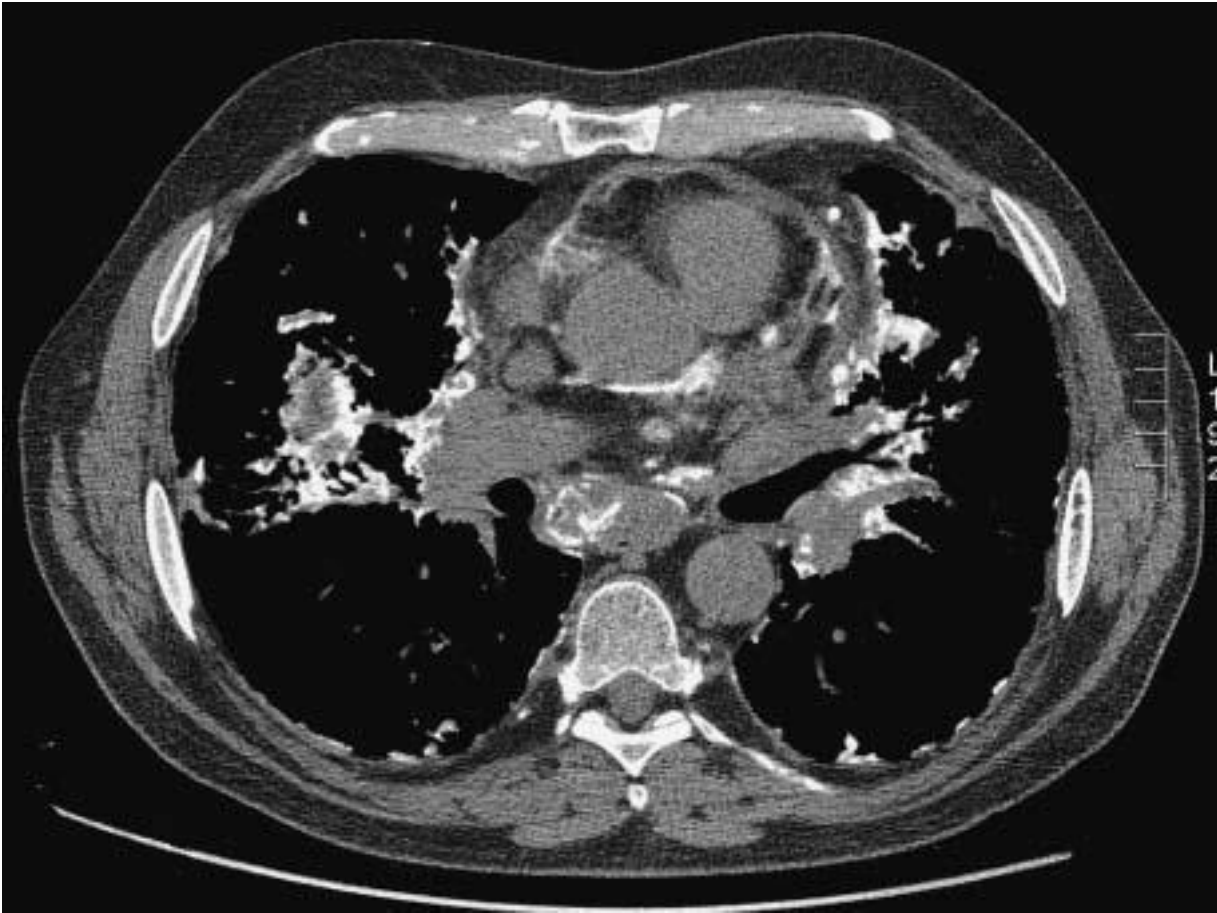
TÜBERKÜLOM



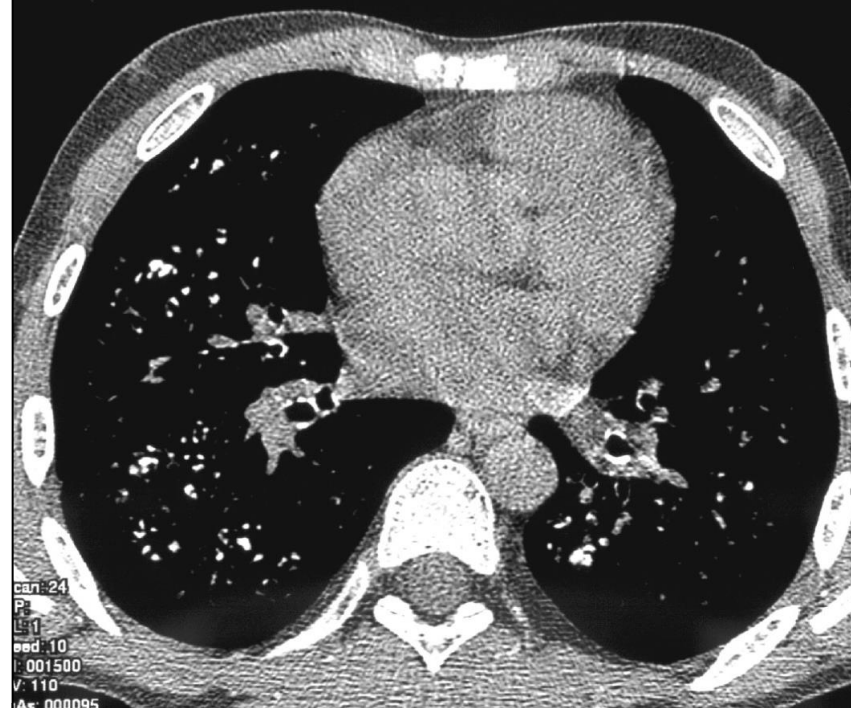


Alveoler Mikrolithiazis





Pulmoner Amiloidozis



KBY





AMIODARON TOKSİSİTESİ

# AKCİĞER DANSİTESİNİ AZALTAN LEZYONLAR

## BAL PETEĞİ YAPAN HASTALIKLAR

- IPF
- Kronik Hipersensitivite Pnömonisi
- Bağ dokusu hastalıkları /IPAF
- Sarkoidozis
- Pnömokonyoz
- İlaç toksisitesi
- Asbestozis
- Ailesel IPF
- Hermansky-Pudlak sendromu
- Aspirasyon pnömonisi

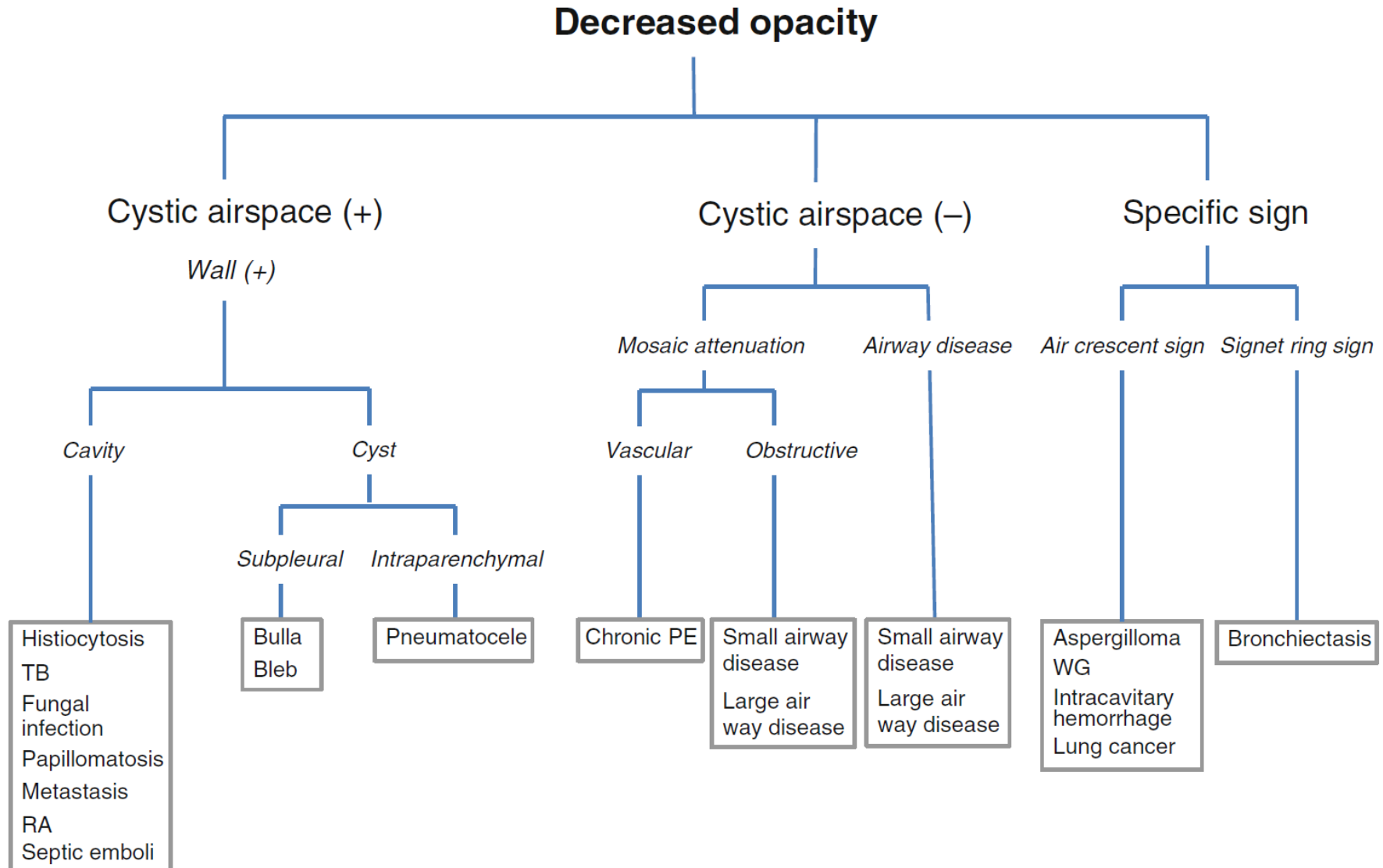
## KİSTİK/KİST BENZERİ GÖRÜNÜM VEREN HASTALIKLAR

- Metastazlar
- Septik emboli
- Wegener gr.
- Tüberküloz
- RA (nekrobiyotik nodül)
- Sarkoidoz
- Amfizem, bronşektazi (**kist benzeri**)
  - LHH
  - LAM, Tuberoskleroz
  - LİP
  - DİP
  - Birt-Hogg-Dube sendromu
  - Amiloidozis
  - Hafif zincir depo hastalığı



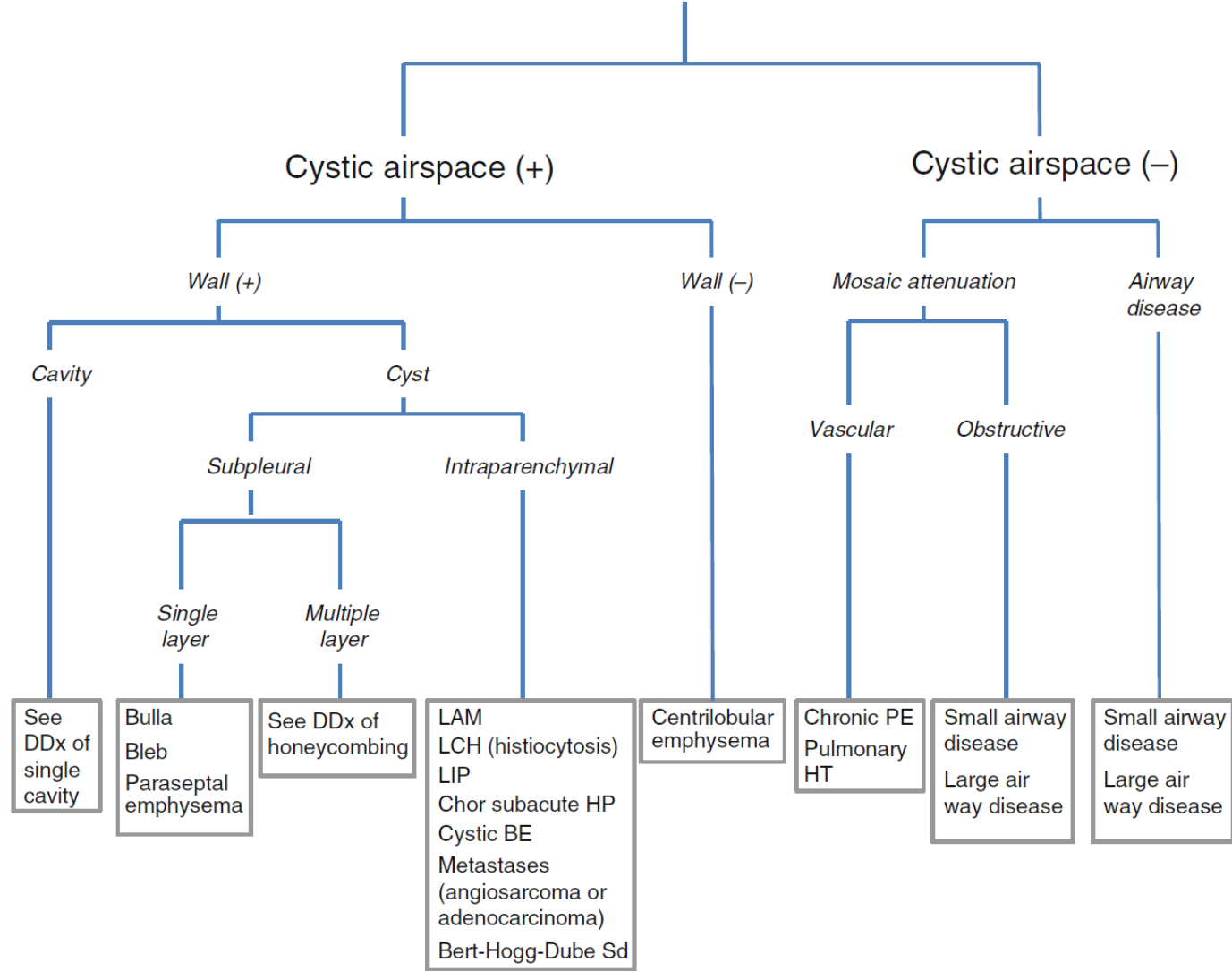
KİSTİK

# FOKAL AZALAN OPASİTE

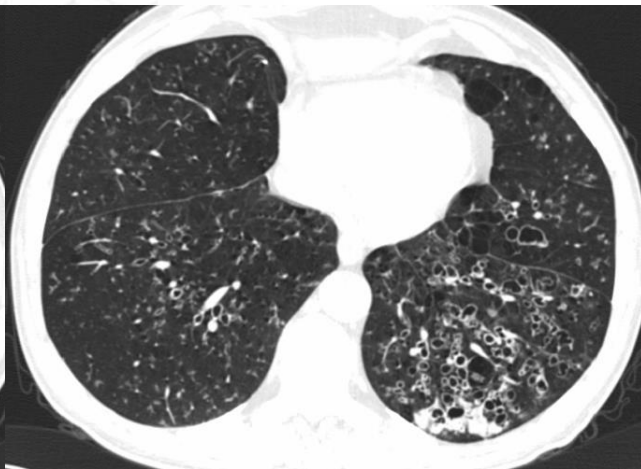
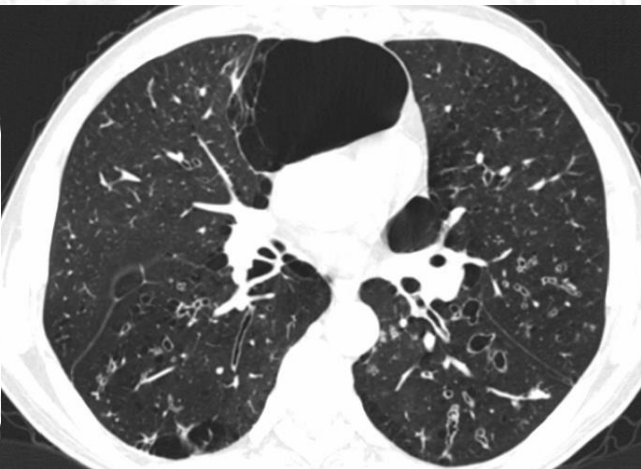
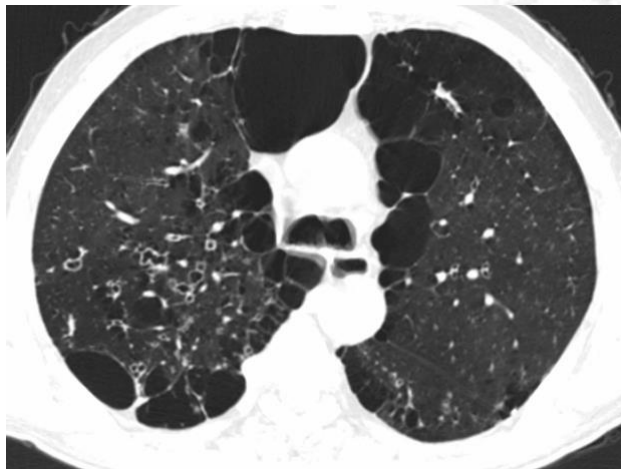
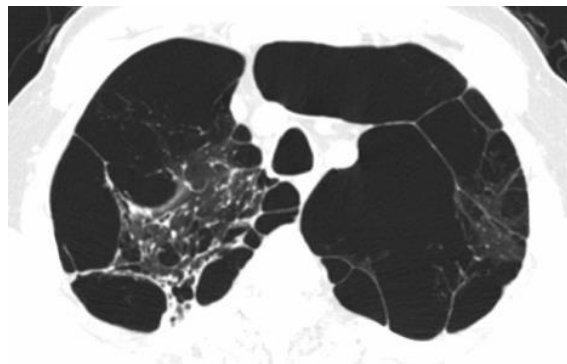
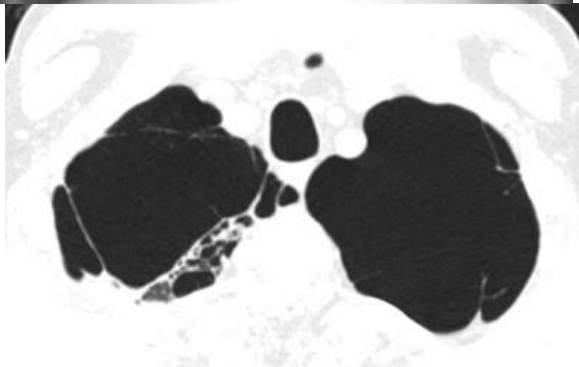


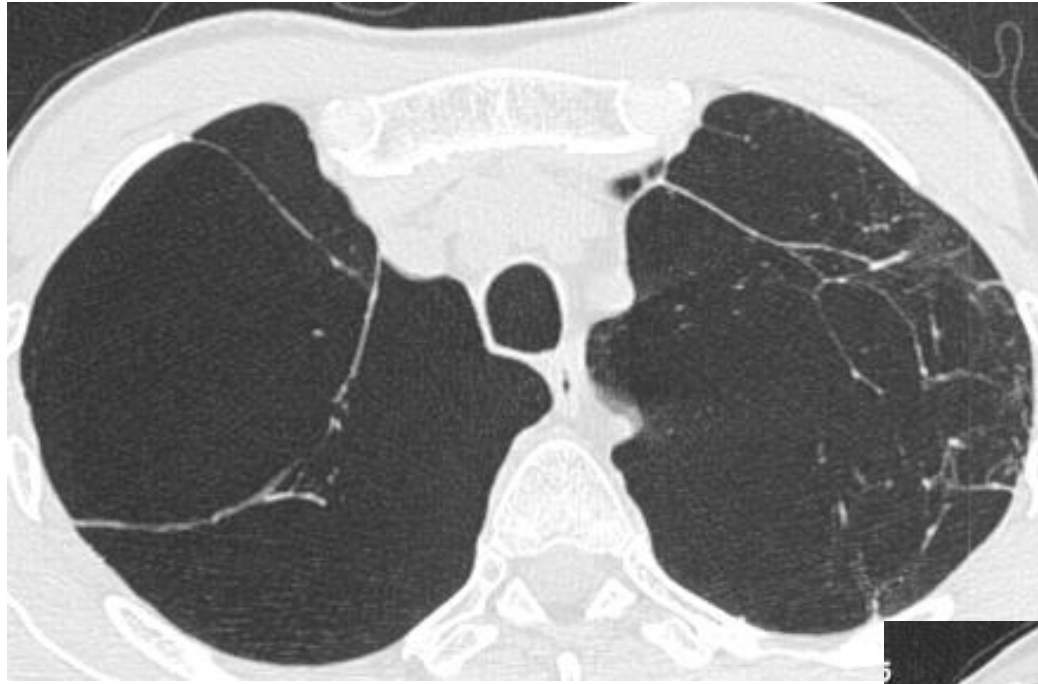
# DIFFUZ AZALAN OPASİTE

## Decreased opacity

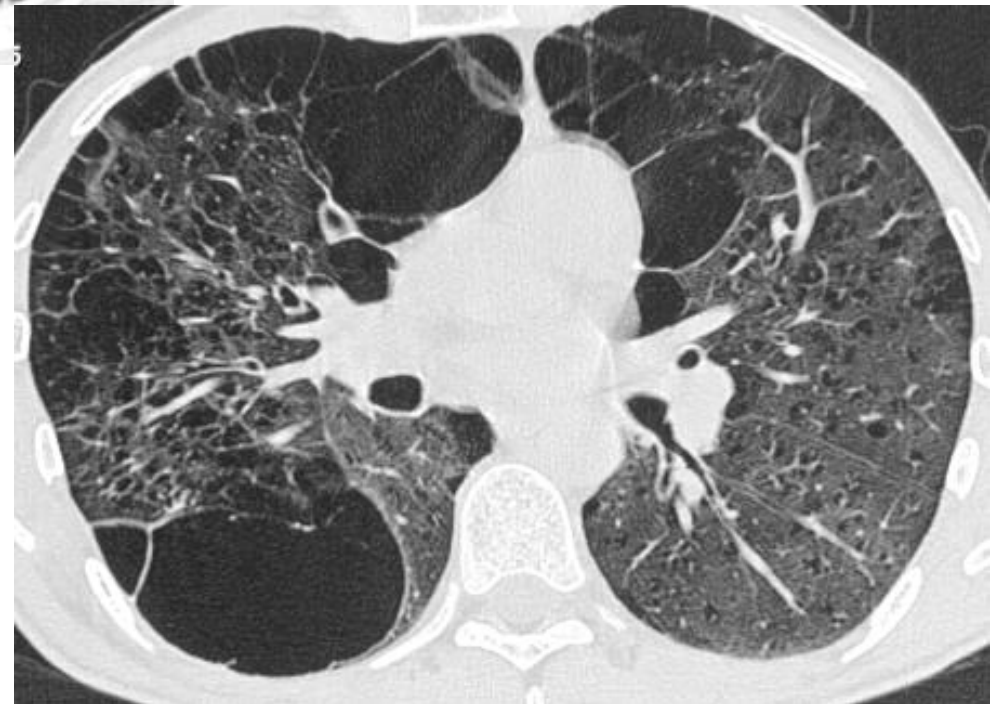


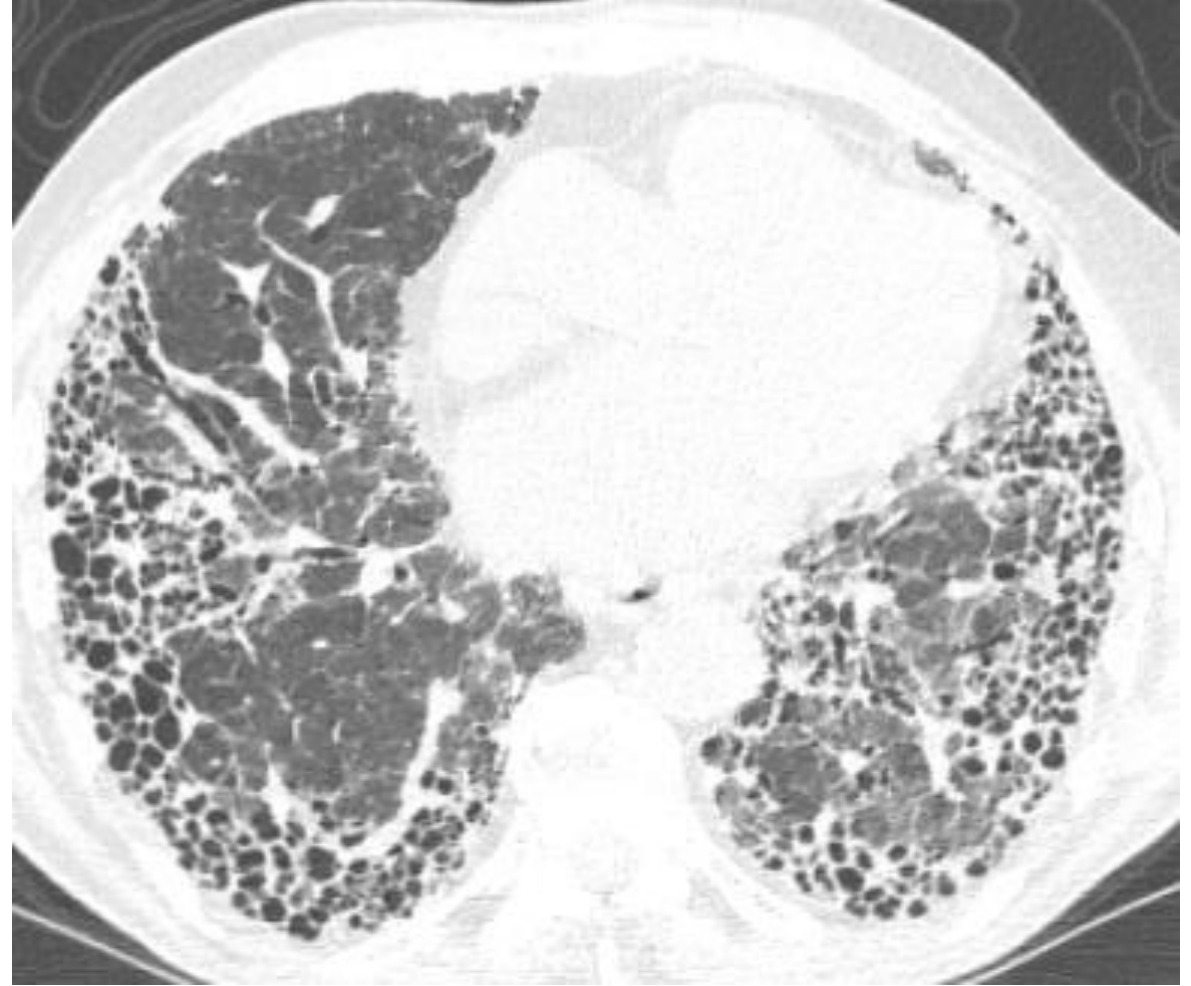




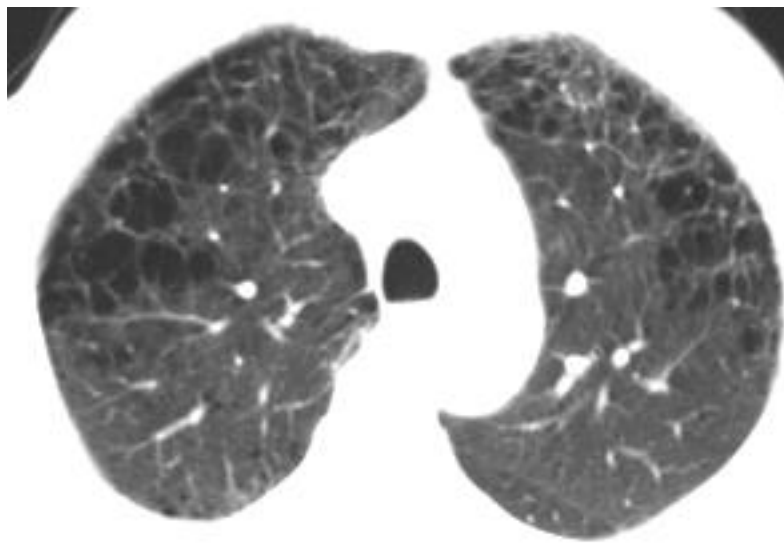


Büllöz amfizem

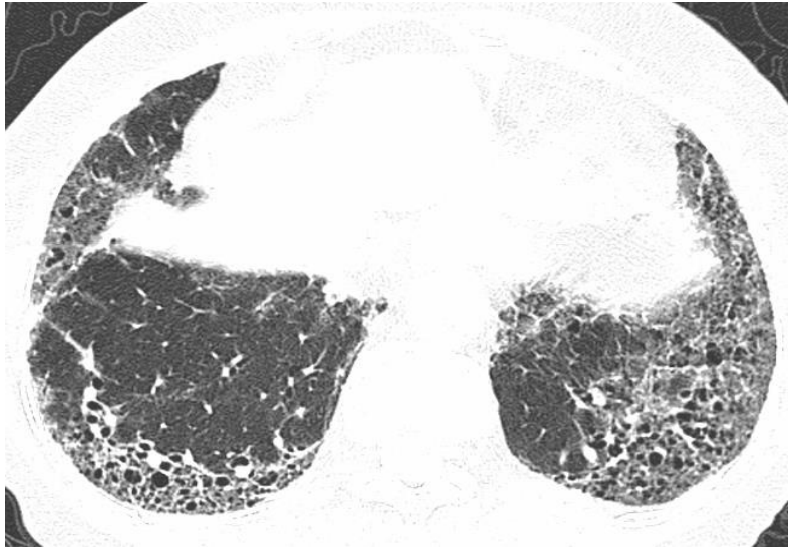




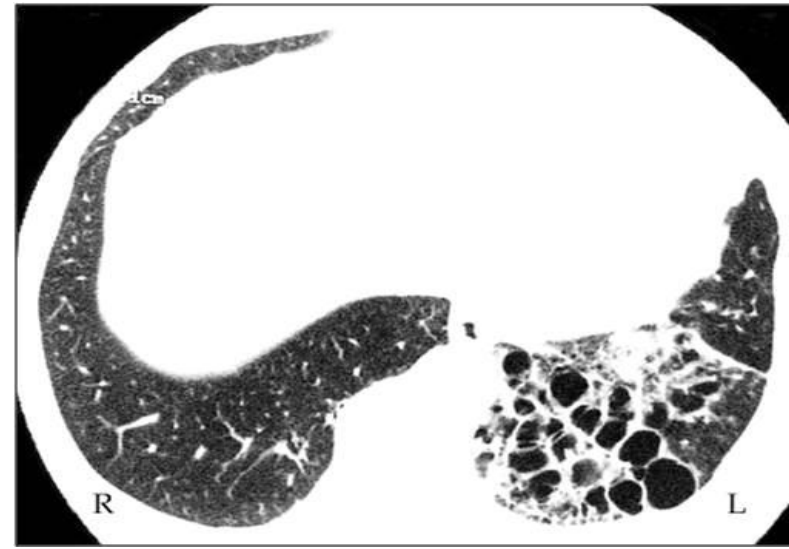
UIP-IPF



Amfizem

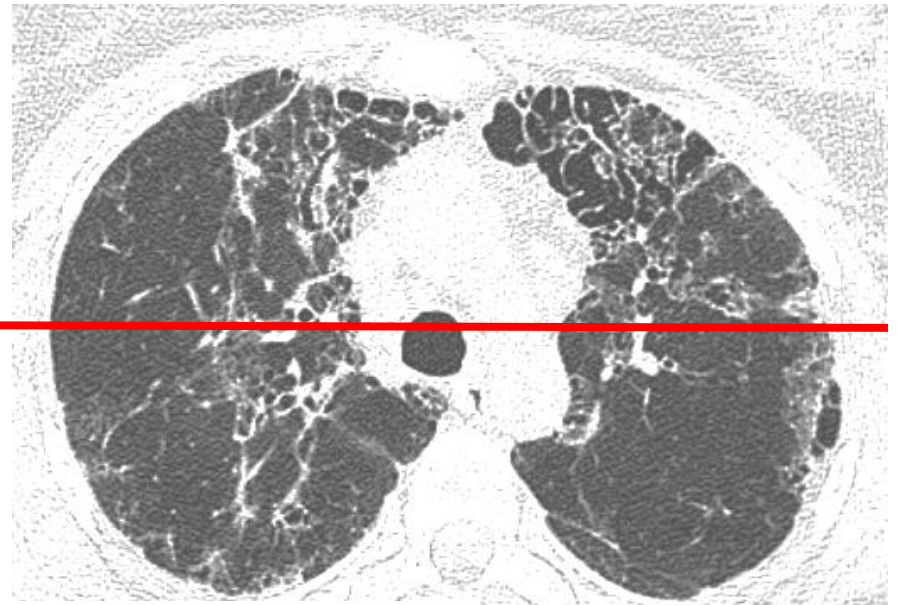


Balpeteđi akciđer

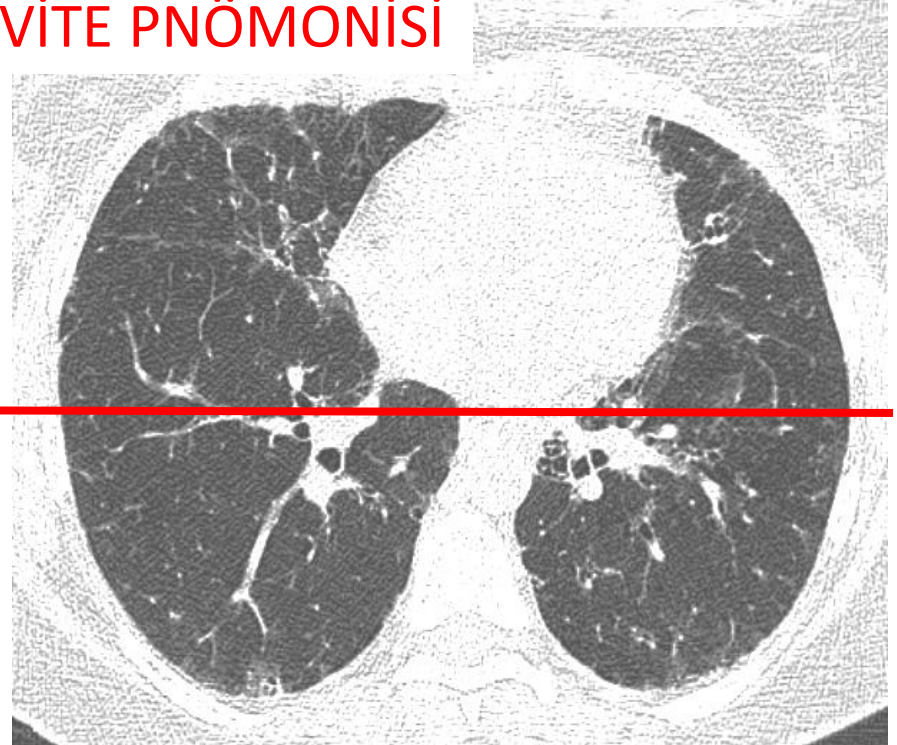
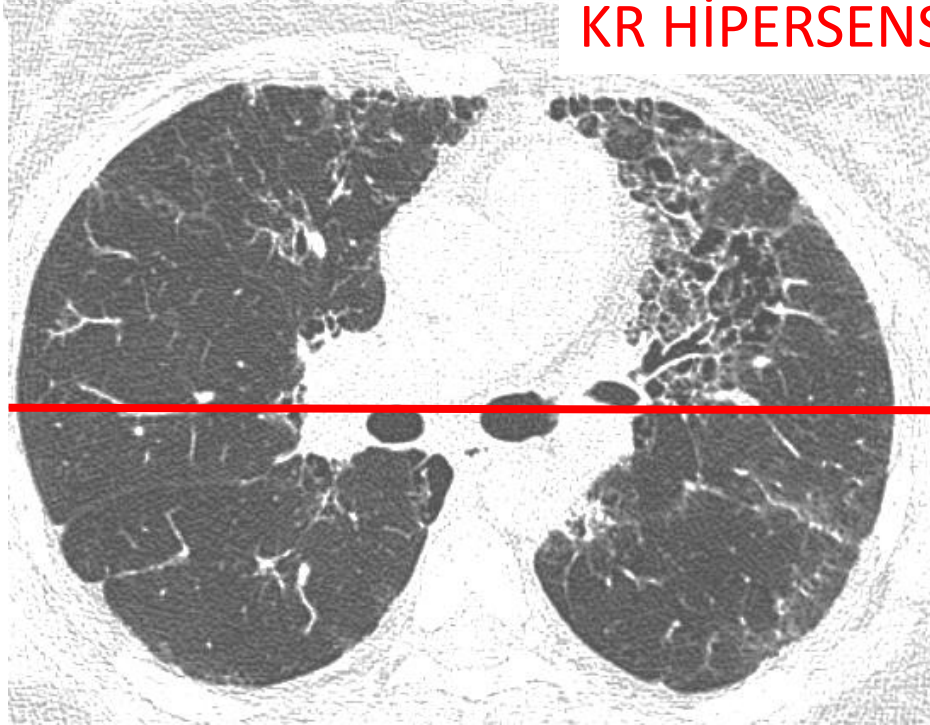


Kistik bronşektazi





KR HİPERSENSİTİVİTE PNÖMONİSİ





LANGERHANS HÜCRELİ HİSTİYOSİTOZ

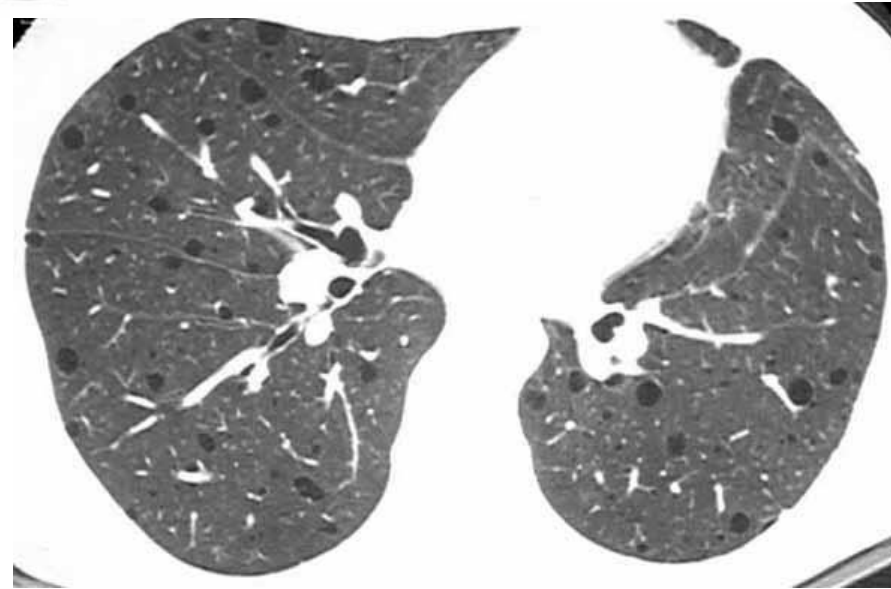
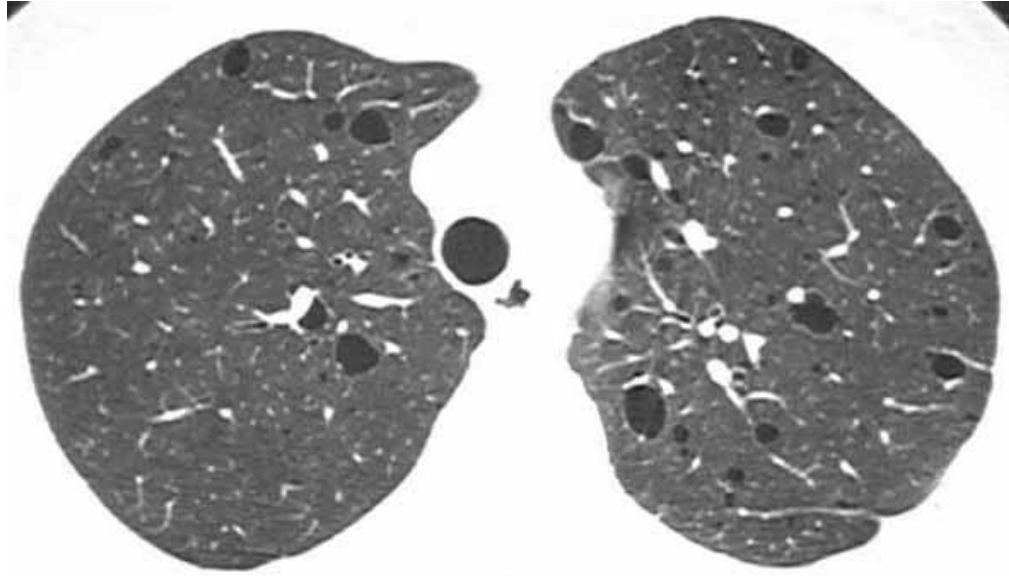




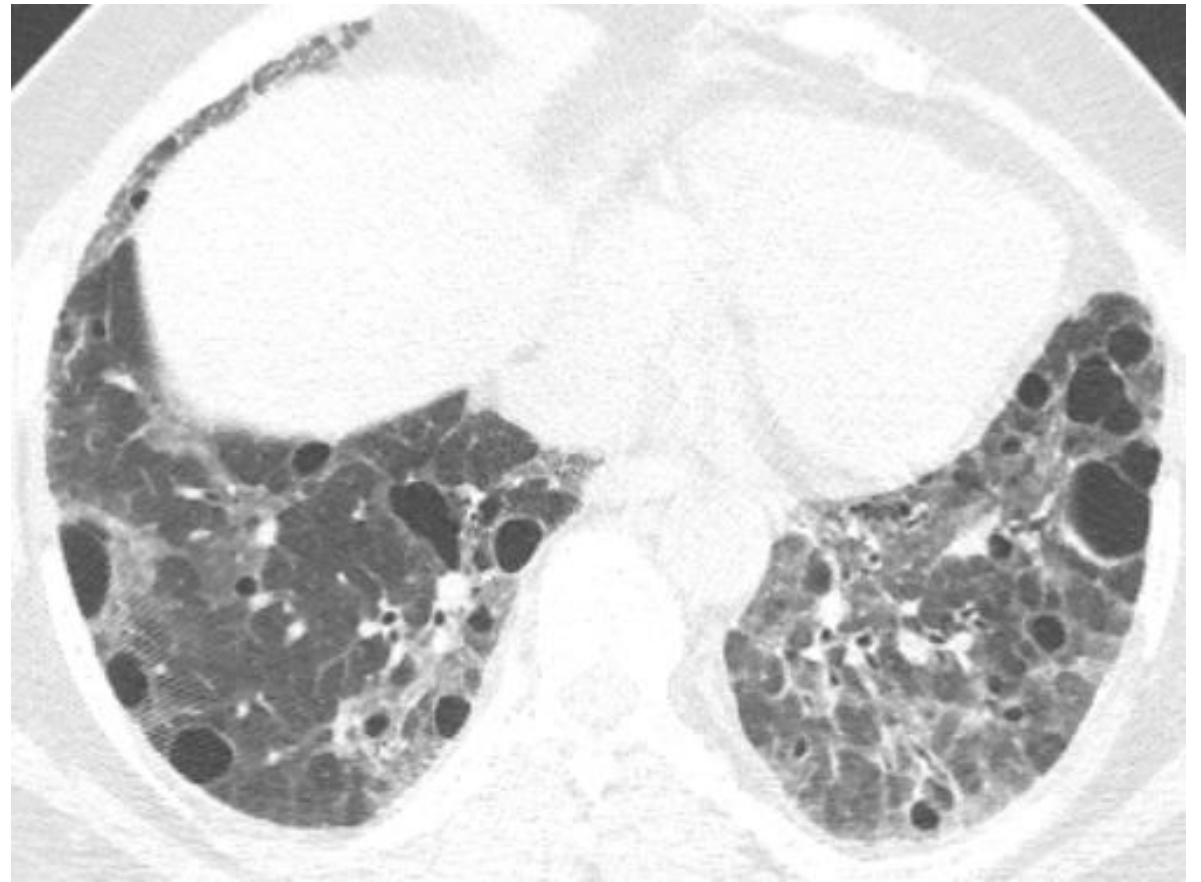


LAM

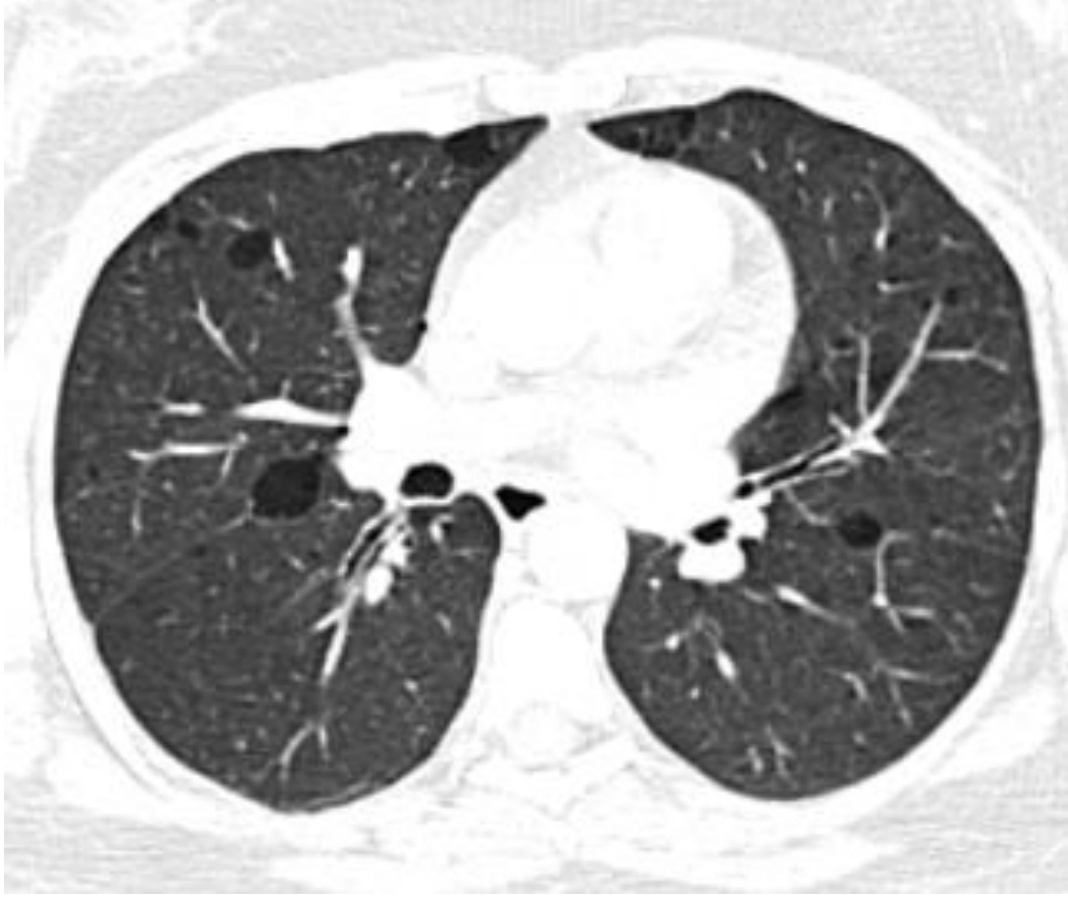




TUBEROSKLEROZ



LIP



## BIRT-HOGG-DUBE SENDROMU

### AYIRICI TANI:

BHD sendromu

LİP

Amiloidoz

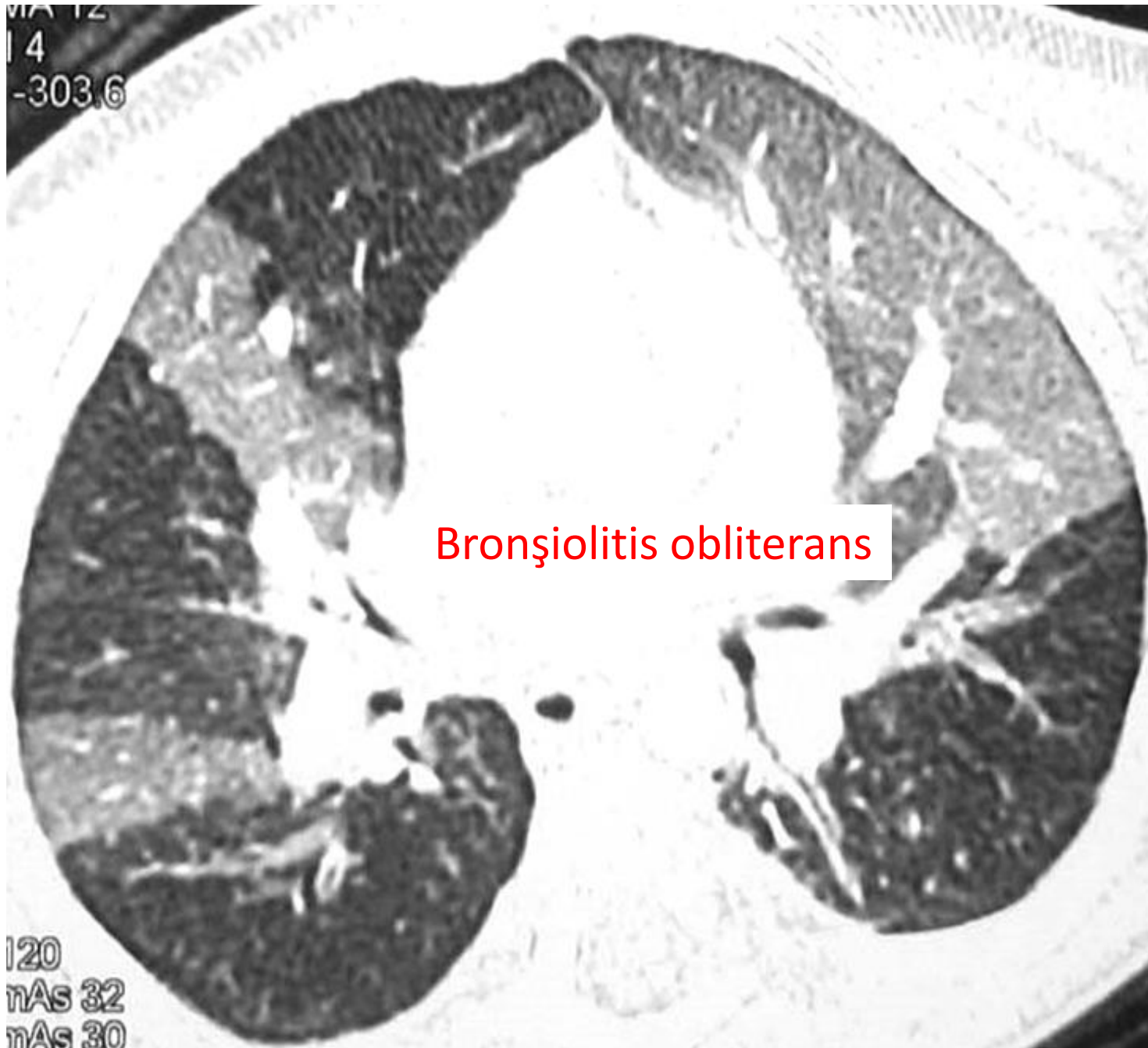
Baltoma

Hafif zincir hastalığı

Sigaraya bağlı İLD



**Dansite artmış mı?  
Azalmış mı?  
Her ikisinde mi?**



**Bronşiolitis obliterans**

# MOZAİK PERFÜZYON

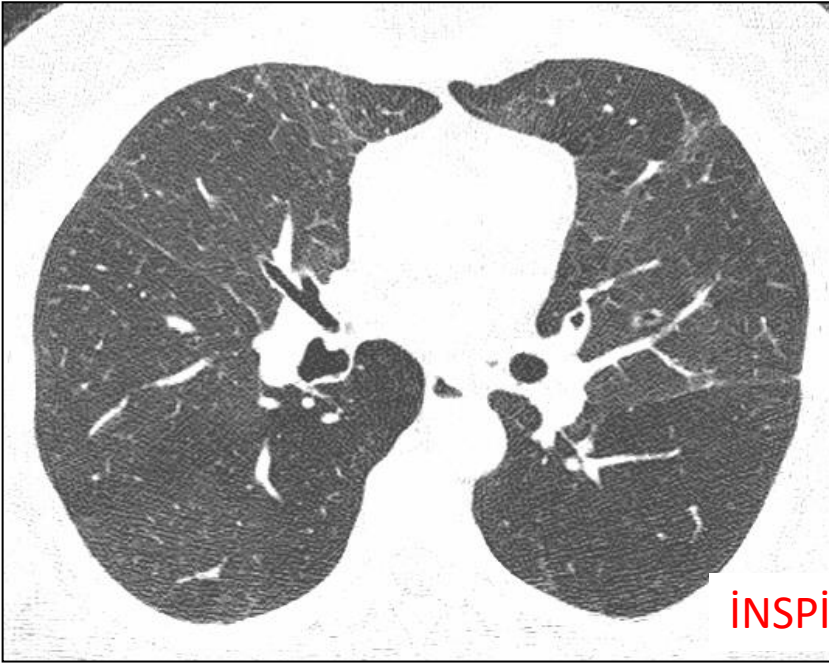
## HAVA YOLU HASTALIKLARI

- Bronşiolitis obliterans
- Sarkoidozis
- Hipersensitiv. Pnomönisi
- AIDS
- LHH ve LAM
- Bronşioler spazm

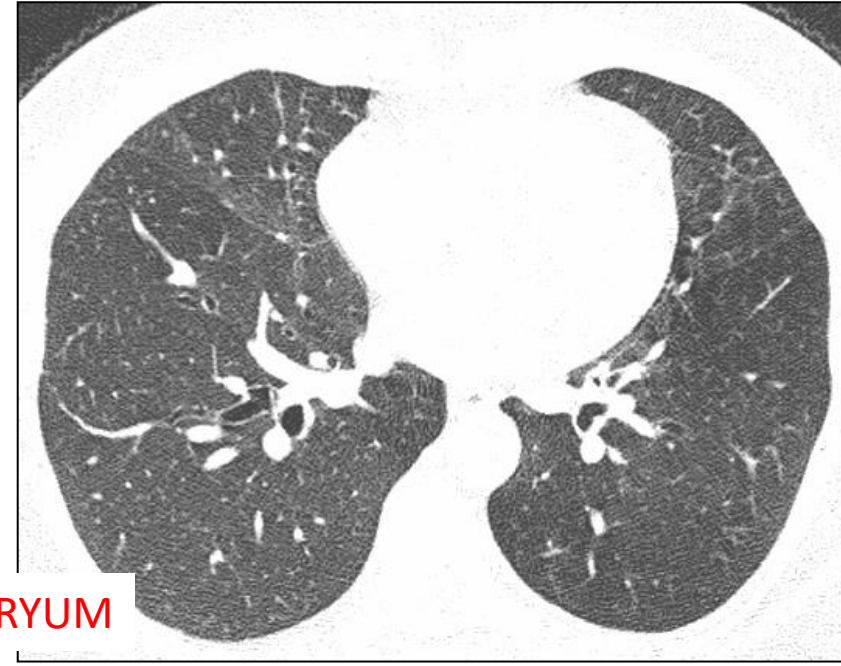
## VASKÜLER HASTALIKLAR

- Kronik pulmoner emboli
- Pulmoner hipertansiyon  
(idiopatik veya kardiyojenik/  
pulmoner nedenle)





İNSPİRİYUM



EKSPİRİYUM



# ÜST ZONLARI TUTAN HASTALIKLAR

- Amfizem (sigara ile ilişkili)
- Ankilozan spondilit
- Plevroparankimal fibroelastoz
- Pnöмокonyozlar (silikozis vb)
- Sarkoidozis
- PCP
- Tüberküloz re-enfeksiyonu
- LHH
- Kistik fibrozis
- Hipersensitivite pnömonisi
- ABPA
- KEP
- Bronkosentrik granülomatozis
- Metastatik kalsifikasyon
- Sağ taraflı pulmoner ödem
- Nörojenik ödem

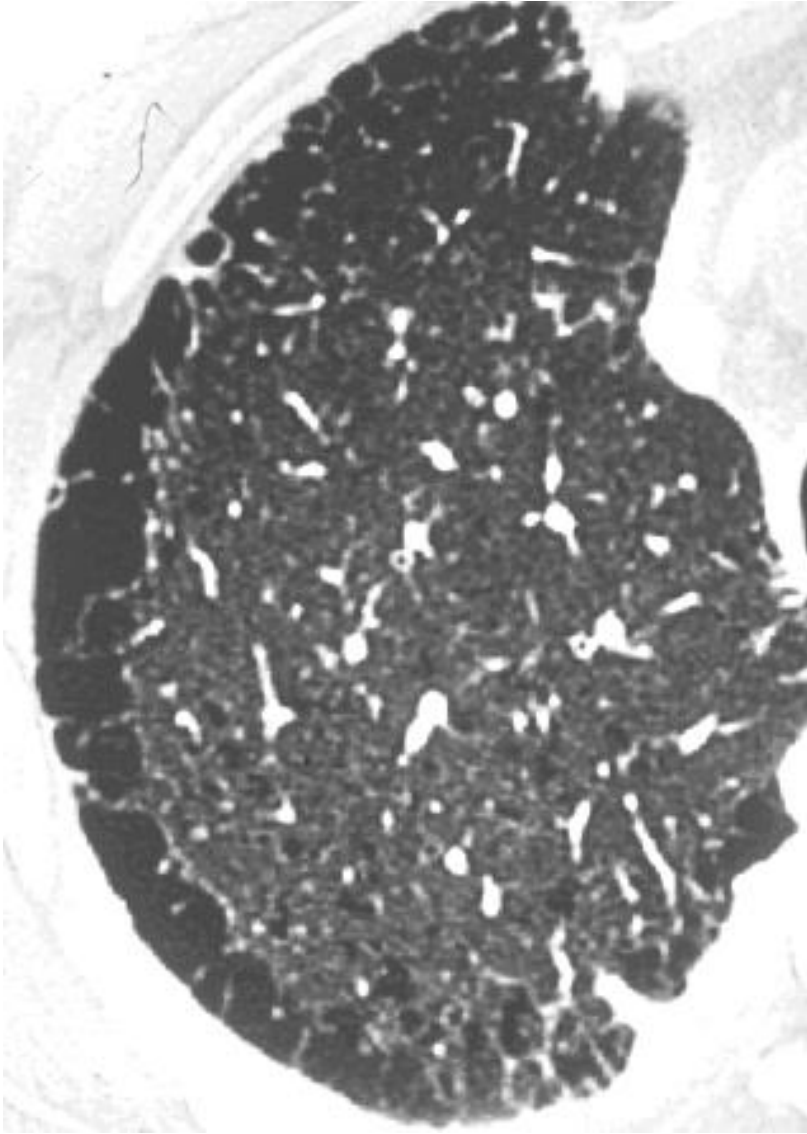
**↑O<sub>2</sub>, ↑Ph**  
**↑V/Q=3:1**

1/3 üst yarı

PCP, TBC, LHH, SARKOİDOZİS, AMFİZEM, RB-İAH HP,  
SİLİKOZİS...

2/3 alt yarı

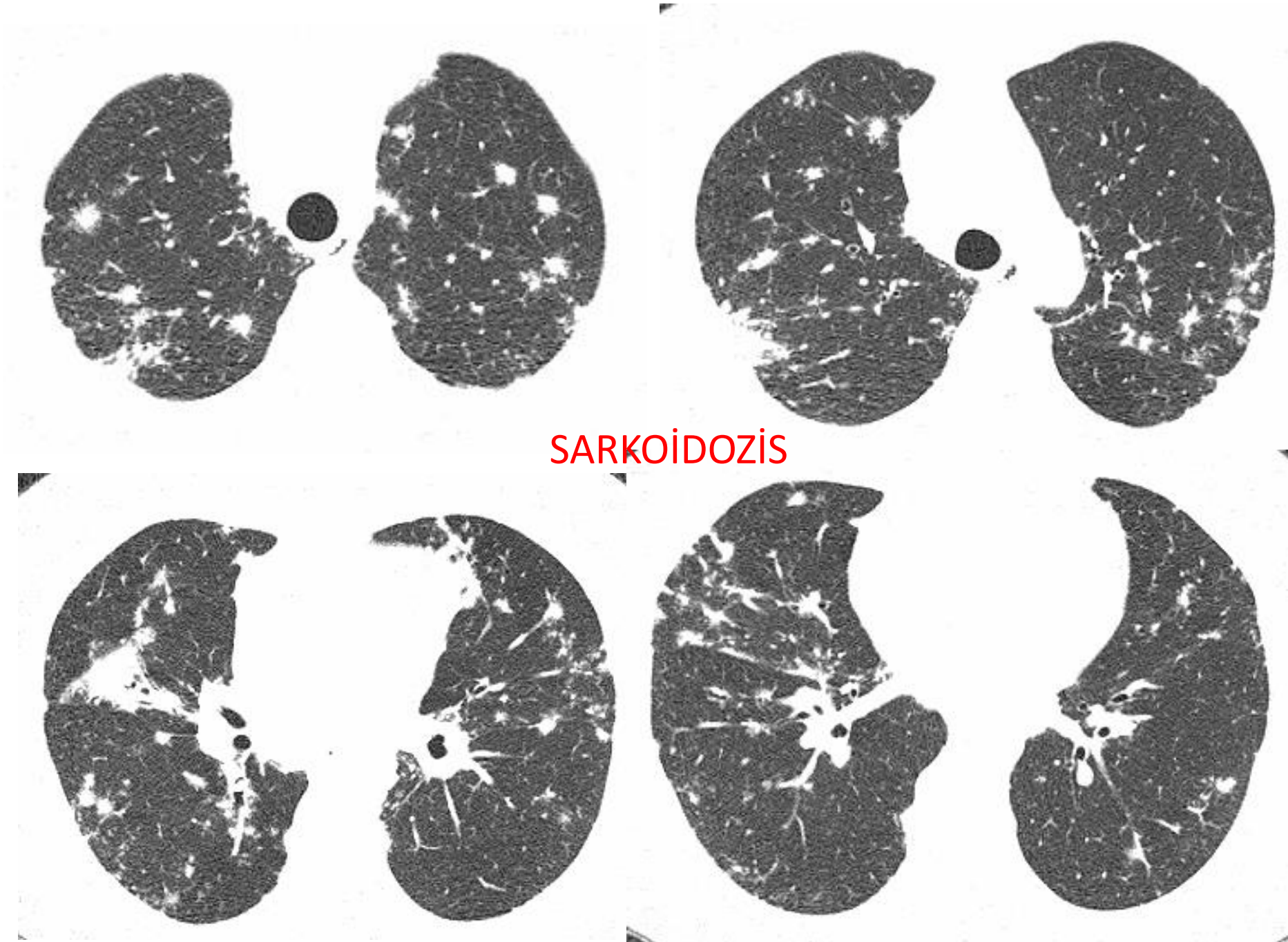
**↓O<sub>2</sub>**  
**N pH**  
**↓V/Q=0.6:1**



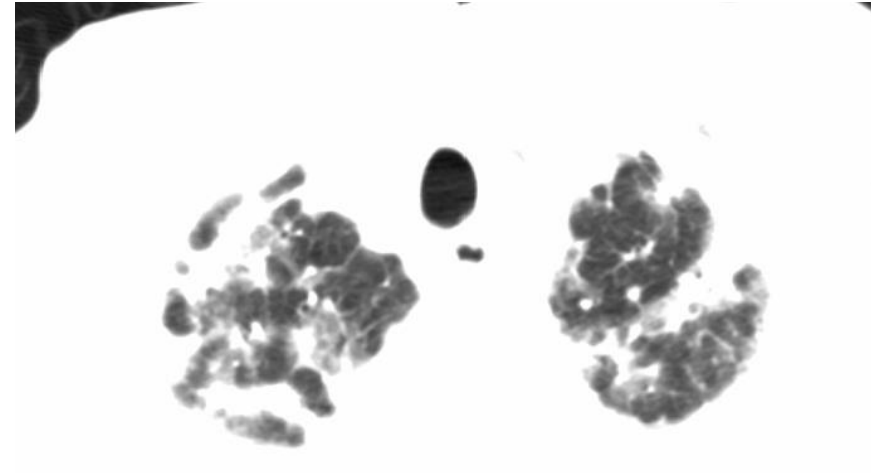
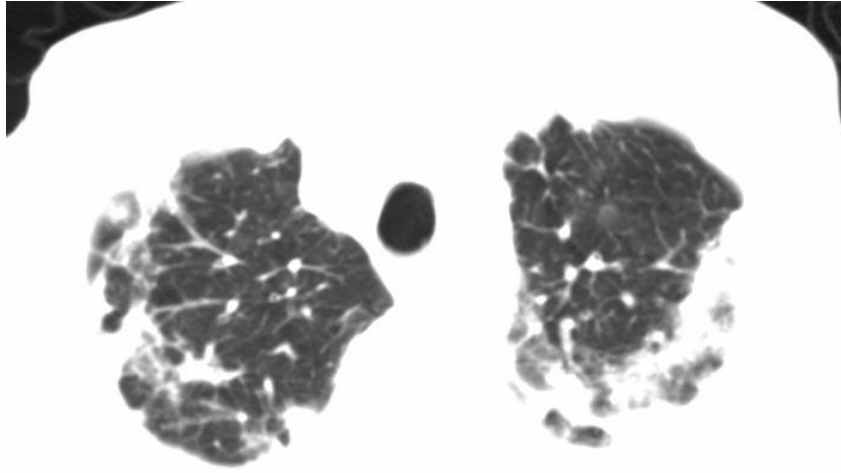
AMFİZEM



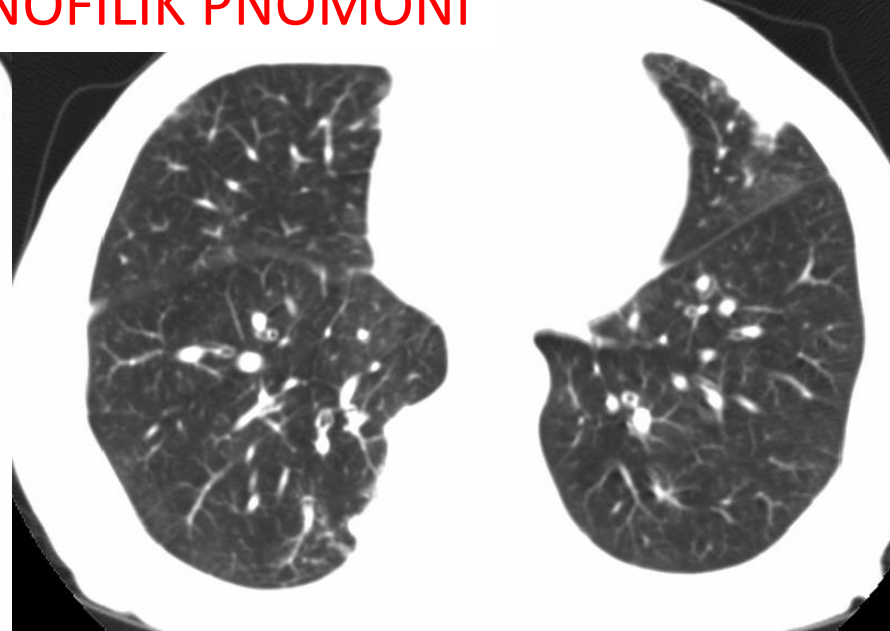
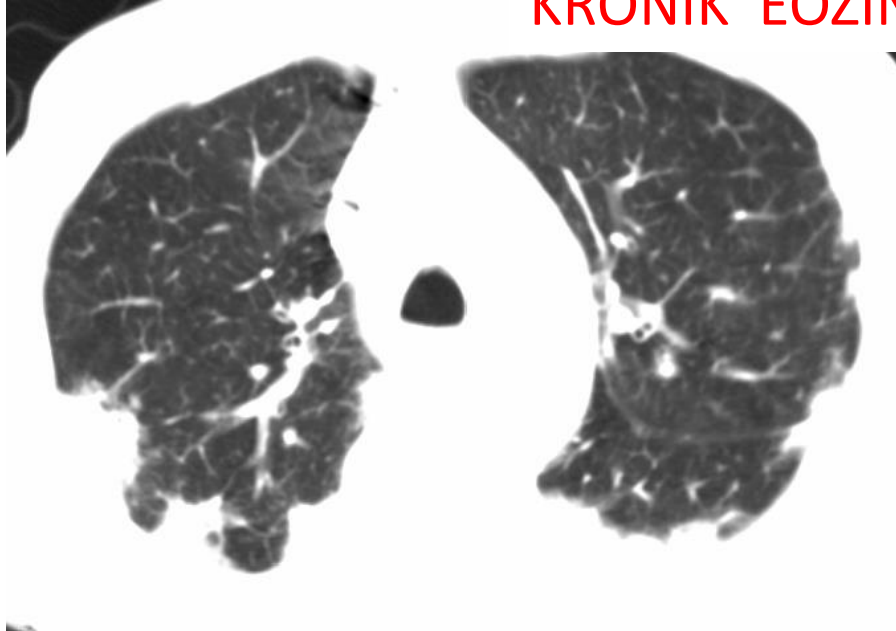


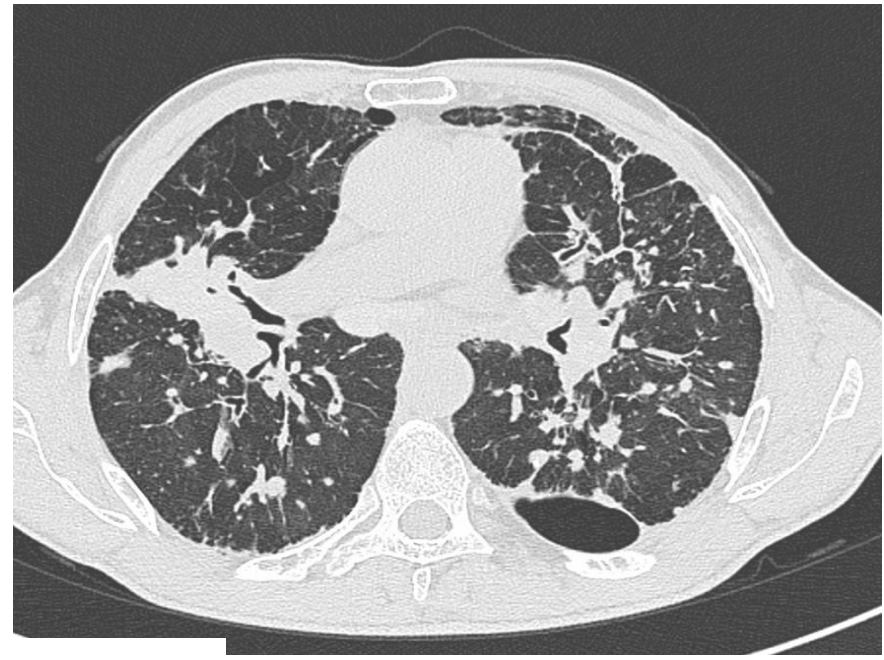
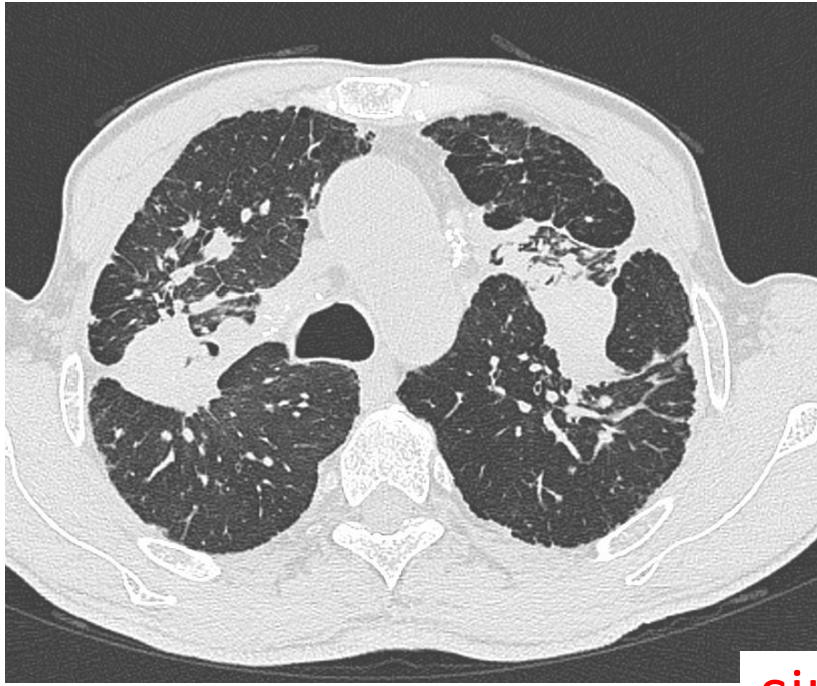




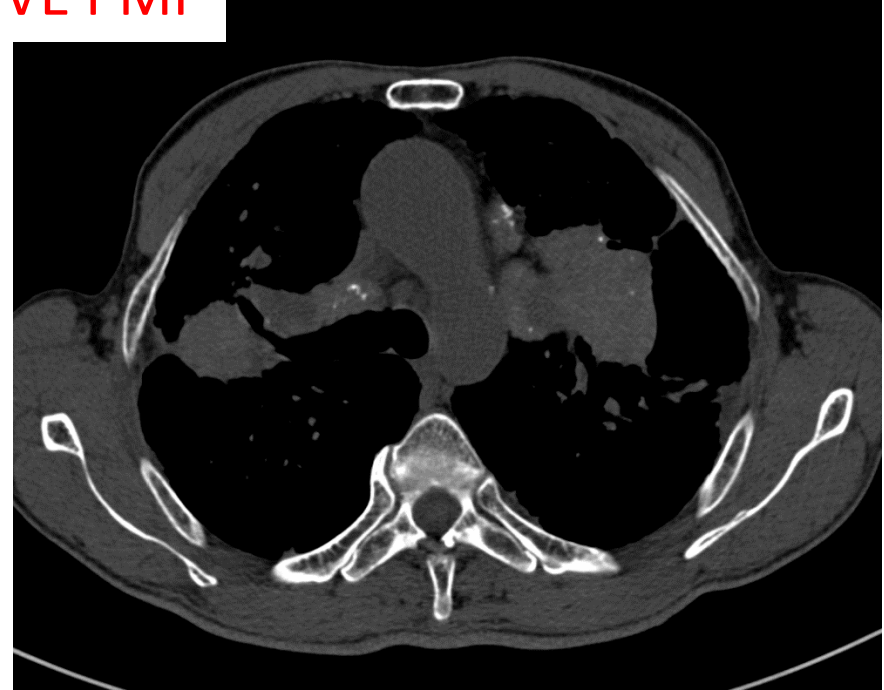
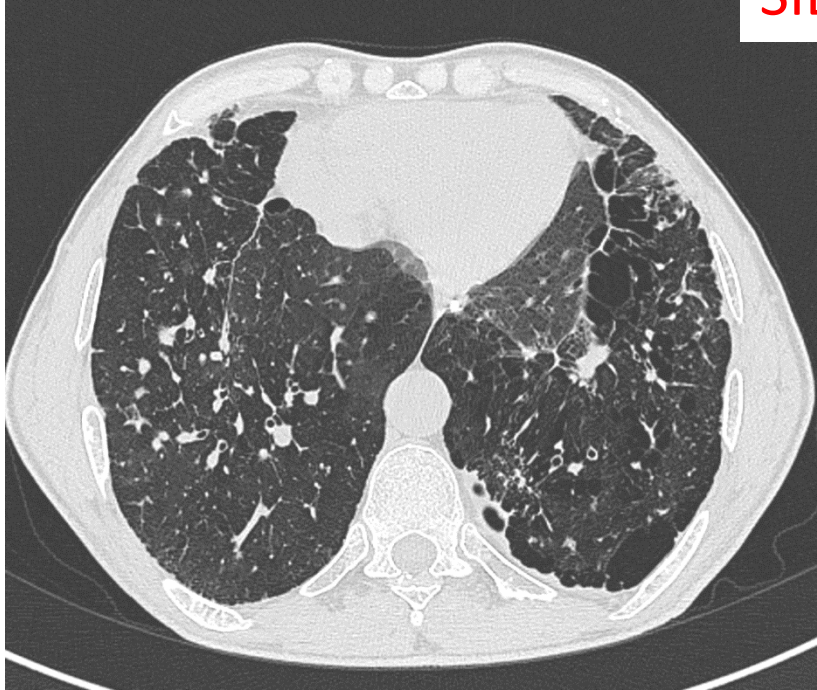


**KRONİK EOZİNOFİLİK PNÖMONİ**

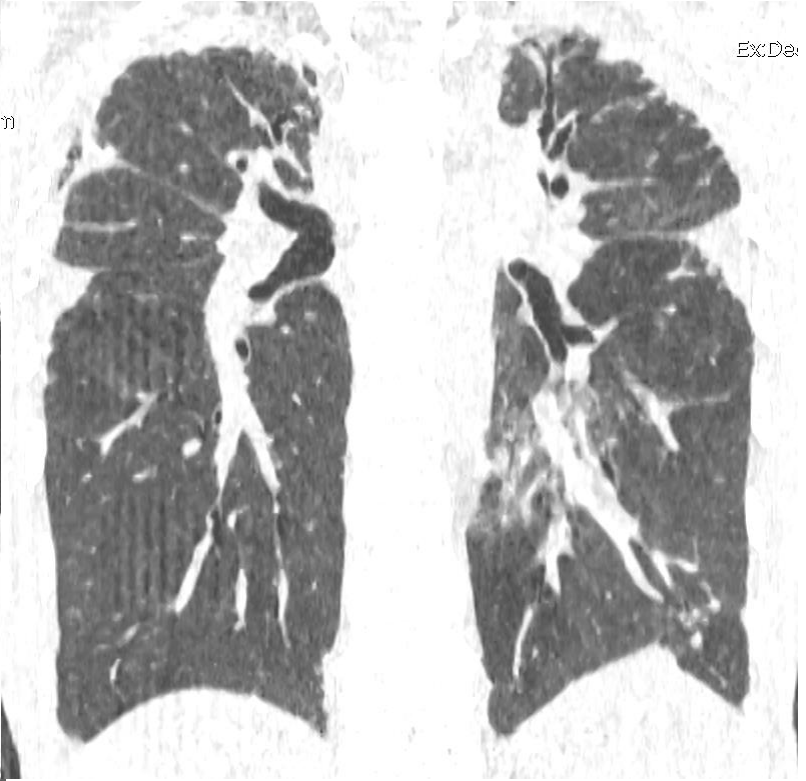
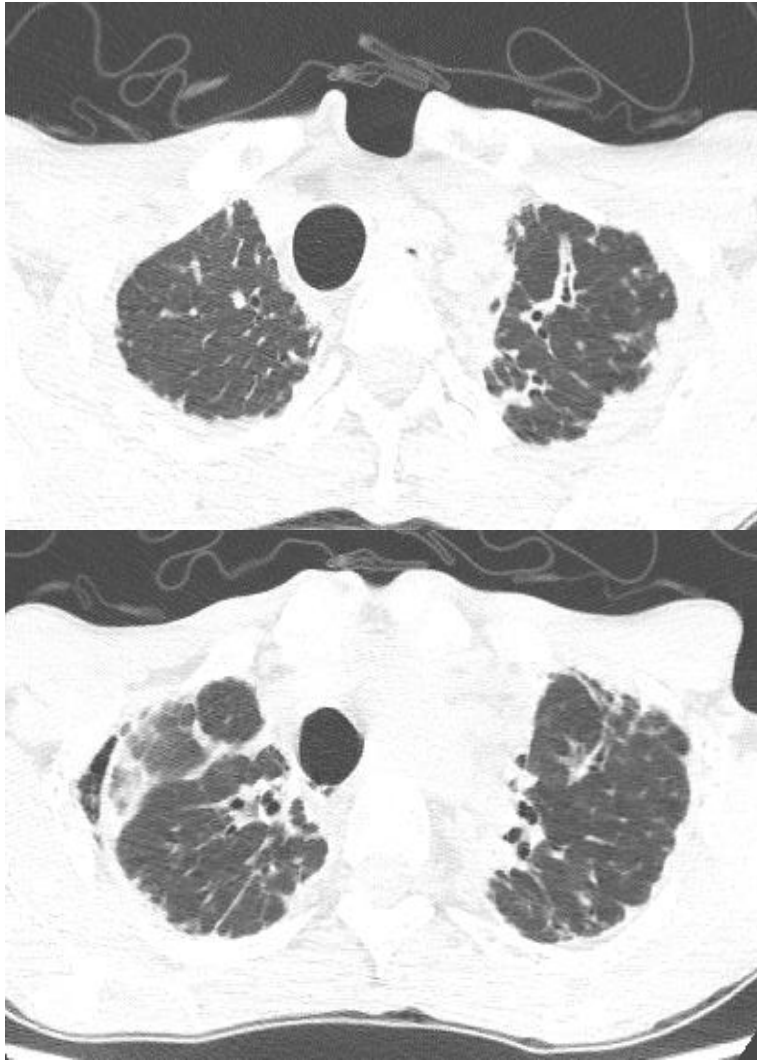




SİLİKOZİS VE PMF







**PLEVROPARANKİMAL FİBROELASTOZ**

$\uparrow O_2, \uparrow Ph$   
 $\uparrow V/Q=3:1$

1/3 üst yarı

$\downarrow O_2$   
 $N pH$   
 $\downarrow V/Q=0.6:1$

2/3 alt yarı

METASTAZ, PULMONER ÖDEM, UİP, NSİP, DİP, PAP, OP,  
YUVARLAK ATELEKTAZİ ...

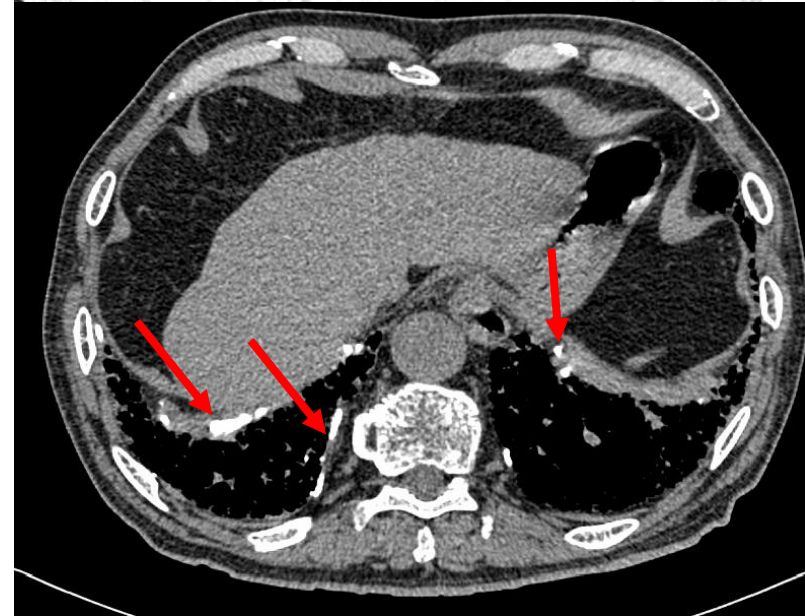
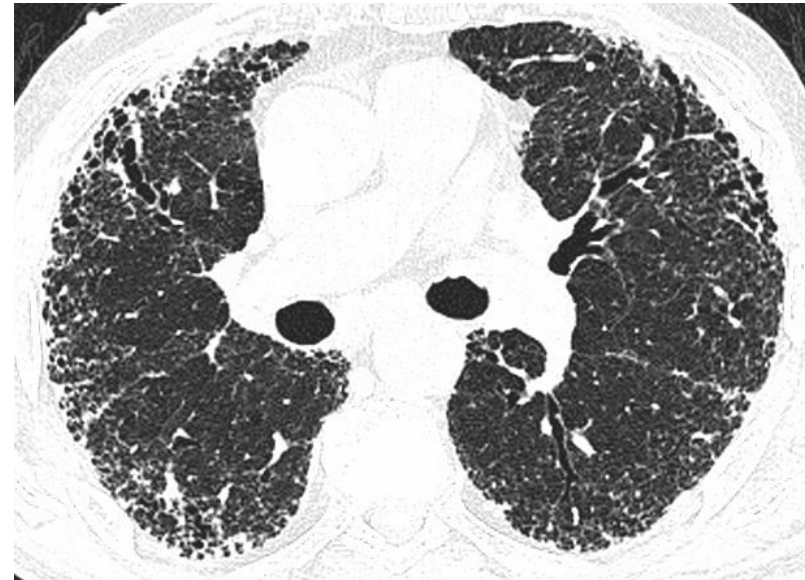
# ALT ZONLARI TUTAN HASTALIKLAR

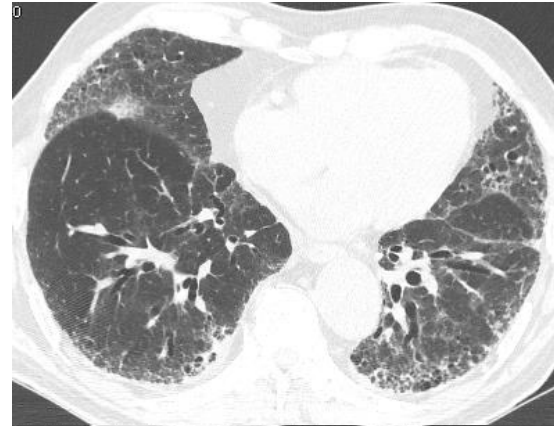
- UIP / Pulmoner fibrozis
- NSiP
- OP
- DiP
- AiP
- Aspirasyon pnömonisi- lipoid pnömoni
- Bronşektazi
- Hematojen yayılım-metastaz, septik emboli..
- Artmış hidrostatik basınçlı ödem
- Alfa1 antitripsin eksikliği
- Bağ dokusu hastalıkları
- Alveoler proteinozis
- Asbestoz ile ilişkili hastalık
- Yuvarlak atelektazi
- Mezotelyoma





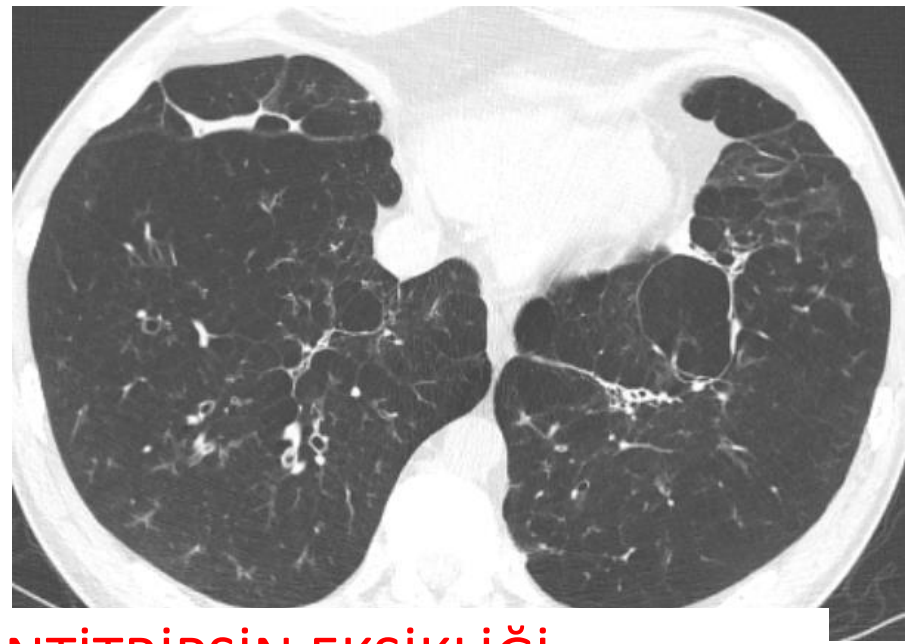
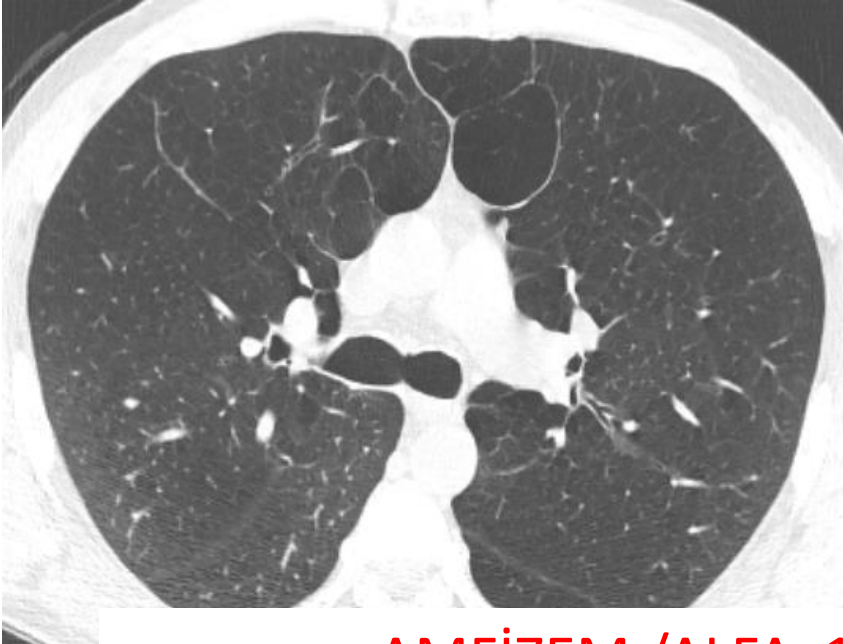
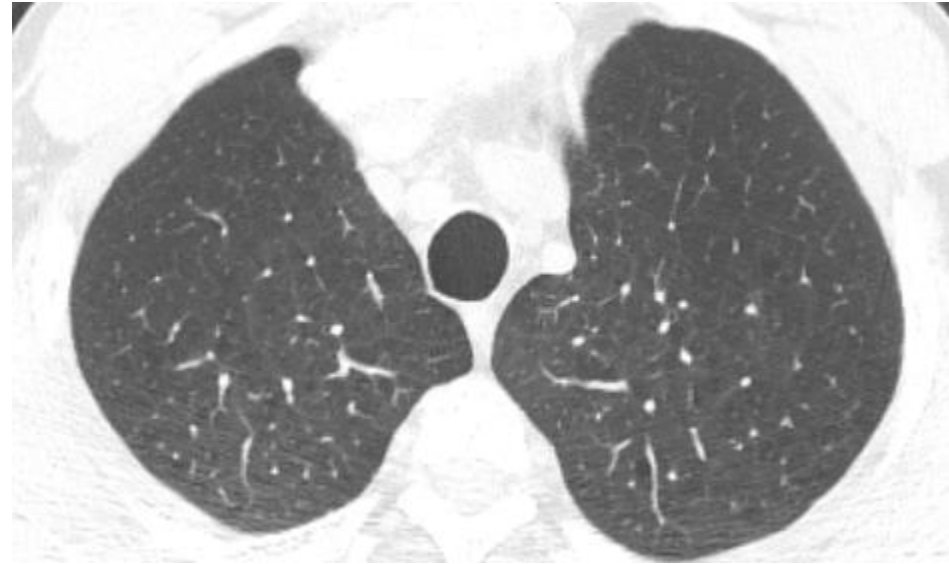
ASBESTOZİS



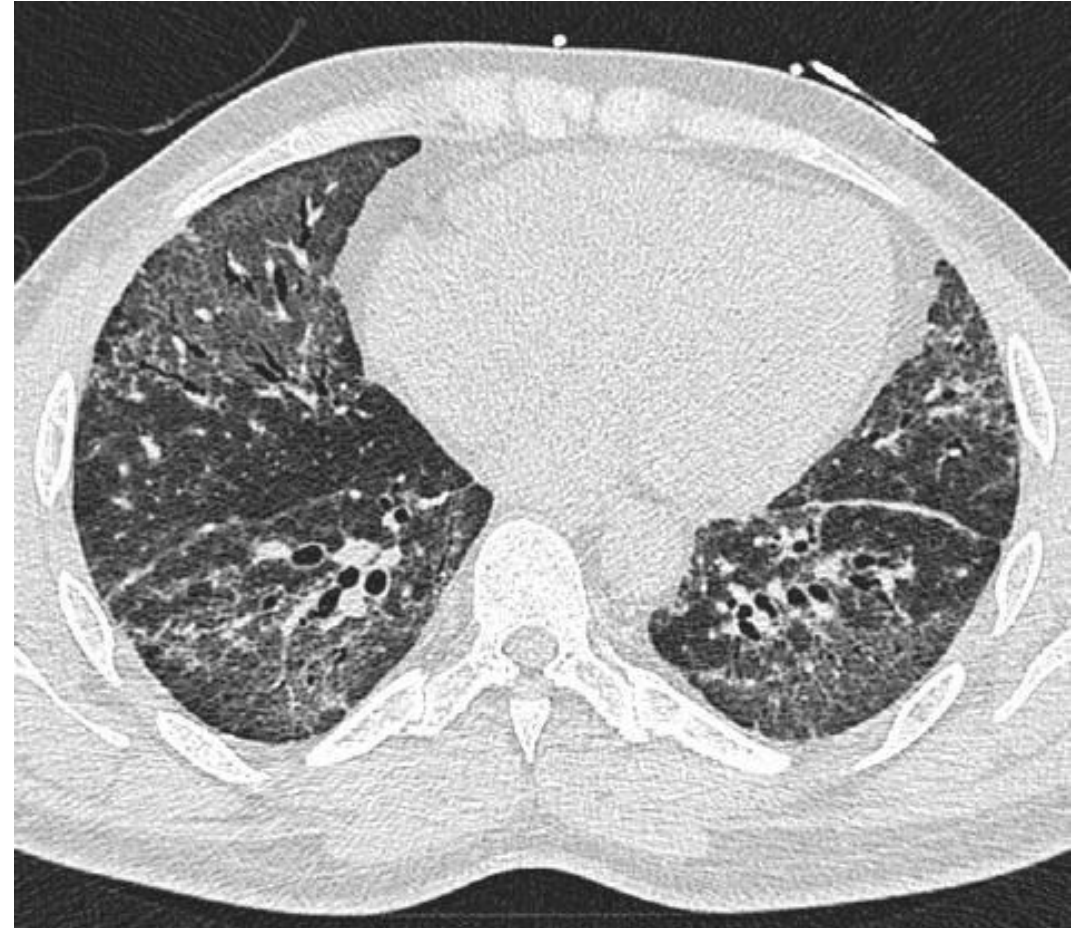
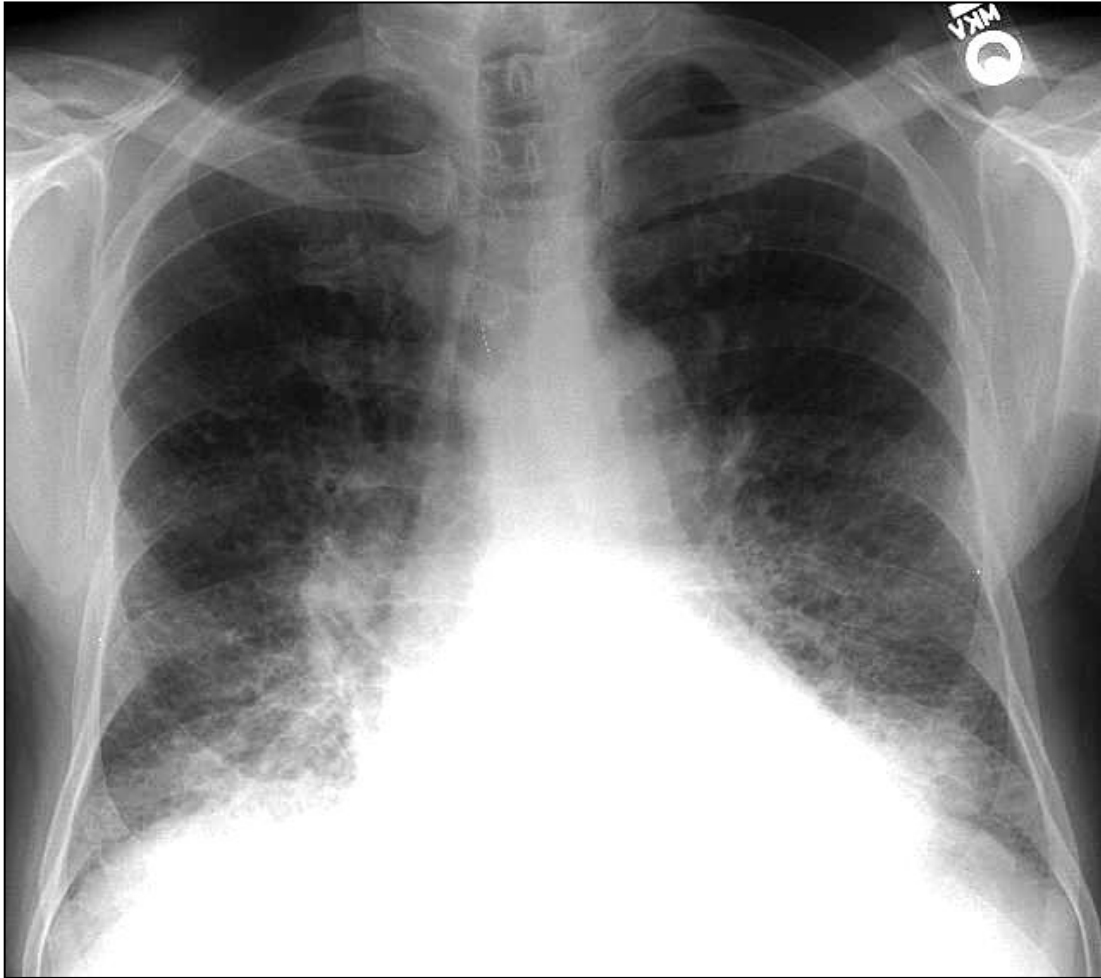


IPF



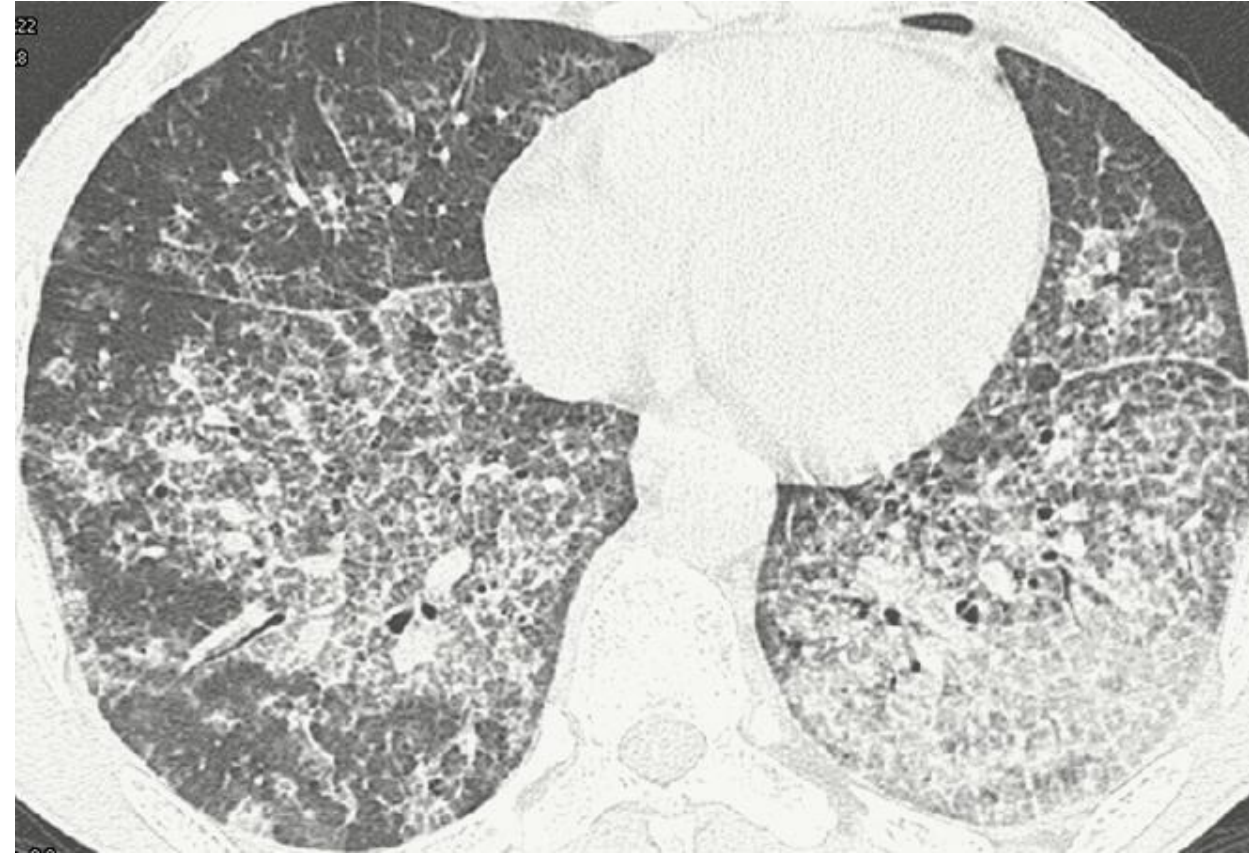
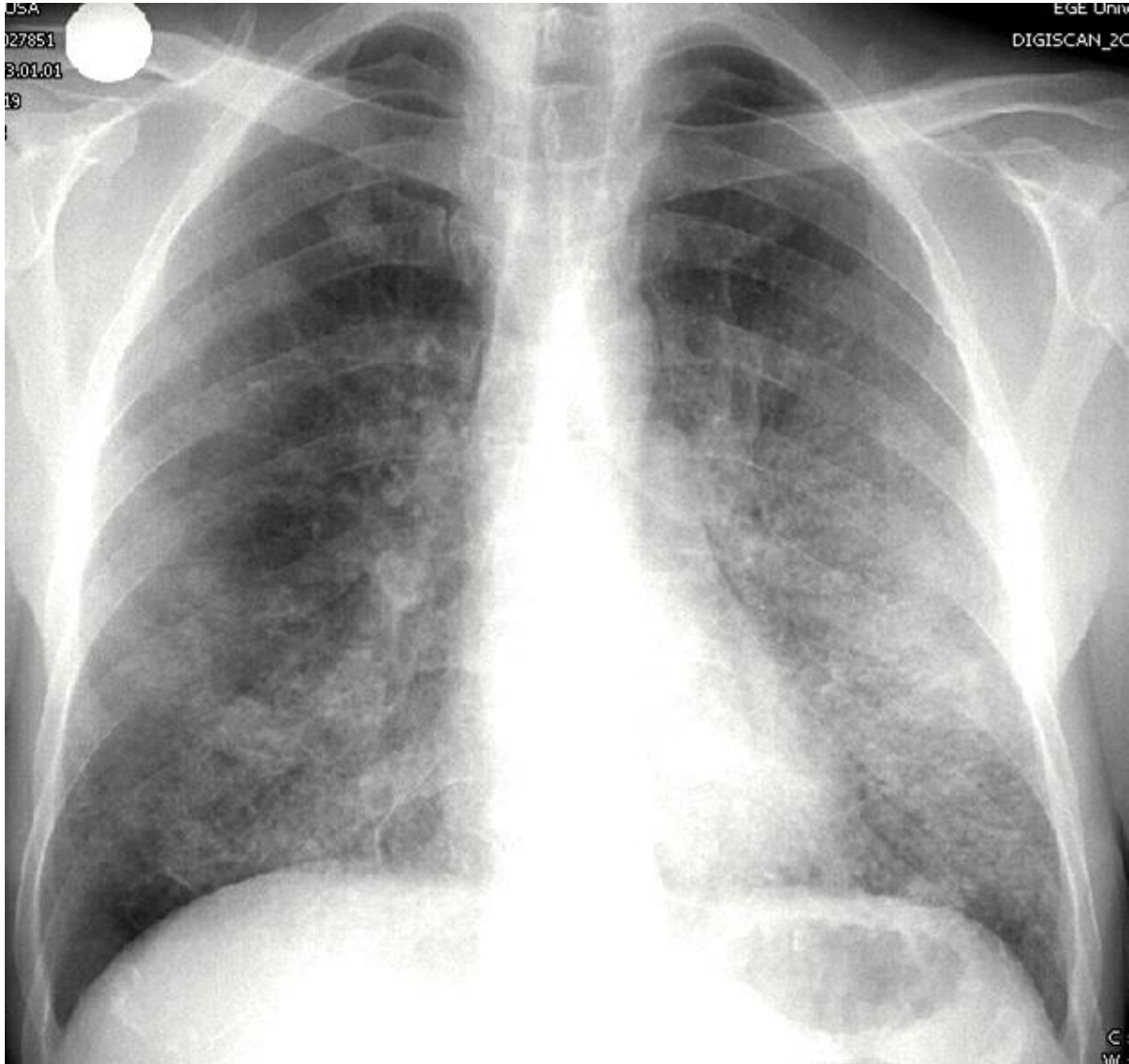


**AMFİZEM /ALFA 1 ANTİTRİPSİN EKSİKLİĞİ**



ROMATOİD ARTRİT, PULMONER TUTULUM/ NSİP





**ALVEOLER PROTEİNOZİS**



## Medülla

2/3 iç kısım

Lenf akımı ↓

Perfüzyon ↑

HEMORAJİ

PAP

PCP

ÖDEM

BALTOMA

KF, ABPA

## Korteks

1/3 dış kısım

Lenf akımı ↑

KEP

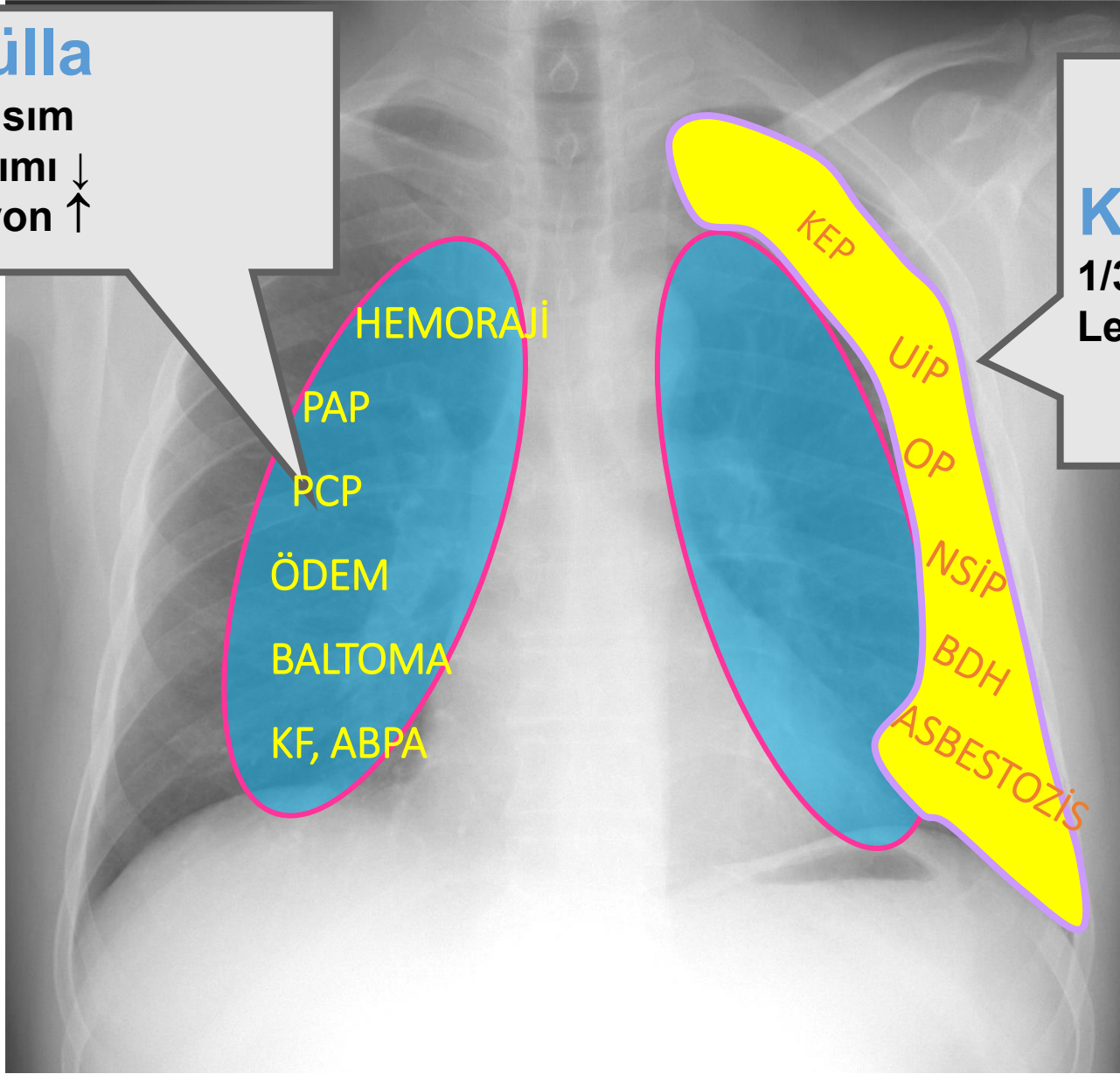
UİP

OP

NSİP

BDH

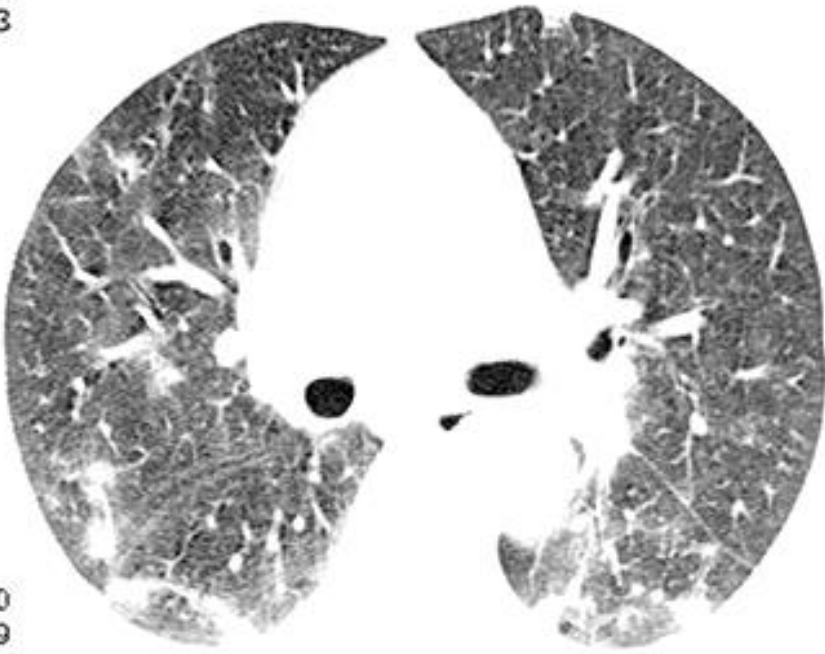
ASBESTOZİS



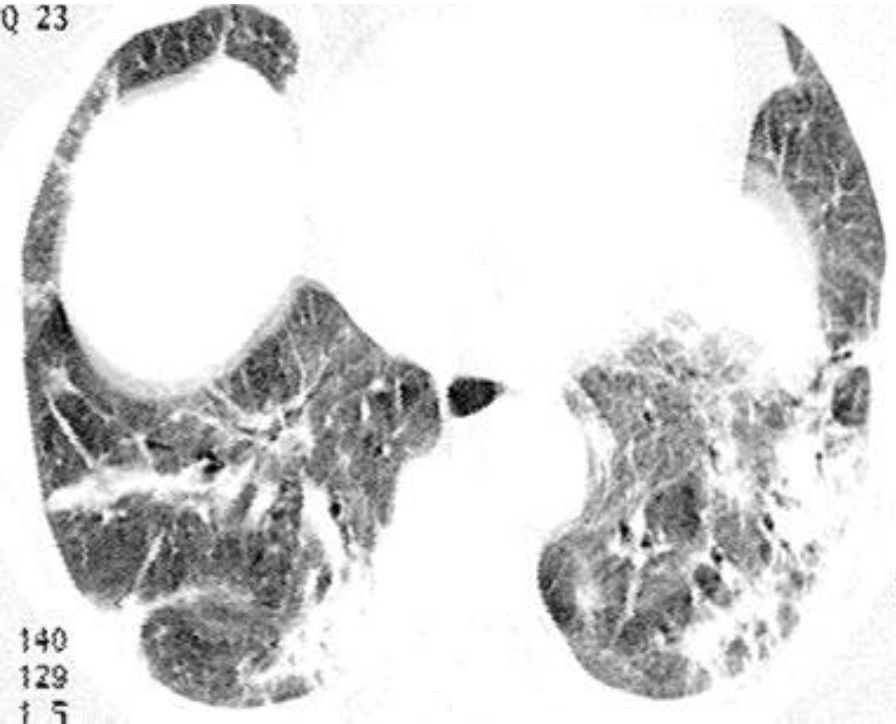
# AKCİĞER PERİFERİNİ (korteksi) TUTAN HASTALIKLAR

- UIP/ Pulmoner fibrozis/İPF
- Organize pnömoni
- Kronik Eozinofilik pnömoni
- HSP
- DIP
- Asbestozis

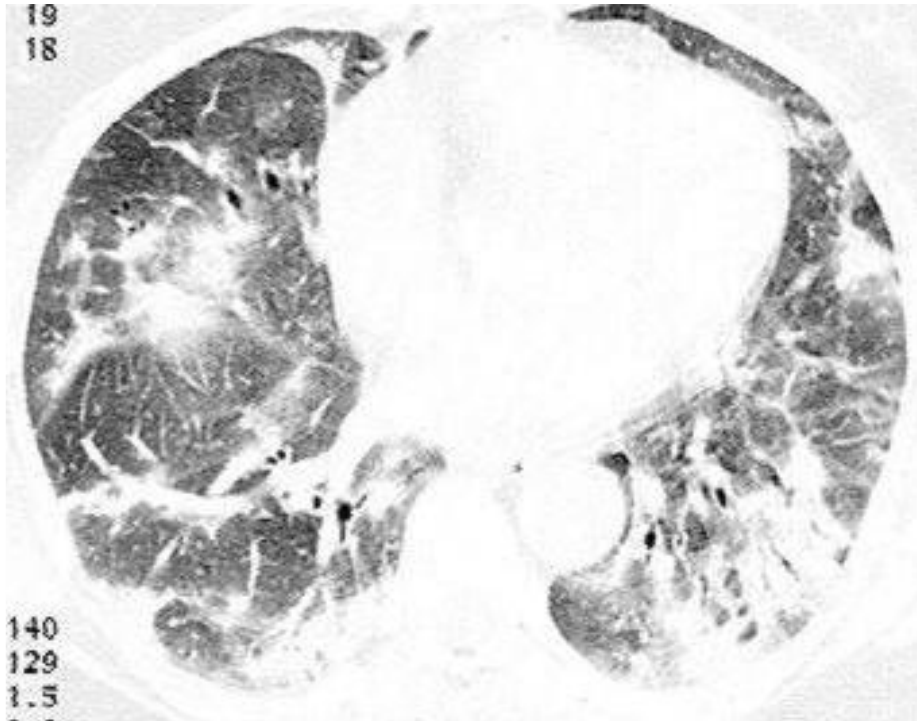
14  
13



Q 23



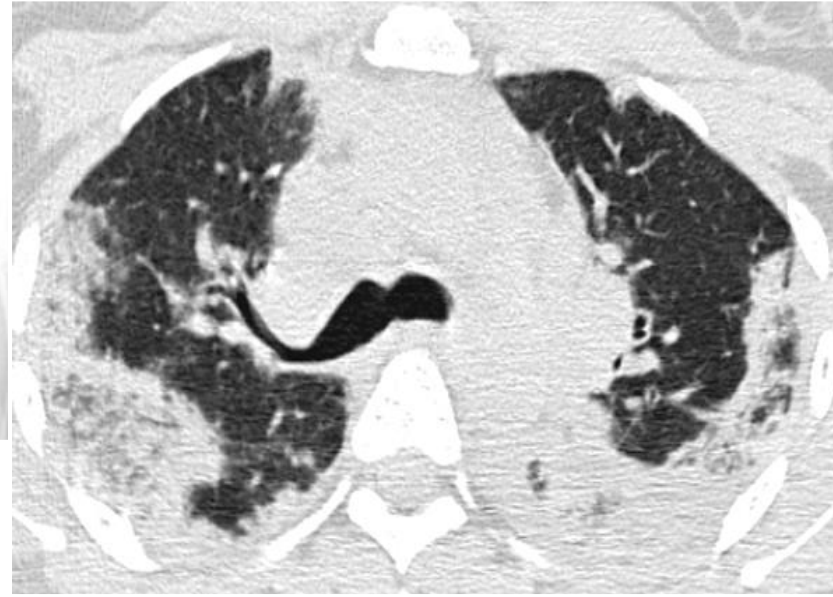
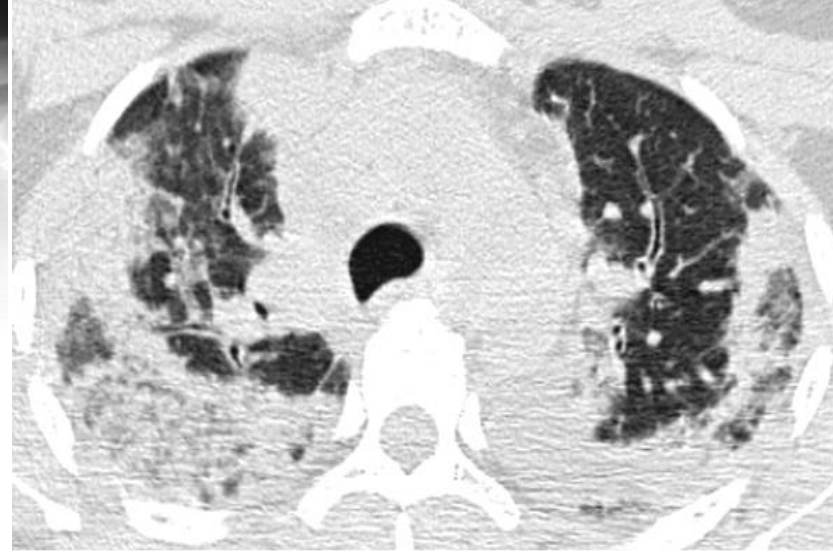
10  
29  
5



140  
129  
1.5

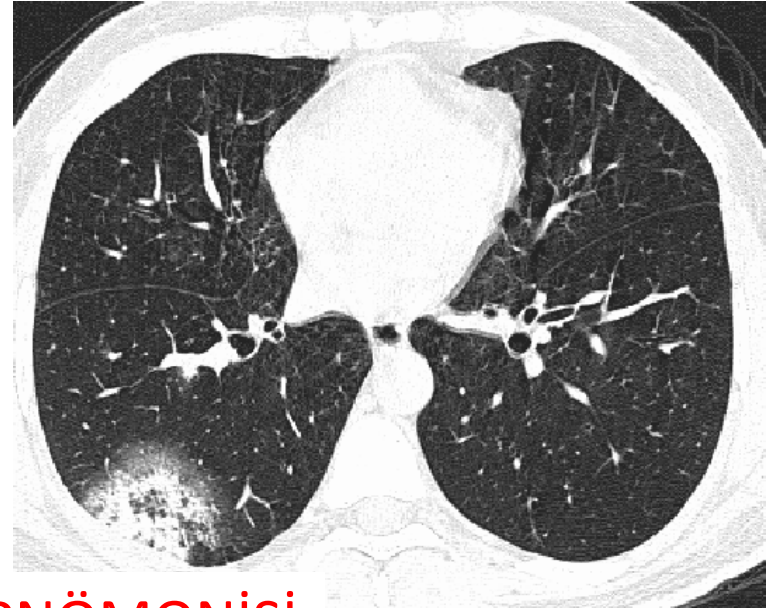
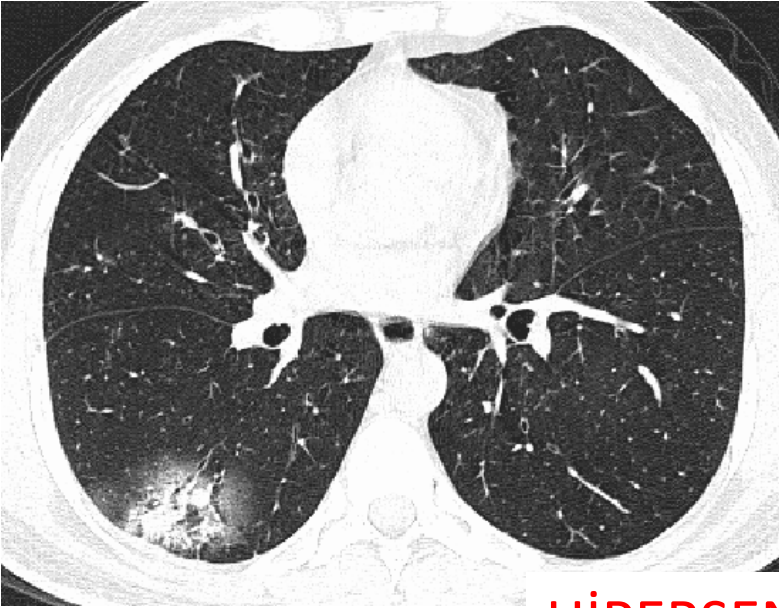
**ORGANIZE PNÖMONİ**

140  
129  
1.5



KR EOZİNOFİLİK PNÖMONİ

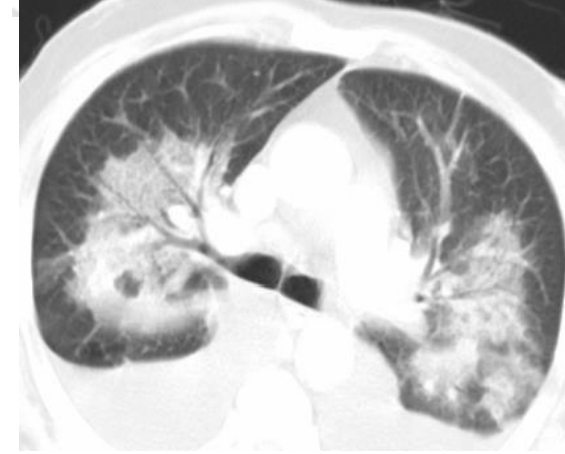
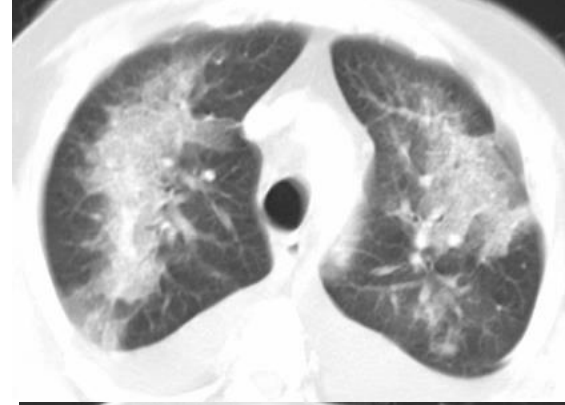
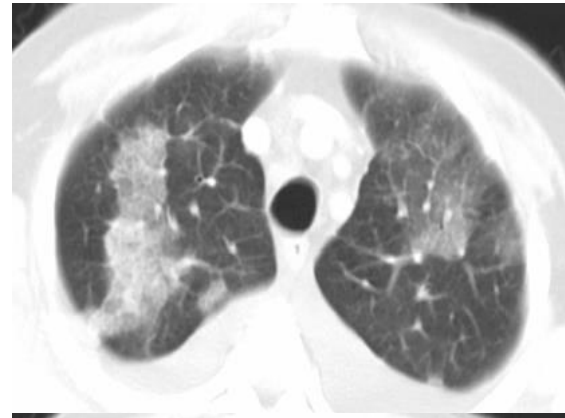
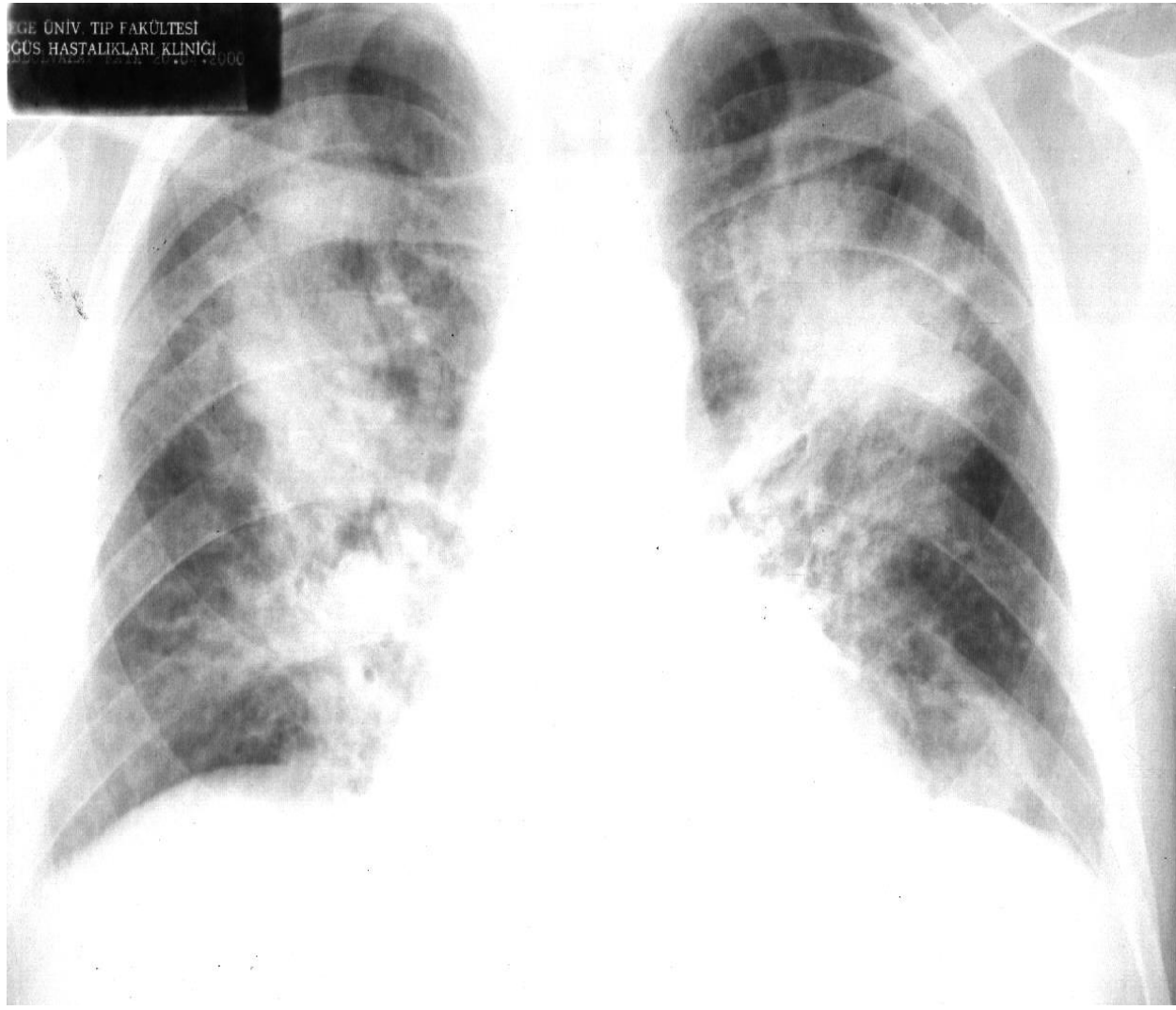




HİPERSENSİTİVİTE PNÖMONİSİ

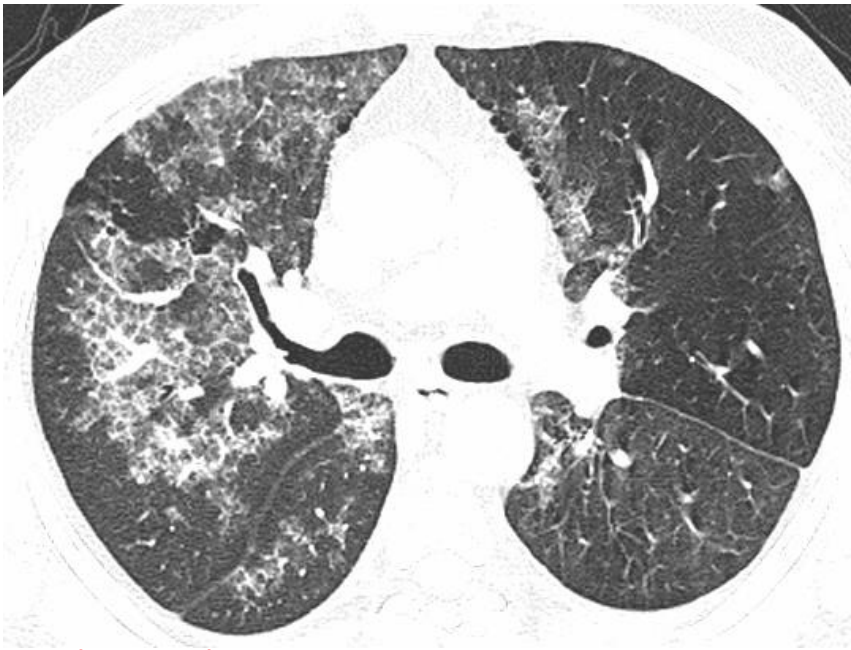
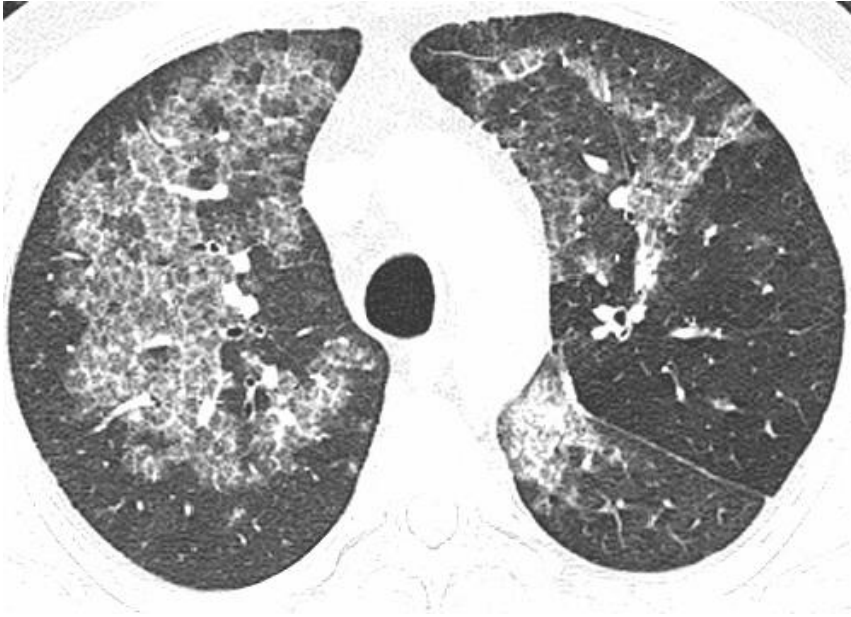
# AKCİĞERİN SANTRALİNİ TUTAN HASTALIKLAR

- PCP, CMV
- Pulmoner ödem, ARDS
- Sarkoidozis
- Silikozis
- Alveoler proteinozis
- ABPA
- Kistik fibrozis



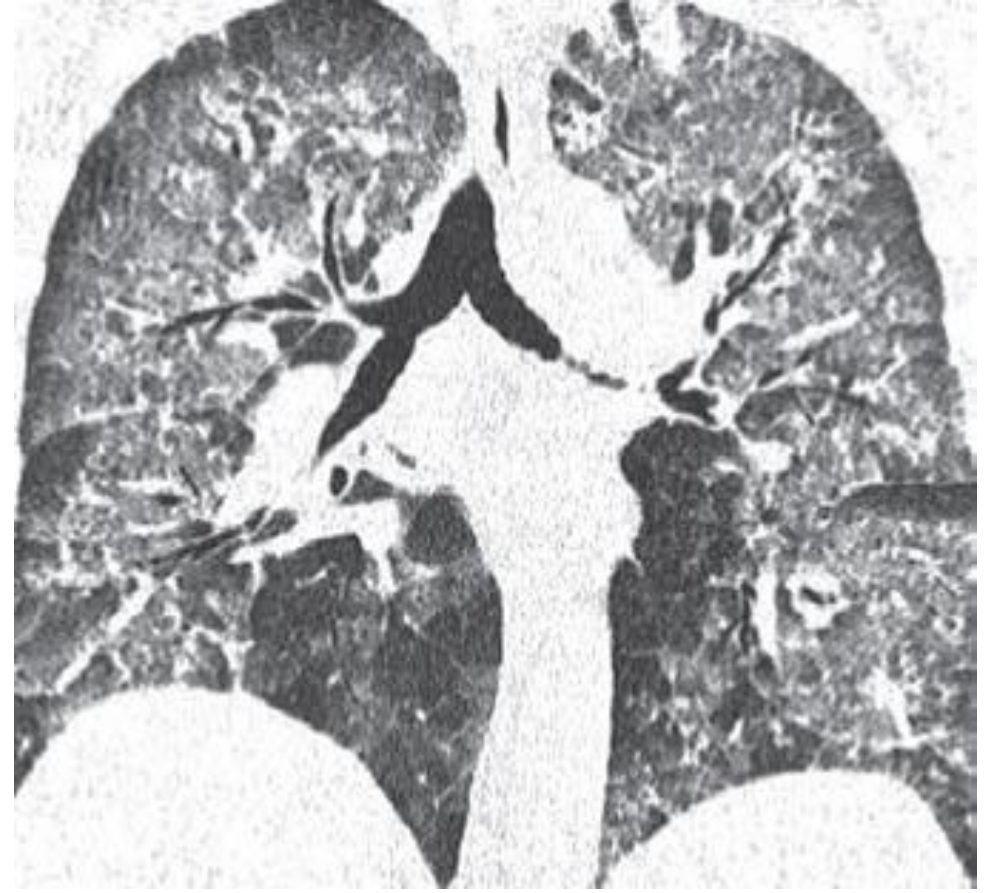
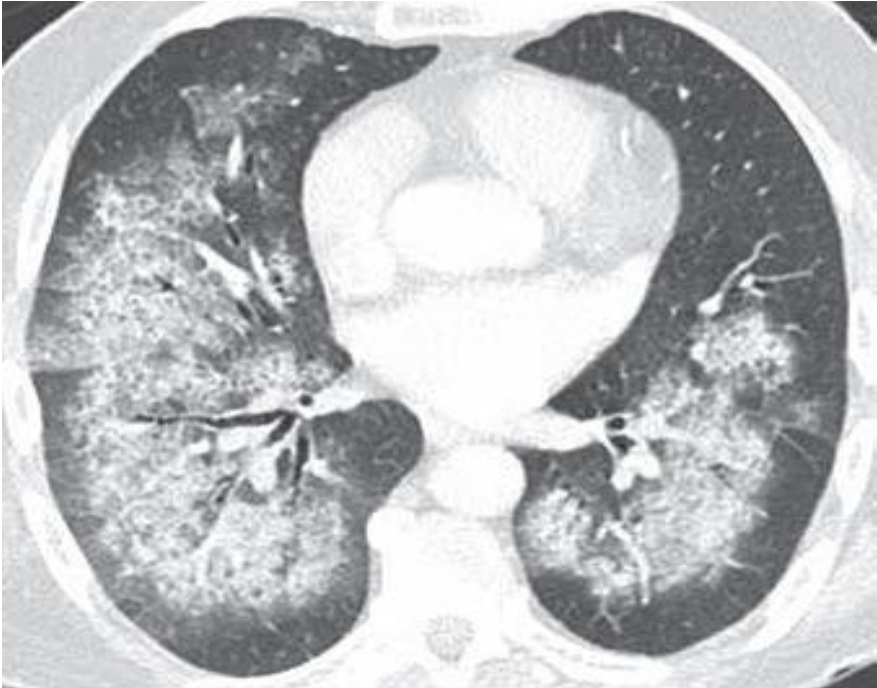
**PULMONER ÖDEM**





**PULMONER ALVEOLER PROTEİNOZİS**

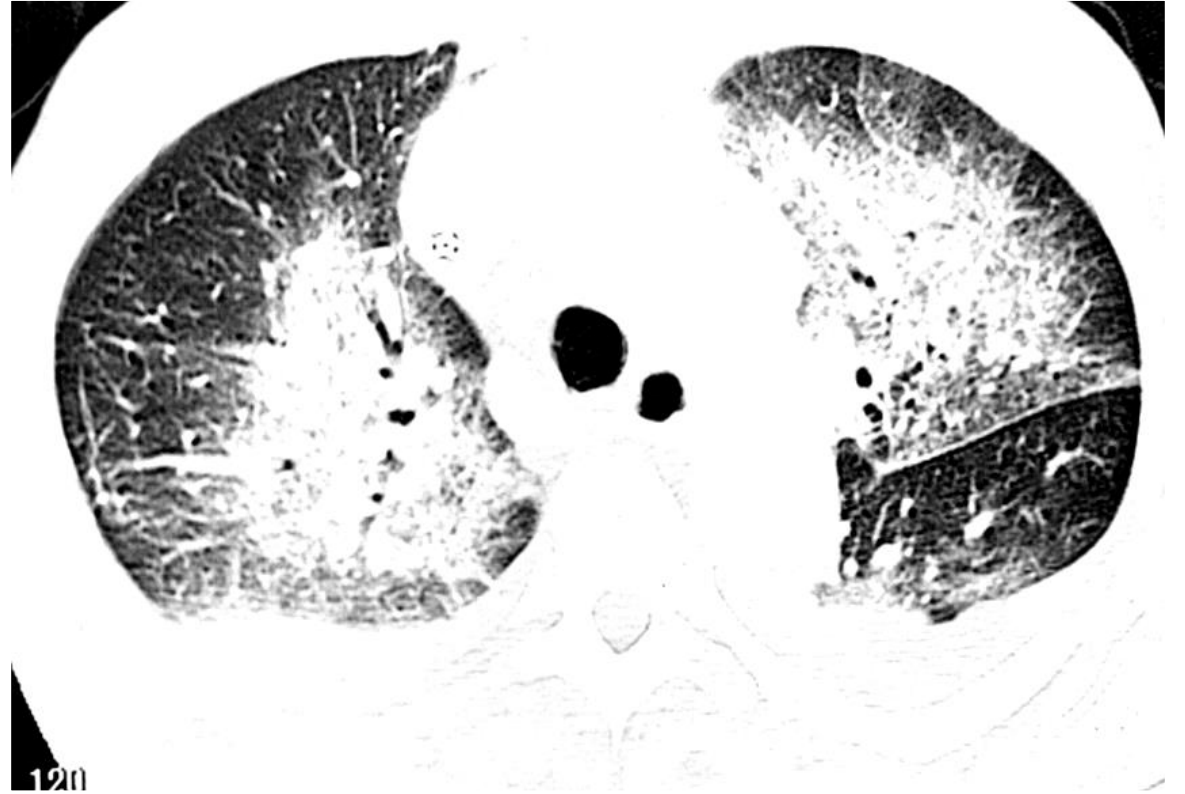




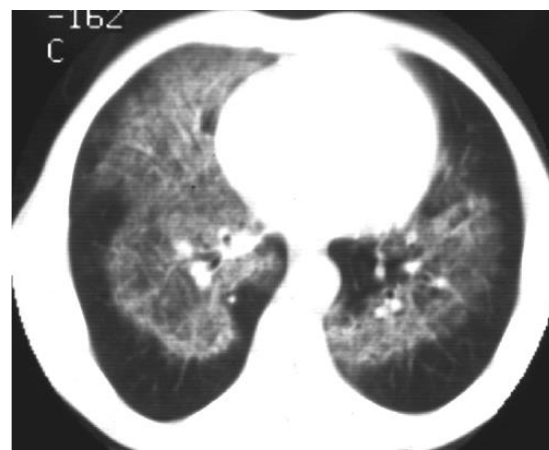
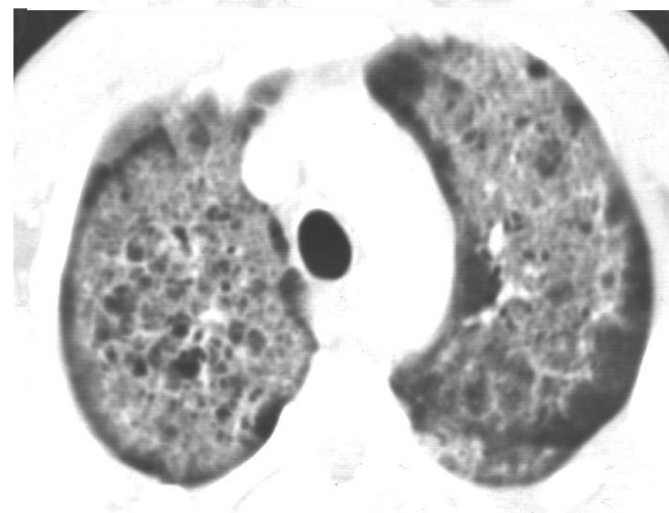
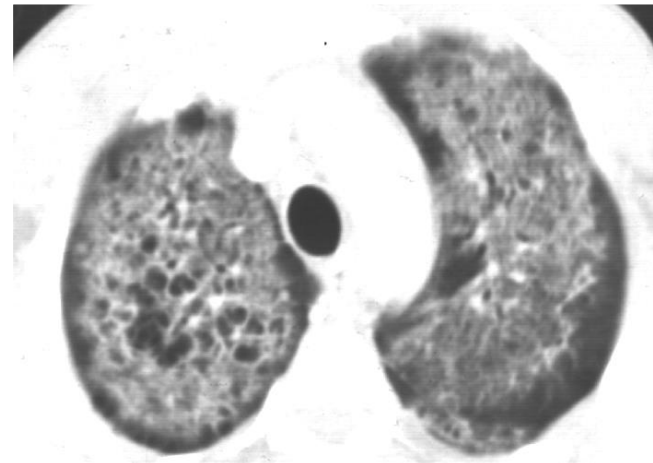
**GRANULOMATÖZ POLIANJİT  
(WEGENER GR)**



PCP



ARDS

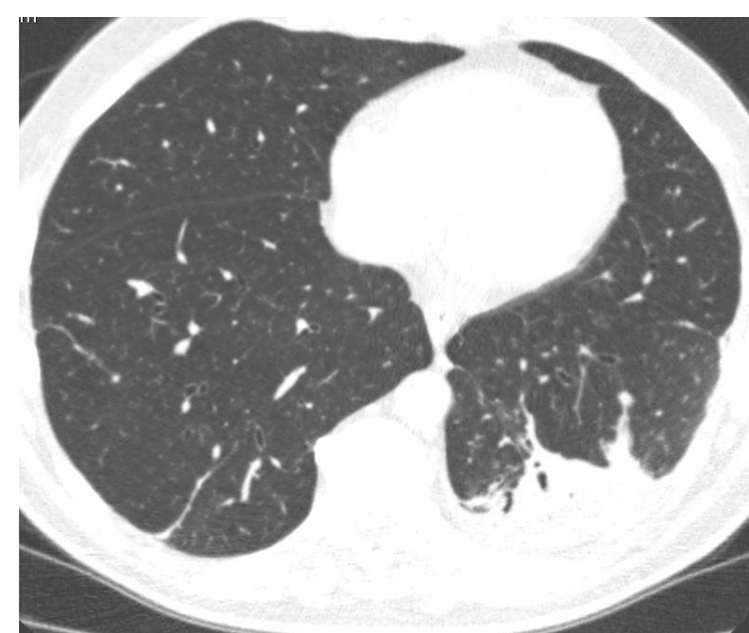
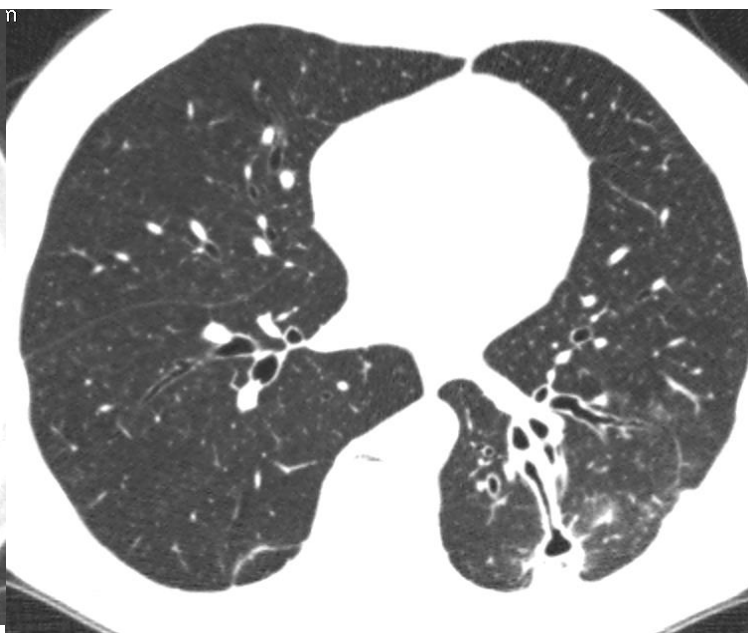
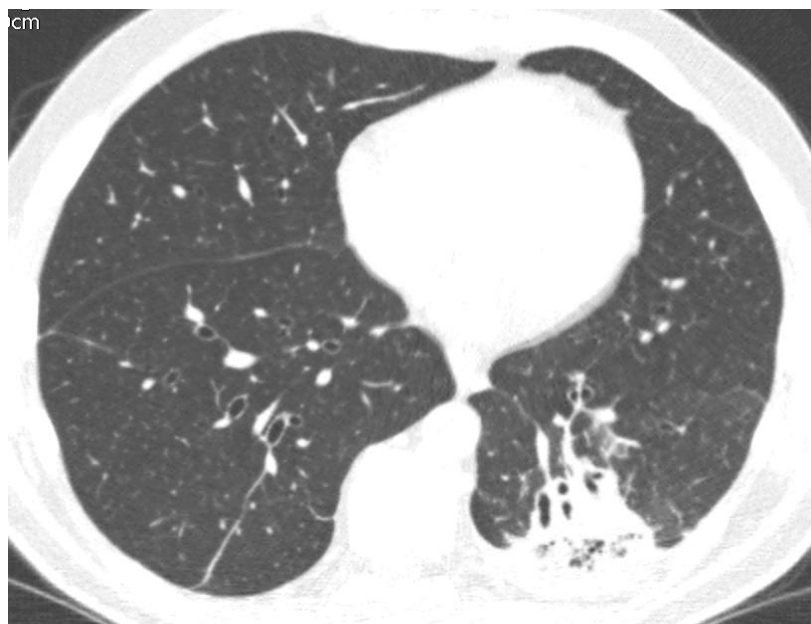
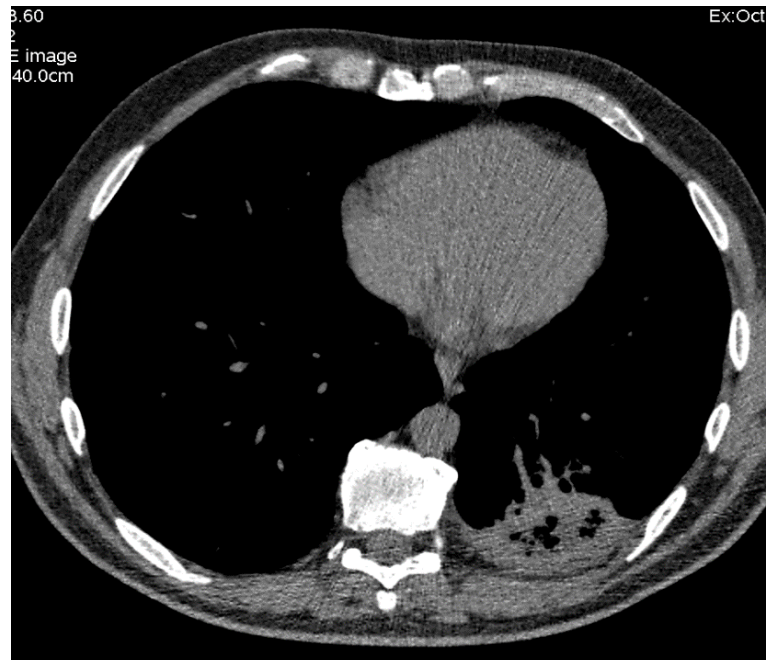
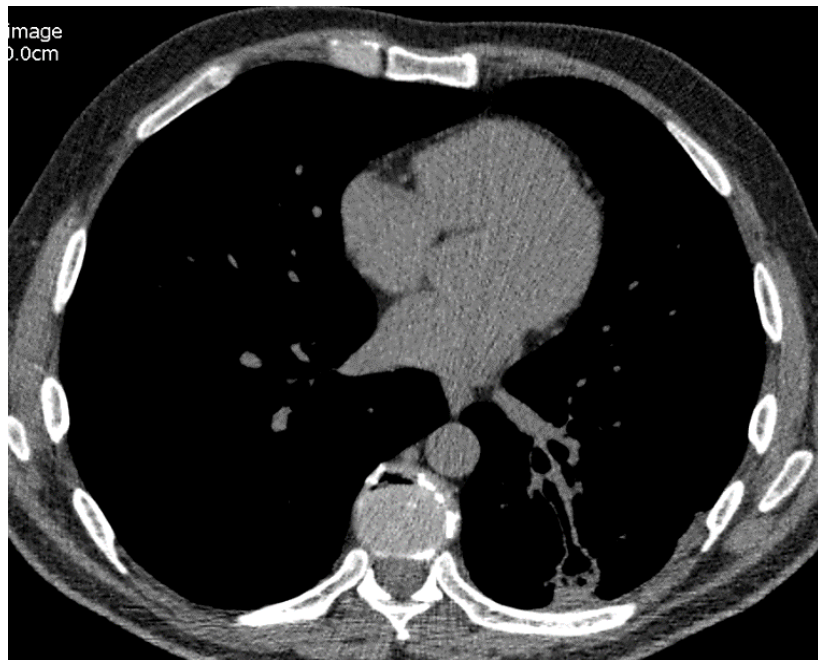


PCP

# Olgu 1

- 43 yaşında erkek
- Öksürük ve dispne, zaman zaman akşamları ateş
- Son 1 aydır kullanılan antibiyotiğe rağmen düzelme yok





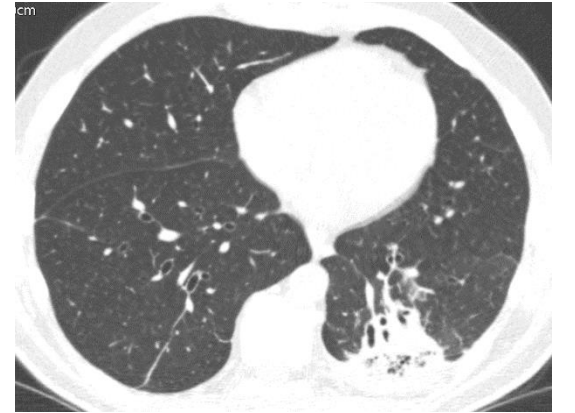
# Tanı için ne yapalım ?

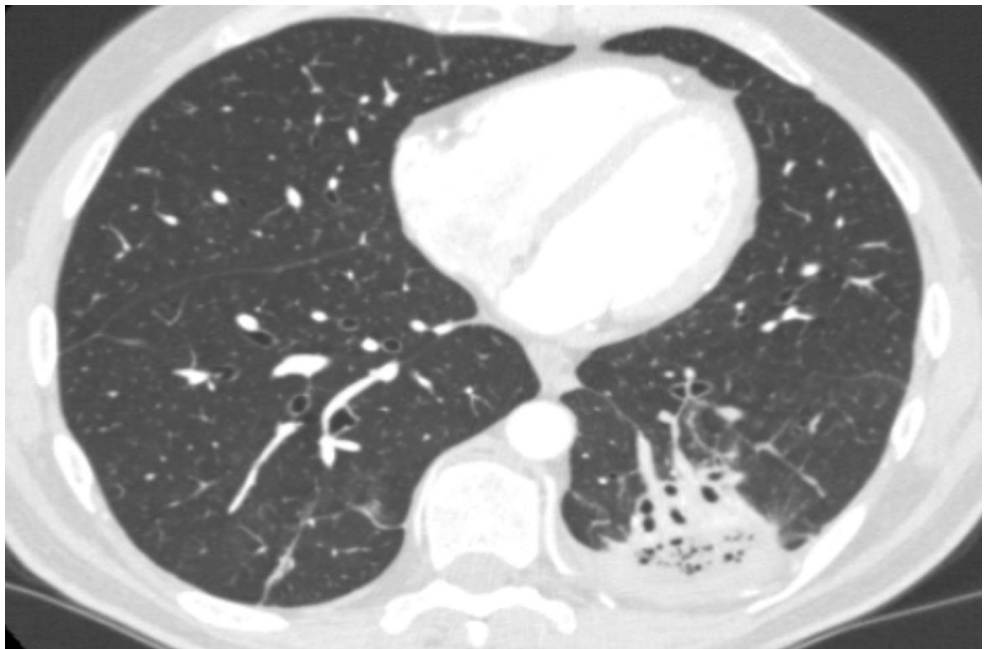
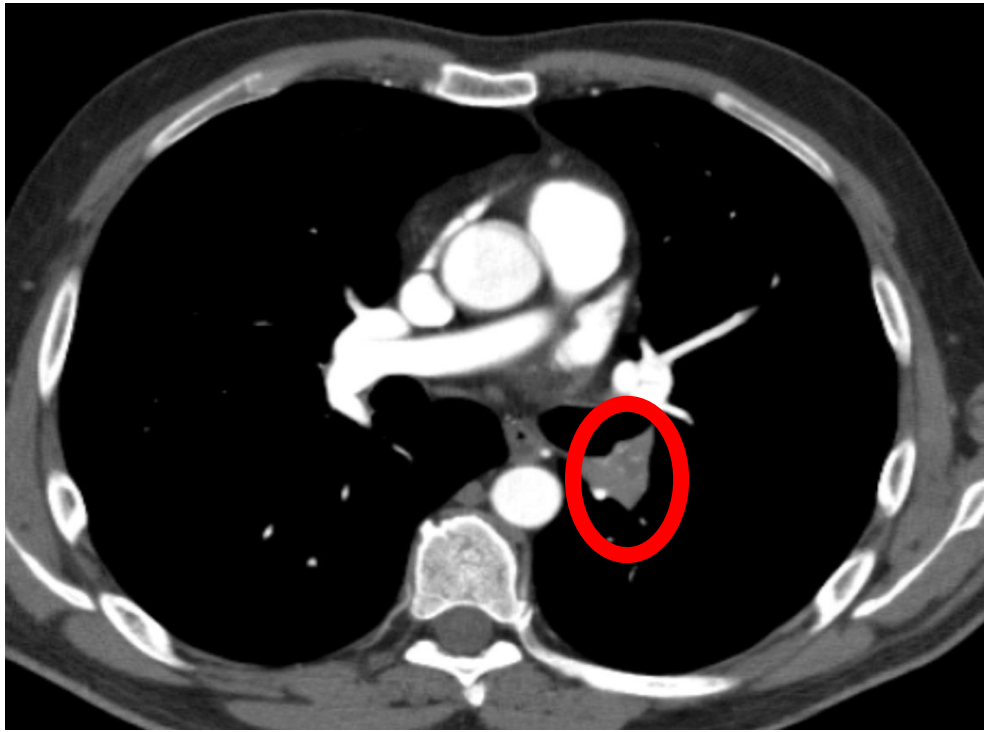
- A) Bronkoskopi
- B) TTiiAB
- C) PET/BT
- D) Cerrahi
- E) Kontrastlı BT



# BT bulguları eşliğinde ne düşünelim?

- A) Malignite
- B) Tüberküloz
- C) Komplike kist hidatik
- D) Pulmoner tromboemboli
- E) Pnömoni- Uygun antibiyotik tedavi





Kontrastlı BT- Anjio BT



# Tanı için ne yapalım ?

- A) Bronkoskopi
- B) TTiiAB
- C) PET/BT
- D) Cerrahi
- E) **Kontrastlı BT**

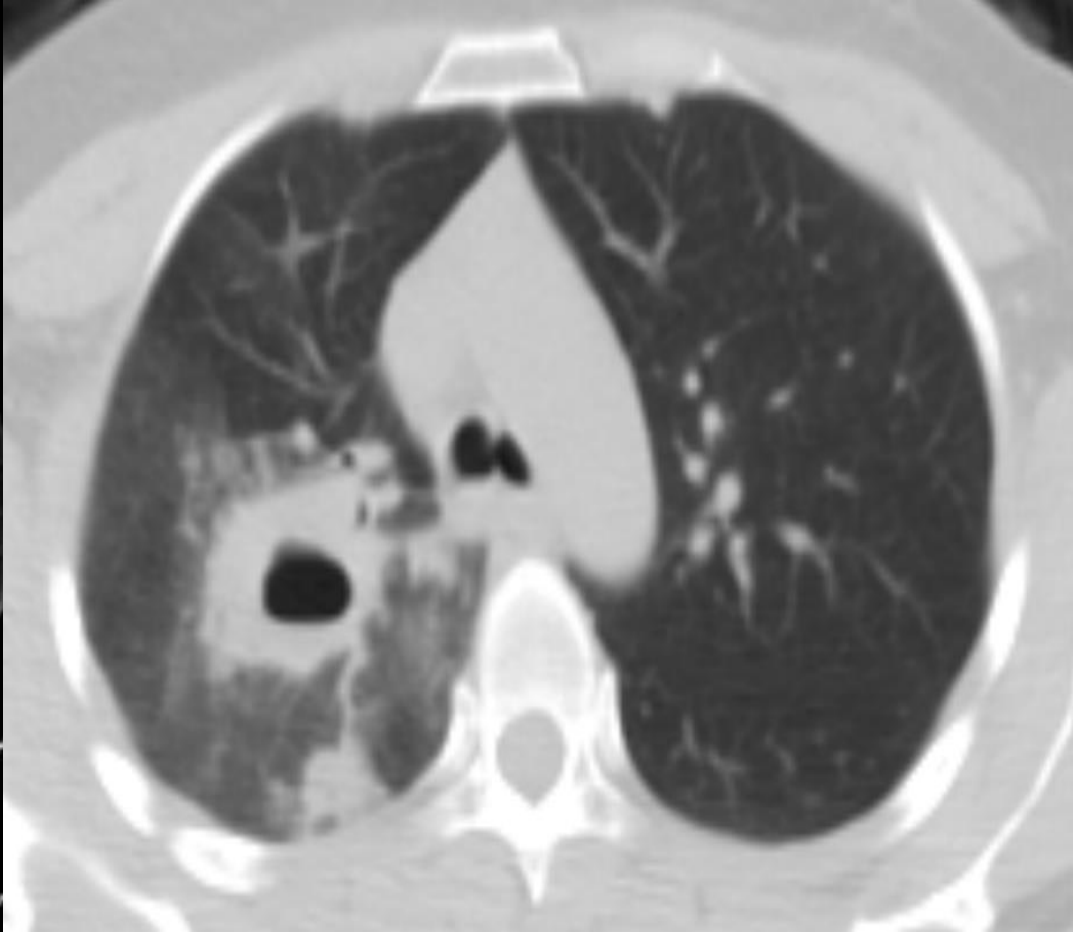
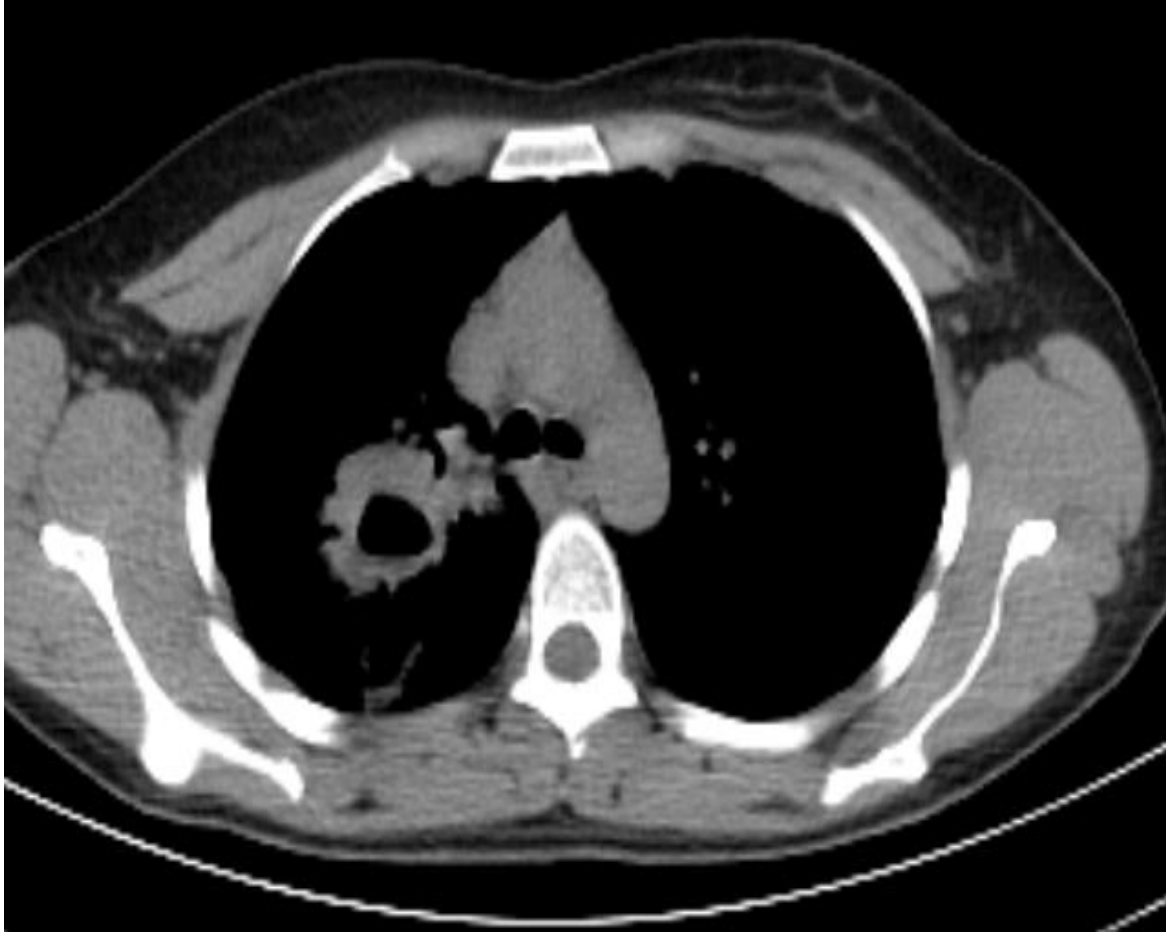


# BT bulguları eşliğinde ne düşünelim?

- A) Malignite
- B) Tüberküloz
- C) Komplike kist hidatik
- D) Pulmoner tromboemboli
- E) Pnömoni- Uygun antibiyotik tedavi

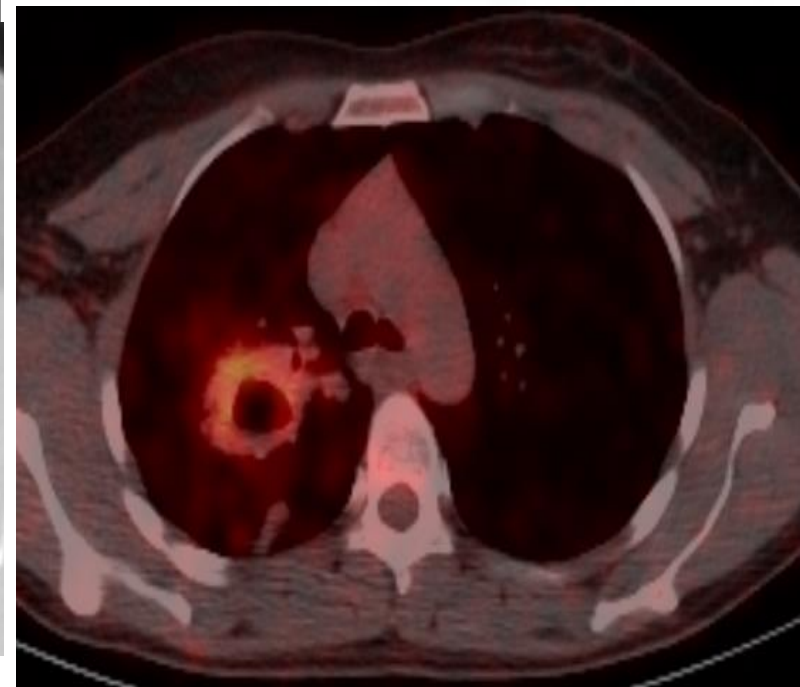
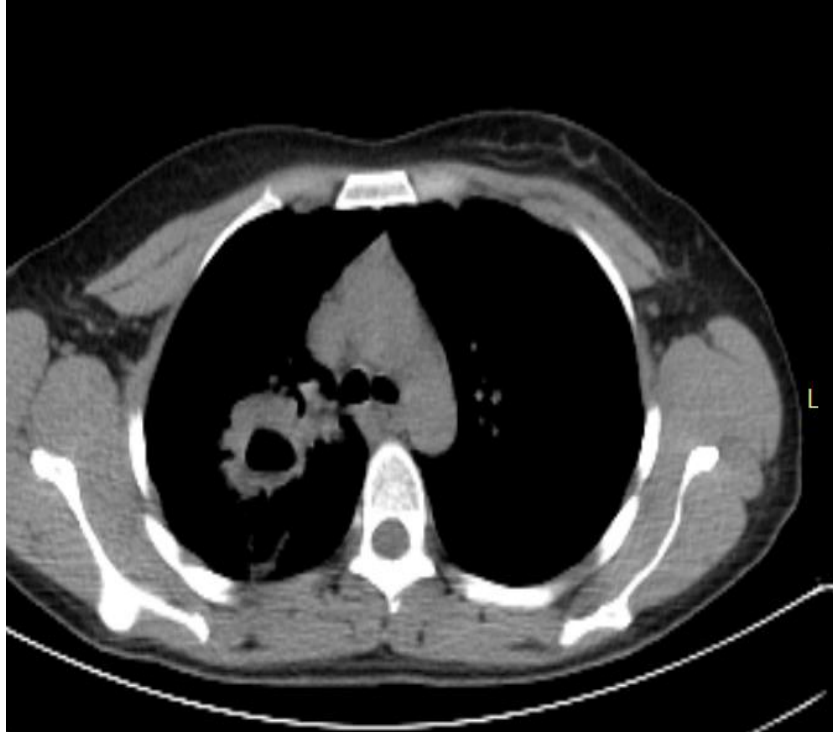
## Olgu 2

- 47 yaşında kadın
- Hemoptizi öyküsü var
- Ateş yok
- BT ve PET/BT'de saptanan kitle için İİAB amaçlı gönderiliyor.



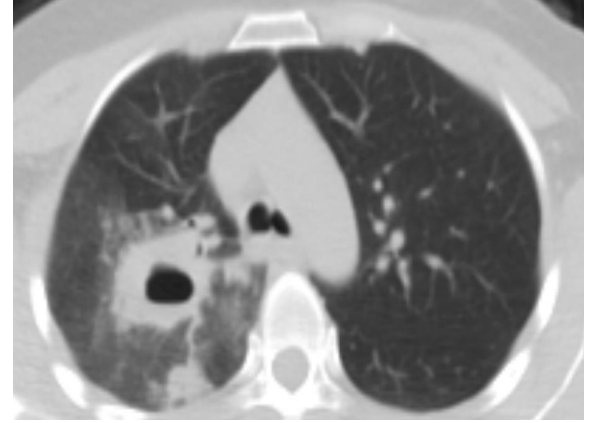
08.03.2016





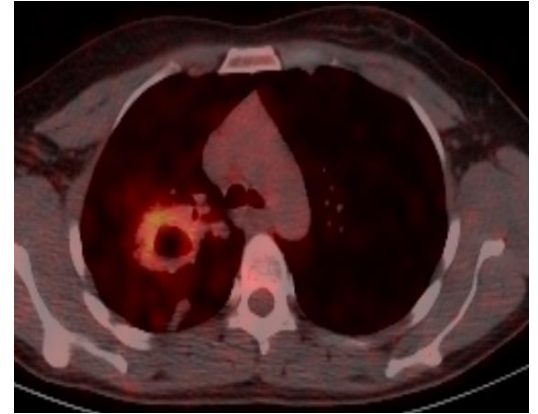
# BT ve PET/BT bulguları eşliğinde ne yapalım?

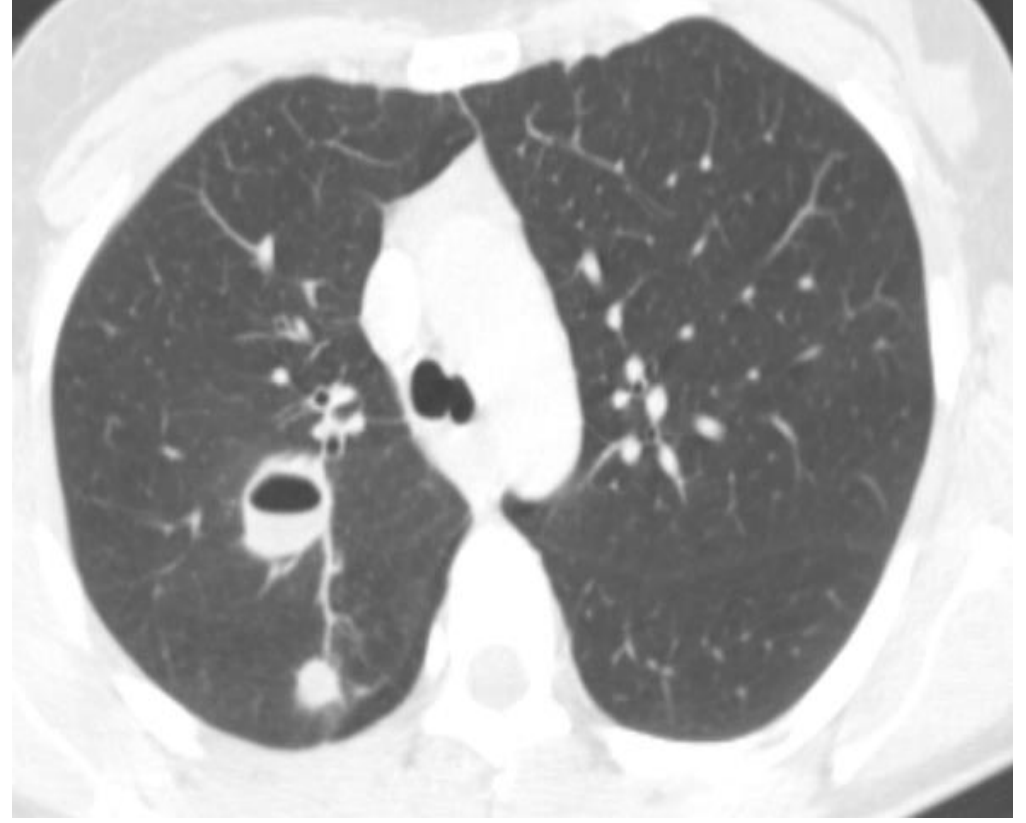
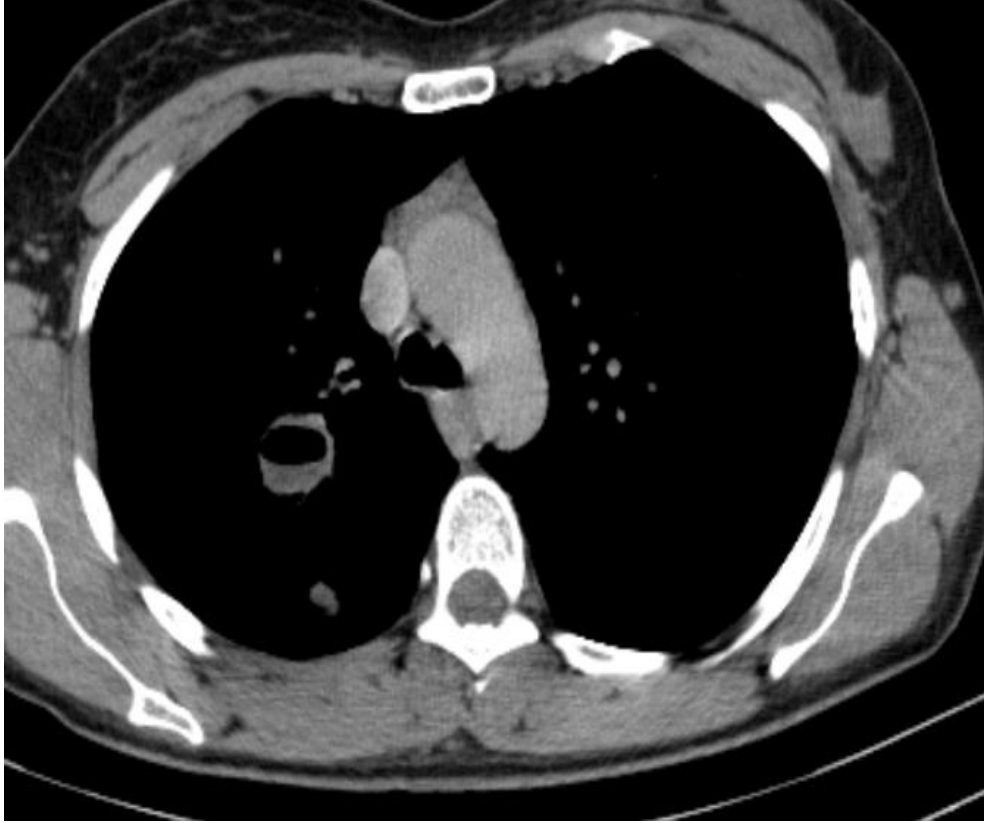
- A) Bronkoskopi
- B) TTiiAB
- C) Cerrahi
- D) Eski filmlere bakalım
- E) İzleyelim



# Tanı için ne düşünelim?

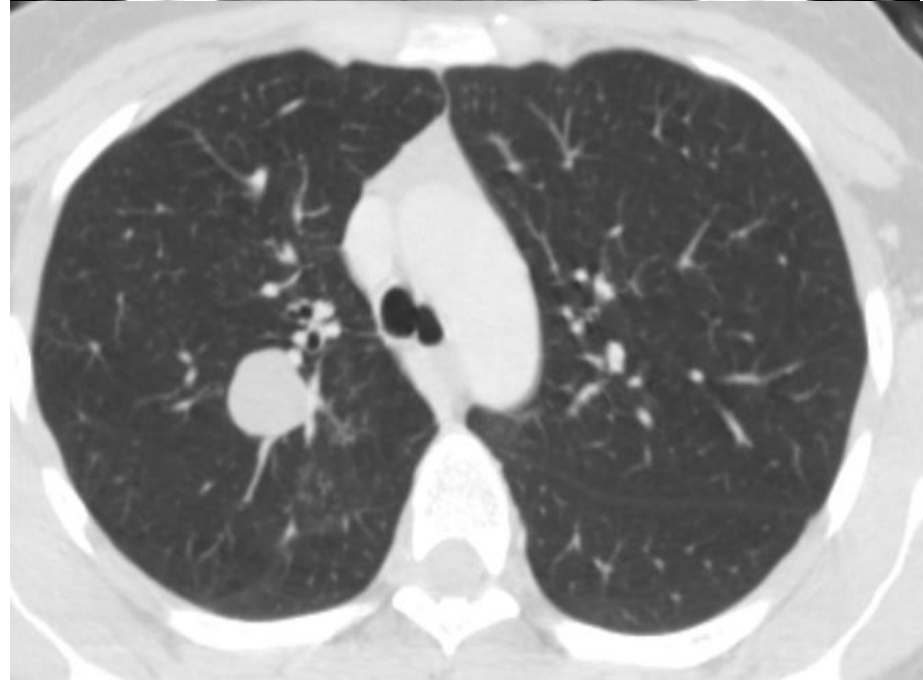
- A) Malignite
- B) Komplike kist hidatik
- C) Vaskülit
- D) Tüberküloz
- E) Fungal pnömoni





18.02.2016 –  
(20 gün önceki BT)





12.01.2016

# BT ve PET/BT bulguları eşliğinde ne yapalım?

- A) Bronkoskopi
- B) TTiAB
- C) Cerrahi
- D) Eski filmlere bakalım
- E) İzleyelim

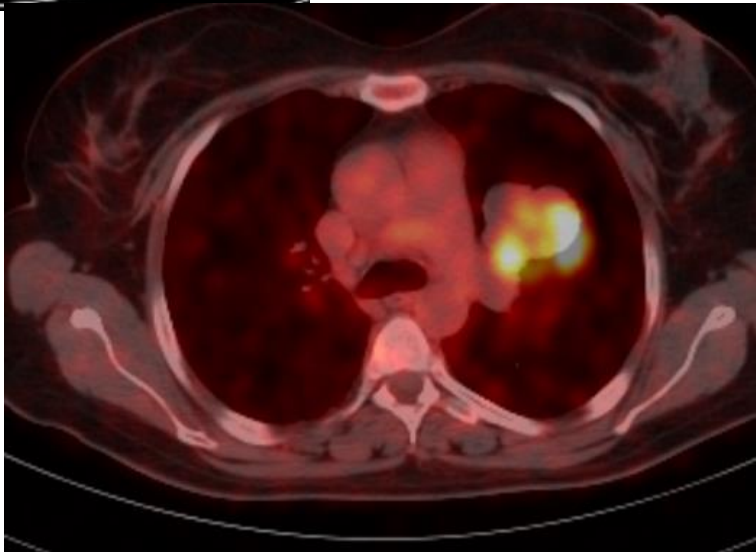
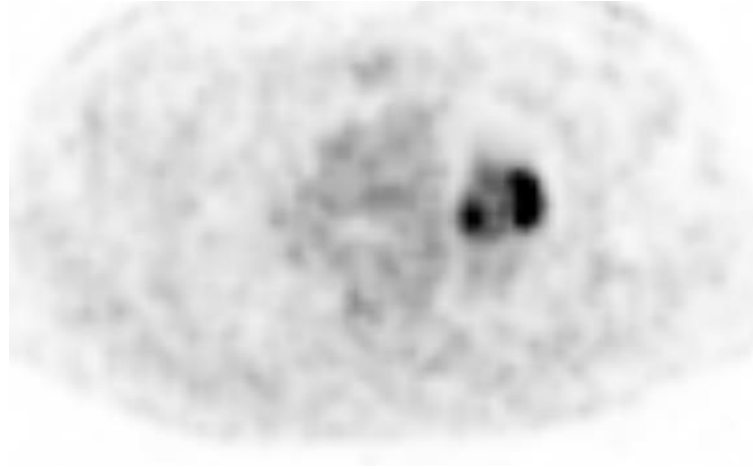
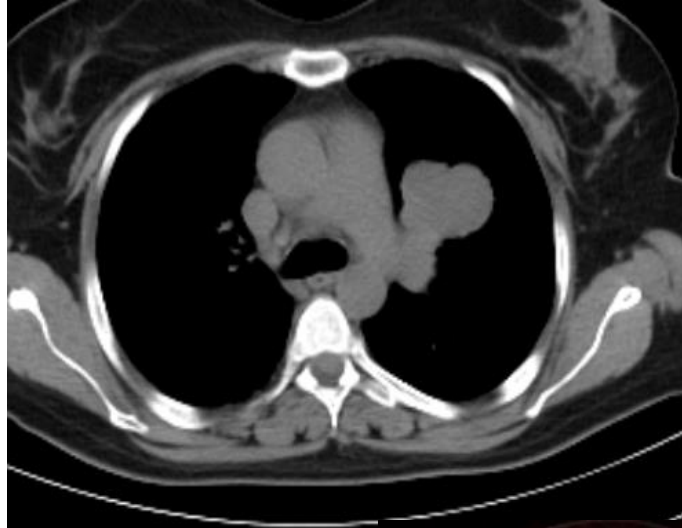
# Tanı için ne düşünelim?

- A) Malignite
- B) Komplike kist hidatik
- C) Vaskülit
- D) Tüberküloz
- E) Fungal pnömoni

## OLGU 3

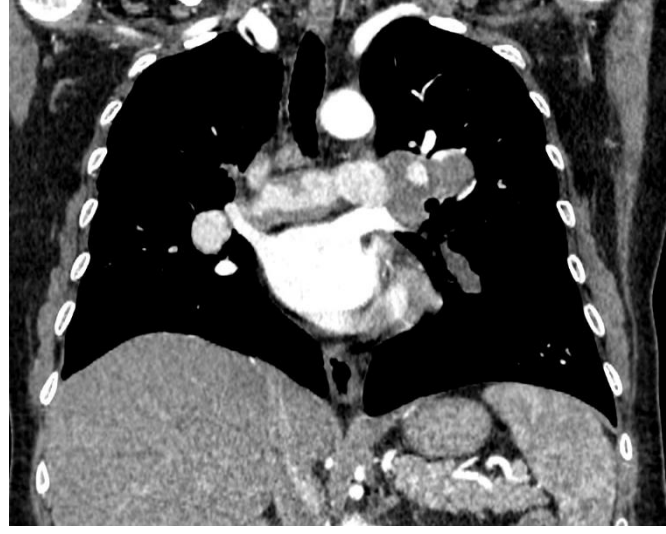
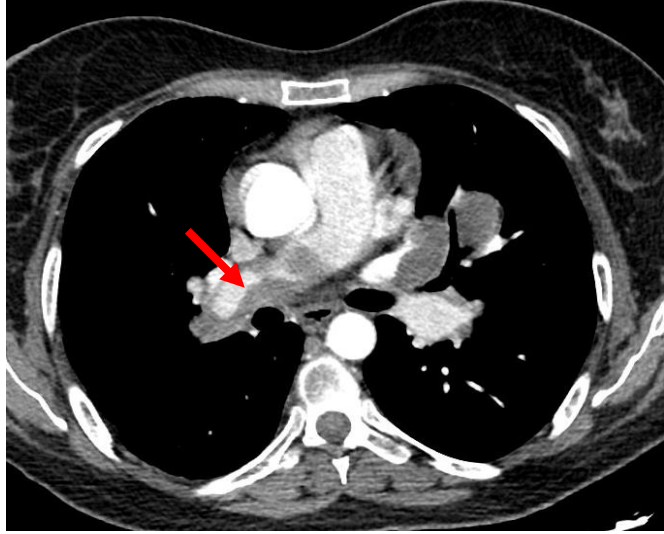
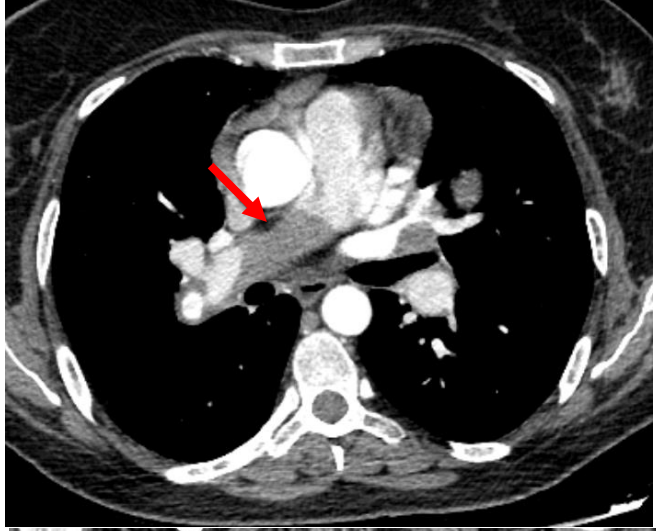
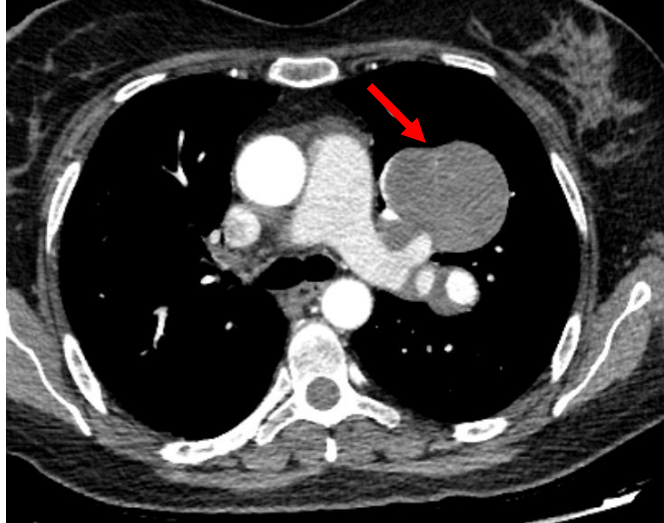
- 42 yaşında kadın
- Dış merkezde çekilen BT ve PET/BT de mevcut lezyon için İİAB amaçlı hasta tarafımıza gönderildi.
- Hastanın öksürük, hemoptizi şikayetleri uzun süreli mevcut.

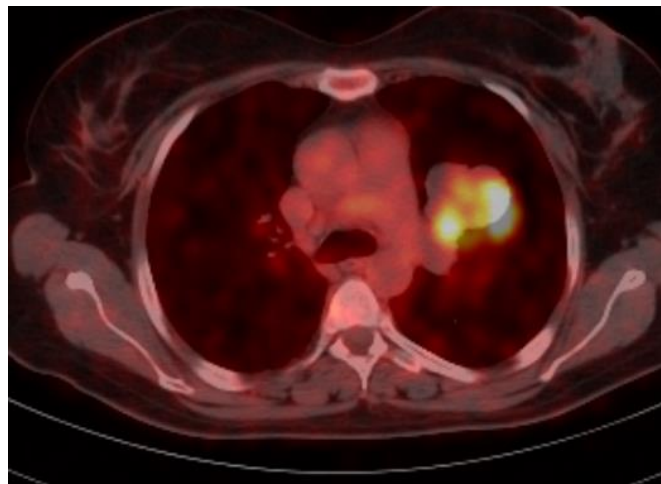
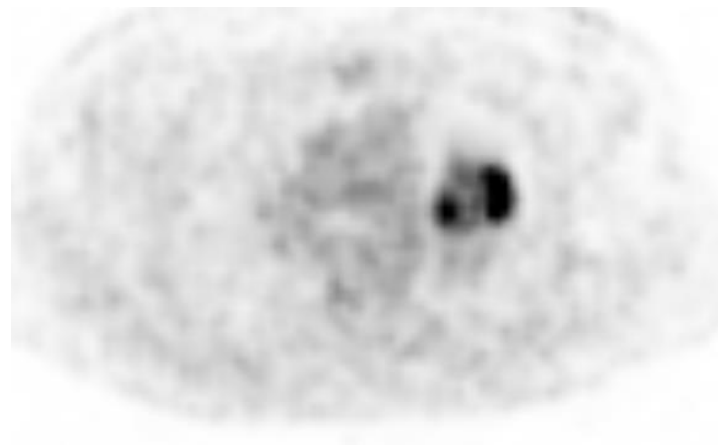
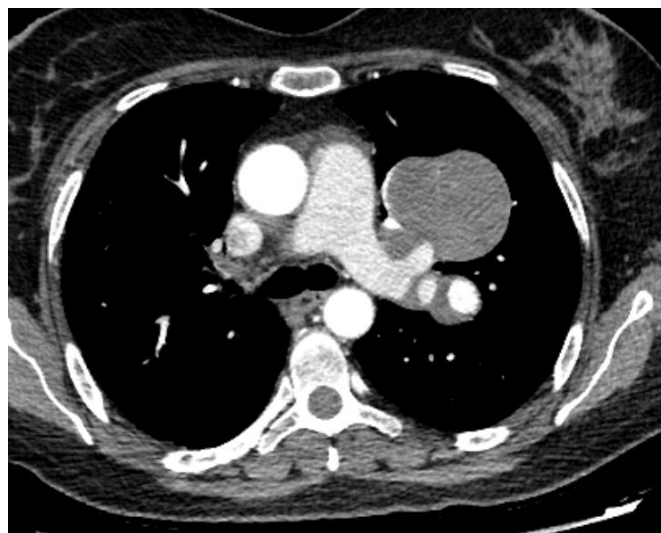
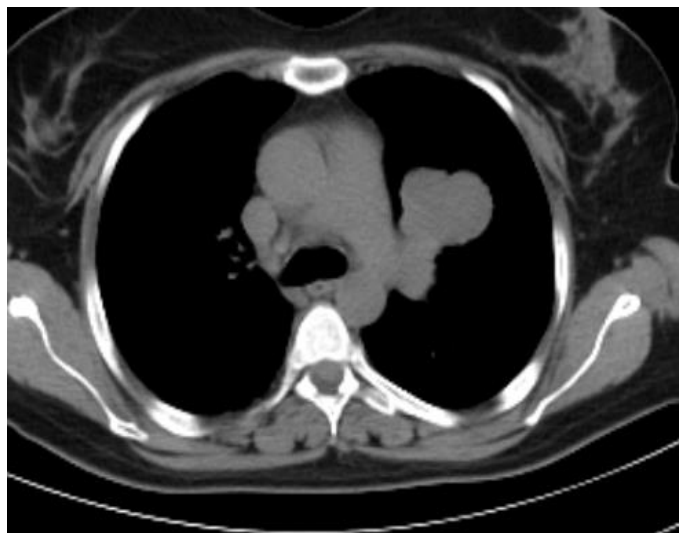




# Ne yapalım?

- A) İİAB için yeri uygun- Biyopsi yapalım
- B) Biyopsiye gerek yok direk opere edelim
- C) MR çekelim
- D) Kontrastlı BT çekelim
- E) Antibiyotik verip çekimi tekrarlayalım







# Behçet hastalığı

- Etiyolojisi bilinmeyen multisistemik inflamatuvar vaskülit.
- 30'lu yaşlarda kadınlarda sık
- Oral ve genital ülserasyon, okuler bulgular
- Aortik vaskülit, pulmoner arter anevrizmaları, trombüs ve buna sekonder parankimal bulgular, VCS sendromu...



## Chest CT Signs in Pulmonary Disease A Pictorial Review

Shine Raju, MD; Subha Ghosh, MD; and Atul C. Mehta, MD, FCCP

Comparison of the chest CT scans of the most important imaging modalities available to a pulmonologist. The advent of high-resolution CT scanning of the chest has led to its increasing use. Although chest radiographs are still useful as an initial test, their utility is limited in the diagnosis of lung diseases that depend on higher resolution images such as interstitial lung diseases and pulmonary vascular diseases. Several metaphoric chest CT scan signs have been described linking abnormal imaging patterns to lung diseases. Some of these are specific to a disease, whereas others help narrow the differential diagnosis. Recognizing these imaging patterns and CT scan signs are thus vitally important. In the present article, we describe a comprehensive list of the commonly encountered metaphoric chest CT scan signs and their clinical relevance.

CHEST 2017; 151(6):1356-1374

**KEY WORDS:** CAT scan; chest imaging; CT scan; pulmonary; radiology; review; thoracic

CT imaging of the chest plays a vital role in the diagnosis of various lung diseases. Although pulmonary diseases can vary in clinical presentation, the associated imaging patterns can be grouped into a few distinct patterns. Various metaphoric signs have been described to identify and simplify these patterns. Some of these signs, which have been well described in the imaging literature, are pathognomonic for a disease, whereas others can help narrow the list of differential diagnoses. These signs also help to create a unique association between an imaging pattern and the underlying disease process.

Understanding these imaging findings, and their subsequent pattern recognition, is thus of vital importance to a pulmonologist. The

present review is a pictorial essay of the important chest CT scan signs and the associated pulmonary diseases. Some of these signs have been described in chest radiographs as well as in CT imaging. We have included these signs in this review, having recognized an increasing trend of CT imaging being used as the initial imaging modality.

### General Considerations: The Secondary Pulmonary Lobule

It is important to review the basic structure of a secondary pulmonary lobule (SPL) and its radiologic appearance on a high-resolution CT (HRCT) scan image before we discuss the various CT scan signs. The SPL is a fundamental unit at the

**ABBREVIATIONS:** GGO = ground glass opacity; HRCT = high resolution CT; PJP = *Pneumocystis jirovecii* pneumonia; SPL = secondary pulmonary lobule

**AFFILIATIONS:** From the Respiratory Institute (Drs Raju and Mehta) and the Radiology Institute (Dr Ghosh), Cleveland Clinic, Cleveland, OH.

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## Radiographic Signs and Patterns in Interstitial Lung Disease

Ayesha Nasrullah, MBBS,\* Shaimaa Fadl, MBChB,\* Jitesh Ahuja, MBBS,\* Haodong Xu, MD, PhD,<sup>†</sup> and Gregory Kicska, MD, PhD\*

### Introduction

Thoracic computed tomography (CT), specifically high-resolution CTs (HRCTs), plays an essential role in diagnosing diffuse pulmonary lung disease. Although diffuse lung diseases often present with nonspecific radiographic findings, there are a small number of radiographic signs and patterns that are more specific and can be used to narrow the differential diagnosis.

### Honeycombing

Honeycombing is a term used to describe the presence of

distinguished IPF from cellular nonspecific interstitial pneumonia (NSIP) and fibrotic NSIP were the extent of honeycombing (odds ratio, 5.16 and 2.10, respectively).<sup>5</sup>

Honeycombing can sometimes constitute more than 70% of the fibrotic portions of the lungs in ILDs and this can be referred to as "exuberant honeycomb sign" (Fig. 1b and c). It is associated more commonly with connective tissue diseases (CTD) UIP rather than IPF UIP.<sup>6</sup> Honeycombing can be present in other conditions such as NSIP and chronic hypersensitivity pneumonitis (HP). However, ground glass opacities dominate in NSIP and honeycombing, if present, is usually minimal. Similarly, HP can also demonstrate honeycombing, but it is usually less extensive than in IPF. The presence of mosaic



## Radiologic Signs in Thoracic Imaging: Case-Based Review and Self-Assessment Module

Mark S. Parker<sup>1</sup>, Marvin H. Chassen<sup>2</sup>, Narinder Paul<sup>3</sup>

### ABSTRACT

#### Objective

Chest imaging remains one of the most important specialties of diagnostic radiology. The successful interpretation of thoracic imaging studies requires the recognition and understanding of the radiologic signs that are characteristic of many complex disease processes.

#### Conclusion

The educational objectives for this case-based self-assessment module are for the participant to exercise, self-assess, and improve his or her understanding of important thoracic radiologic signs that are useful in establishing the diagnosis of particular diseases of the chest.

#### INTRODUCTION

This self-assessment module on several radiologic signs used in thoracic imaging to assist radiologists in establishing a particular diagnosis of pathologic processes affecting the chest has a self-assessment component and an educational component. The self-assessment component consists of six previously unpublished case-based studies with accompanying clinical histories and radiologic images. These cases have been selected to illustrate specific radiologic imaging signs. A series of multiple-choice questions follows each case, with solutions and a discussion of that particular radiologic sign and its cause. The educational component consists of suggested readings or references that accompany each case that the participant should review. To claim CME and SAM credit, each participant must log on to the ARRS Website ([www.rrs.org](http://www.rrs.org)) and enter his or her responses to the questions online.

#### EDUCATIONAL OBJECTIVES

By completing this educational activity, the participant will: A. Exercise, self assess, and improve his or her understanding of selected radiologic signs useful in establishing a particular diagnosis of pathologic processes affecting the chest.

B. Exercise, self assess, and improve his or her understanding of the underlying cause for these particular imaging signs.

**REQUIRED ACTIVITY**  
This interactive case scenarios presented in this article.

#### RECOMMENDED READING

1. Woodring JH, Reed JC. Radiographic manifestations of lobar atelectasis. *J Thorac Imaging* 1996; 11:109-144
2. Catalano O. The incomplete border sign. *Radiology* 2002; 225:129-130
3. Chung M, Edinburgh K, Webb E, McCovin M, Webb W. Mixed infiltrative and obstructive disease on high-resolution CT: differential diagnosis and functional correlates in a consecutive series. *J Thorac Imaging* 2001; 16:69-75
4. Whitten CR, Khan S, Muncke GJ, Grubnic S. A diagnostic approach to mediastinal abnormalities. *Radiographics* 2007; 27:657-671
5. Ferguson EC, Krishnamurthy R, Oldham SA. Classic imaging signs of congenital cardiovascular abnormalities. *Radiographics* 2007; 27:1323-1334
6. Marshall GB, Farnquist BA, MacGregor JH, Burrows PW. Signs in thoracic imaging. *J Thorac Imaging* 2006; 21:76-89

#### INSTRUCTIONS

1. Complete the educational and self-assessment components included in this issue.
2. Visit [www.rrs.org](http://www.rrs.org).
3. Order the online SAM as directed. (The SAM must be ordered to be accessed even though the activity is free to ARRS members.)
4. The SAM can be accessed at [www.rrs.org](http://www.rrs.org) under the Lifelong Learning link.
5. Answer the questions online to obtain SAM credit.

# BT'de işaretler

TABLE 3 ] Tabular Summary of Common CT Signs on Pulmonary Imaging

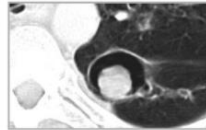
### Air crescent sign

- Crescentic or circumferential rim of radiolucent airspace within a parenchymal consolidation or nodular opacity
- DDx: Invasive aspergillosis, bronchogenic Ca



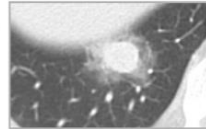
### Monod sign

- Air surrounding a fungal ball in a preexisting pulmonary cavity.
- DDx: Aspergilloma



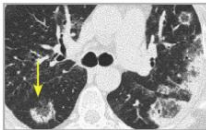
### Halo sign

- SPN or mass surrounded by a circumferential GGO
- DDx: invasive pulm aspergillosis, pulm mucormycosis, GPA, amyloidosis, sarcoidosis, mets to the lung



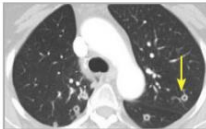
### Atoll sign (reverse-halo sign)

- Central GGO surrounded by a crescentic or circumferential denser consolidation
- DDx: COP, IFI, PJP, LG, GPA, lipid pna, sarcoidosis, paracoccidioidomycosis



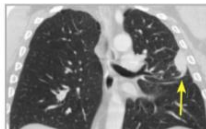
### Cheerio sign (open bronchus sign)

- Pulmonary nodule with a central lucency
- DDx: Pulm adeno Ca, PLCH, primary and metastatic lung malignancy, rheumatoid nodules, GPA



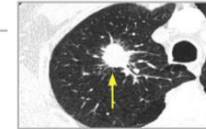
### Comet tail sign

- Curvilinear pleural based opacity directed towards the ipsilateral hilum
- DDx: Rounded atelectasis



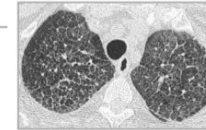
### Corona radiata (sunburst sign)

- SPN or mass, with spiculated and irregular margins
- DDx: Bronchogenic Ca



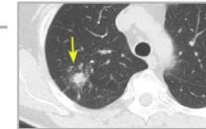
### Crazy paving sign

- Thickened interlobular septa in a background of diffuse GGO's.
- DDx: PAP, pulm edema, lymphangitic spread of malignancy, pulm mucinous adeno Ca, sarcoidosis, lipid pna, pulm hge, ARDS, PJP



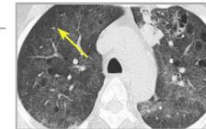
### Galaxy sign

- Coalescent granuloma with a central dense mass and tiny peripheral satellite nodules
- DDx: Sarcoidosis, progressive massive fibrosis, active pulm TB.



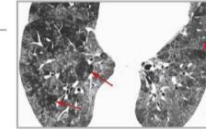
### Mosaic attenuation

- Variable attenuation seen on a chest CT in a lobular or multilobular distribution.
- DDx: BO, CTEPH, PJP, CEP, HP, COP



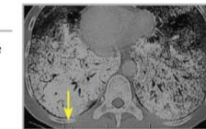
### Head cheese sign

- Juxtaposition of distinct radiographic areas of low, normal and high attenuation
- DDx: sub-acute HP, sarcoidosis, RB, Mycoplasma pna



### Sand storm sign

- Diffusely dense pulmonary micronodular calcifications. Note the black pleural line sign (arrow)
- DDx: PAM





# SONUÇ:

- Çok geniş bir konu
- Radyolojik veriler birbirine benzeyebilir
- Ayırtetmek; bilgi, tecrübe ve iyi karar verebilme yeteneğine bağlı
- Ancak tanıya götürmeye yardımcı bulgular mutlaka klinik verilerle birleştirilmelidir.

