Must Know Images in Acute Cardiac and Pulmonary Diseases

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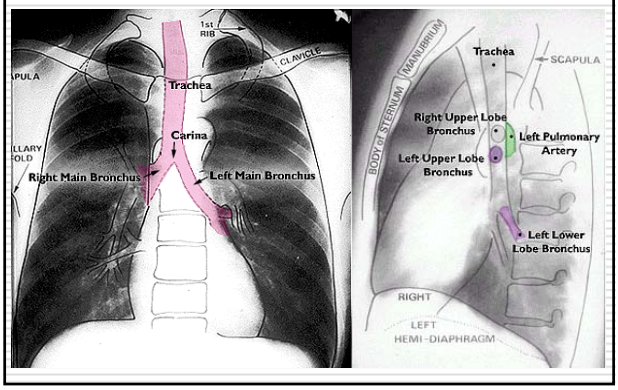
胸部X光之判讀原則 整體觀察（ I ）

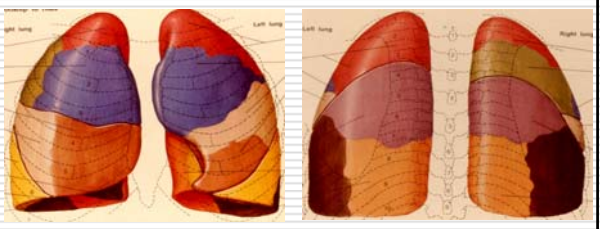
- 是否為理想之X光？
  - X光投射角度是否正確:胸椎棘突在兩鎖骨之正中央
  - 範圍須包括胸廓整體
  - 深吸氣橫膈膜位置在前胸達第六肋骨，後背達第十肋骨
  - 肩胛骨須完全移開
  - 氣管及分歧部須隱約可見

胸部X光之判讀原則 整體觀察（ II ）

- 是否為理想之X光？
  - 心臟後方之肺紋須隱約可見
  - 胸椎之椎間盤間隙須隱約可見
  - 可清楚見到軟組織，如乳房、胸鎖骨乳突肌、大胸肌，但不致遮蔽肺部組織
  - 可清楚定出心臟、縱膈腔、橫膈膜之邊界
  - 可清楚見到肺門血管及橫裂



Anatomy of the Lung



Standing Chest PA

1. Cardiac/thoracic ratio
2. Pulmonary vasculature
3. Mediastinal contour
4. Hila

Key Observation of Four Clinical Questions

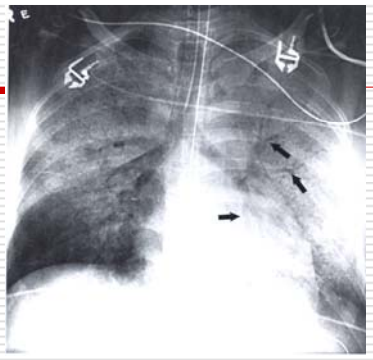
- CHF- hear size, shape, LA size, hilar contour, vascular redistribtution, azygous v, Kerley's B lines, effusions
- Chest Pain-Aortic contour, heart size and shape, CHF signs, air bronchogram (pleural based), effusion, pneumothorax
- Pneumonia- reticular opacities, air bronchogram, silhouette signs, effusion, hilar contour, volume loss
- Lung tumor-Mass, tracheal margin, retrotracheal space, mediastinal nodes, hilar contour, volume loss, effusion

Specific Signs

Opacity

Opacity

- Mediastinum-smooth, well-define contour, contiguous with mediastinum, no air-bronchograms
- Pleura- no definable edge, a smooth sharp contour on one side only, contiguous with chest wall on at least one view
- Parenchyma- any kind of contour (smooth, irregular, sharp or indistinct), located anywhere, can have air-bronchogram



ARDS- air bronchogram

Abnormal Lucencies

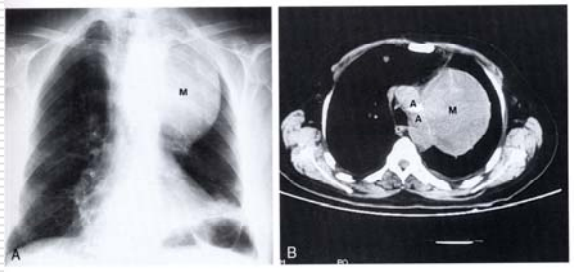
- Radiolucency-Too black
- Definable border- ring shadows, cyst, cavity, etc.
- Generalize-
  1. Chest wall loss- mastectomy
  2. Emphysema
  3. Pneumothorax
  4. Oligemia
  5. Obstructive- air trapping

Pneumothorax

Silhouette Sign

- Positive- when lesion is in direct contact with normal structure
- Negative- “overlie”, lesion not directly contact with normal structure

Left and Right showed RML and RLL pneumonia



Middle mediastinal mass obscures aortic arch silhouette

胸部X光判讀之訣竅

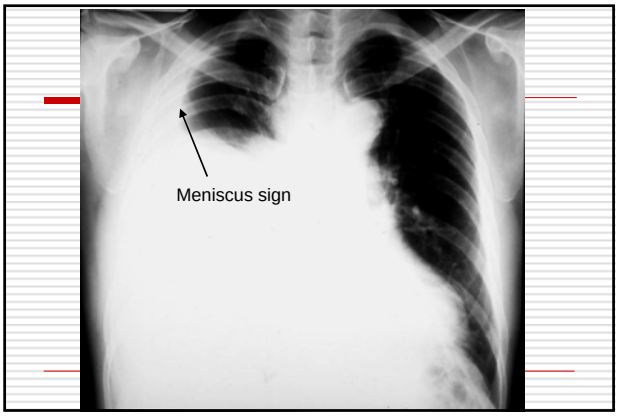
- 了解胸廓之正常解剖學結構
- 了解胸部X光照射之原理及其對疾病鑑別診斷之能力與限制
- 作系統性的分析
- 熟悉特殊之X光影像表徵及其代表之意義
- 綜合病史理學檢查結果及X光影像之發現做出合理的判斷
- 盡可能參考先前之X光片

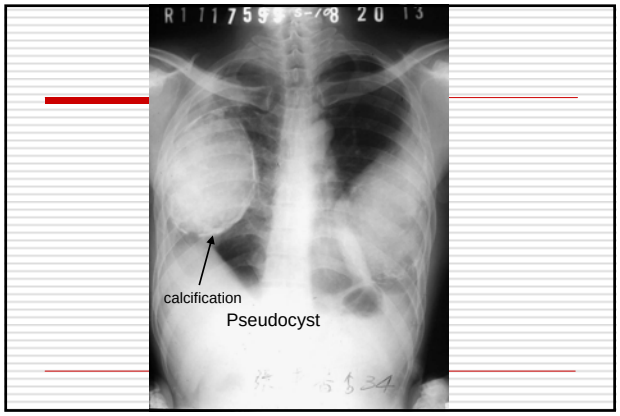
Patterns and Differential Dx

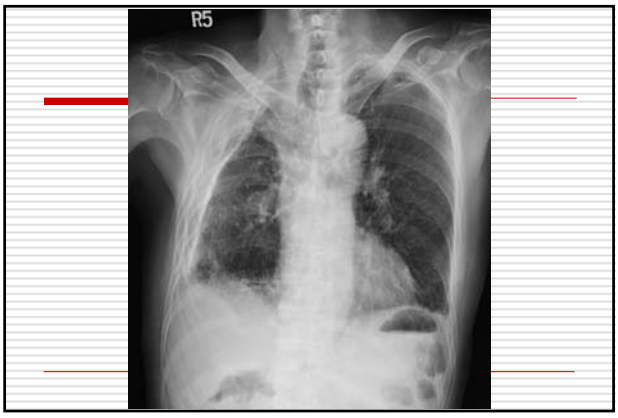
- Pleural lesion
- Atelectasis
- Air-space Opacity
- Hyperlucent abnormality
- Interstitial pattern
- Nodular/Mass pattern
- Mediastinum and hilum lesion
- Chest wall and diaphragm lesion

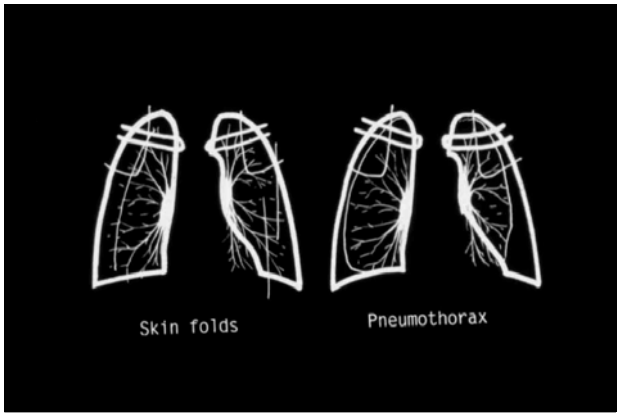
Pleura

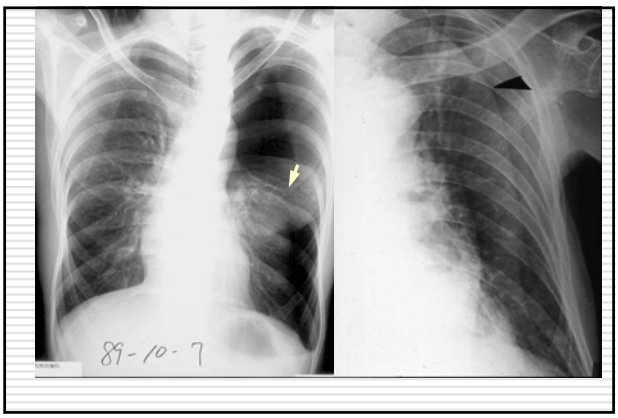
- Thickening
- Fluid: costophrenic angle, dome of the diaphragm, meniscus sign, lamellar shadow
- Air: pneumothorax, air-fluid level
- Interlobar fissure
- Calcification

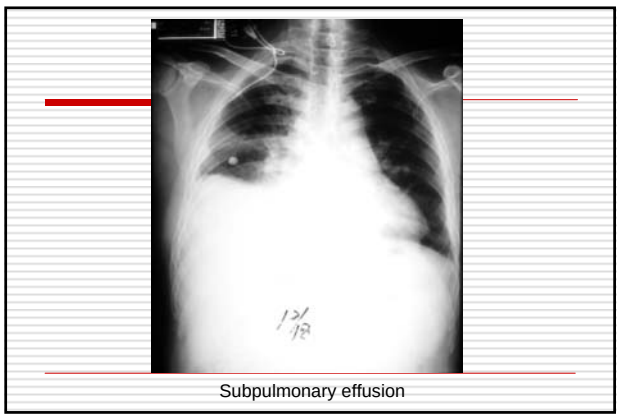






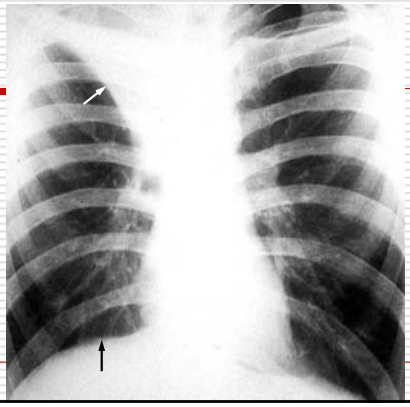


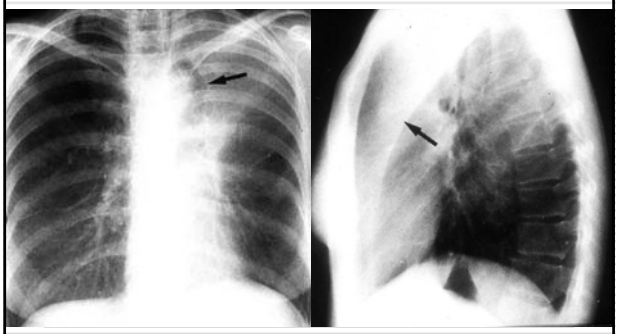


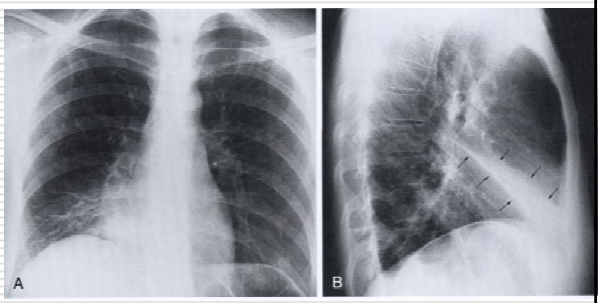

Subpulmonary effusion

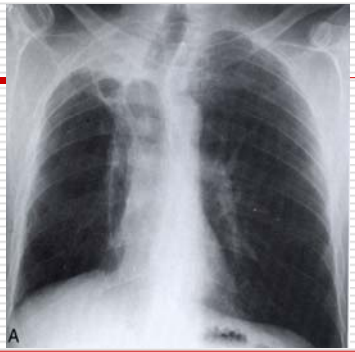
Atelectasis

- Direct signs
  - Increased density (atelectatic shadow)
  - Displacement of fissures
  - Displacement of pulmonary vessels
  - Displacement of major bronchi
- Indirect signs
  - Mediastinal shift
    - trachea, heart
  - Compensatory overexpansion of the adjacent lobe
  - Hemidiaphram elevation
  - Narrowing of the ICS between the affected ribs



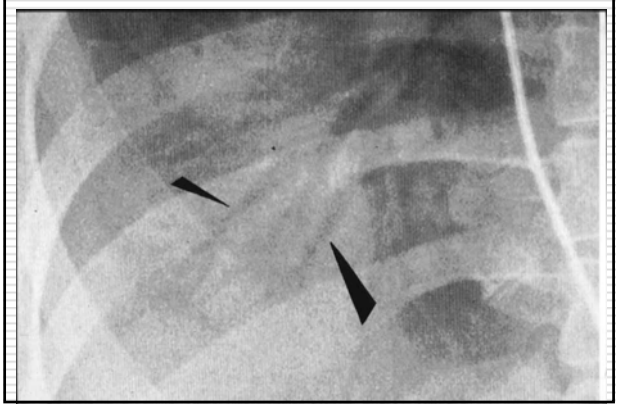




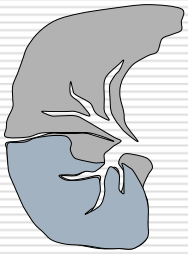


Alveolar (Air-space) pattern

- Lobar or segmental distribution
- Poor margination of the process
- Tendency of the process to coalesce
- Air bronchogram and air alveologram
- “Butterfly” or “bats wing”distribution of the process



Lobar consolidation



CT patterns

- Lobar consolidation
- Bronchopneumonia
- Interstitial pneumonia
- Bronchiolitis

APSR_2006_Kyoto

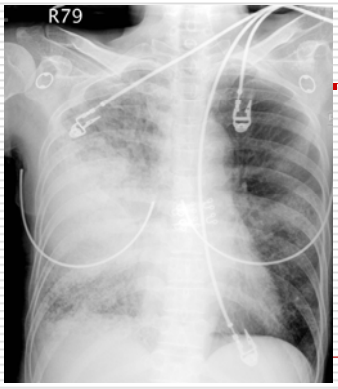
Legionellosis

Urinary antigen (+)
Legionella antibody 1:128 (+)

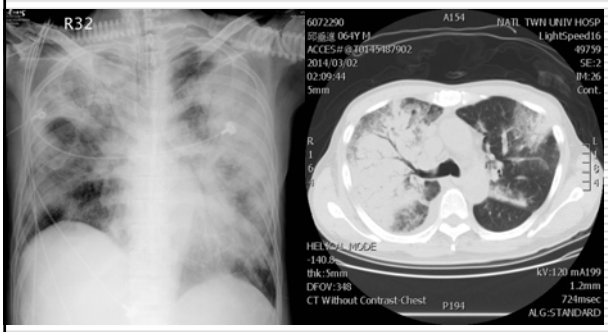
50 y/o, F, DM

Sputum /blood cultue:

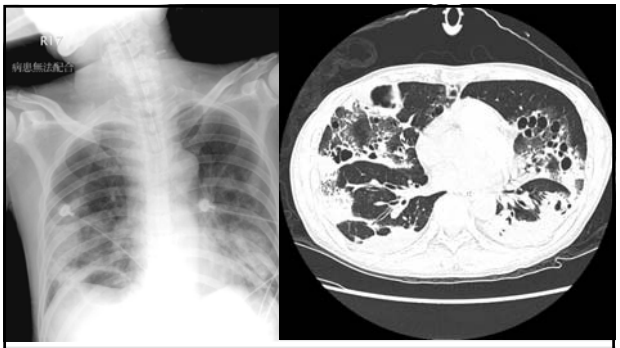
PRSP



Pneumoncoccus pneumonia



Multilobar pneumonia- Legionella



52 y/o M

Multilobalr pneumonia,
Cavitations, pneumatocels

B/C, S/C: MRSA

Multiple patchy consolidation

CT patterns

- Lobar consolidation
- Bronchopneumonia
- Interstitial pneumonia
- Bronchiolitis

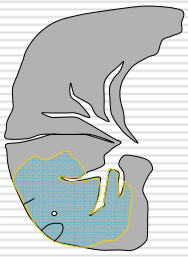
APSR_2006_Kyoto

S/C, B/C: KP

86 M

SARS

Ground glass opacity



CT patterns

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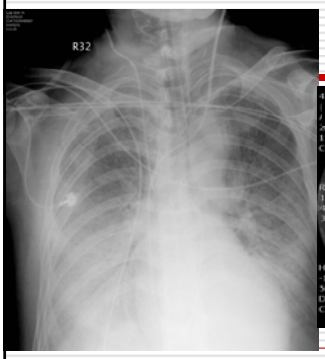
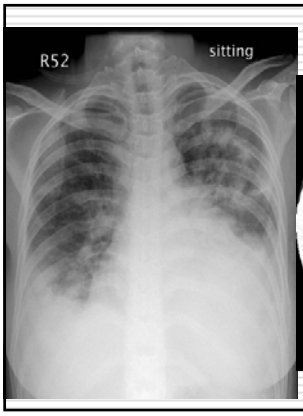
APSR_2006_Kyoto

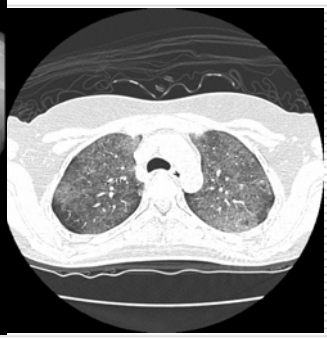


Influenza A

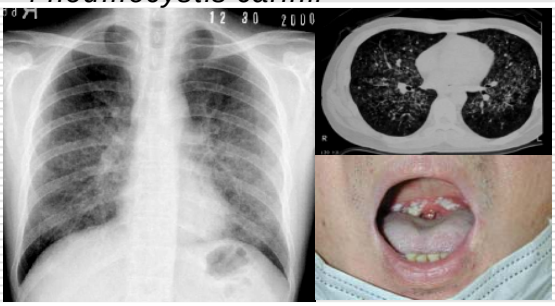


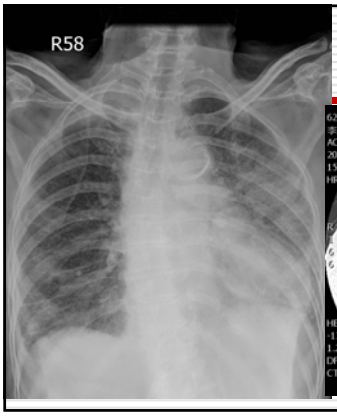
Influenza A

PJP



Pneumocystis carinii





TKI Interstitial pneumonitis

Pneumonia - Chest X Ray

Franquet T. Eur Respir J 2001;18:196

Radiographic findings	Clinical circumstance	Organisms
Lobar consolidation	Community-acquired	*S. pneumoniae*, *K. pneumoniae*
Segmental consolidation	Community-acquired	*S. pneumoniae*, *M. pneumoniae*
Bronchopneumonia	Hospital-acquired streptococci, GNB,	*P. aeruginosa*, *S. aureus*, Anaerobes
Interstitial pneumonia	Community-acquired	Virus, *M. pneumoniae*
Cavitations	Aspiration, COPD	*S. aureus*, GNB, anaerobes, *M. tuberculosis*
Multiple cavitary nodules	Drug addicts	*S. aureus*
Pneumatoceles	Postinfluenza	*S. aureus*
Chest wall invasion	Alcoholic	Actinomycosis, *M. tuberculosis*, Fungi
Lymphadenopathy		*M. pneumoniae*, *M. tuberculosis*

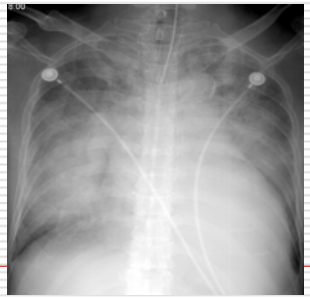
Pulmonary Edema and ARDS

Hydrostatic Lung Edema

- CT-
  1. Smooth interlobular septal thickening
  2. Patchy ground-glass opacity
  3. Smooth peribronchovascular interstitial thickening
  4. Smooth subpeural or fissural thickening
  5. Dependent, perihilar, or lower lung predominance

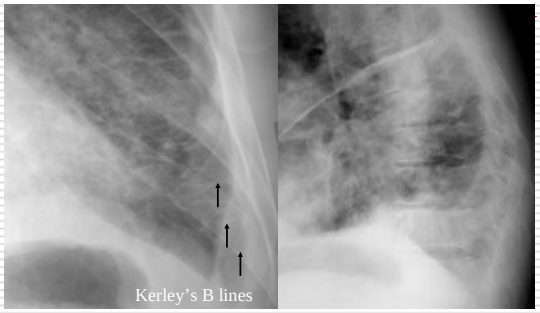
Aortic stenosis with fluid overload

AMI papillary m rupture severe MR pulmonary edema

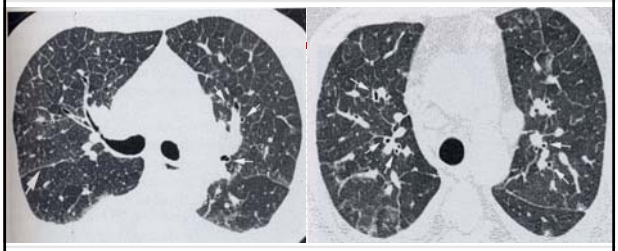


"Butterfly" or "bats wing"distribution

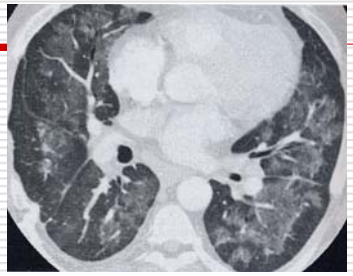
Cardiogenic pulmonary edema



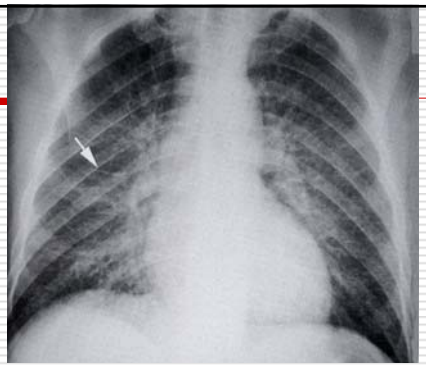
Kerley's B lines



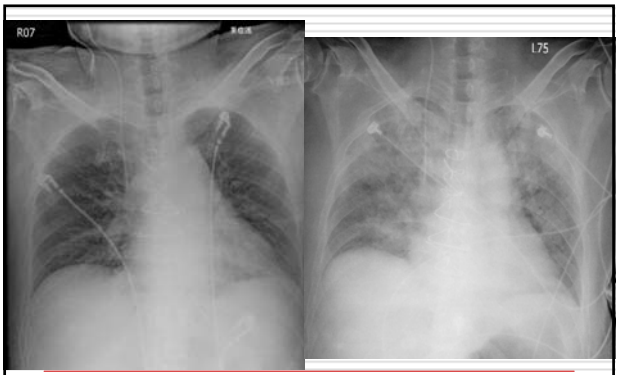
Interlobular septal thickening; fissure edema; bronchial wall thickening; GGO; pleural effusion



Patchy perihilar ground-glass opacity



Aortic stenosis with fluid overload



Septic shock, liver abscess

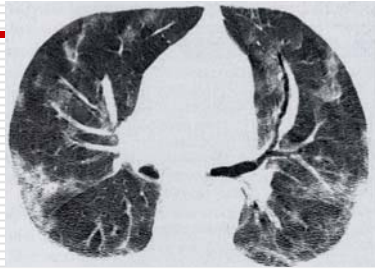
s/p Fluid Challange

s/p CVVHD, diuretics and IF NTG

Permeability Lung Edema-ARDS

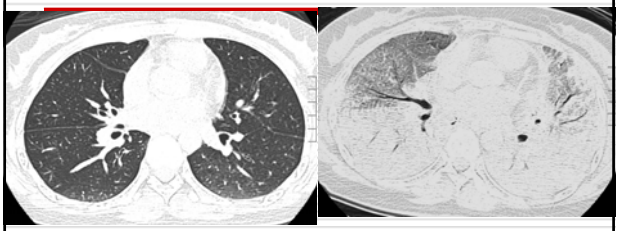
CT-

1. Diffuse or patchy ground-glass opacity or consolidation*
2. Centilobular opacities
3. Interlobular septal thickening
4. Dependent predominace
5. Peripheral distribution*
6. Anterior lung fibrosis with healing



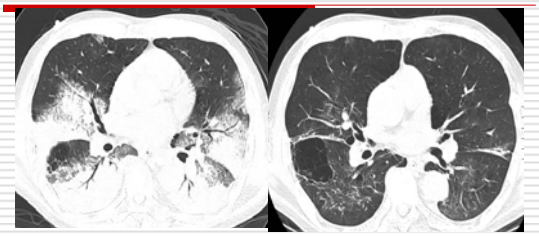
Sepsis/ARDS- patchy peripheral consolidation and GGO

ARDS



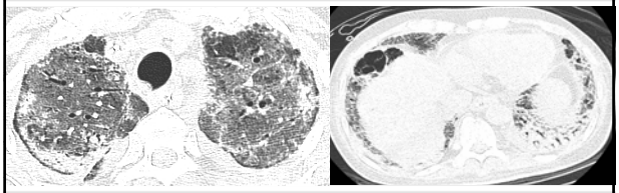
AML/ARDS-Consolidations at the bilateral dependent parts of lung, ~~and diffuse ground glass opacity at non-dependent parts of lung;~~ vertical ventral-dorsal gradient

ARDS

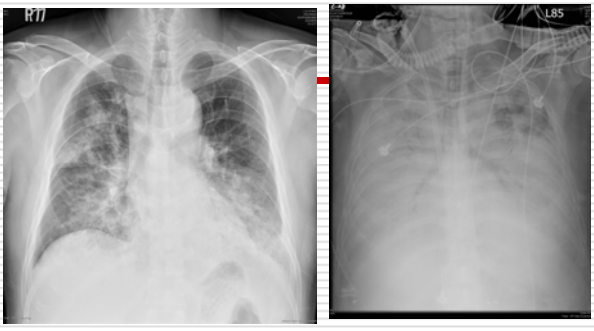


Pneumonia/ARDS- Bilateral consolidation on dependent parts; fibrosis during late stage

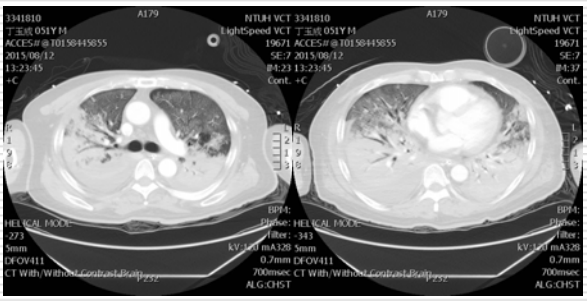
ARDS-complication



Pneumonia/ARDS-Bilateral GGO; supleural cysts



51 y/o man, productive cough with fever for 4 days. Severe dyspnea was noted on 2015/08/08



Community-acquired pneumonia, accompanied by septic shock with respiratory failure , ARDS

s/p Tazocin + cravit, solumedrol, iNO, VV ECMO

Community-acquired pneumonia, accompanied by septic shock with respiratory failure, s/p ETT+MV and VV-ECMO, suspected Mycoplasma pneumonia
Acute Respiratory distress syndrome