

# After the Chest X-Ray: What To Do Next

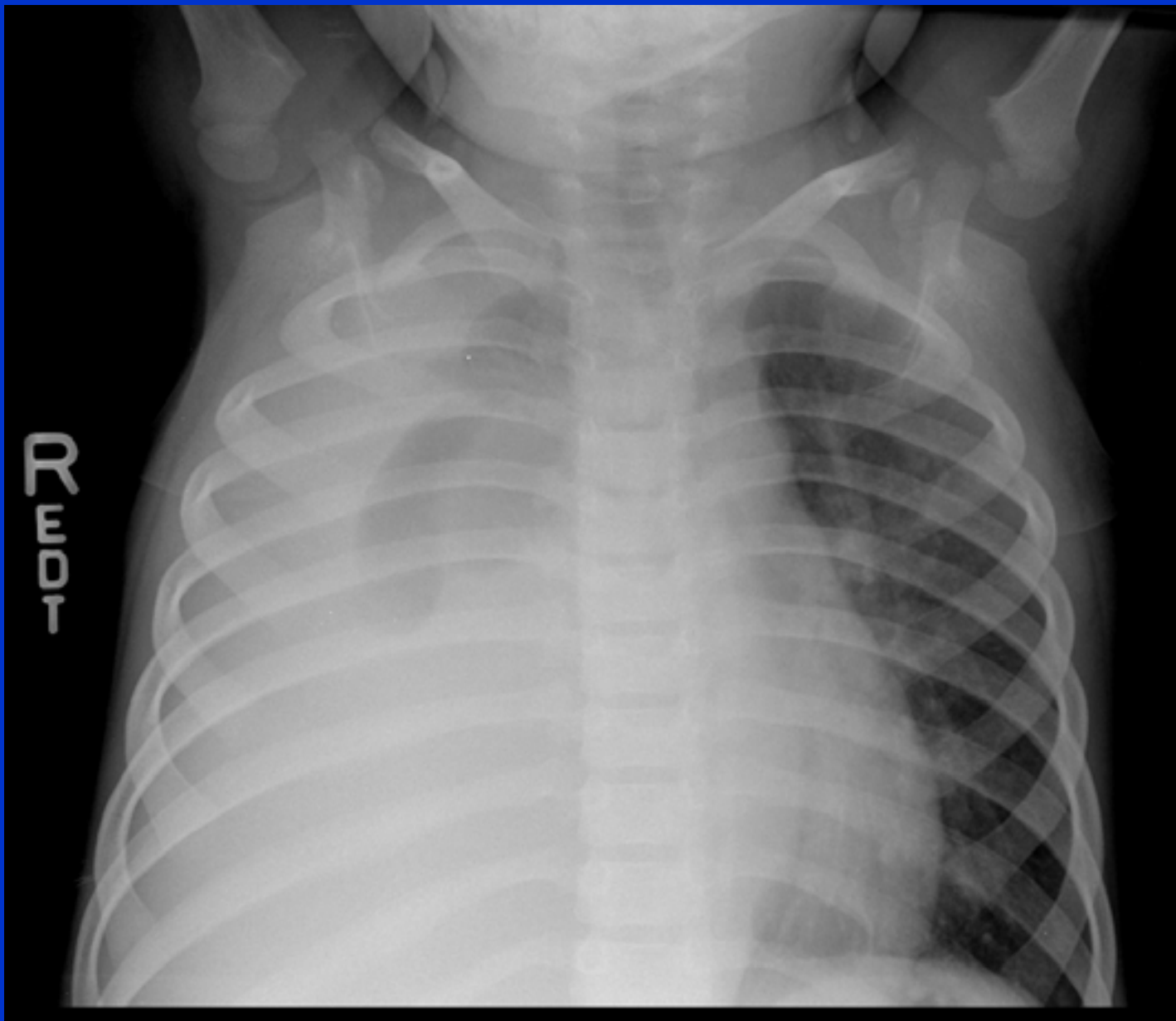
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# What Should We Do Next?

- CT scan?
- Conventional or High-Resolution?
- With or without contrast?
- CT angiogram?
- Ultrasound?
- Magnetic Resonance Imaging?

# What Should We Do Next?

- History and physical examination will lead us
  - Infection?
  - Tumor?
  - Congenital abnormality?
- To order the right study, we must speak the same language

# The Language of CT Scanning

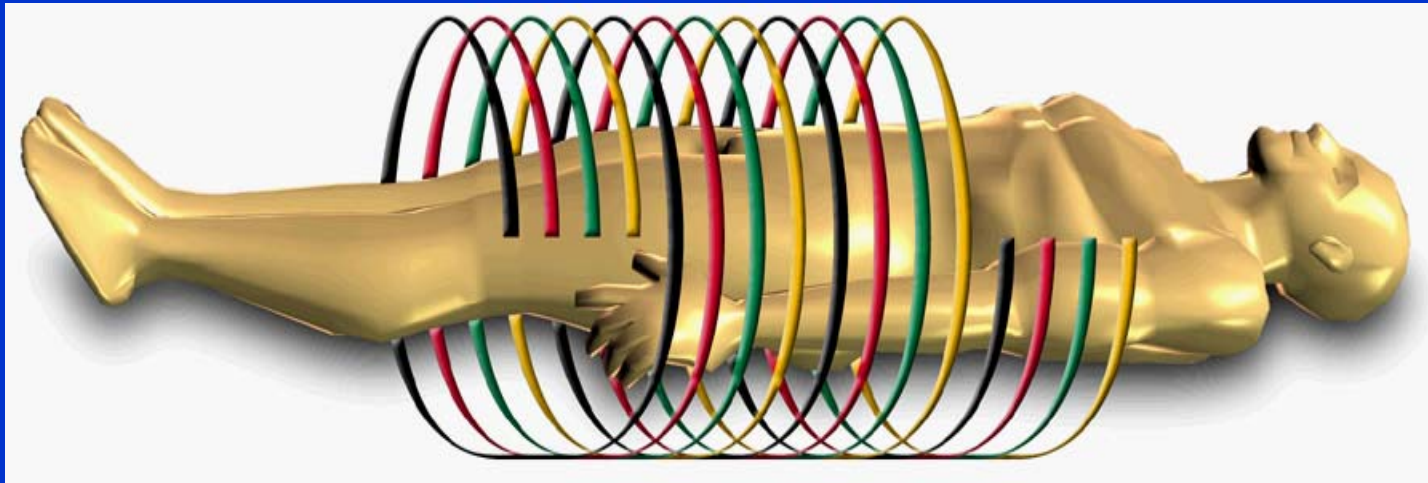
- Helical or Spiral
- Axial
- Multislice
- Contrast or noncontrast
- High-resolution
- CT angiography

# Axial CT Scanning

- The patient table moves to the location for the slice
- The table stops while the X ray tube rotates around the patient
- The table moves to the next location
- This pattern continues for all slices
- High-resolution CT uses axial scanning

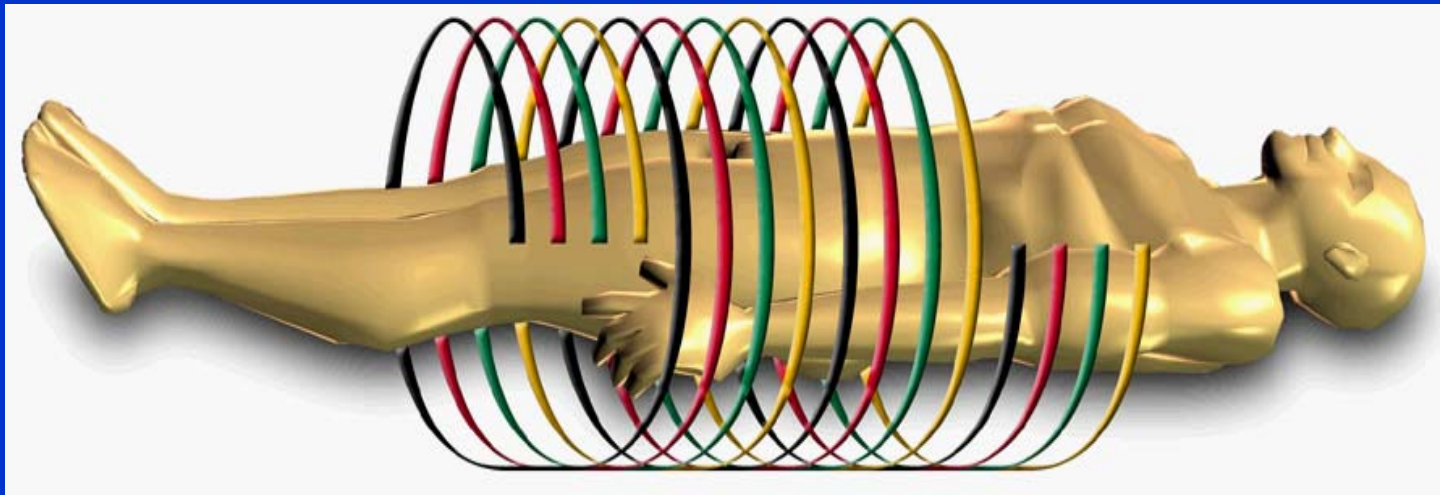
# Helical (Spiral) CT Scanning

- The patient moves through the CT scanner while the X-ray tube rotates around him or her



# Multislice Imaging

- 4 to 64 slices are obtained during each rotation
- Multislice imaging is a type of helical imaging



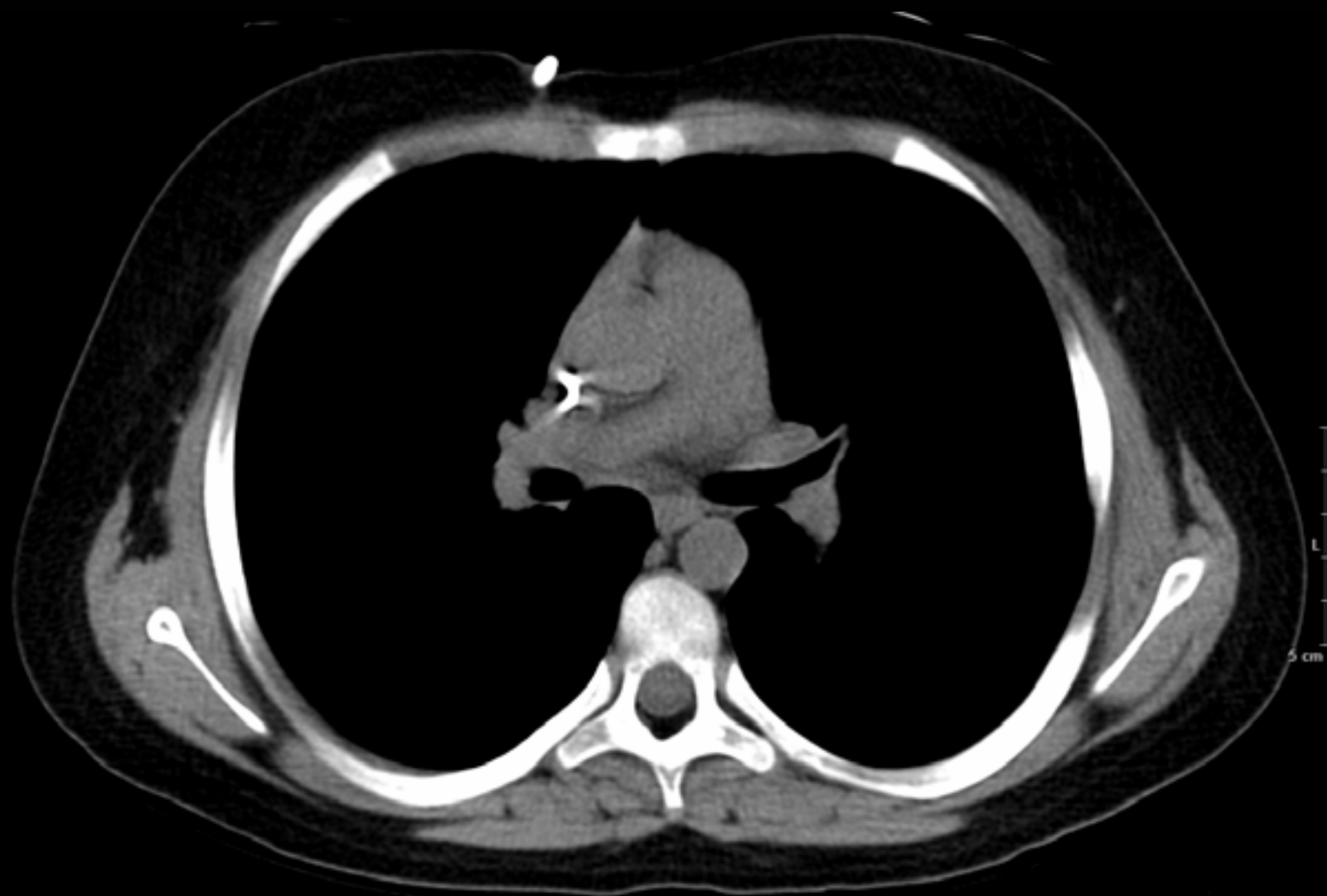


# Helical CT

- Helical scanning is faster and provides higher quality images
- Multislice scanning is still faster; a complete chest CT can be completed in less than 10 seconds
- If possible all conventional CT should be performed with helical imaging

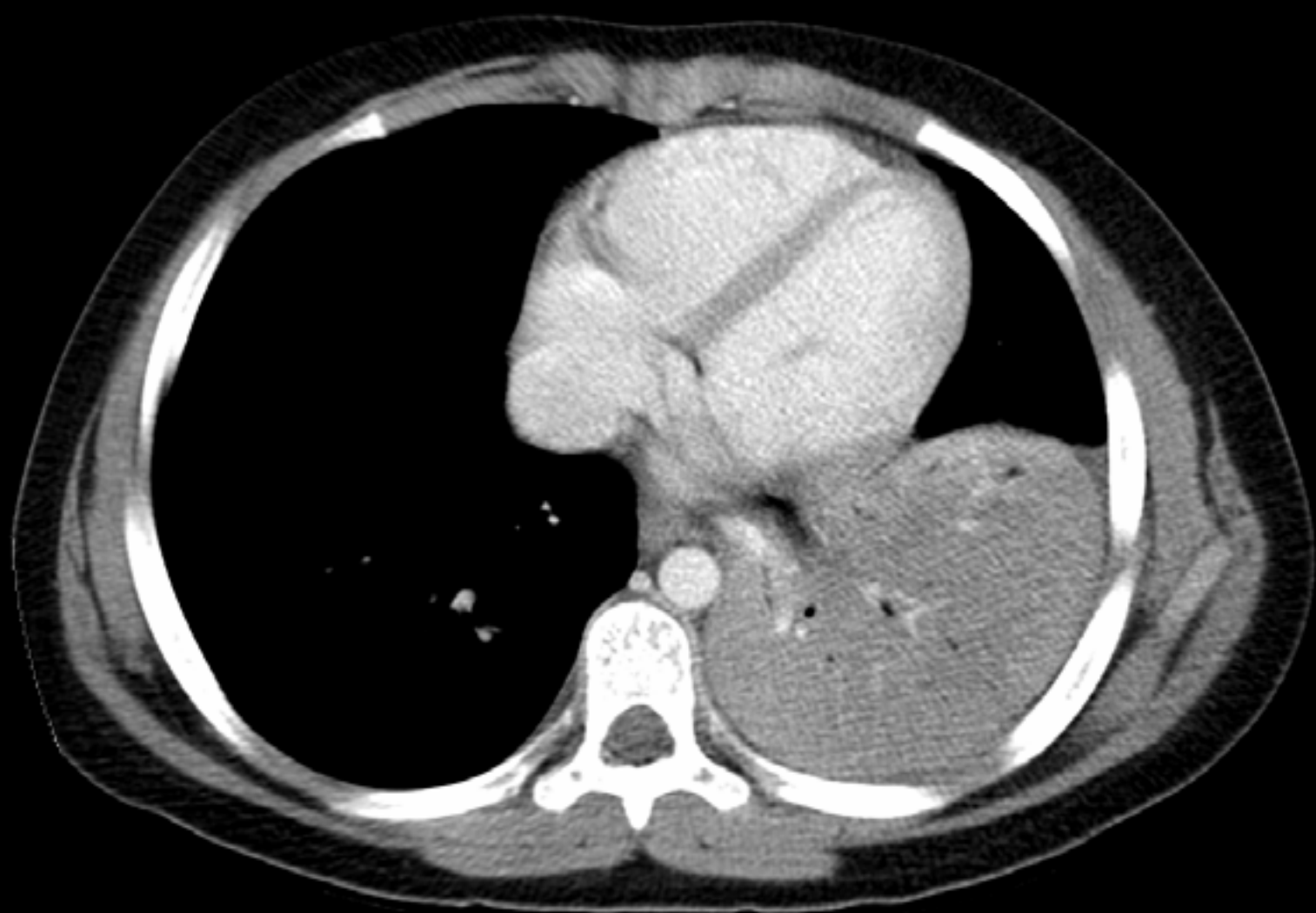
# Intravenous Contrast

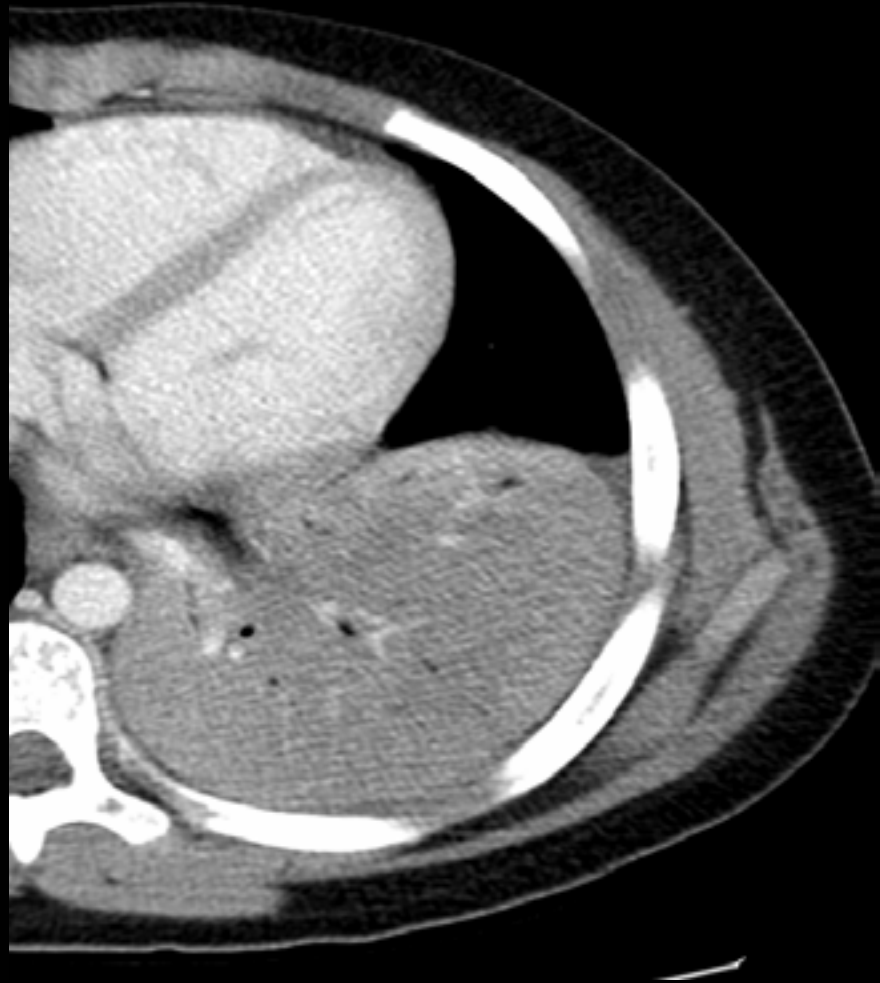
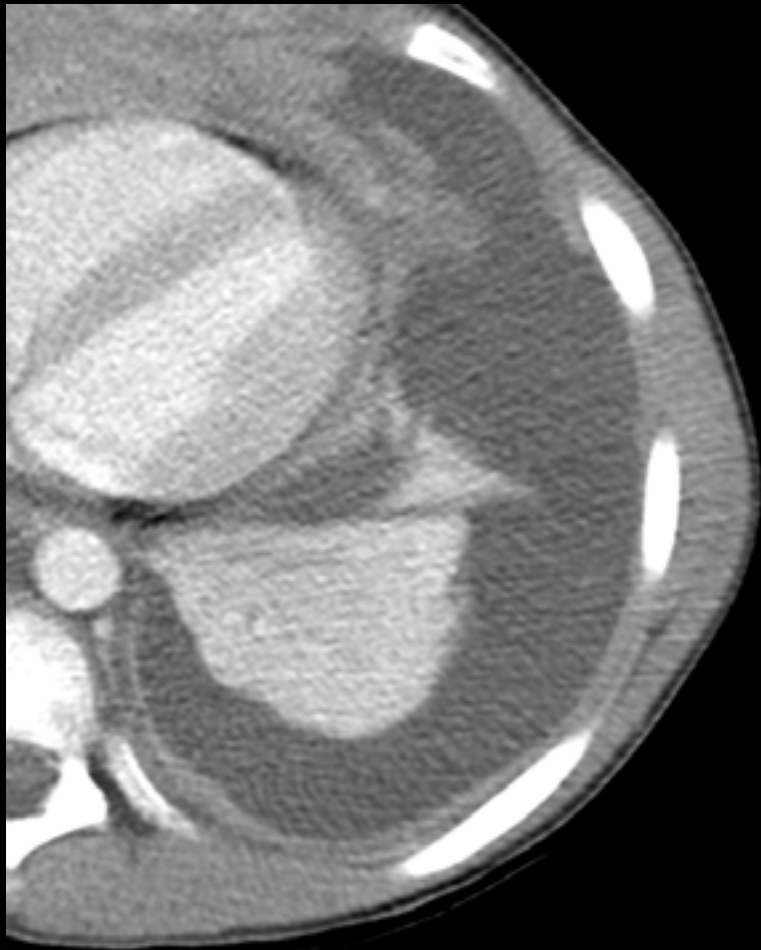
- When in doubt, use IV contrast
- Evaluation of the mediastinum and hila is very difficult without contrast
- Contrast helps tell atelectasis from pneumonia or tumor











# Intravenous Contrast

- Do not use IV contrast for:
  - Parenchymal lung metastases
  - Subtle calcifications (may do without and with contrast)



# High-Resolution CT

- Useful only for diffuse or widely distributed abnormalities
- If a small abnormality is likely to change the diagnosis, HRCT is the wrong study
- In a 5 year old an HRCT includes a total of 1 inch of the lung parenchyma

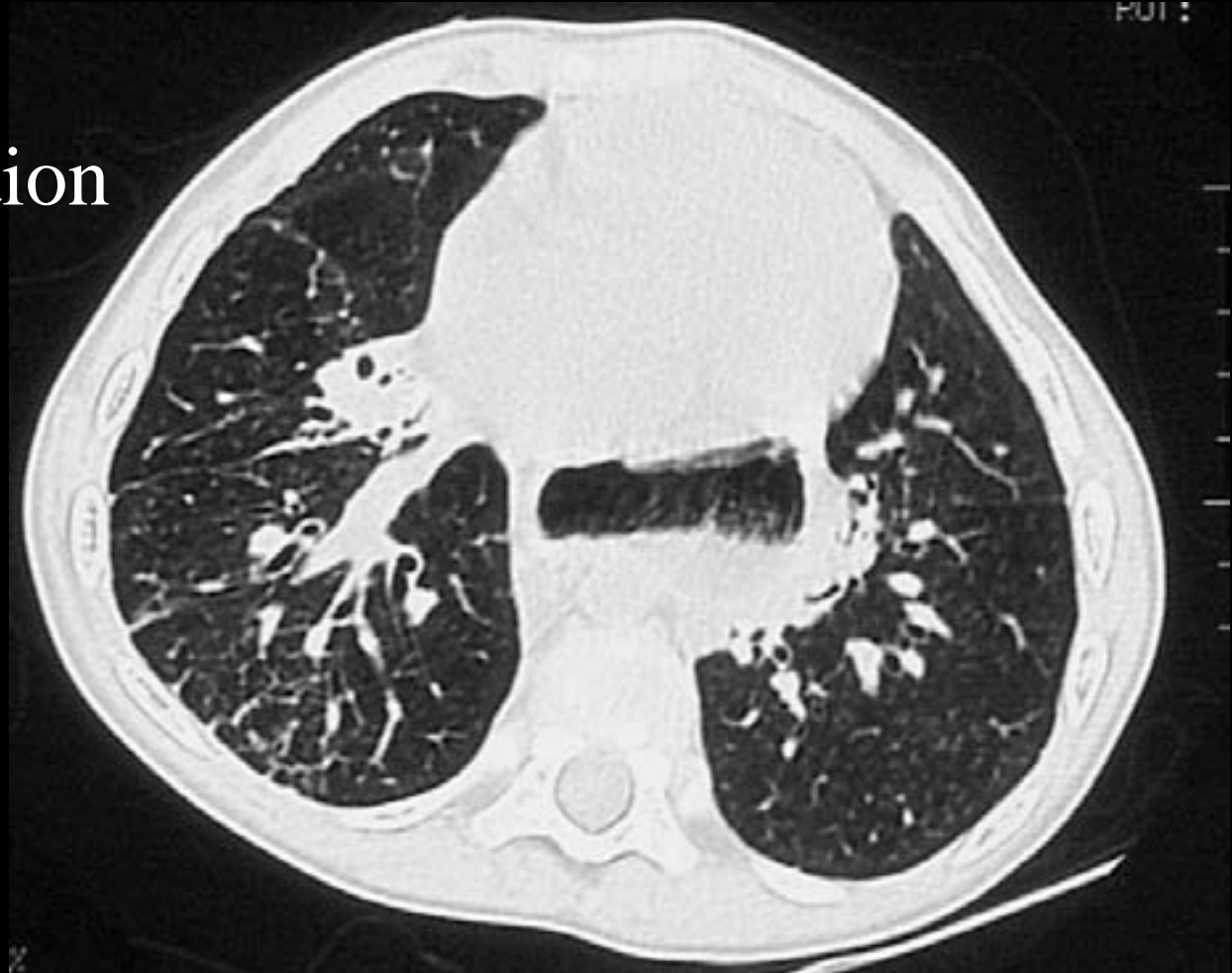
# 4 Month Old, Gastric Pull-up

Conventional  
CT



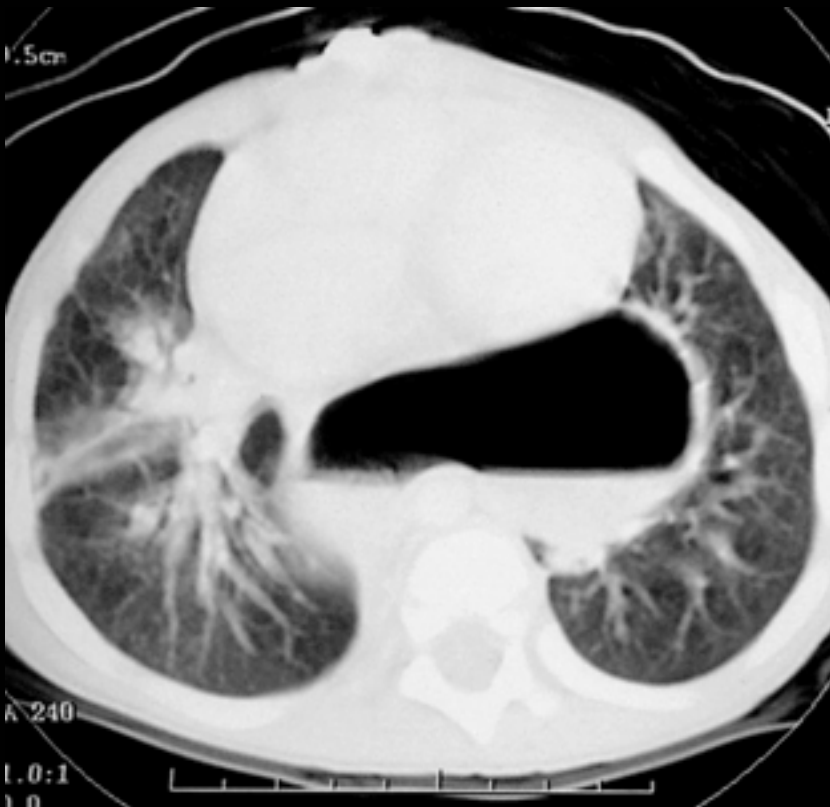
# 4 Month Old, Gastric Pull-up

High Resolution  
CT

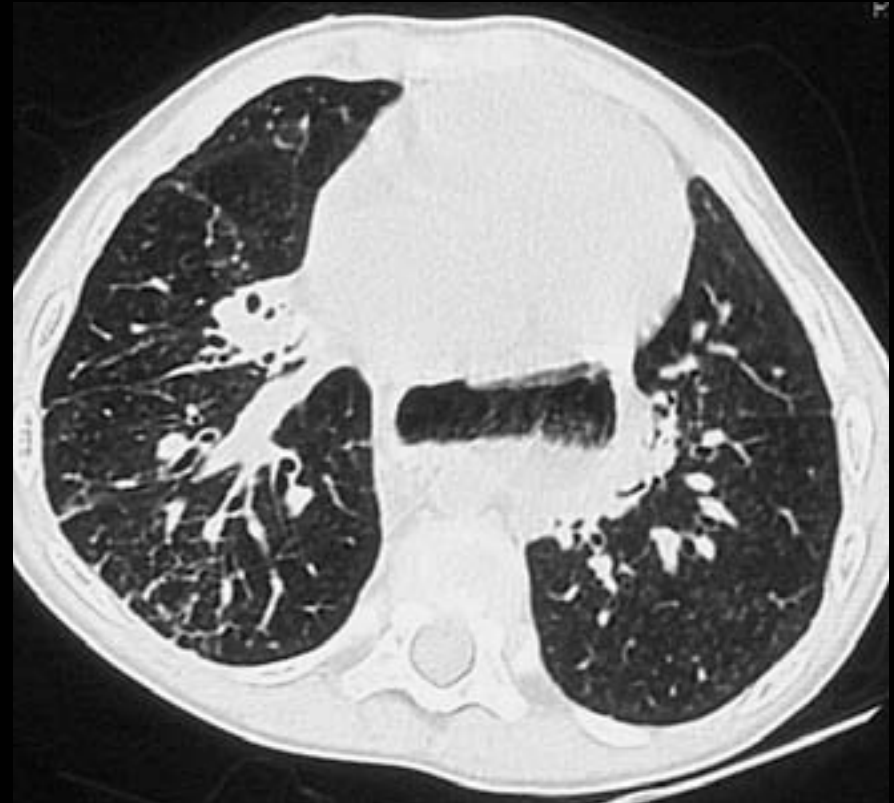


# 4 Month Old, Gastric Pull-up

Conventional CT



High Resolution CT



# CT Angiography

- CT technique optimized for vascular structures
- Rapid IV bolus contrast
- Short imaging time
- Thin sections
- Off axis and 3D reconstructions



# Radiation Risk

# Radiation Risk

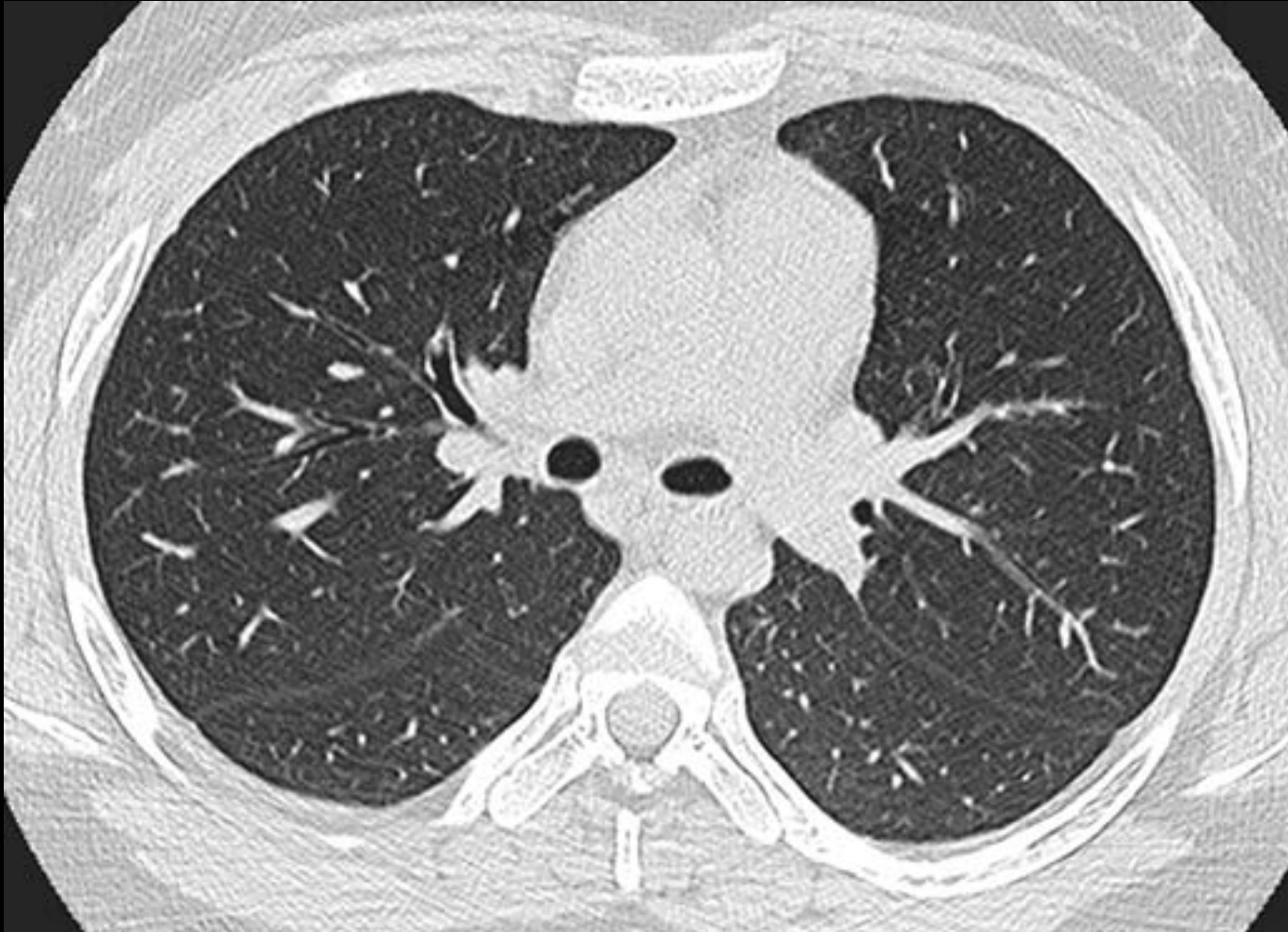
- CT scanning probably has a small, but real, risk
- Use CT scanning only when it is needed
- Use the lowest dose that provides good quality images



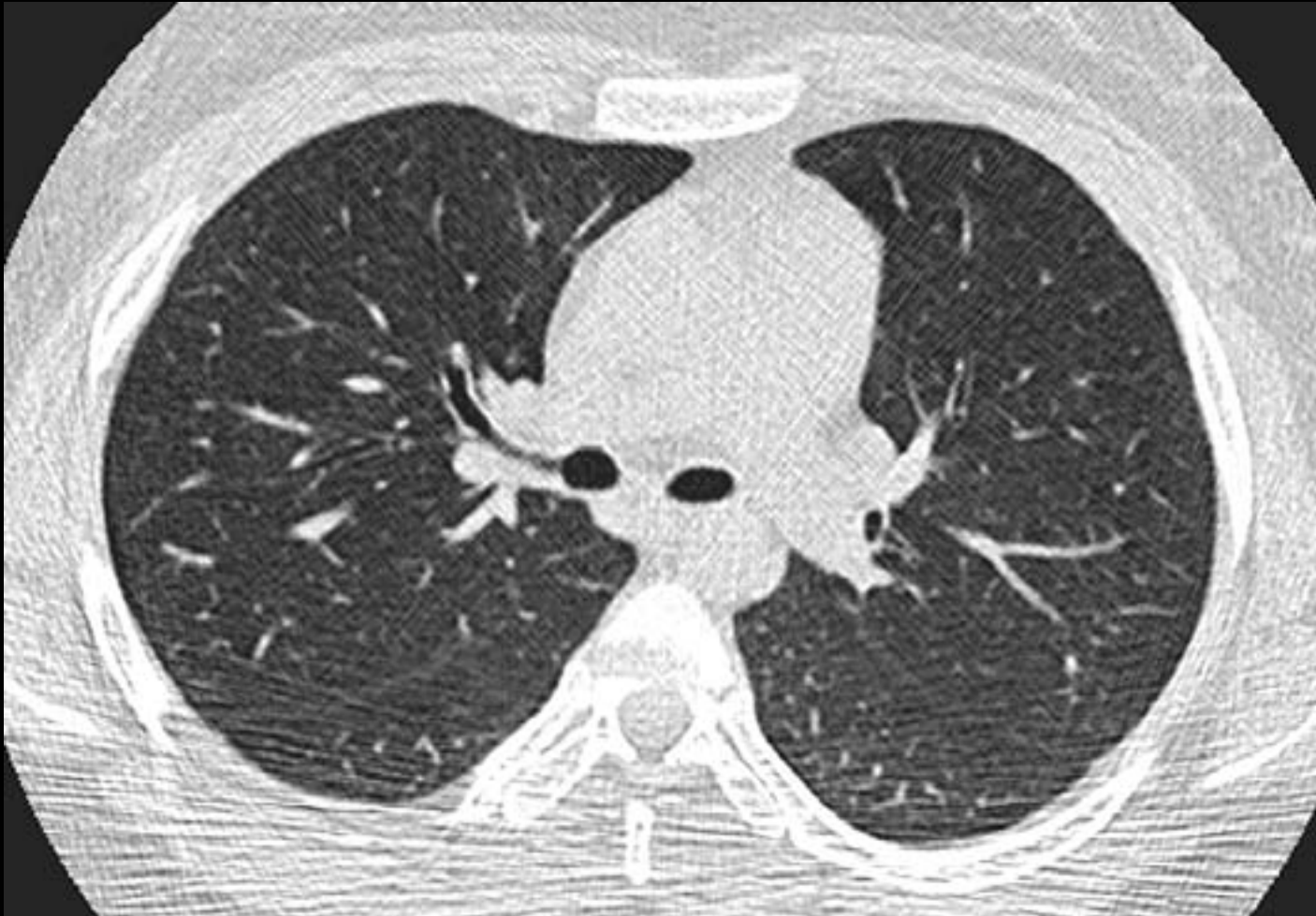
# Radiation Risk

- Any indicated CT scan has a greater benefit than the possible risk of cancer

15 year old, full dose



15 year old, ? dose

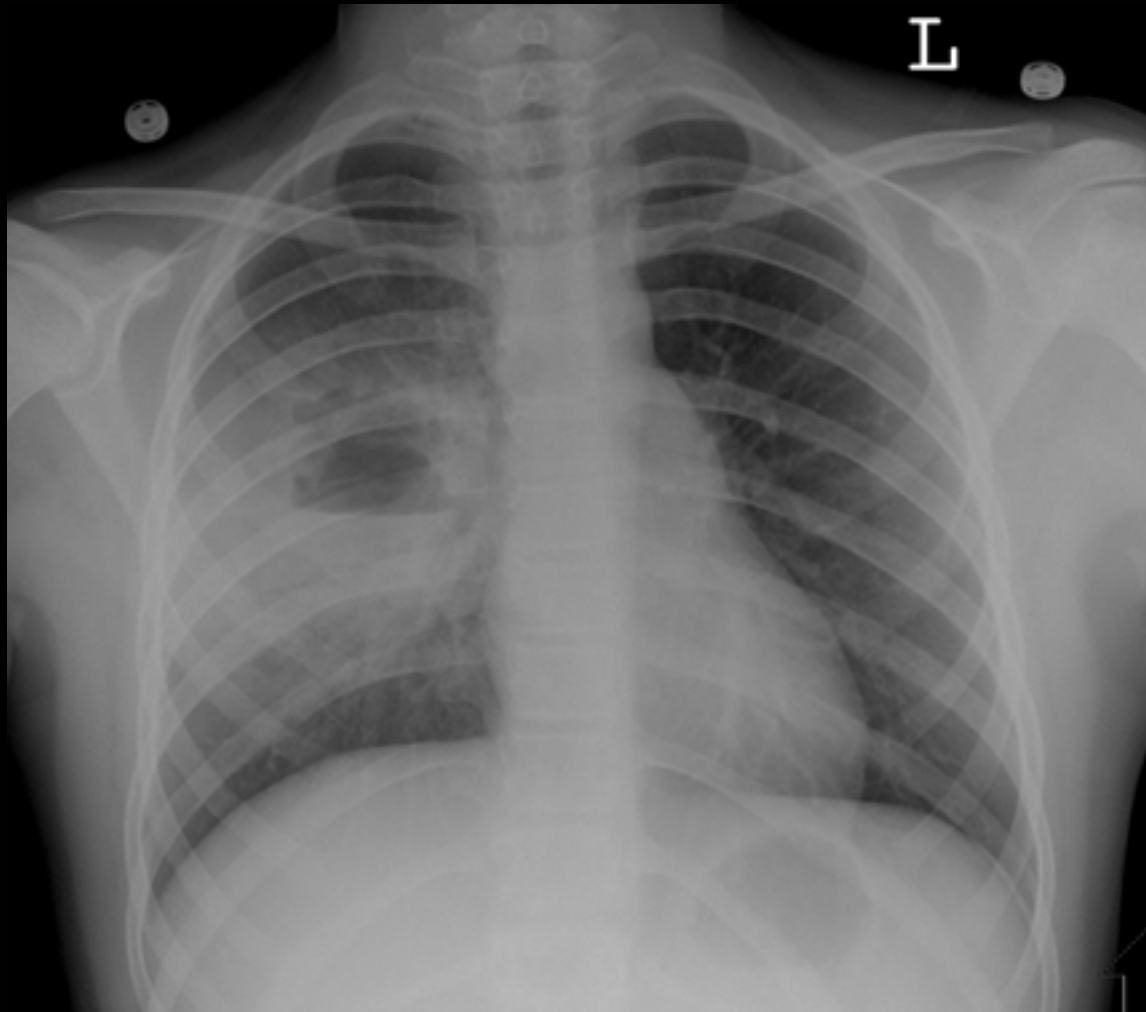


# Full Compared to 1/4 dose



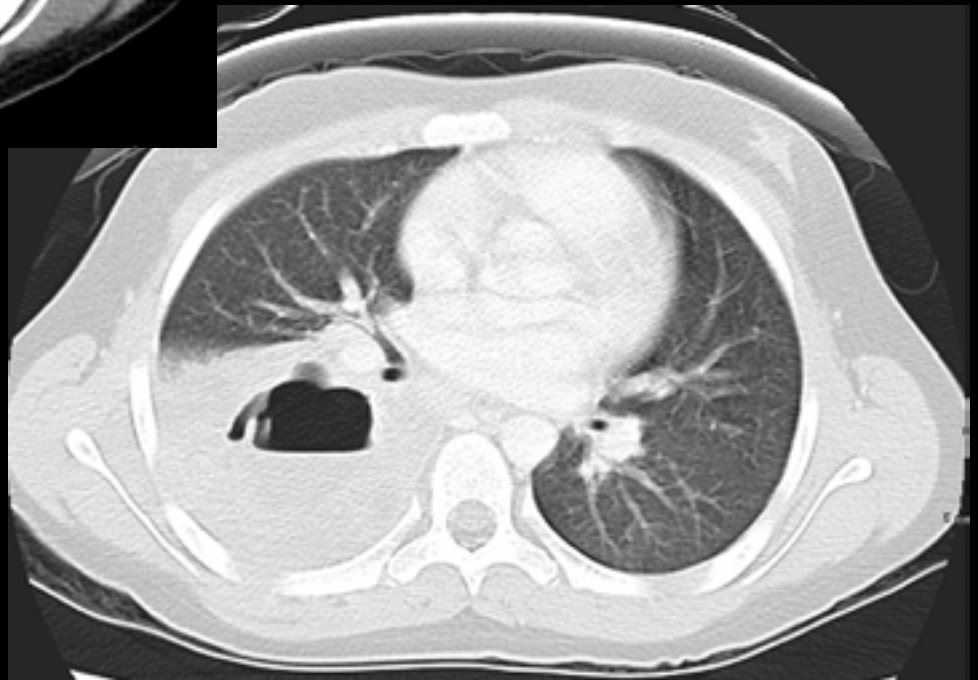
# Clinical Cases

# Febrile 9 year old

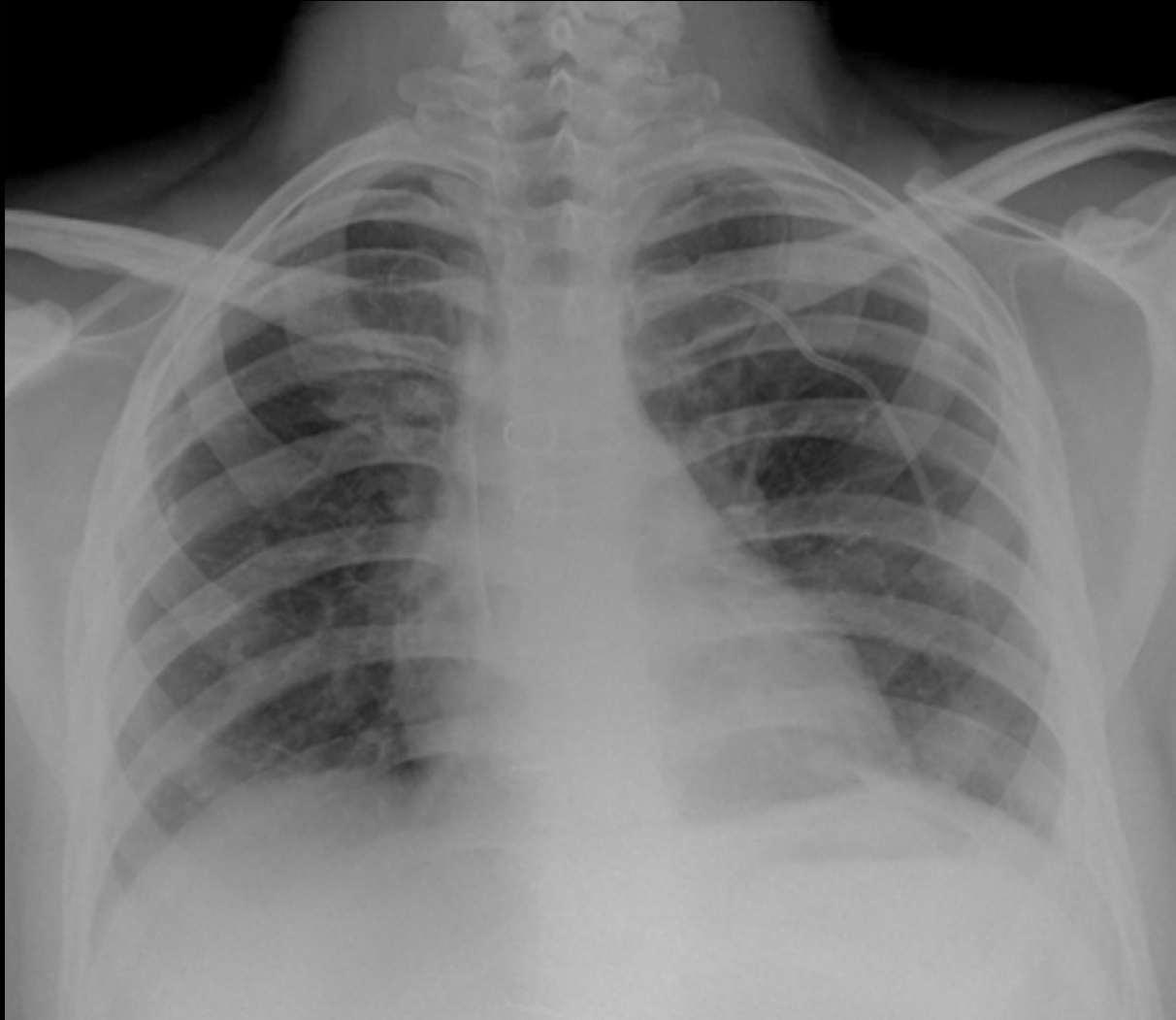




# Conventional CT with Contrast

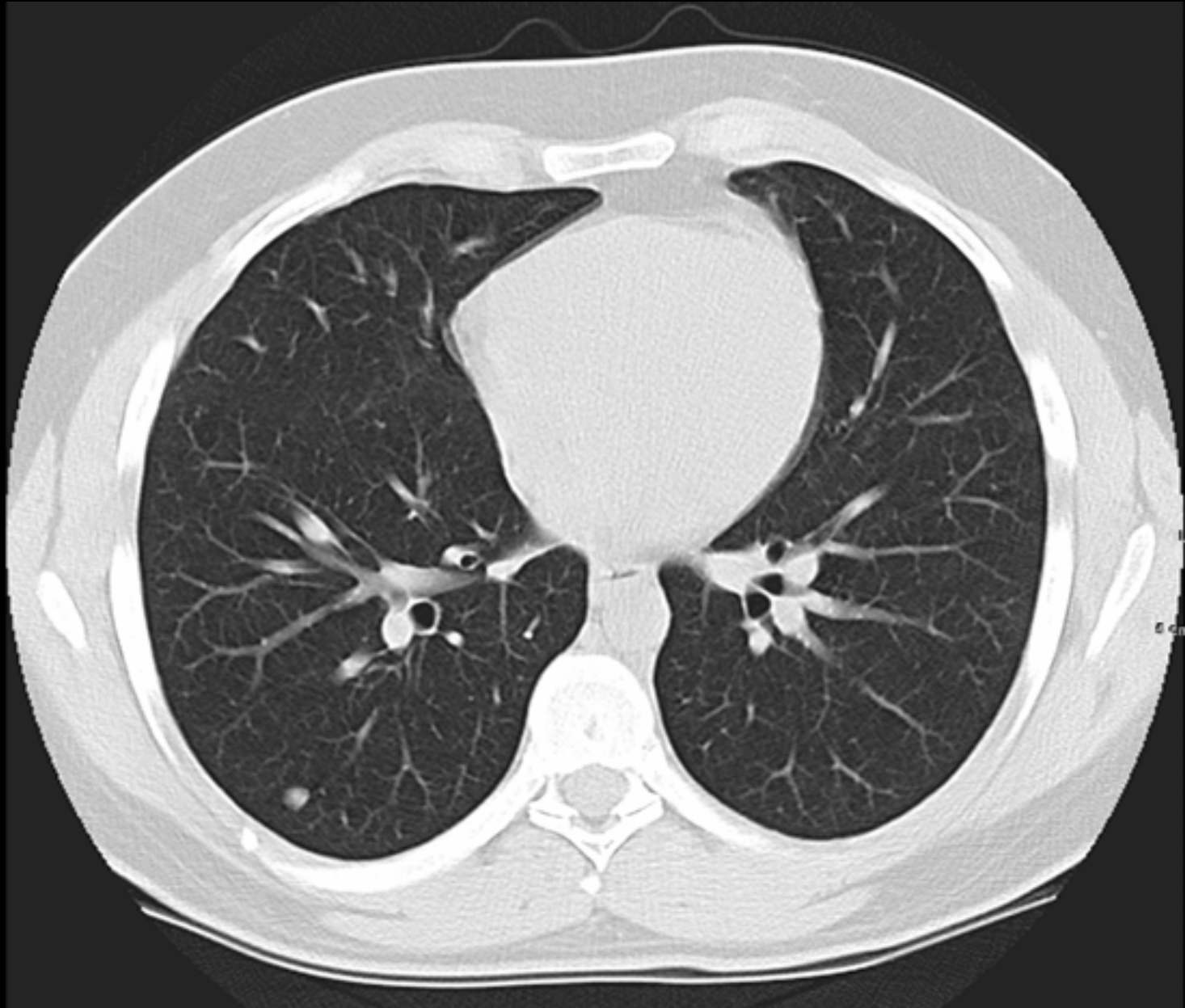


# 21 Year Old with Osteosarcoma

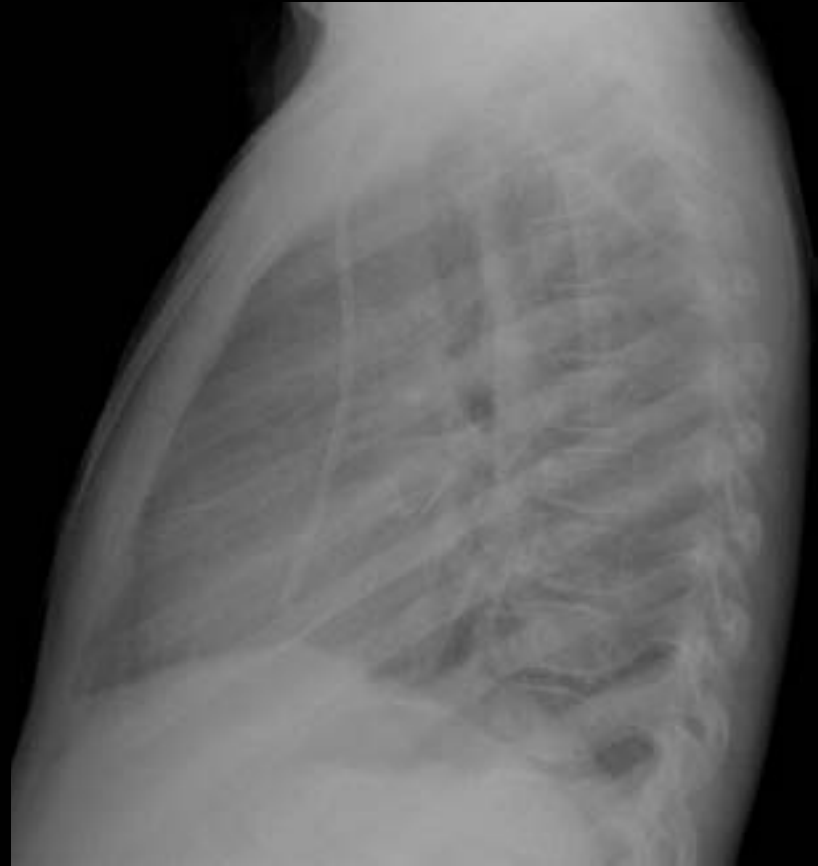




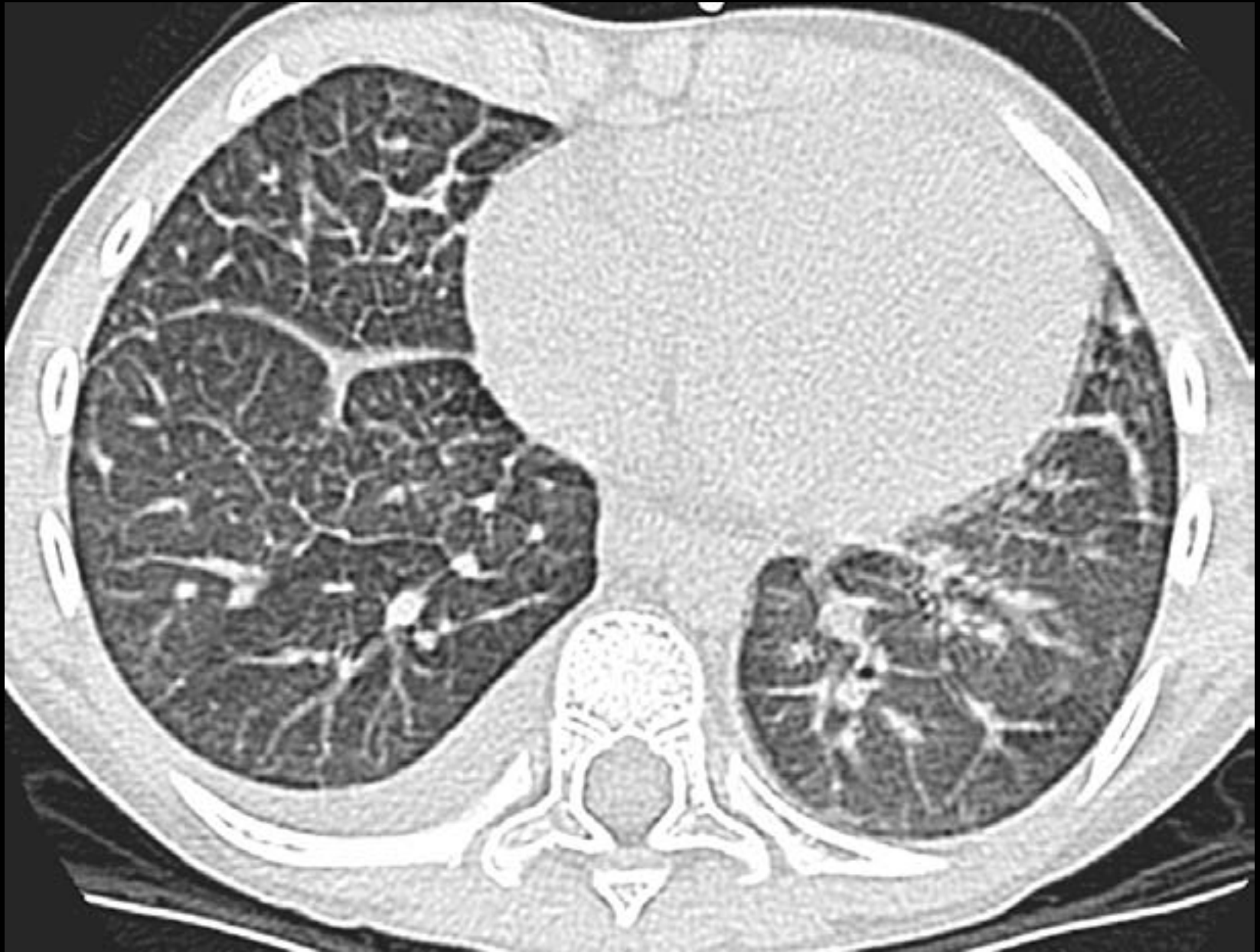
# Conventional CT Without Contrast



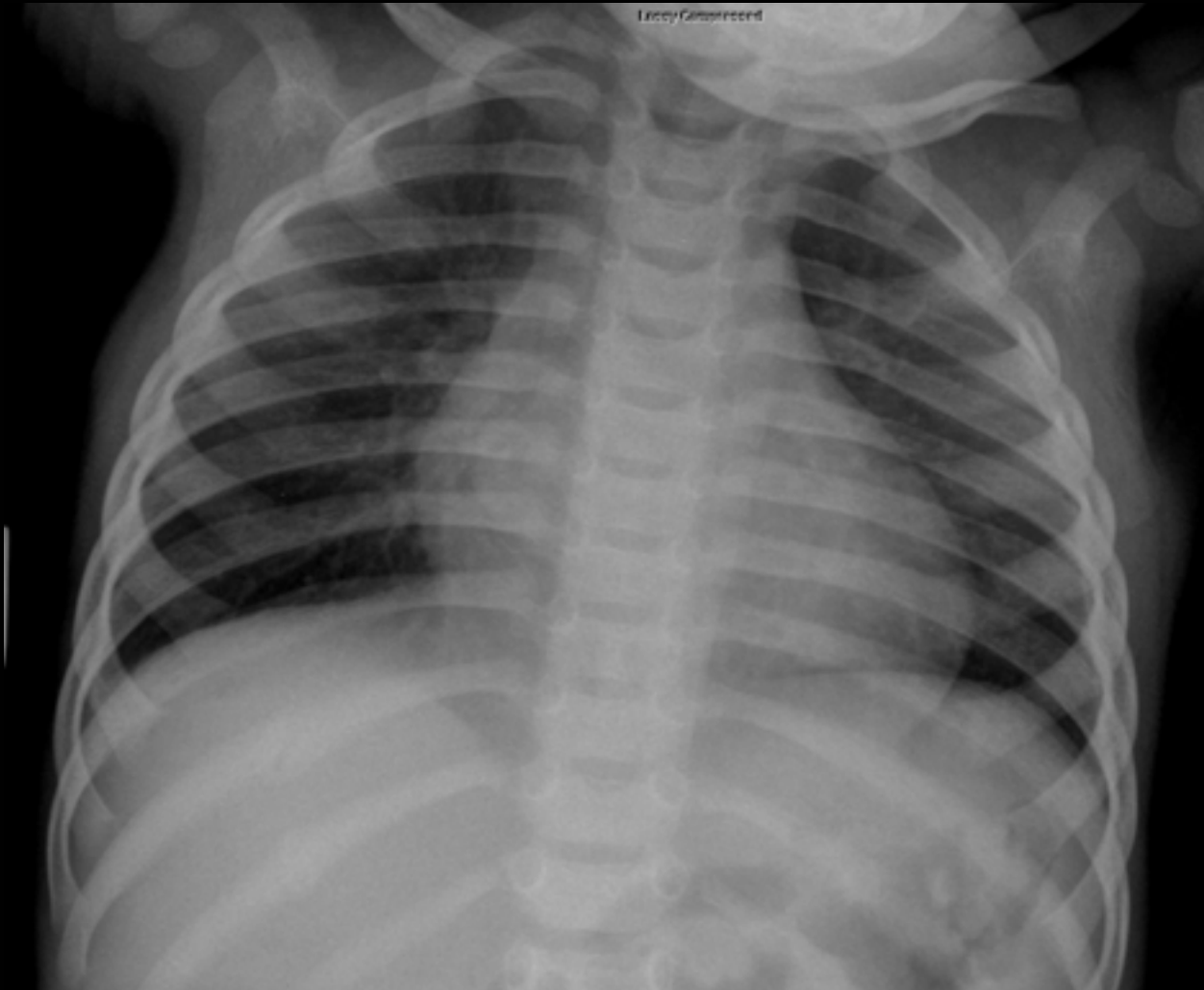
# 5 year old 60 Days after Bone Marrow Transplant, Cytomegalovirus Positive



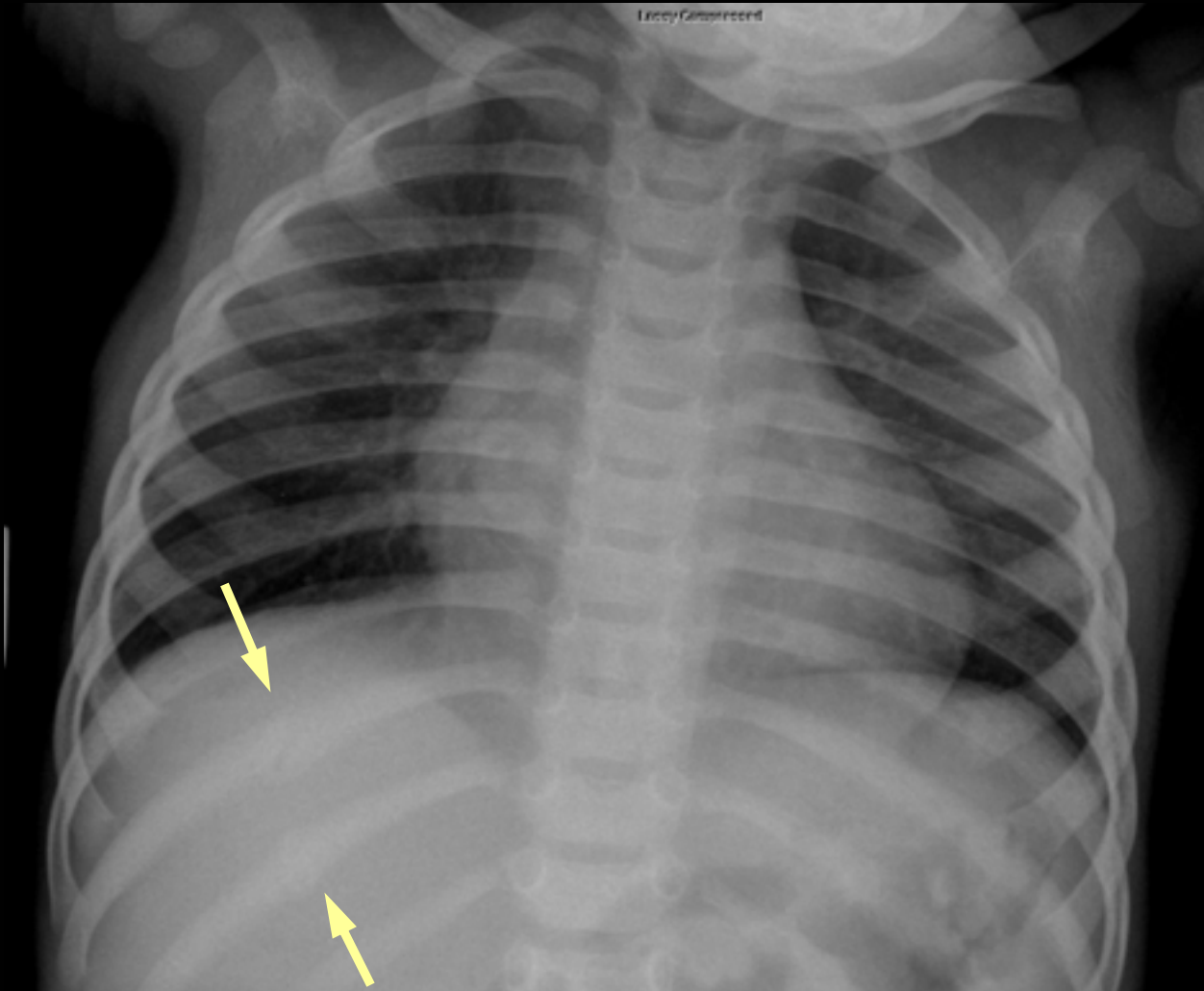
# High Resolution CT



# Fussy 15 Month Old

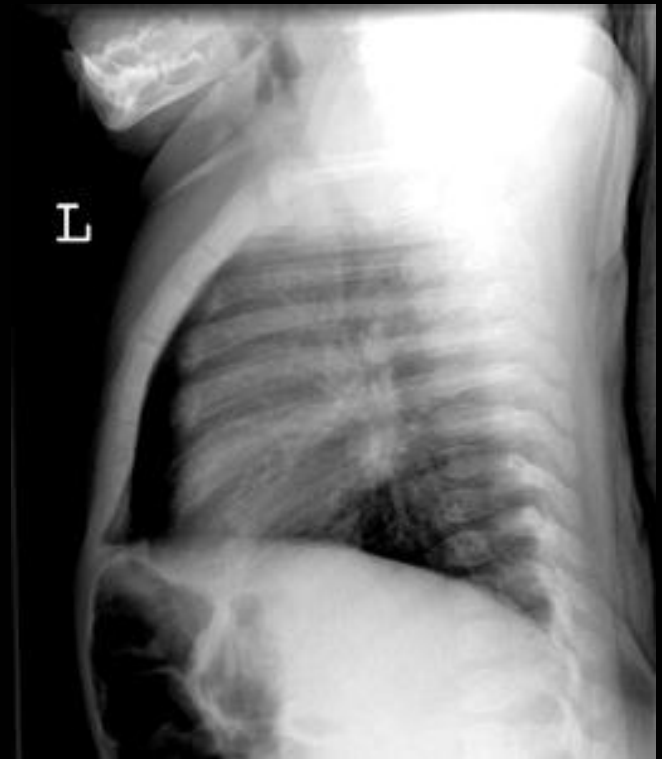
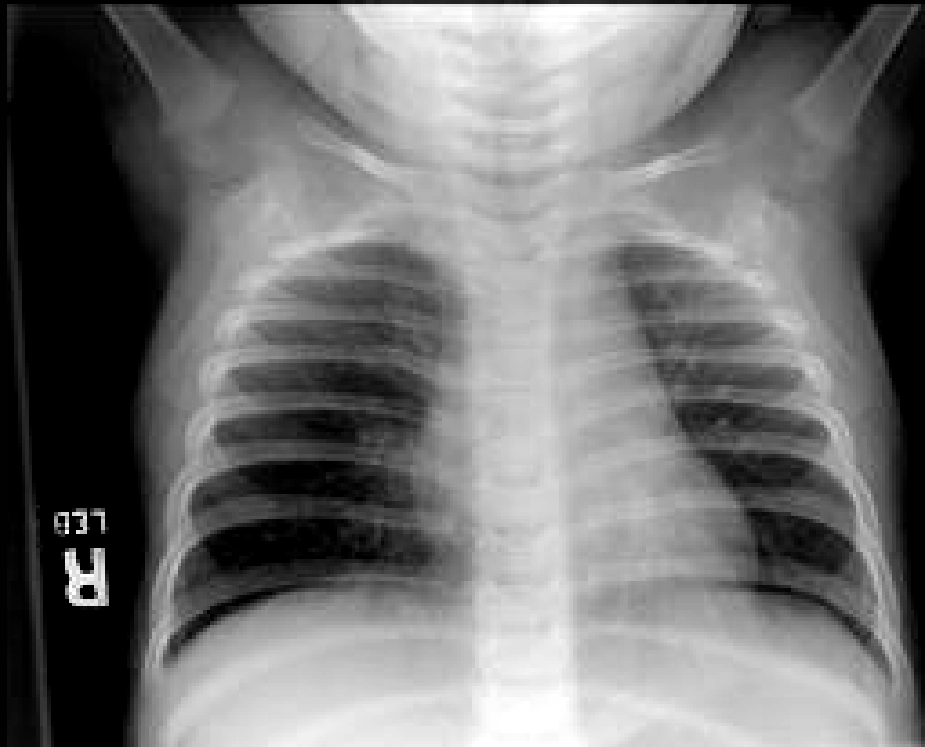


# Rib Fractures from Child Abuse





# 11 Month Old With Noisy Breathing and Vomiting



# Right Sided Aortic Arch with Aberrant Left Subclavian Vein







# 3 Month Old with Respiratory Distress

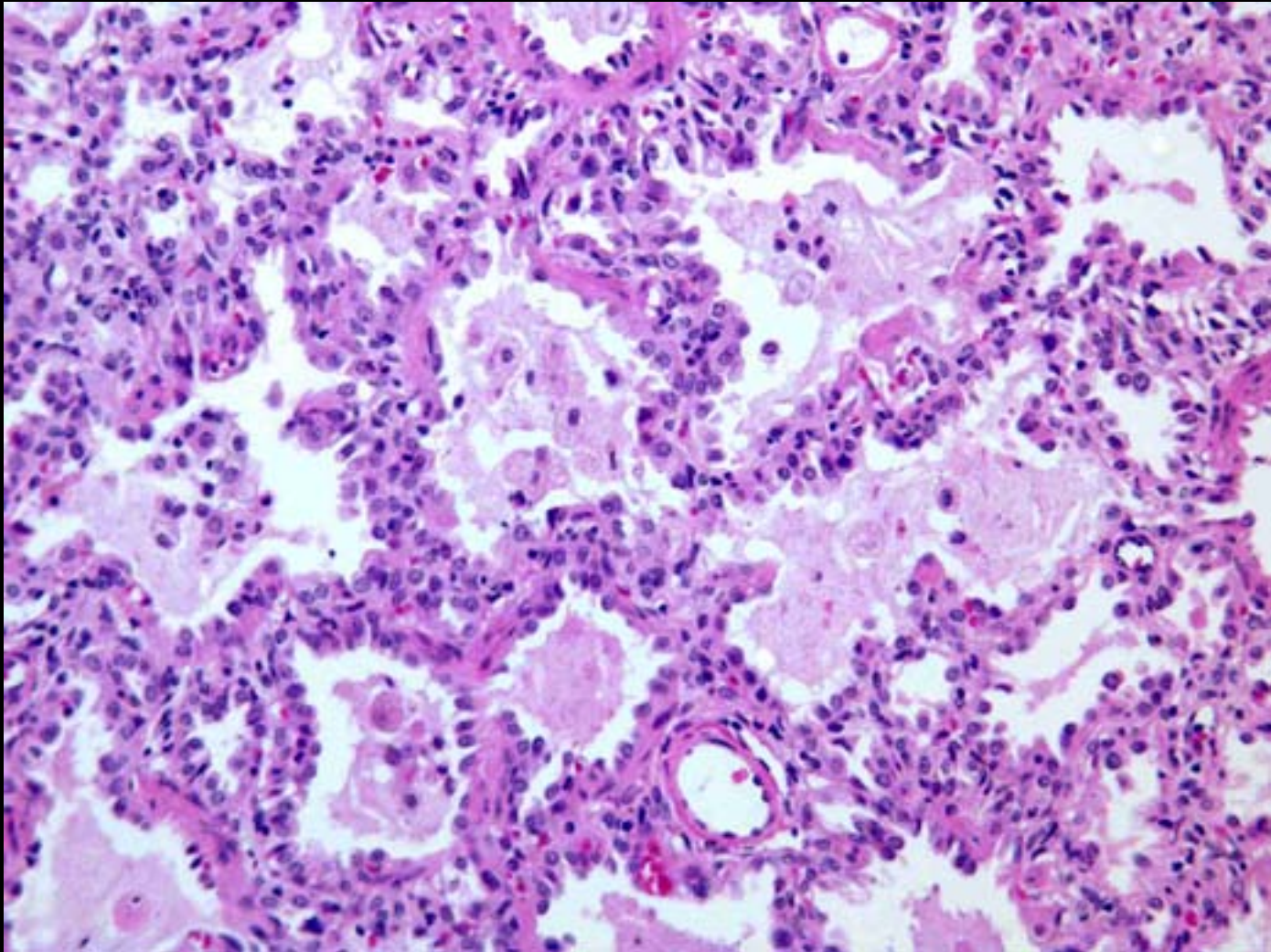


# High-Resolution CT



Pulmonary Alveolar Proteinosis

# Pulmonary Alveolar Proteinosis



# Pulmonary Alveolar Proteinosis

- In infants, a disease of abnormal surfactant, due to genetic mutation with very limited treatment options
- In adults an autoimmune disease from antibodies against granulocyte macrophage colony stimulating factor treated with lung lavage and perhaps immunotherapy
- Children may present with either form

# 2 Different Children with Pulmonary Alveolar Proteinosis



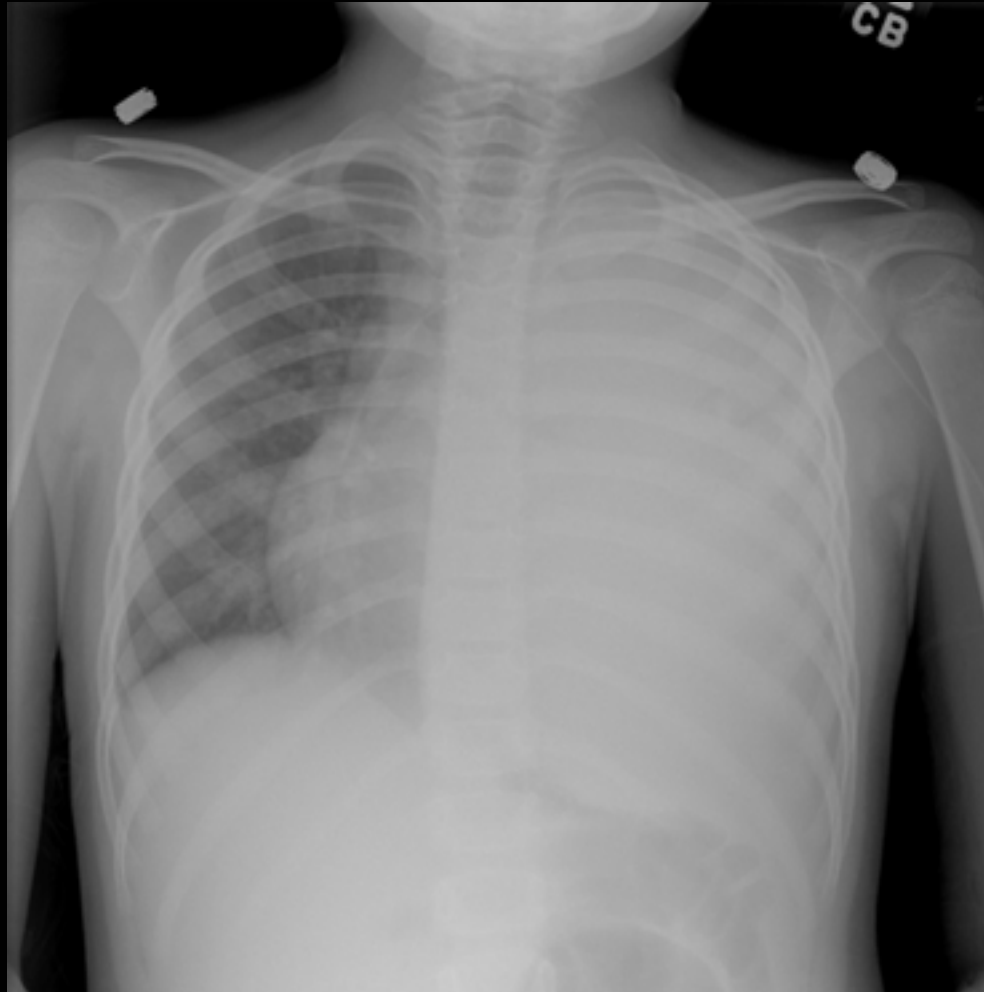
3 Months Old



14 Years Old



# 3 yo with Fever and Decreased Breath Sounds



LT LONG

CT

11:19:31 am

4V2

4.0MHz

100mm

PEDIATRIC ABD

General

Pwr= -3dB MI=.72

80dB T1/+1/2/4

Gain= -2dB  $\Delta=2$

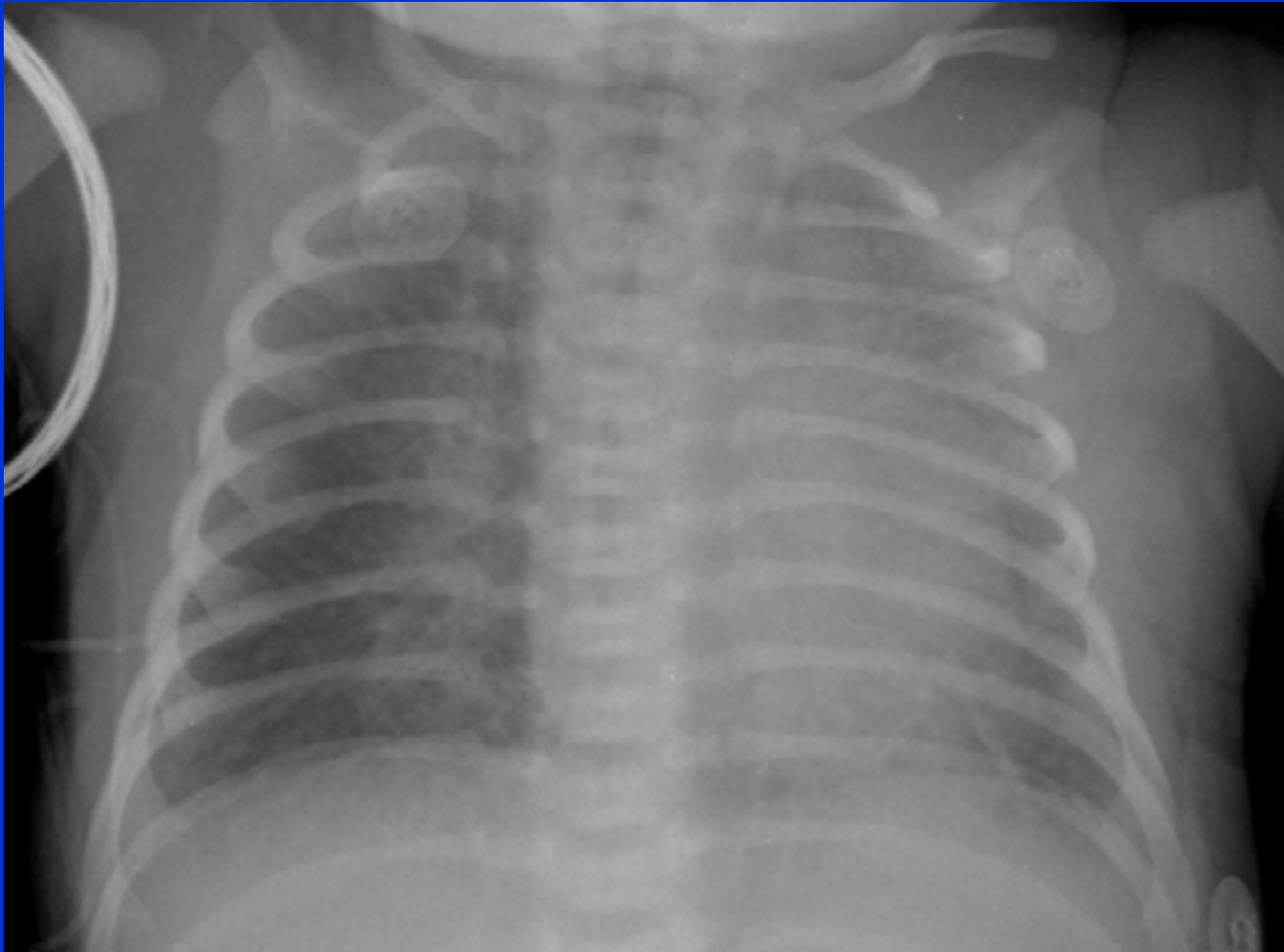
Store in progress

50 pix

“To the man with a hammer,  
everything looks like a nail”



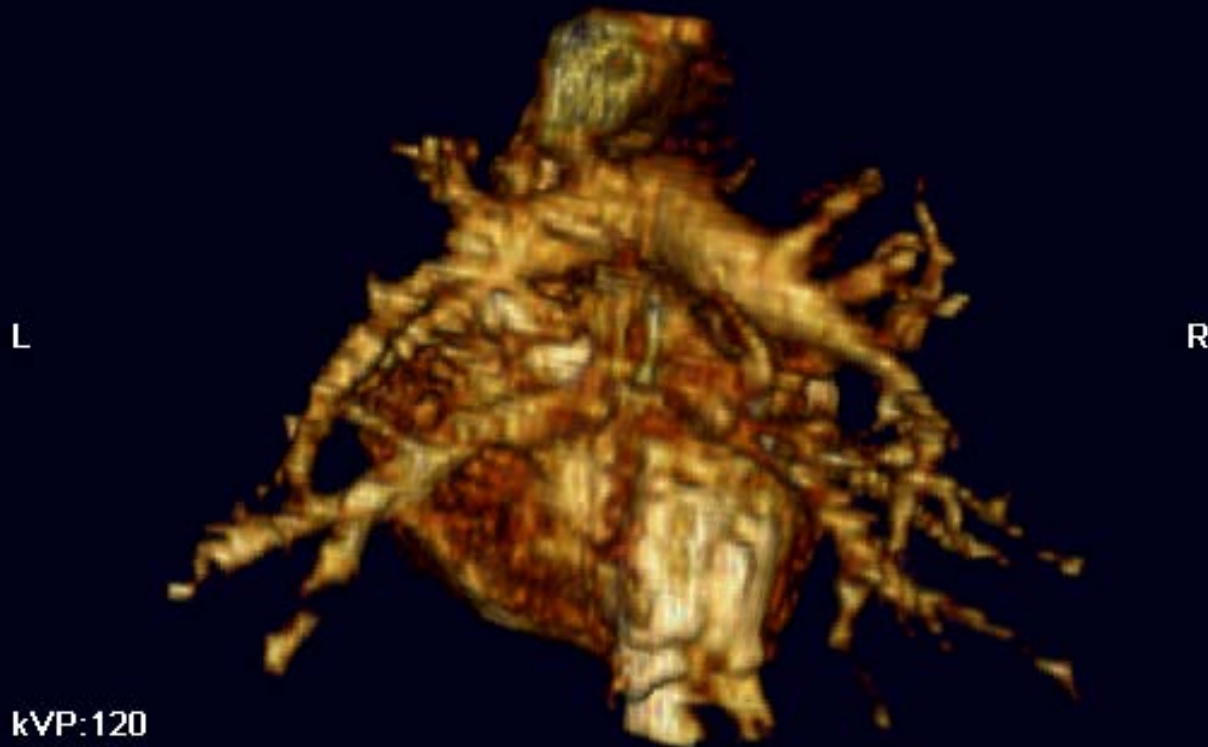
# Newborn with Double Outlet Right Ventricle and Pulmonary Venous Obstruction



# CT Angiogram

WOOD, INF GIRL  
01126333  
Age:1 days  
F  
06 Mar 2003  
09:57:44

S CHILDRENS HOSPITAL MEDICAL  
Ref:MONE, SUZANNE M.D.  
Rad:BRODY  
CT  
CT CHEST W/CONTRAST



kVP:120  
mA:80  
msec:912  
mAs:0  
Thk:1.25 mm  
LightSpeed QX/i

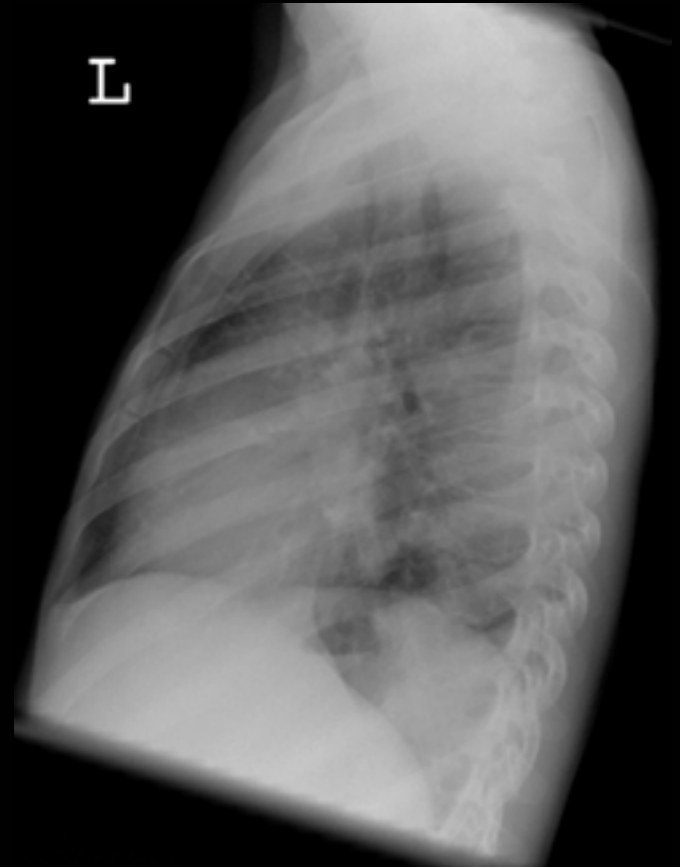
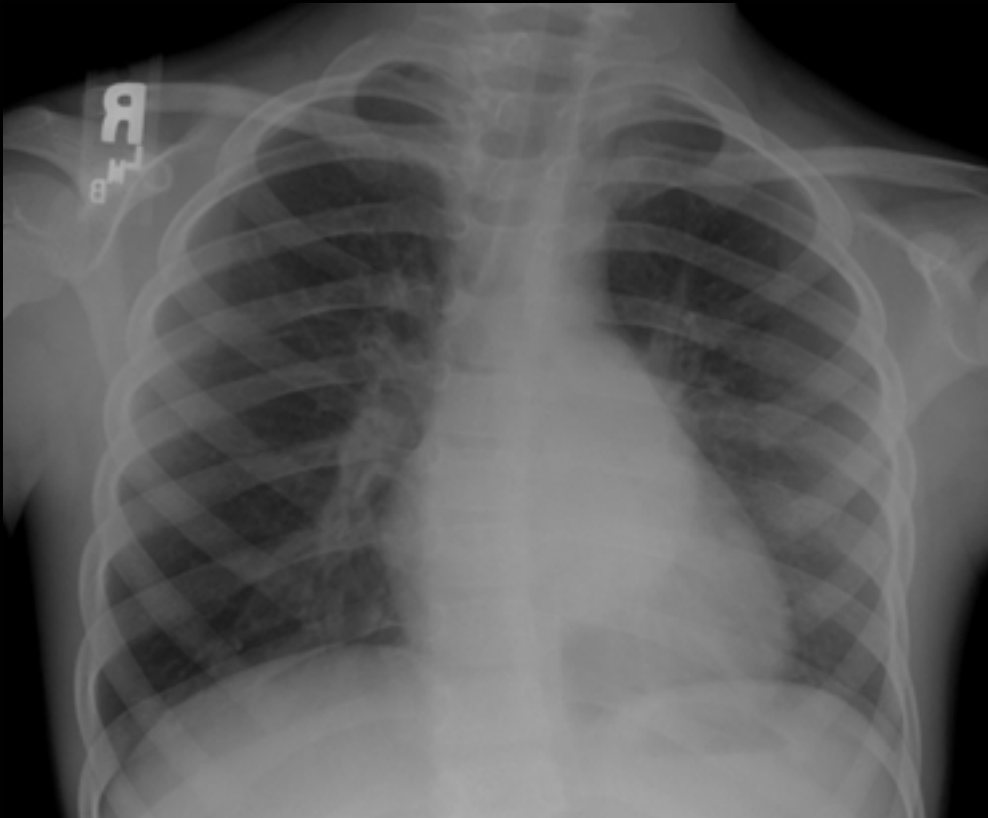
Vitrea®  
W/L:122/145

# Infant with Poor Weight Gain

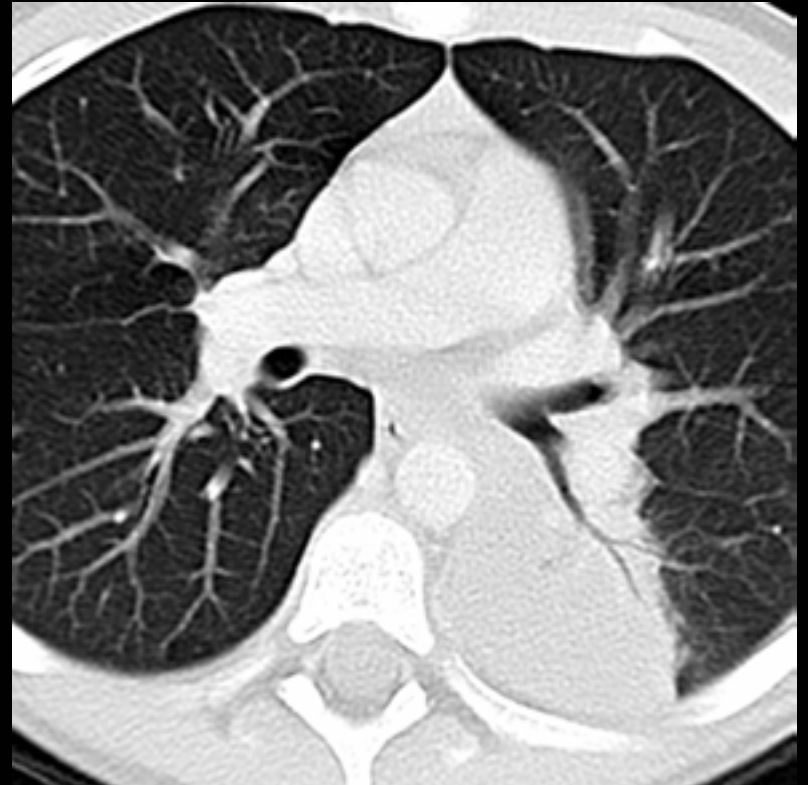
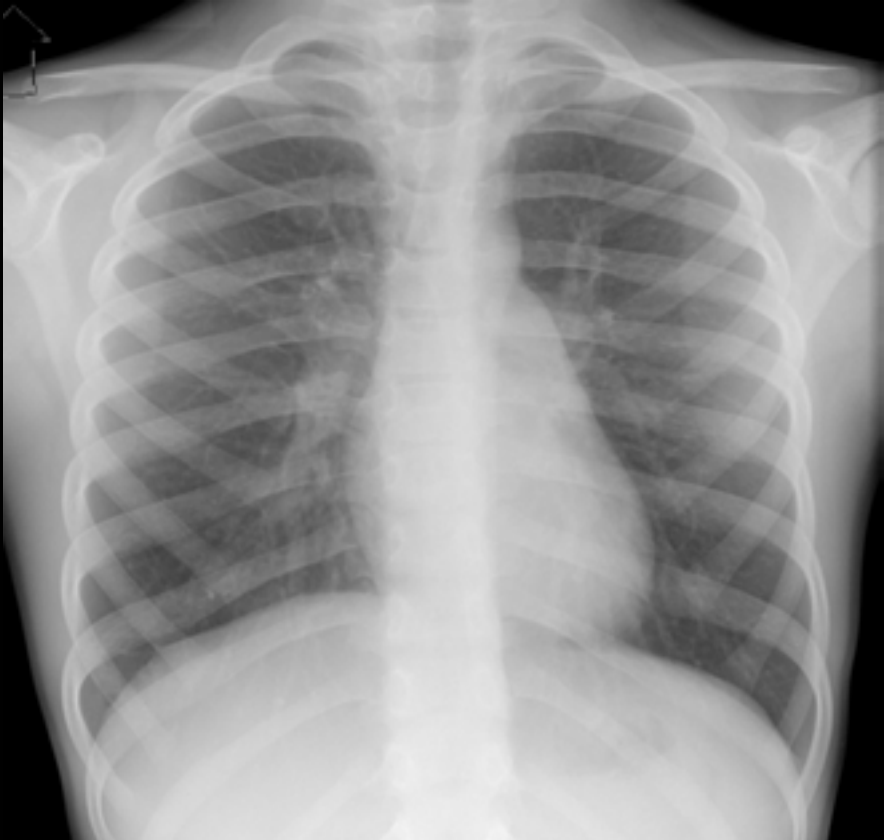




# 8 Year Old with Cough and Fever



# Round Pneumonia



# Conclusion

- Chest CT scanning is a powerful tool to aid those caring for children
- Clinicians and radiologists working together always get the best results

Thank You  
For Your Attention

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