

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

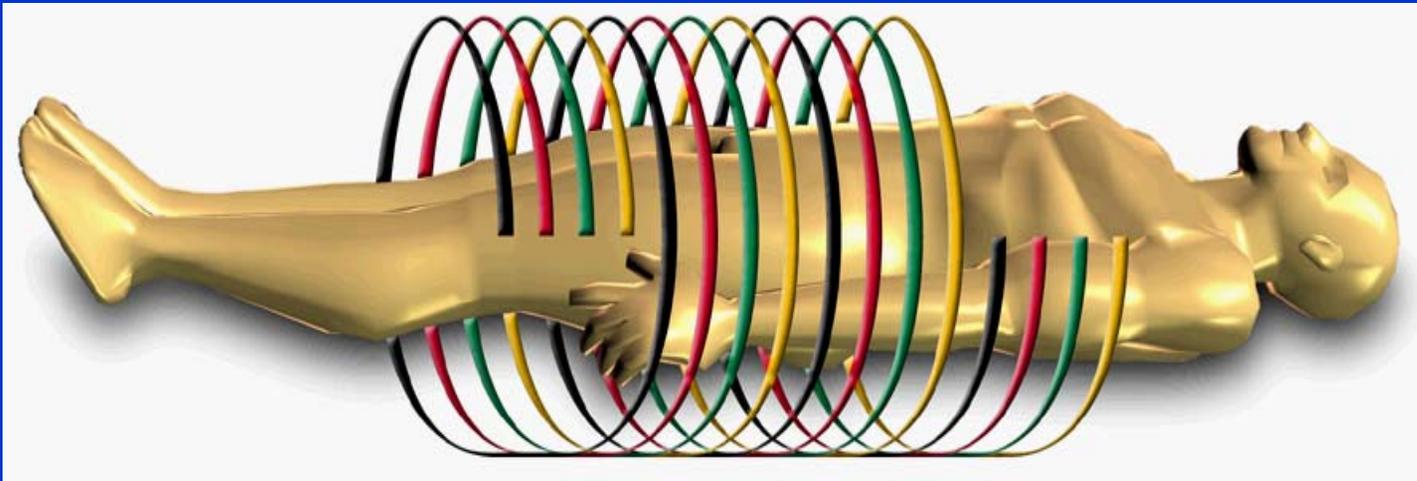
- Helical or Spiral
- Axial
- Multislice
- Contrast or noncontrast
- High-resolution
- CT angiography

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

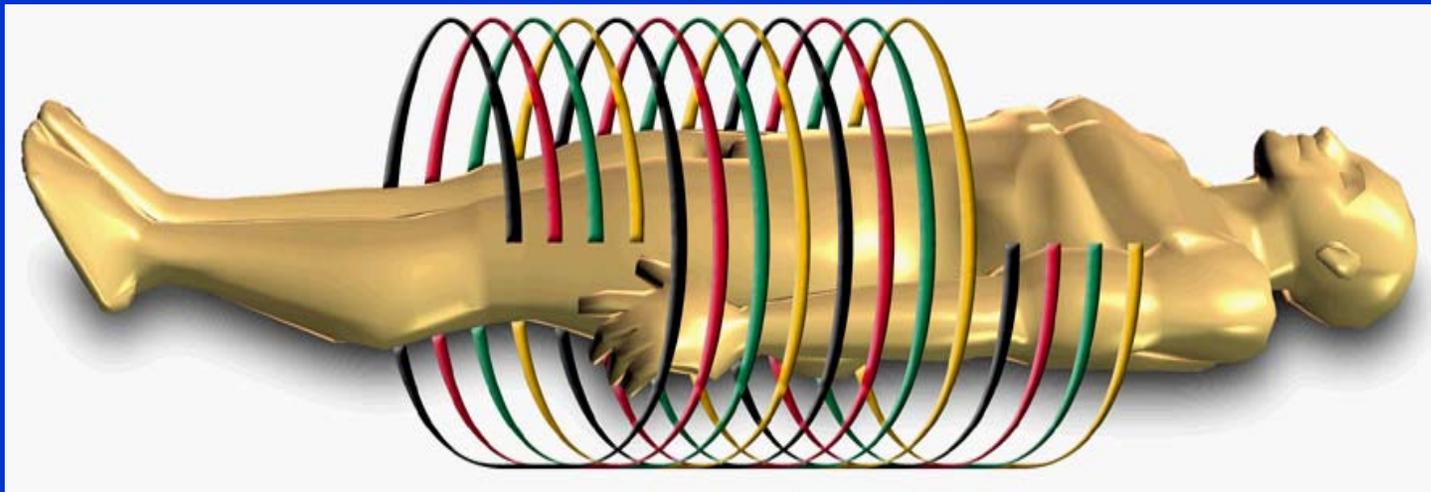
Helical (Spiral) CT Scanning

- 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

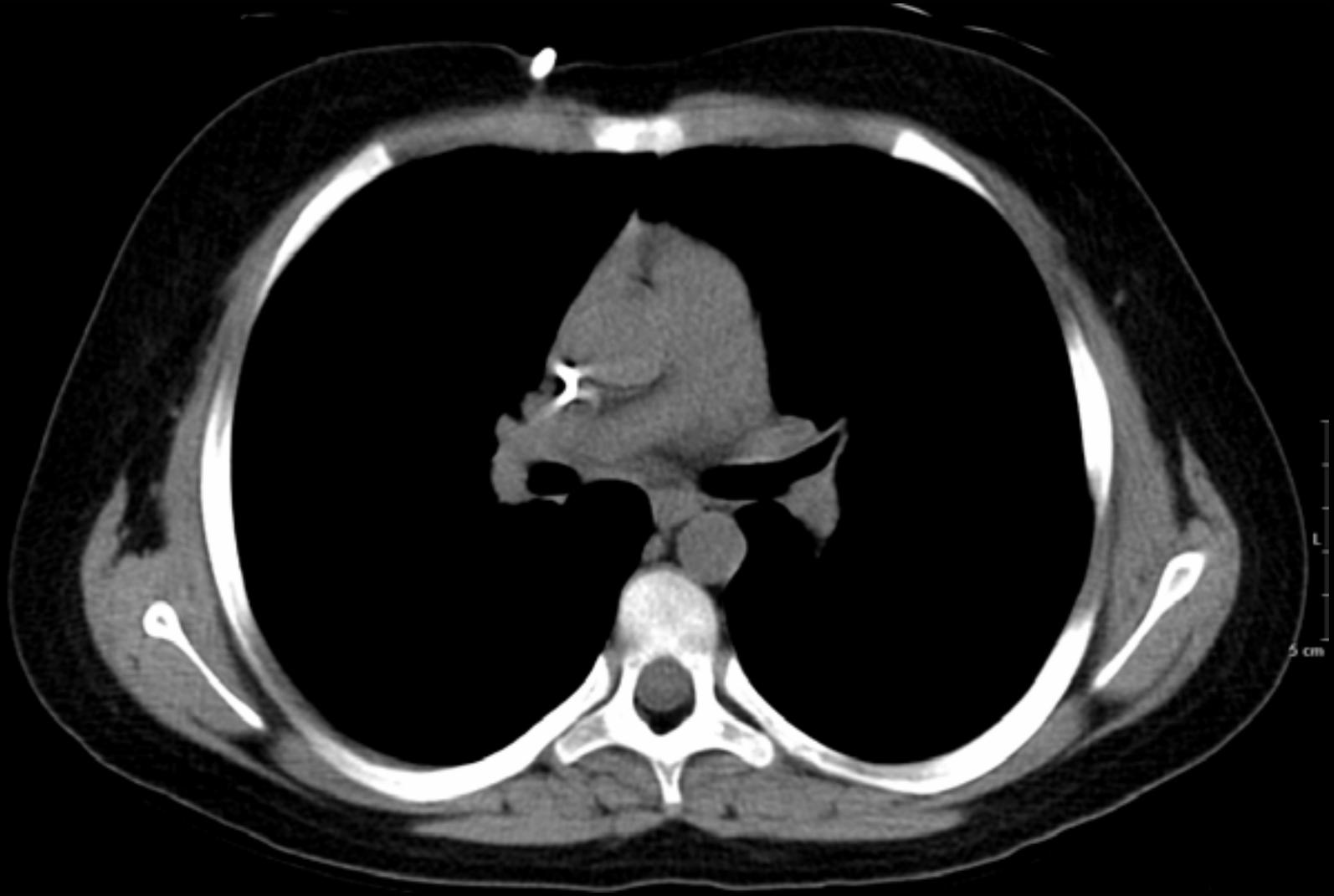


Helical CT

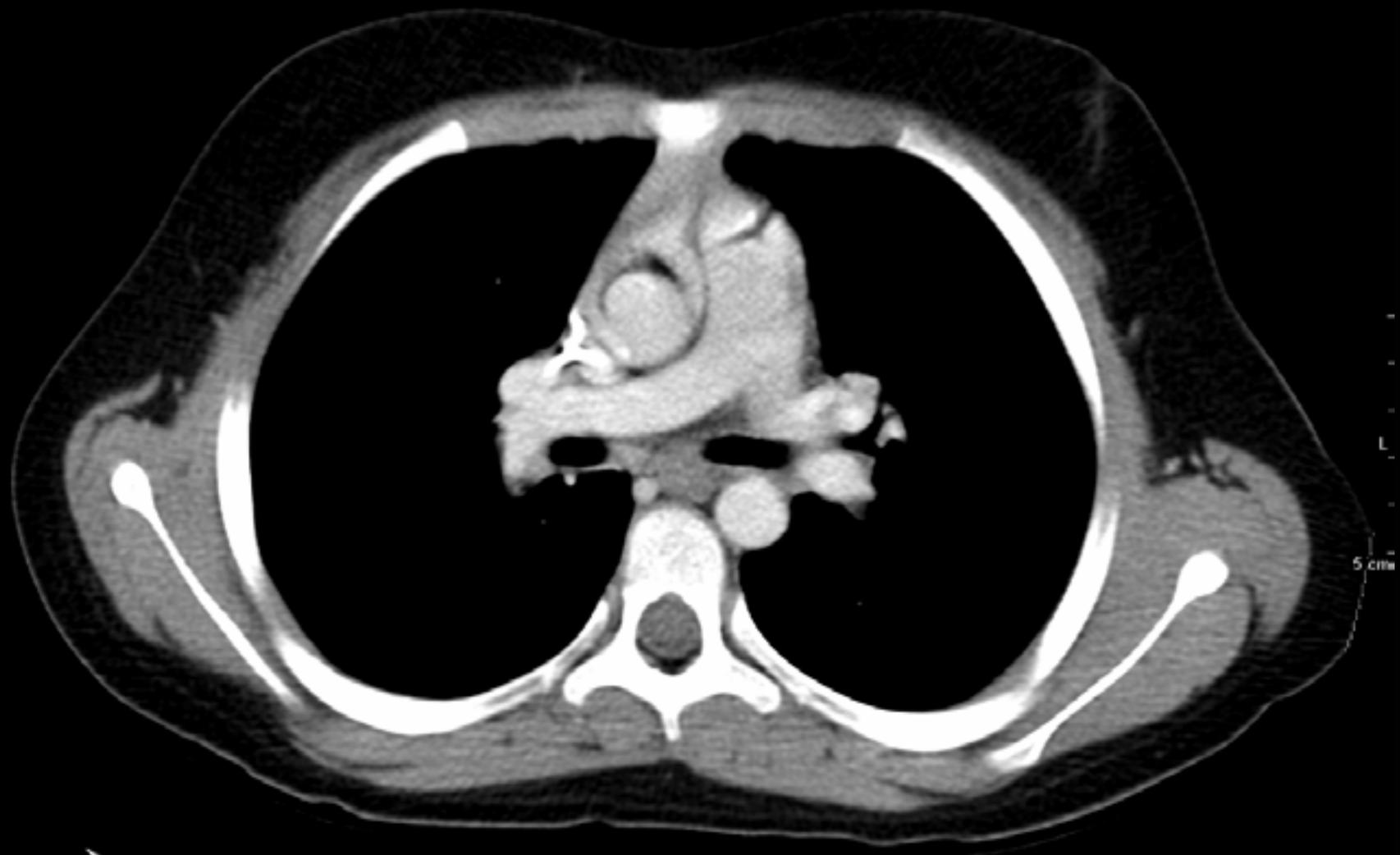
- Helical scanning is faster and provides higher quality images
- Multislice scanning is still faster; a complete chest CT can be completed in less than 10 seconds
- If possible all conventional CT should be performed with helical imaging

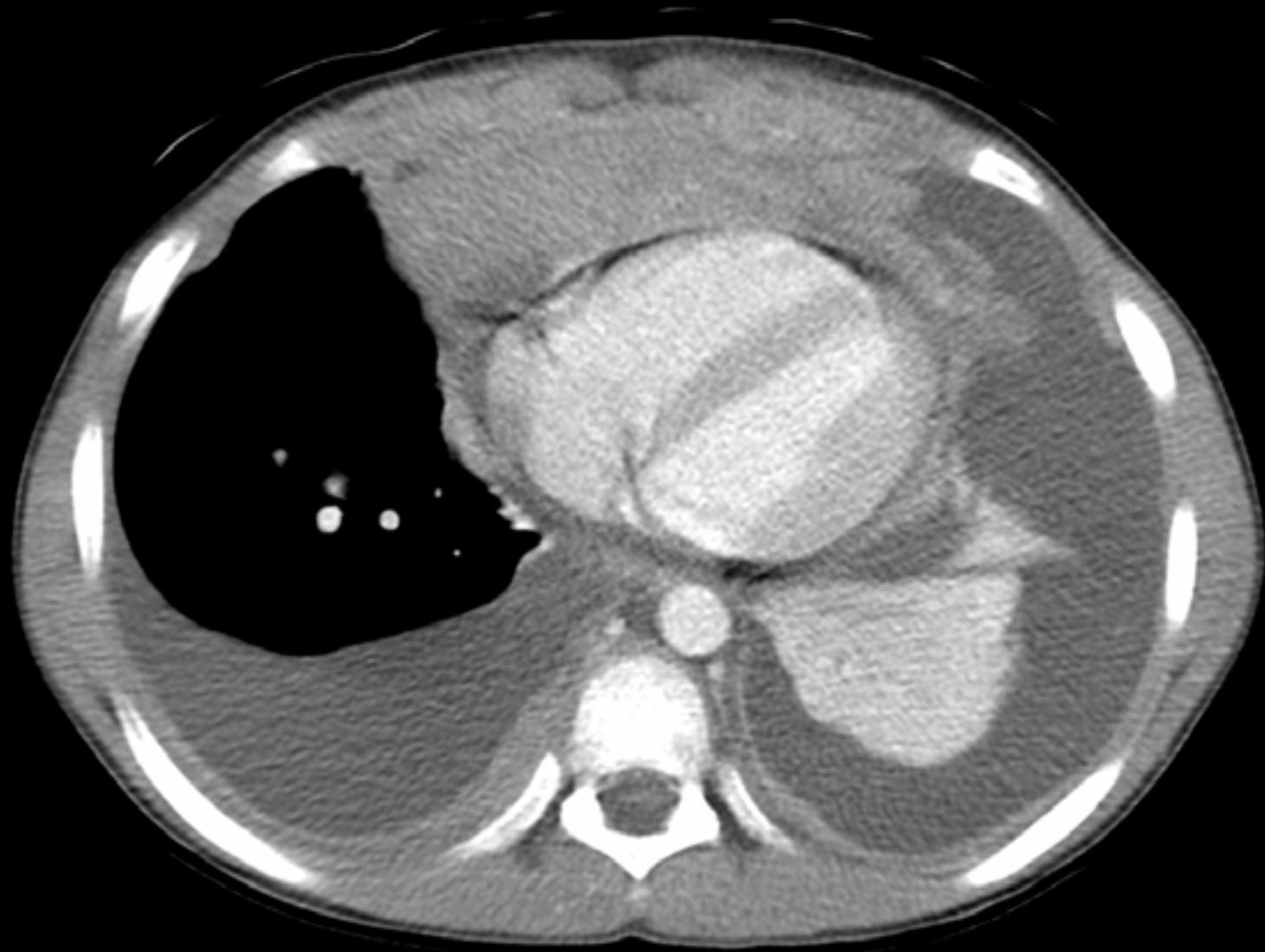
Intravenous Contrast

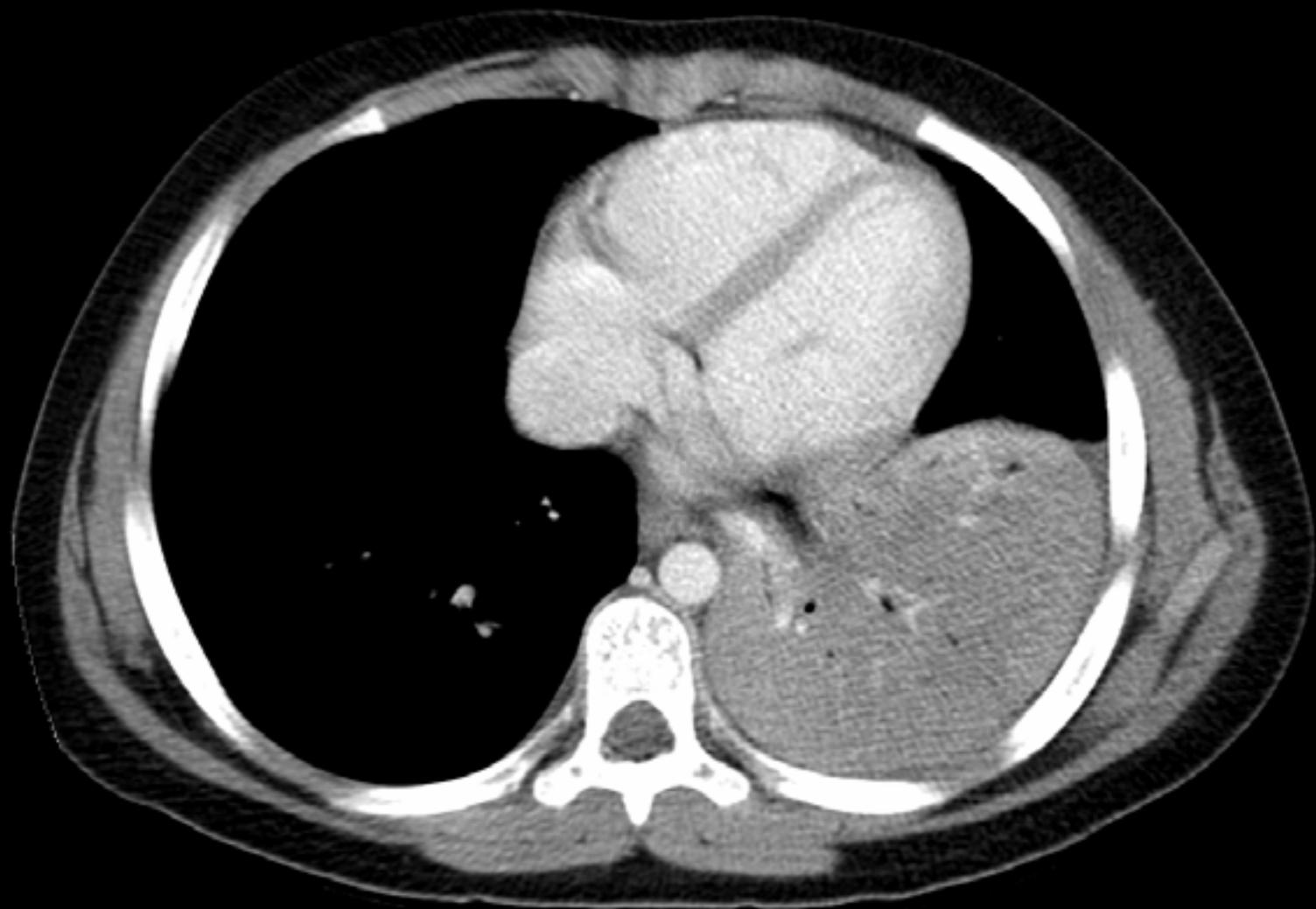
- When in doubt, use IV contrast
- Evaluation of the mediastinum and hila is very difficult without contrast
- Contrast helps tell atelectasis from pneumonia or tumor

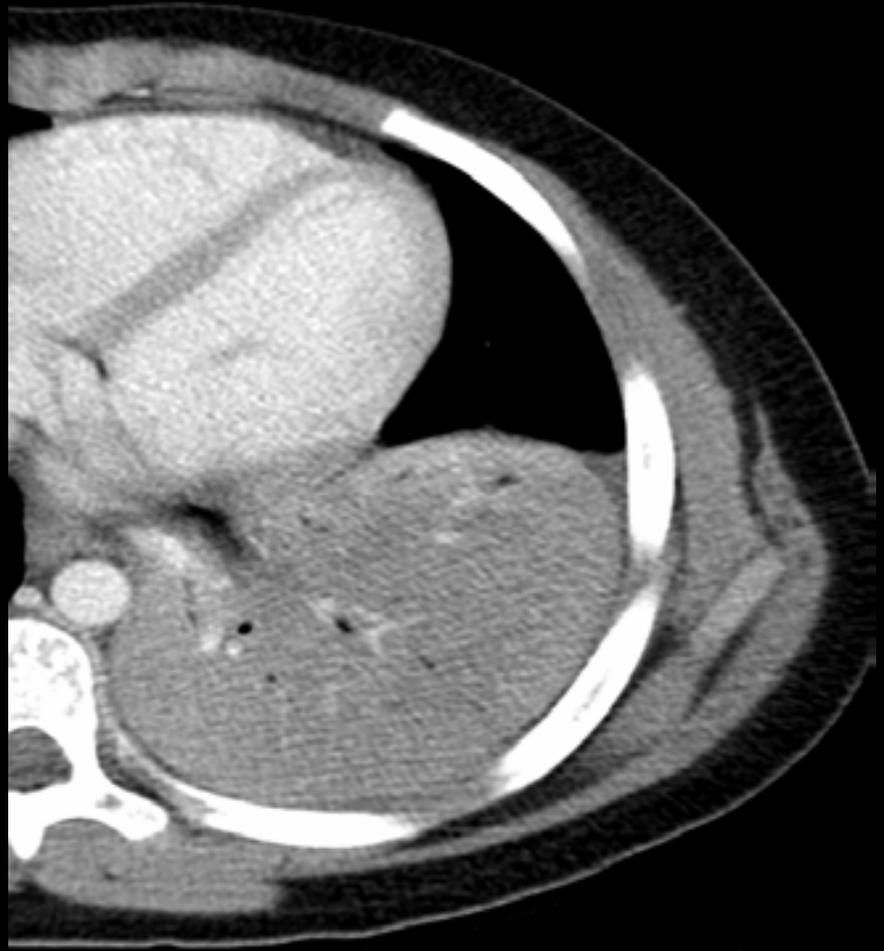
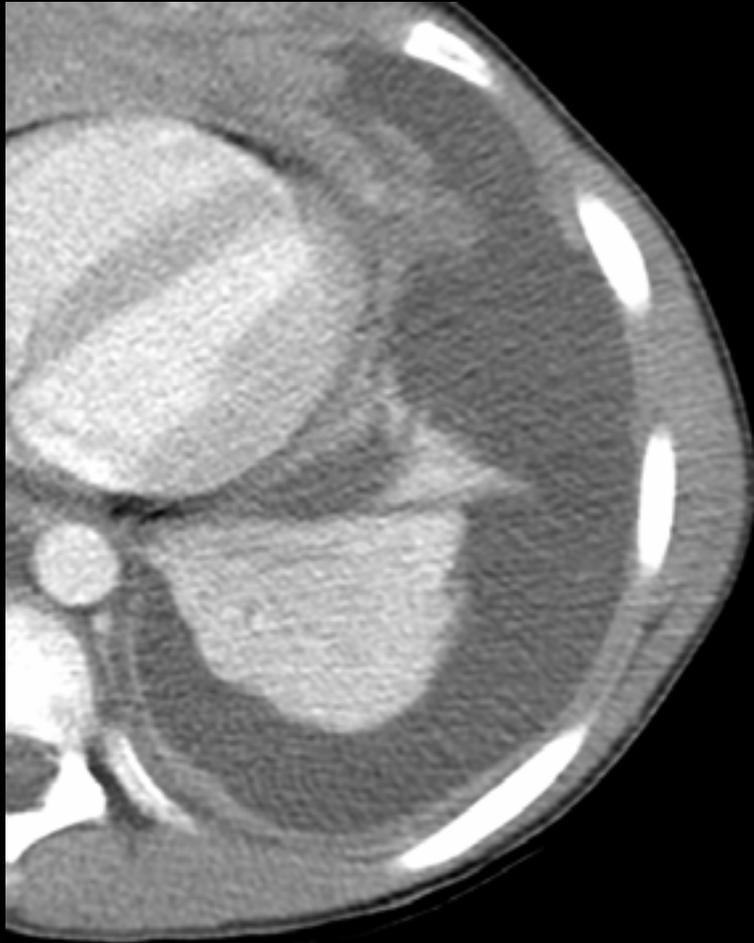


L
5 cm









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

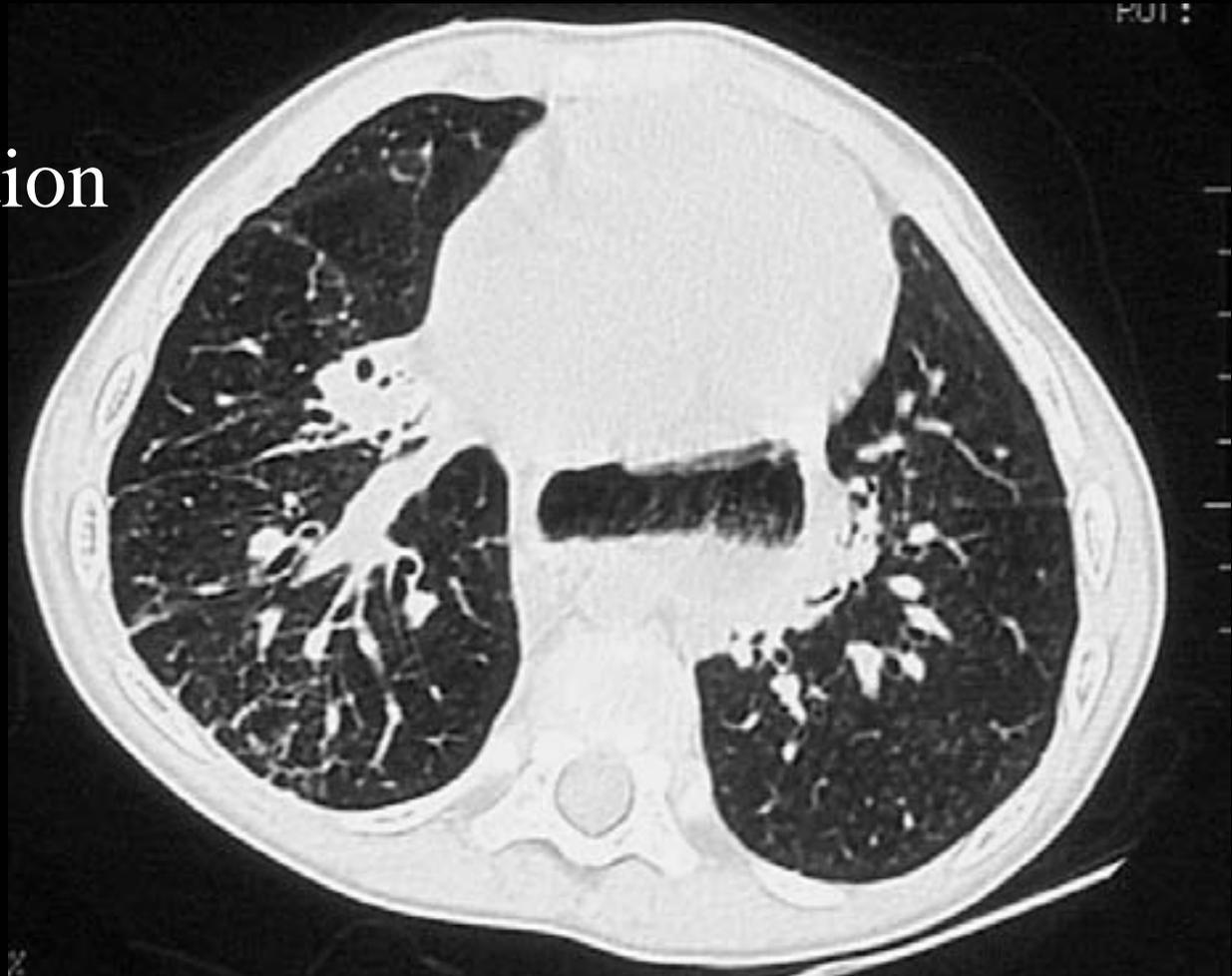
4 Month Old, Gastric Pull-up

Conventional
CT



4 Month Old, Gastric Pull-up

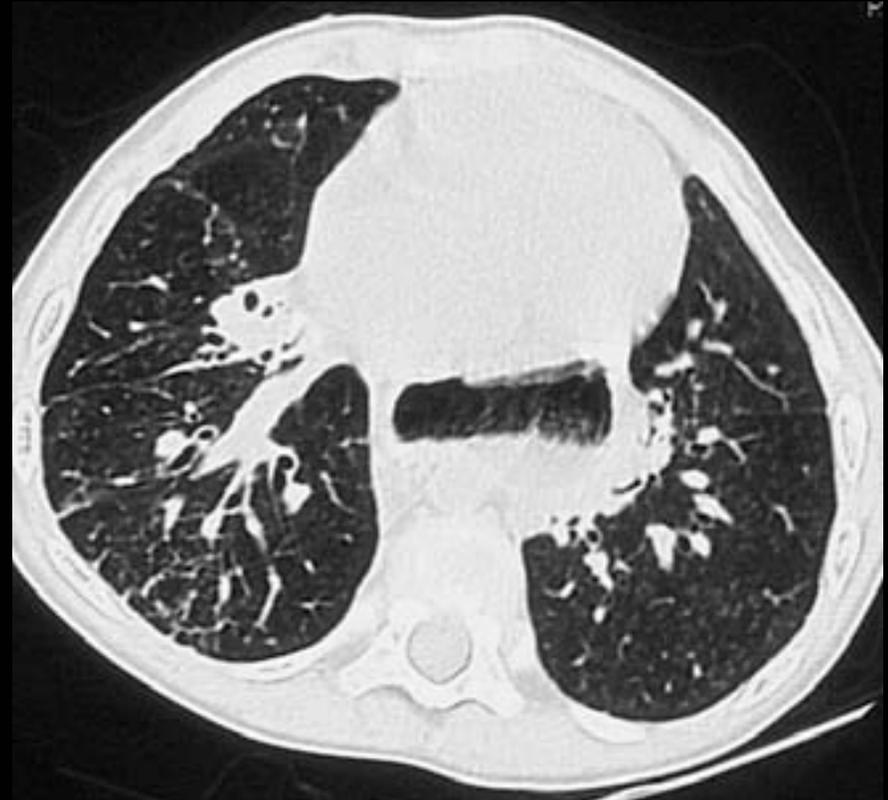
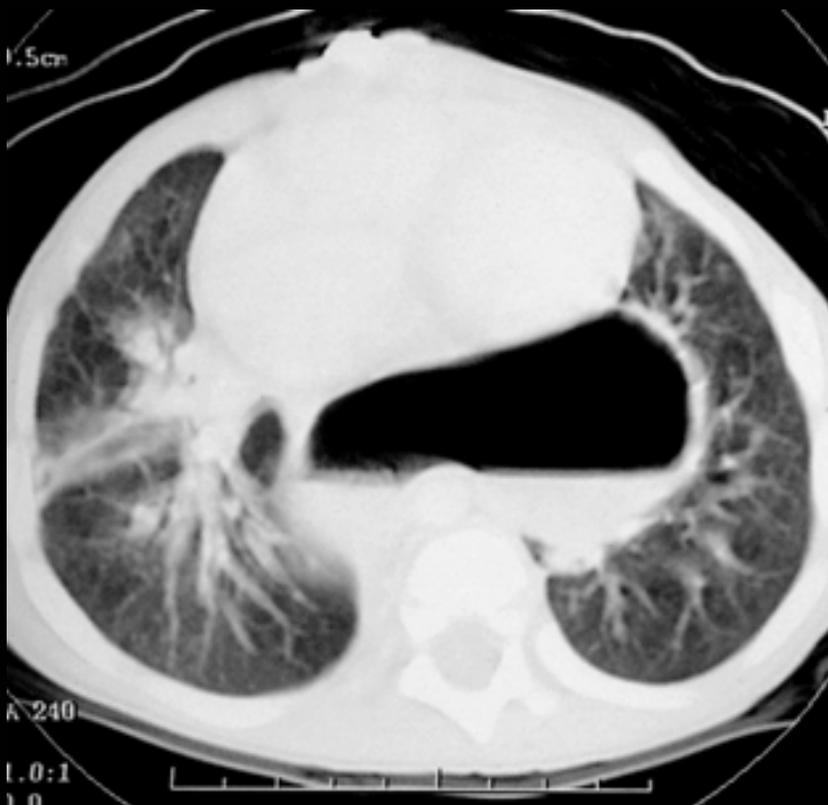
High Resolution
CT



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

CT CHEST 1



Radiation Risk

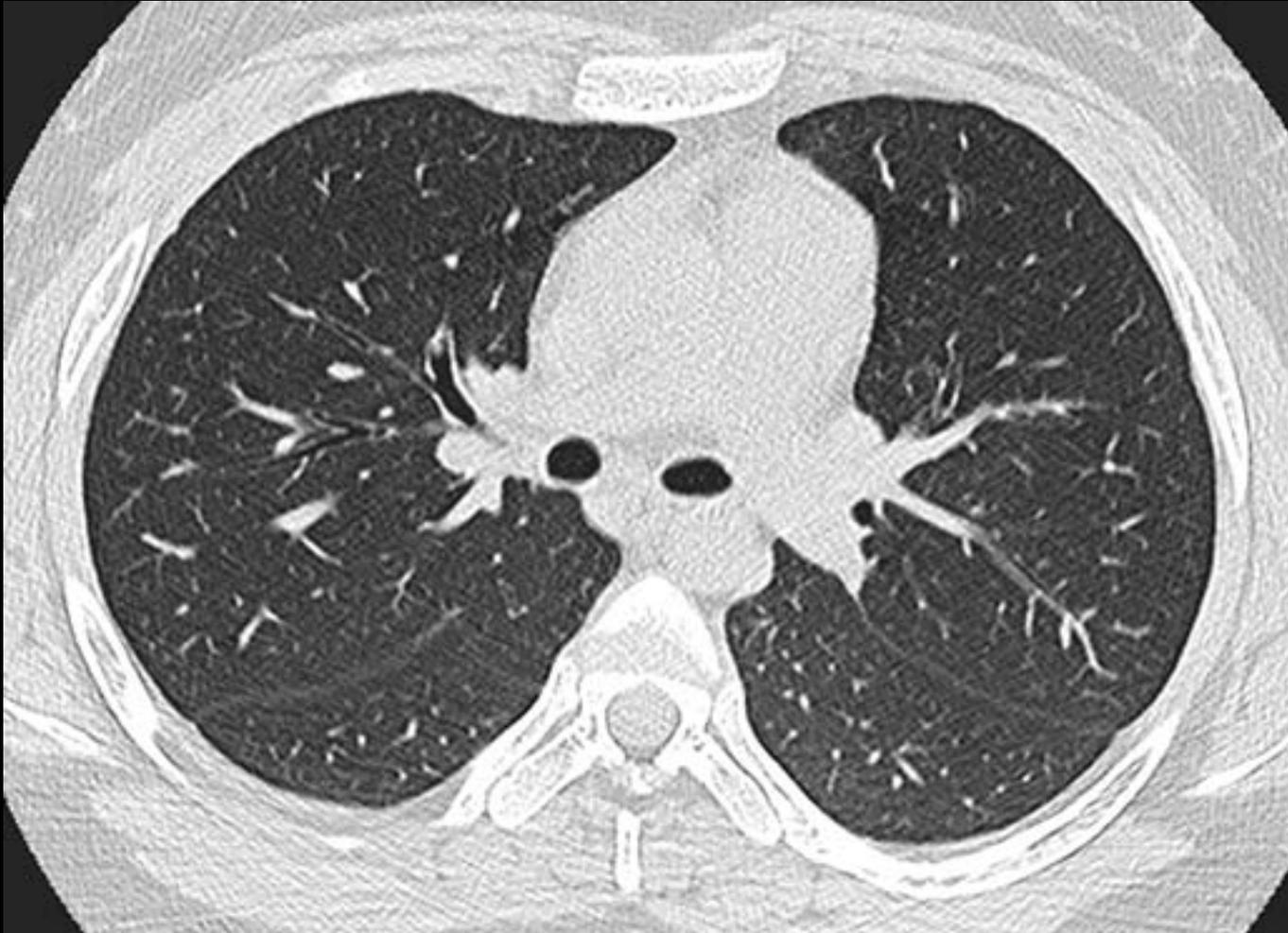
Radiation Risk

- 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

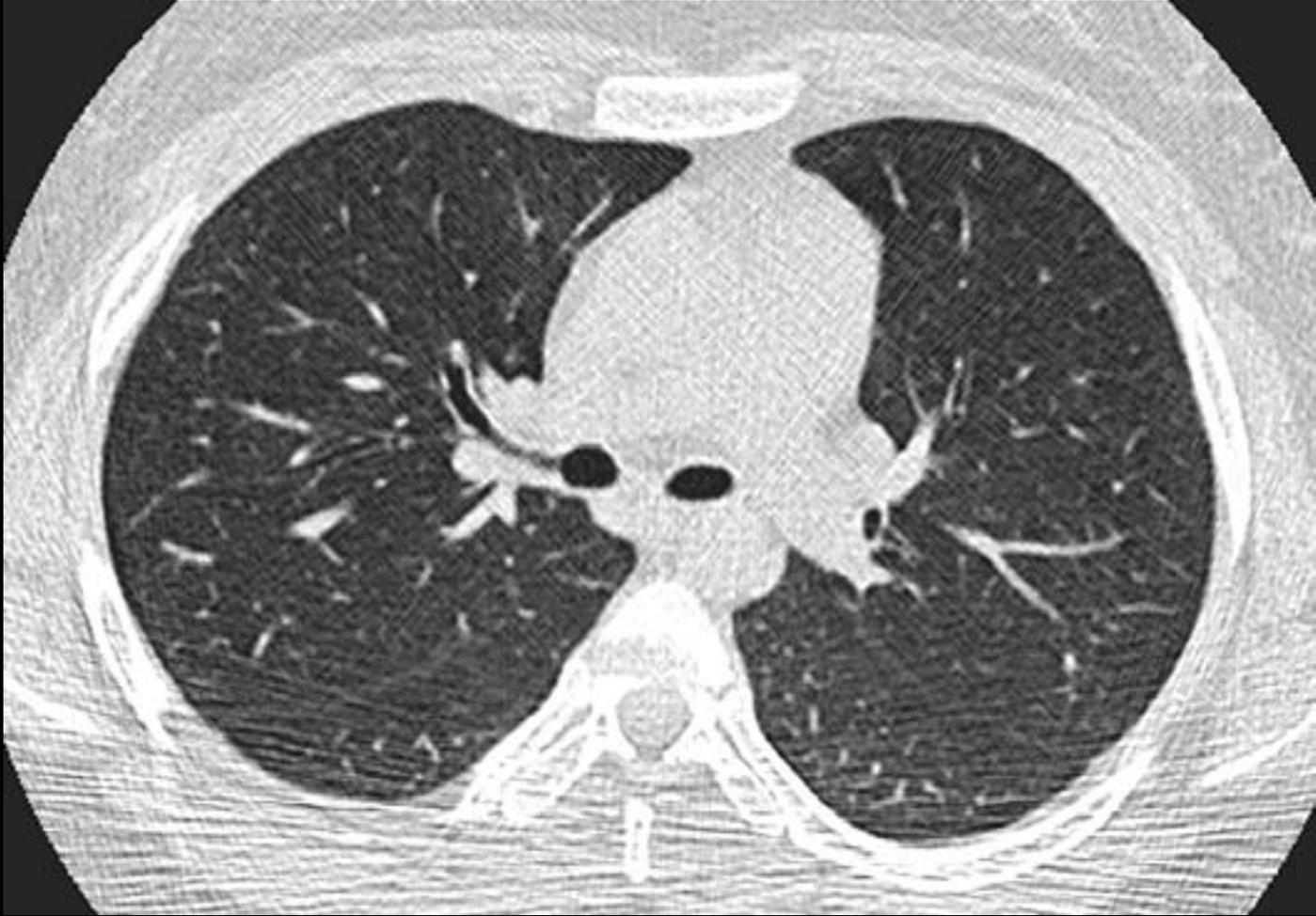
Radiation Risk

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

15 year old, full dose



15 year old, ? dose

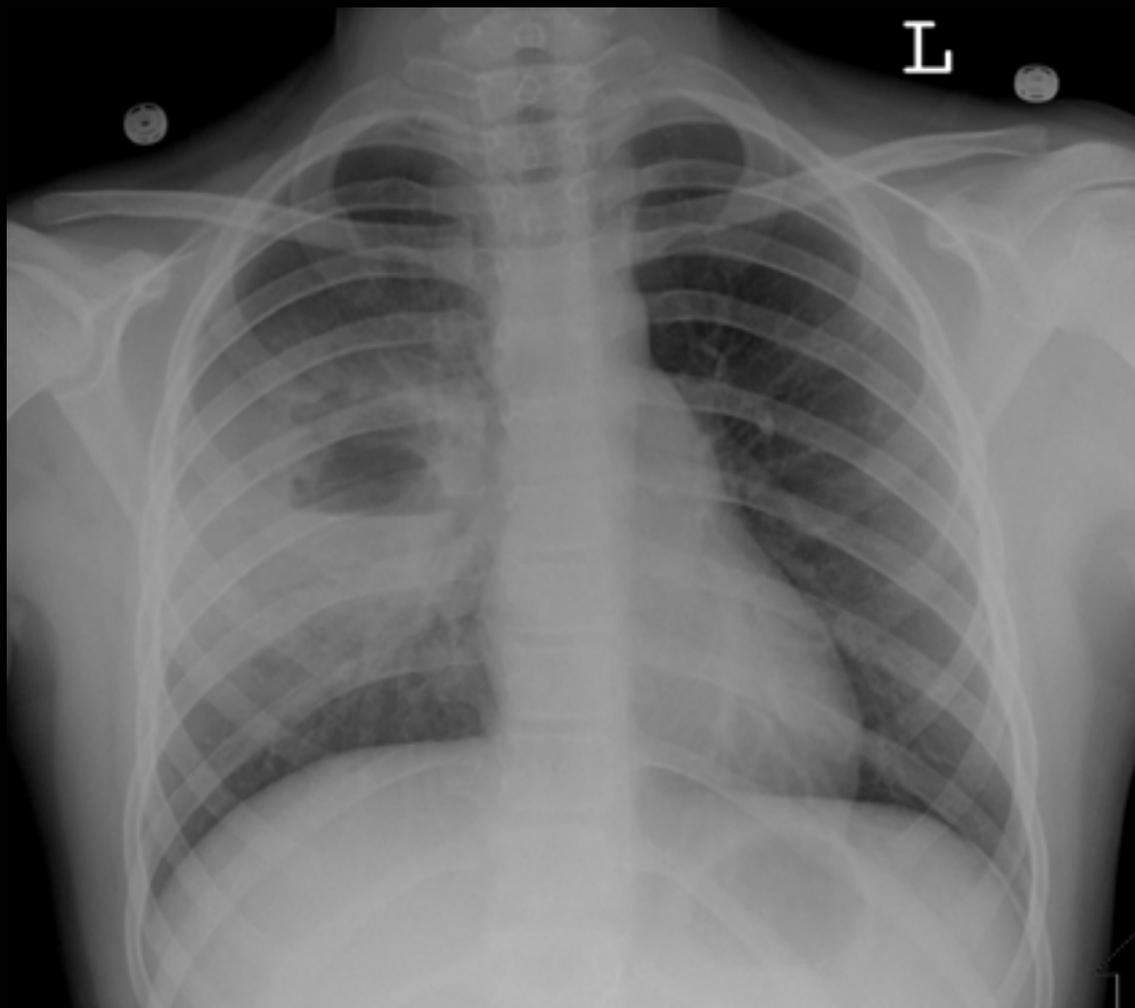


Full Compared to 1/4 dose

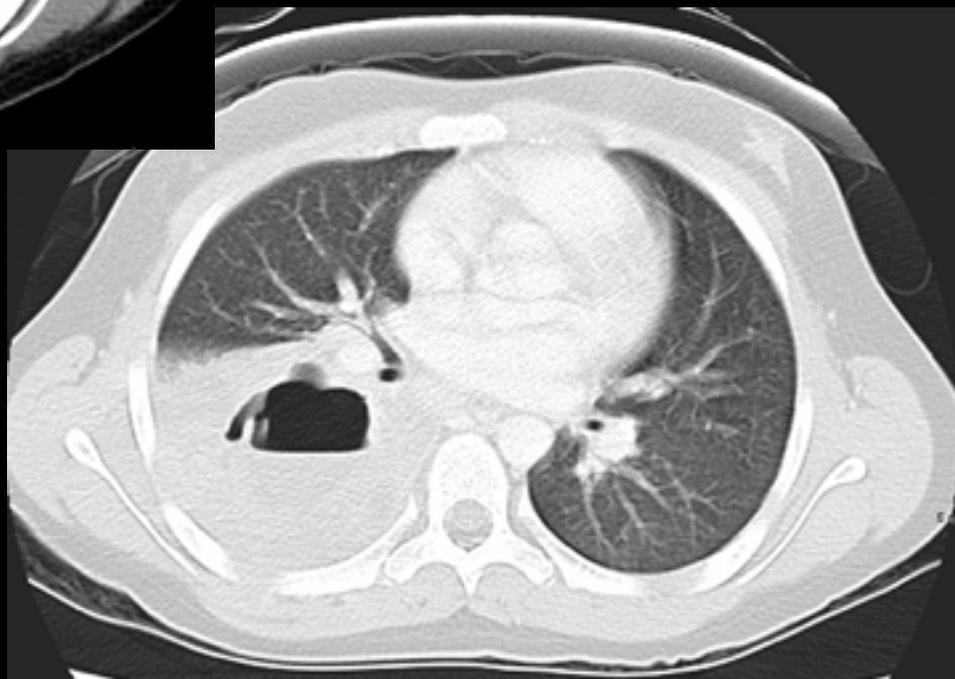


Clinical Cases

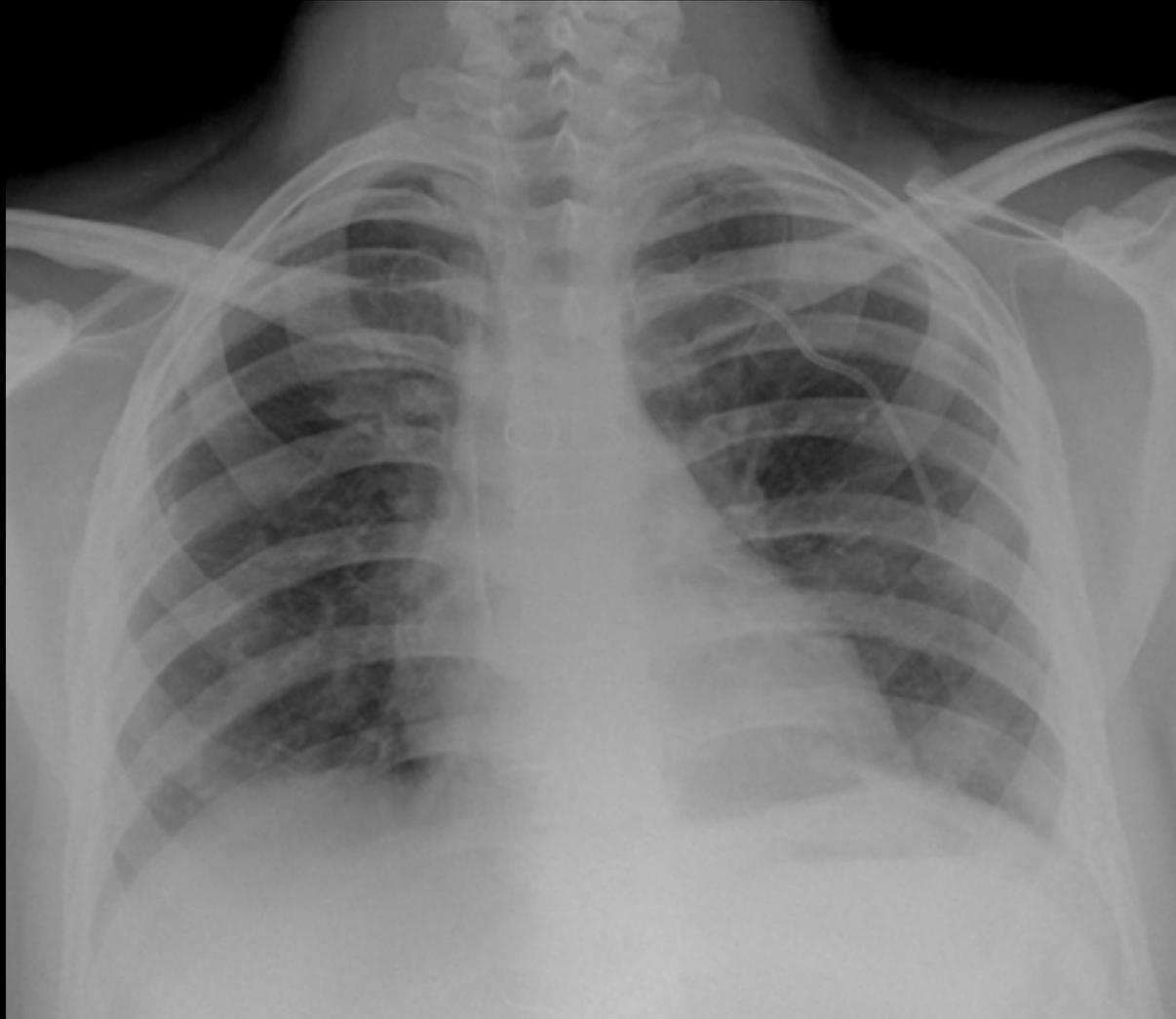
Febrile 9 year old



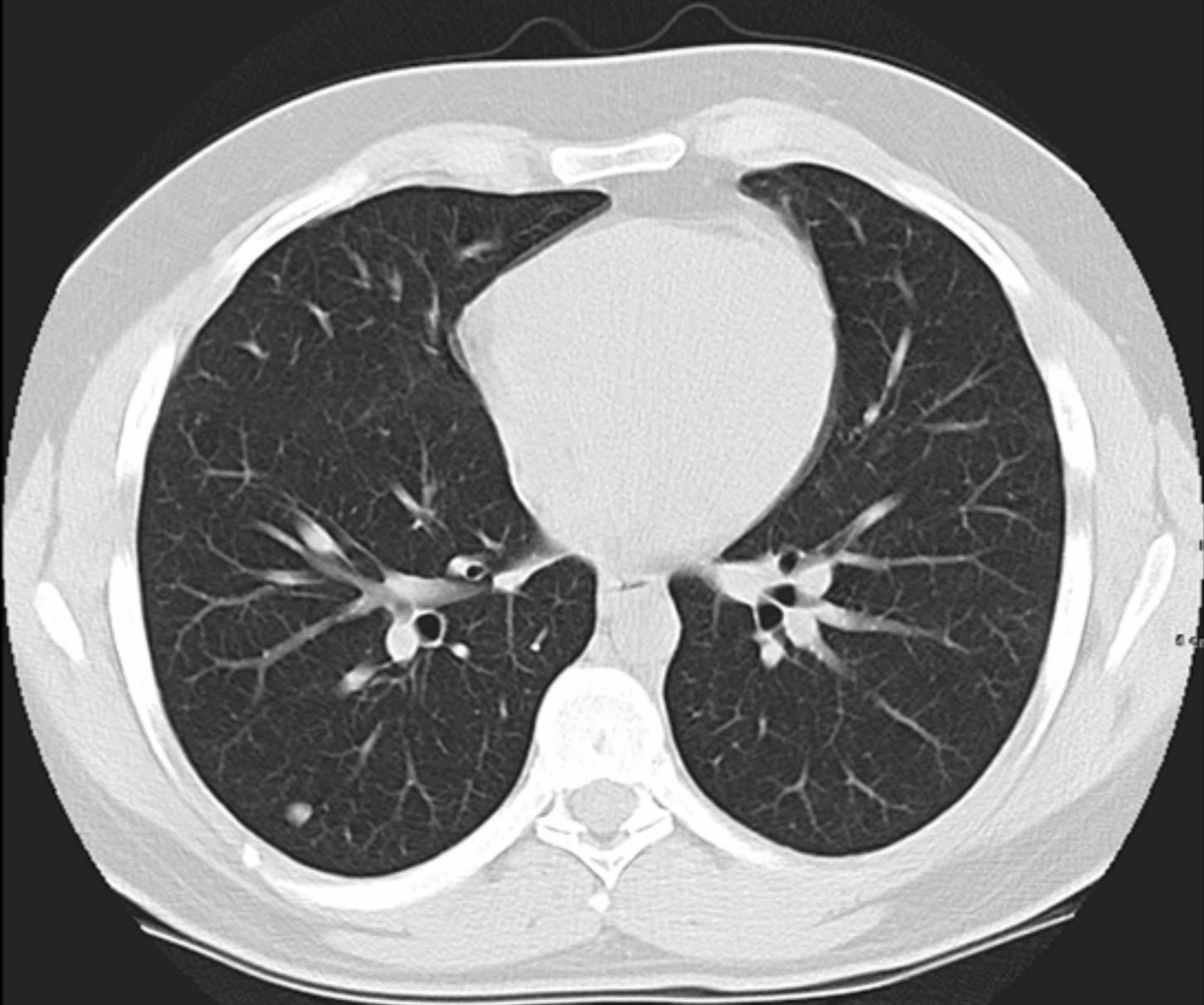
Conventional CT with Contrast



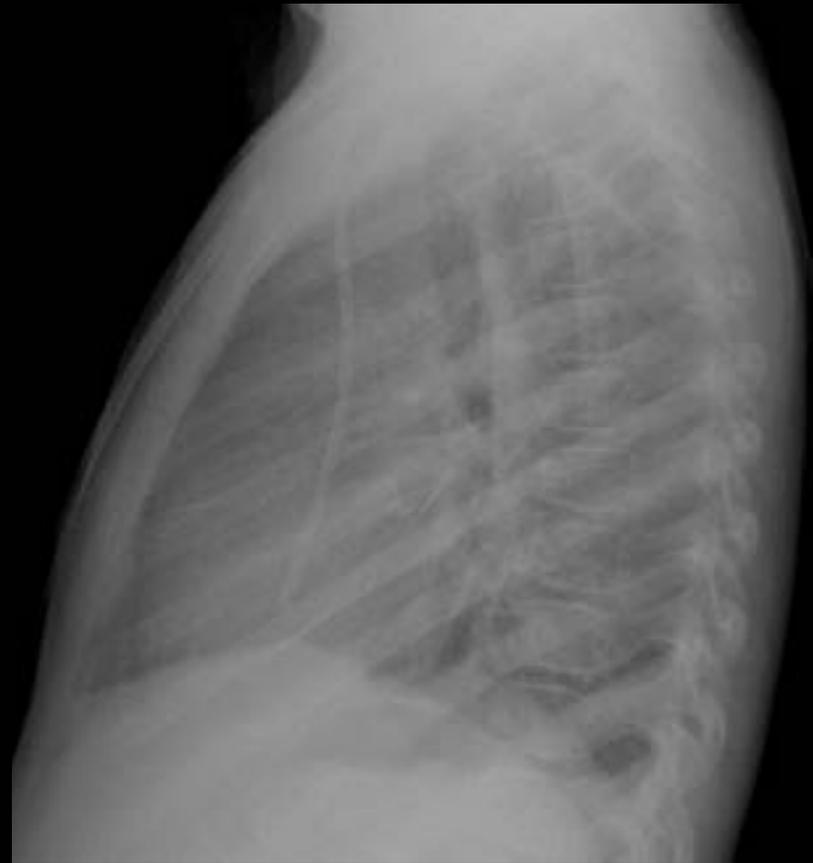
21 Year Old with Osteosarcoma



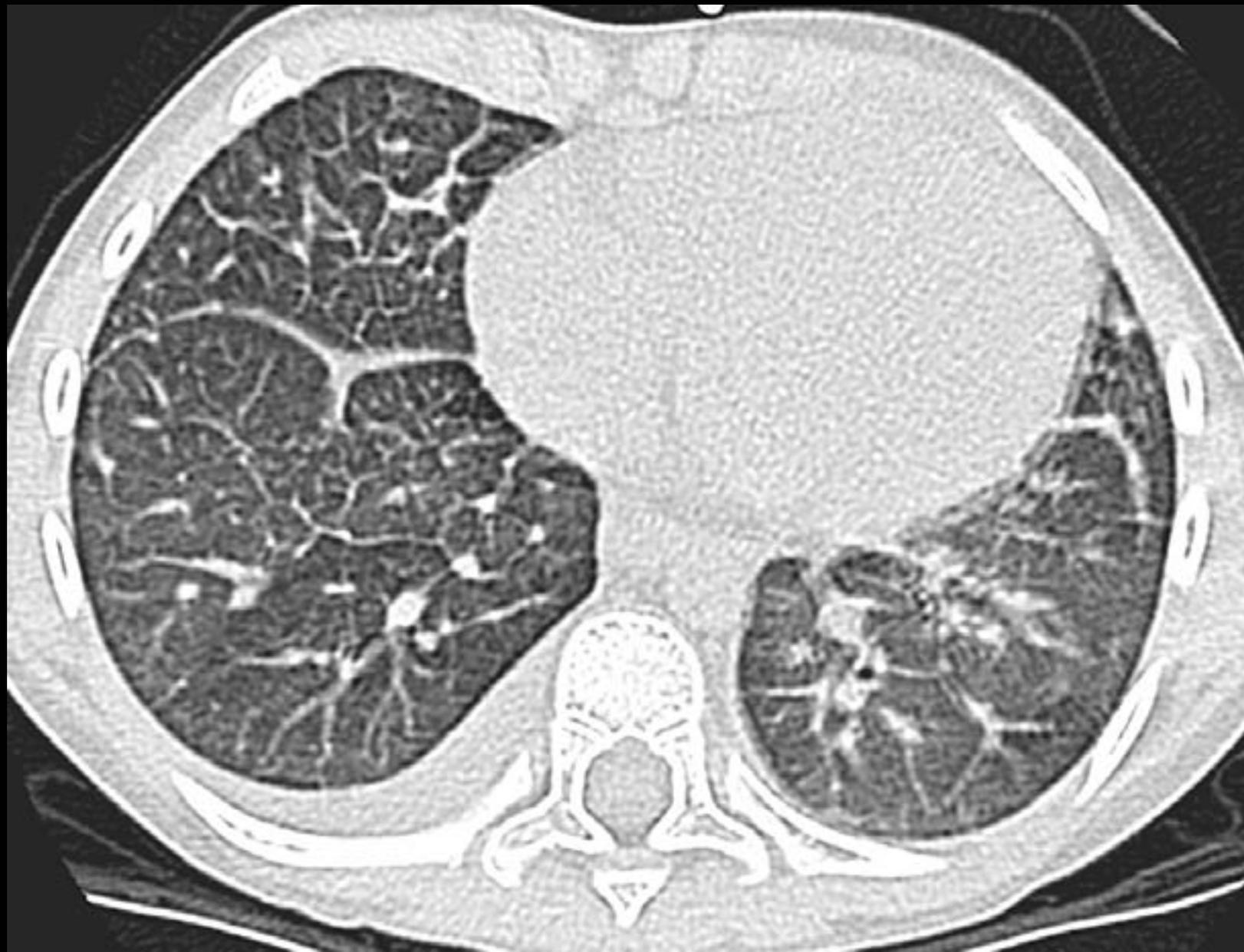
Conventional CT Without Contrast



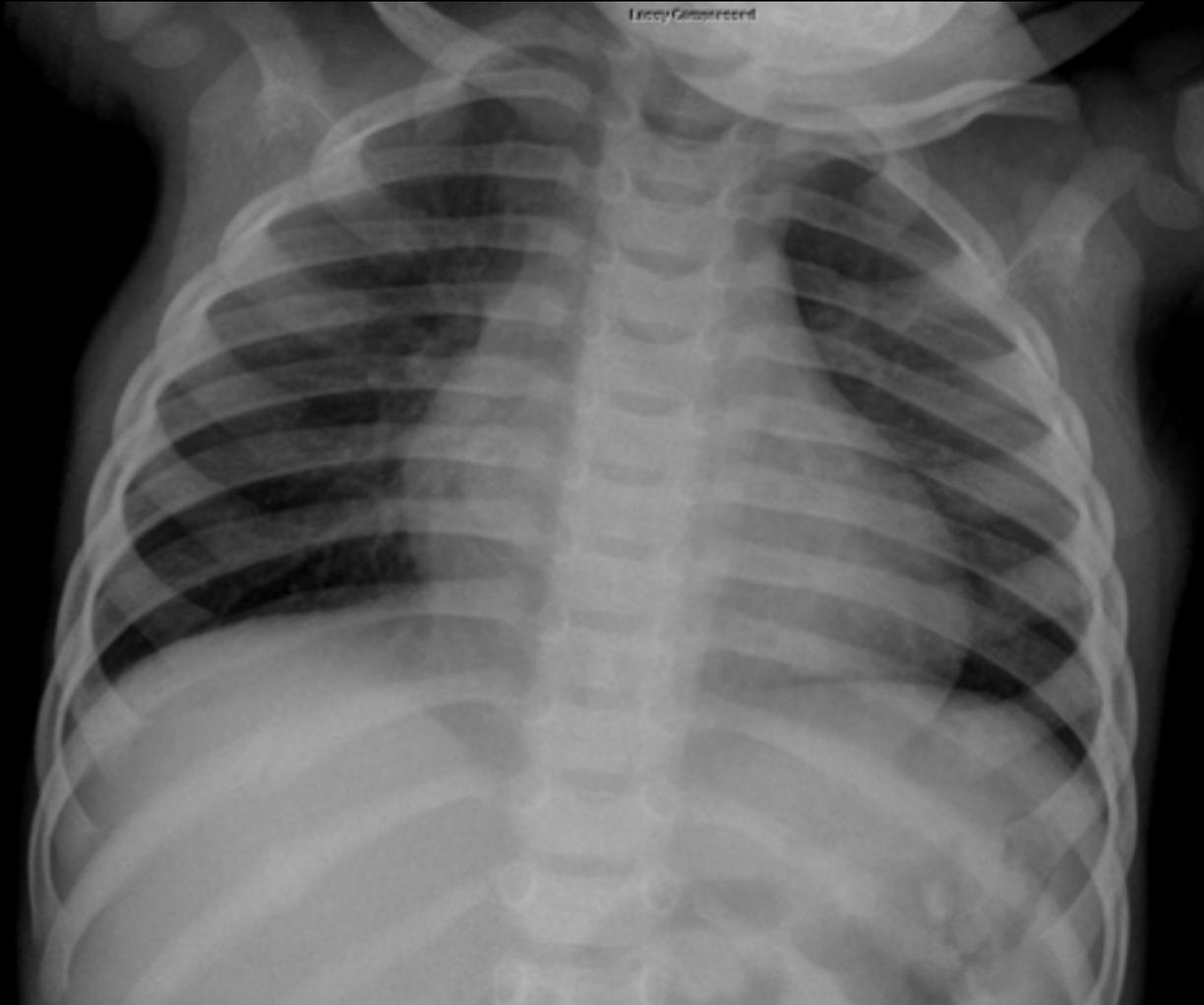
**5 year old 60 Days after Bone
Marrow Transplant,
Cytomegalovirus Positive**



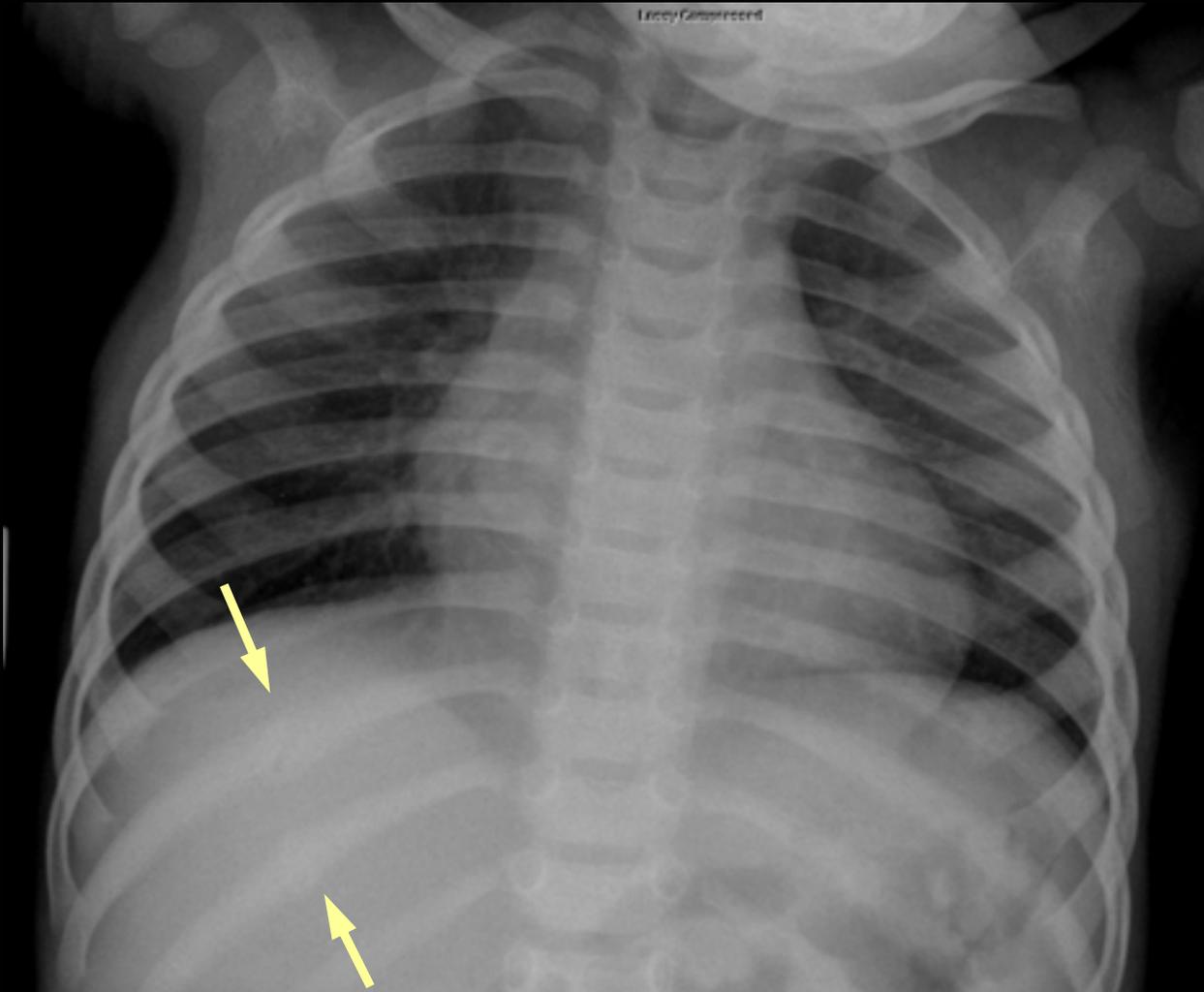
High Resolution CT



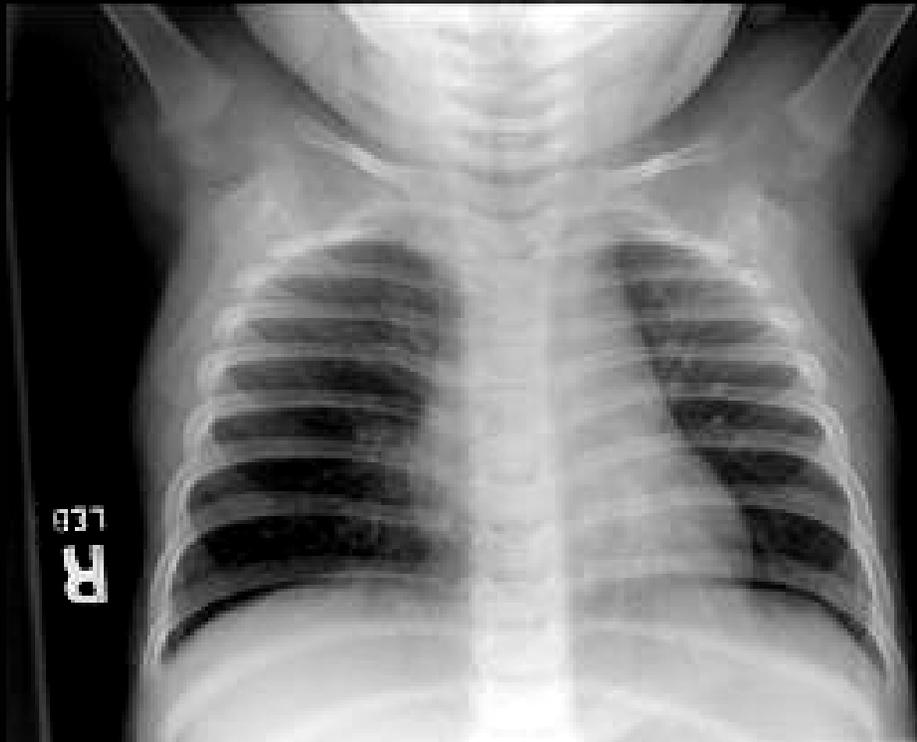
Fussy 15 Month Old



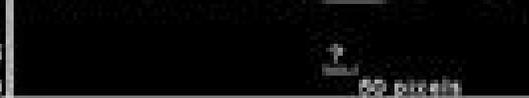
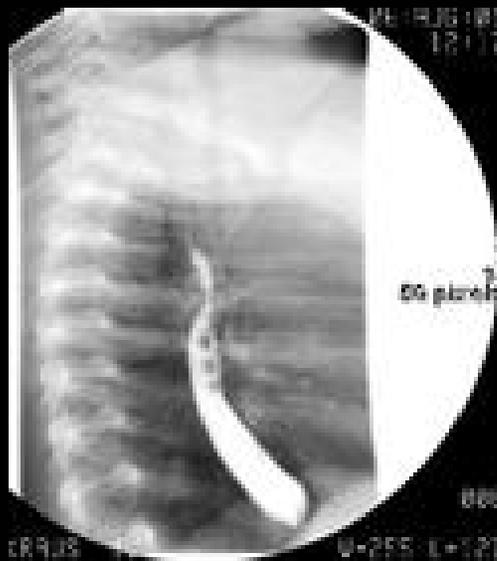
Rib Fractures from Child Abuse



11 Month Old With Noisy Breathing and Vomiting



Right Sided
Aortic Arch
with
Aberrant
Left
Subclavian
Vein





3 Month Old with Respiratory Distress

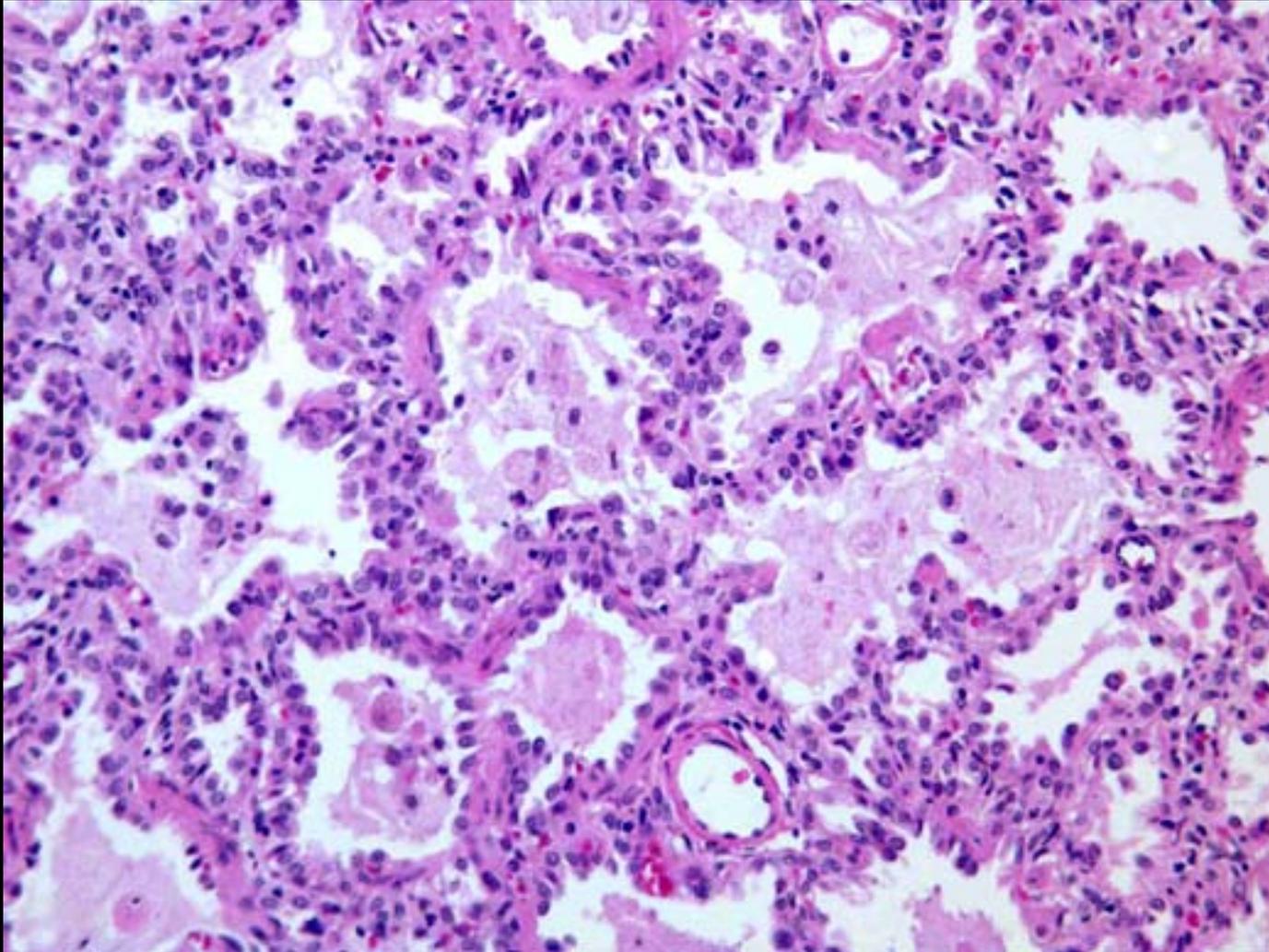


High-Resolution CT



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

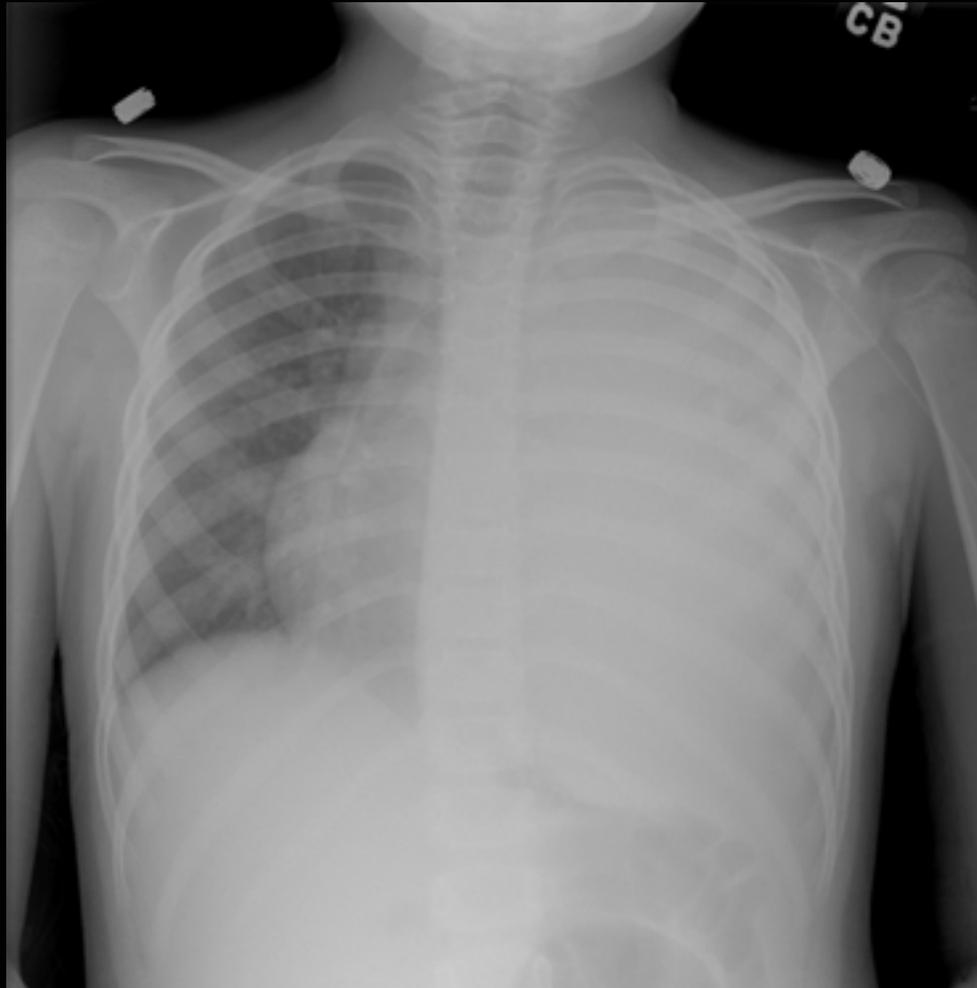


3 Months Old



14 Years Old

3 yo with Fever and Decreased Breath Sounds



11:19:31 am

4V2

4.0MHz 100mm

PEDIATRIC ABD

General

Pwr= -3dB MI=.72

80dB T1/+1/2/4

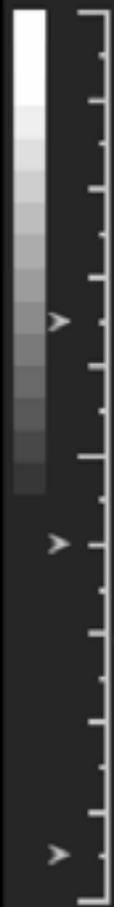
Gain= -2dB Δ =2

Store in progress

50 pt

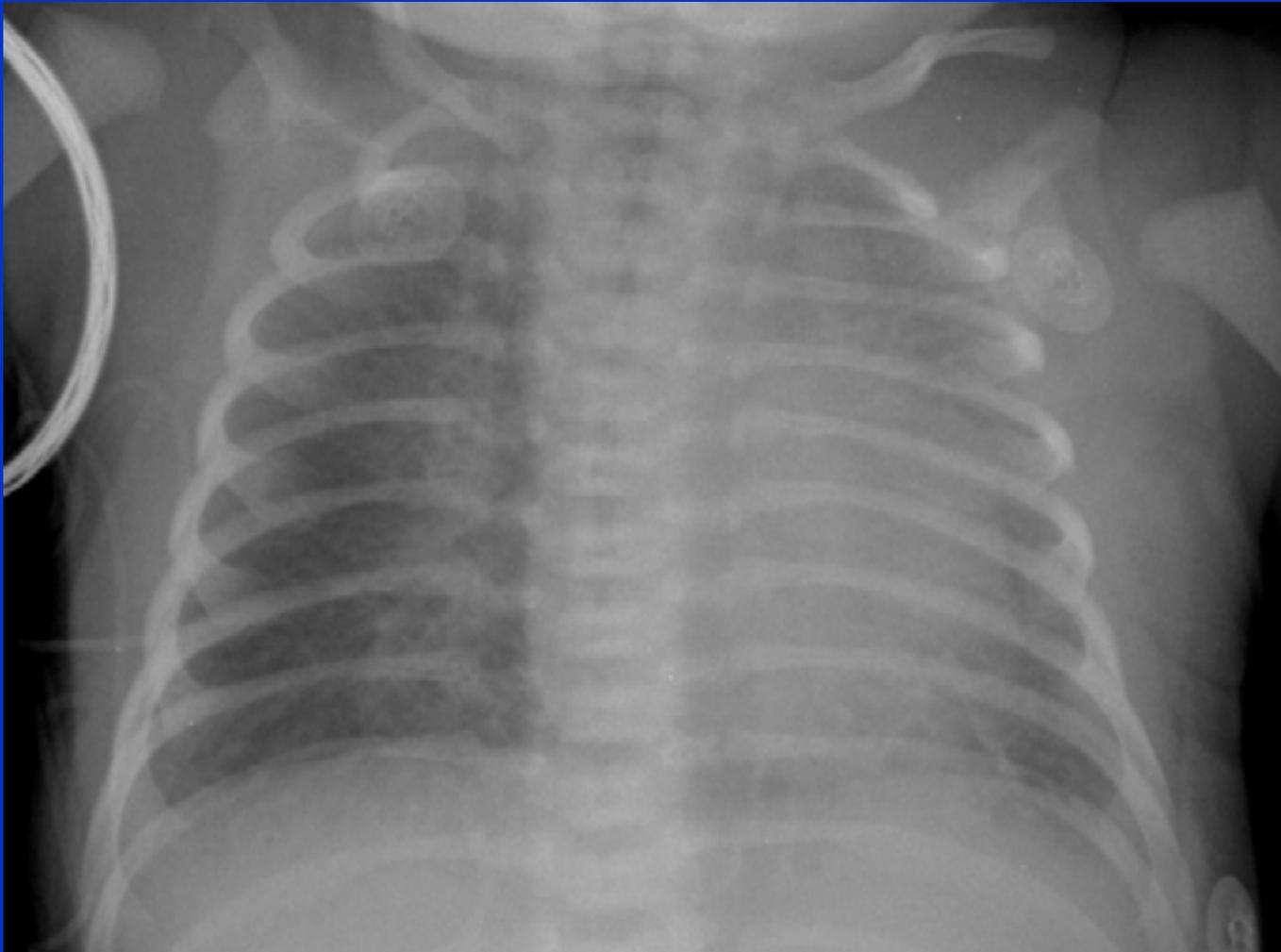
LT LONG

57



“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

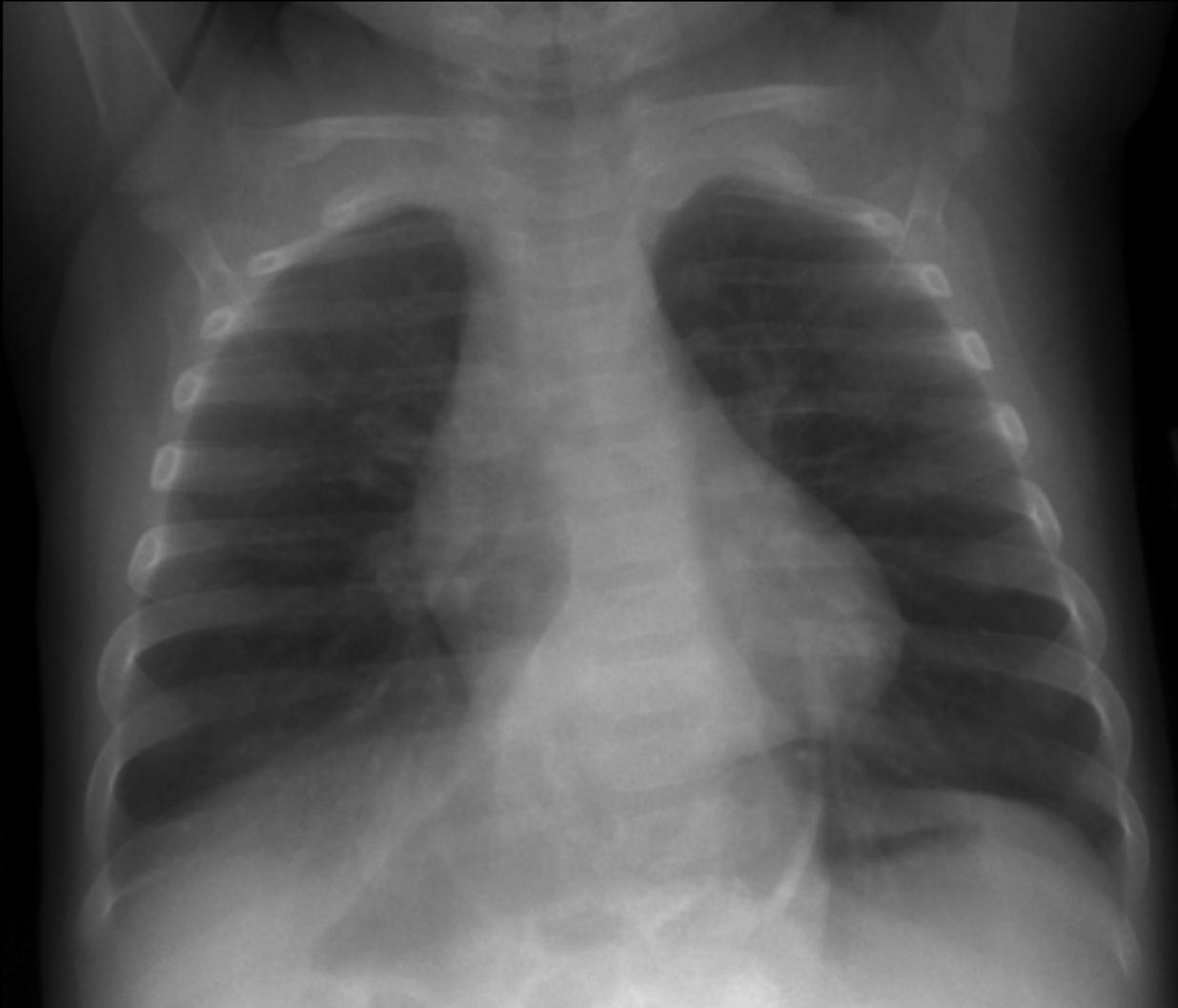
S CHILDRENS HOSPITAL MEDICAL
Ref:MONE, SUZANNE M.D.
Rad:BRODY
CT
CT CHEST W/CONTRAST



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

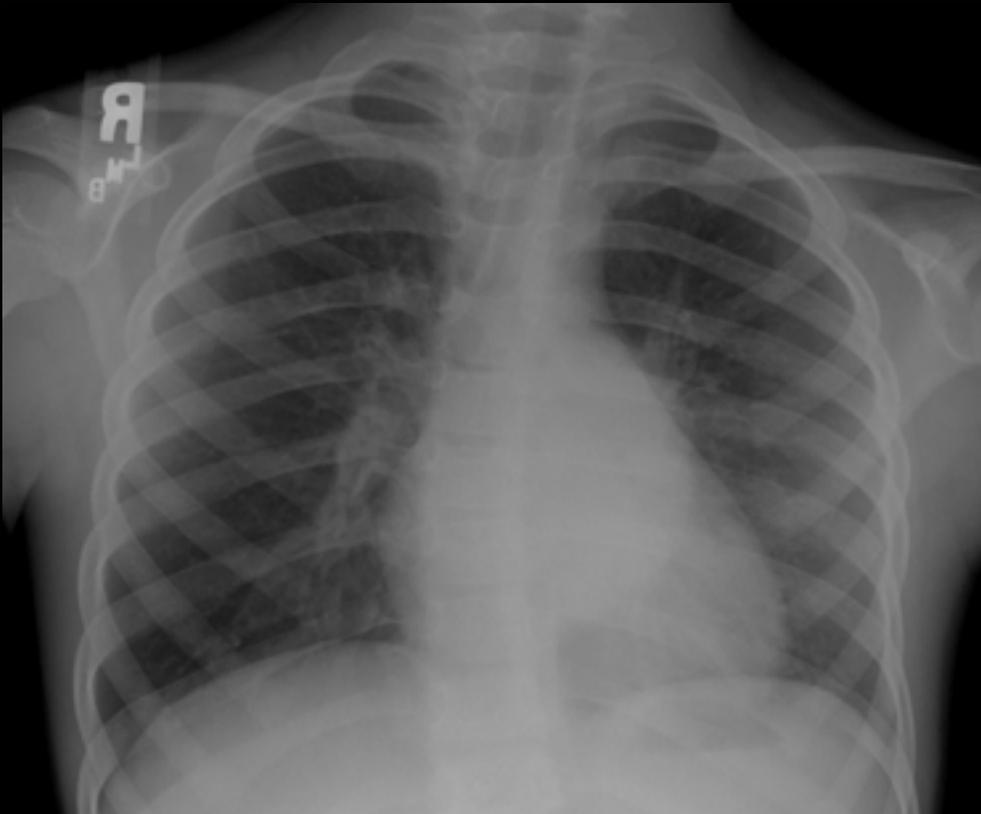
Vitrea®
W/L:122/145

Infant with Poor Weight Gain

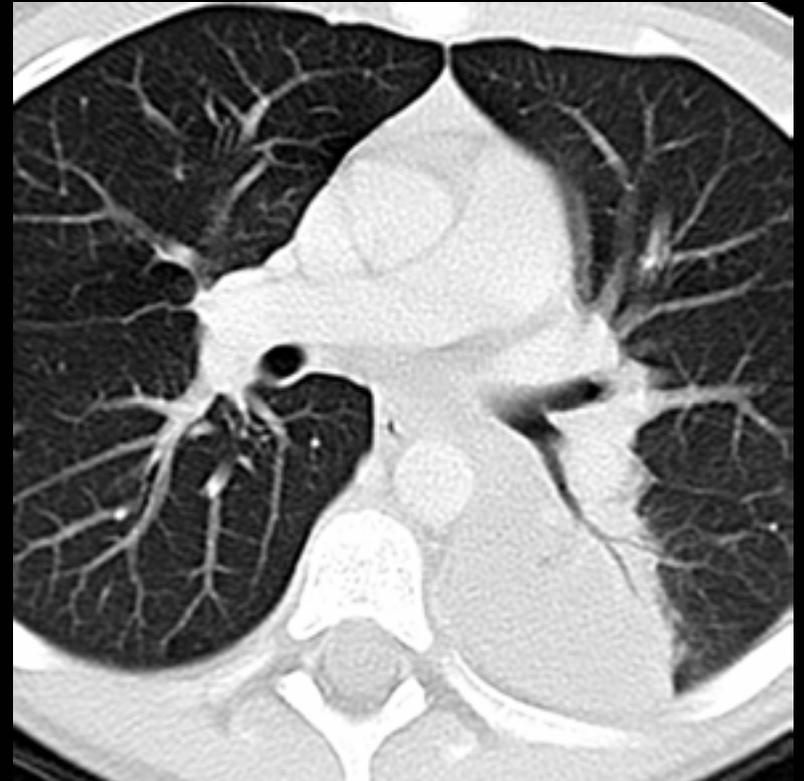
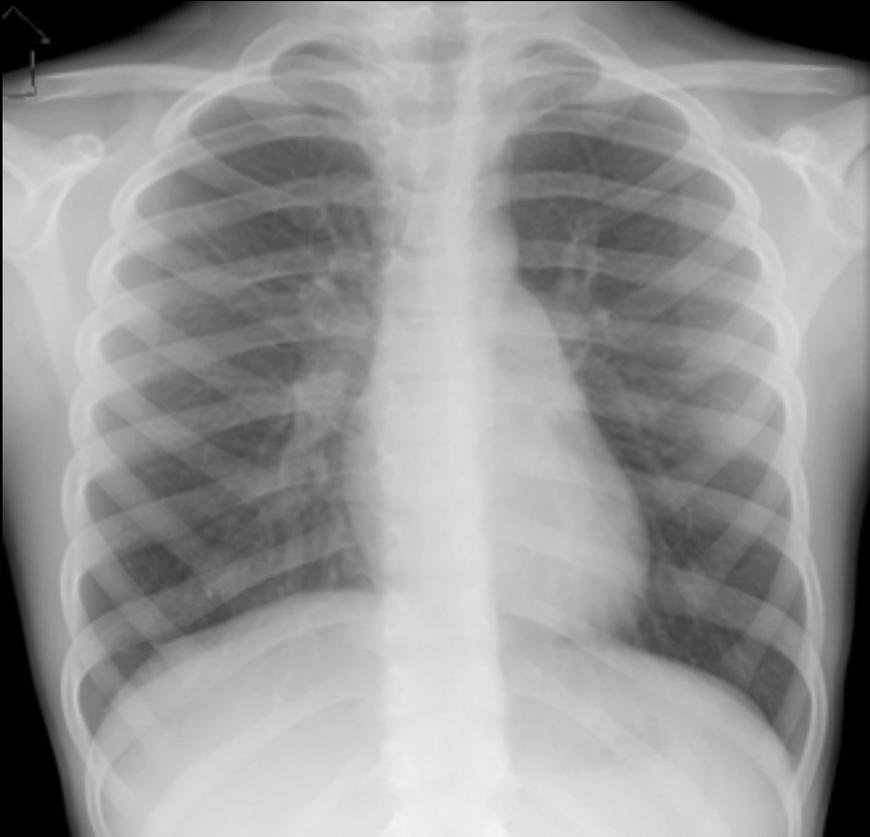




8 Year Old with Cough and Fever



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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