

# Interpreting Pediatric Chest X-Rays

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# For People Who Write Notes

- Write down my email address:  
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- Put down your pen or pencil
- Write me for anything you need
- Slides at:  
[http://www.cincinnatichildrens.org/research/  
div/radiology/present.htm](http://www.cincinnatichildrens.org/research/div/radiology/present.htm)

# Three Talks This Morning

- Interpreting pediatric chest X-rays
- High-resolution CT scanning in children
- After the chest X-ray, what to do next

# Interpreting Pediatric Chest X-Rays

# Chest X-rays

- Provide a great deal of information
- Are less expensive than other imaging and use very, very little radiation
- Often provide the information that tells us we need to do additional imaging
- Can be hard to interpret in children

# Interpreting Pediatric Chest X-Rays

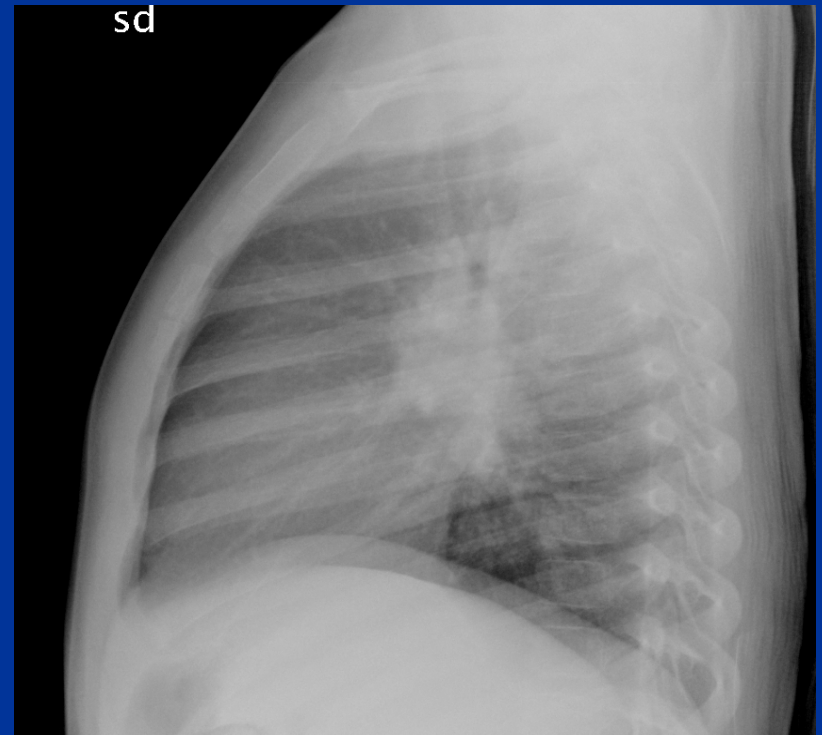
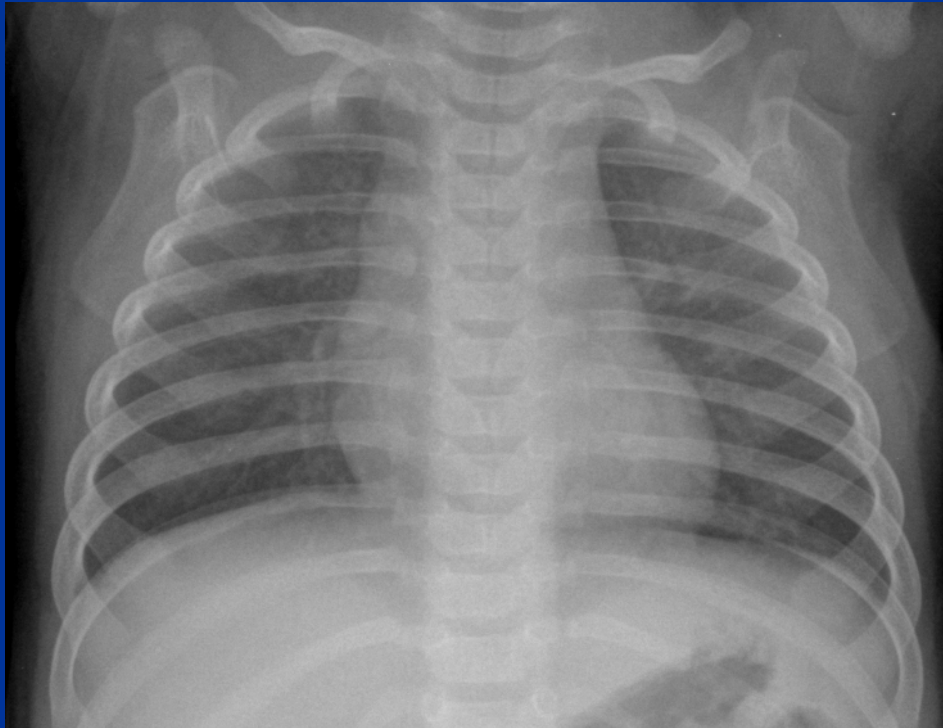
- Chest X-rays look different in children
- Children have different diseases
- There are special places to look when reading a pediatric chest X-ray

# Children Are Different

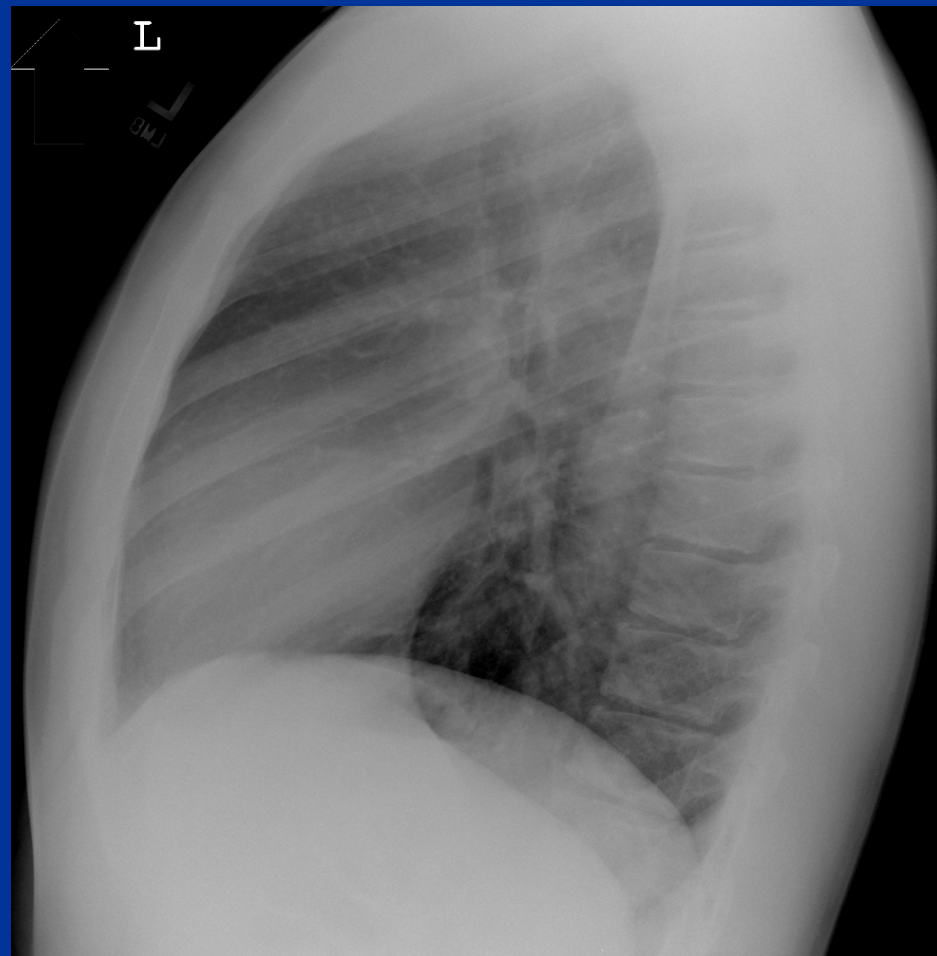
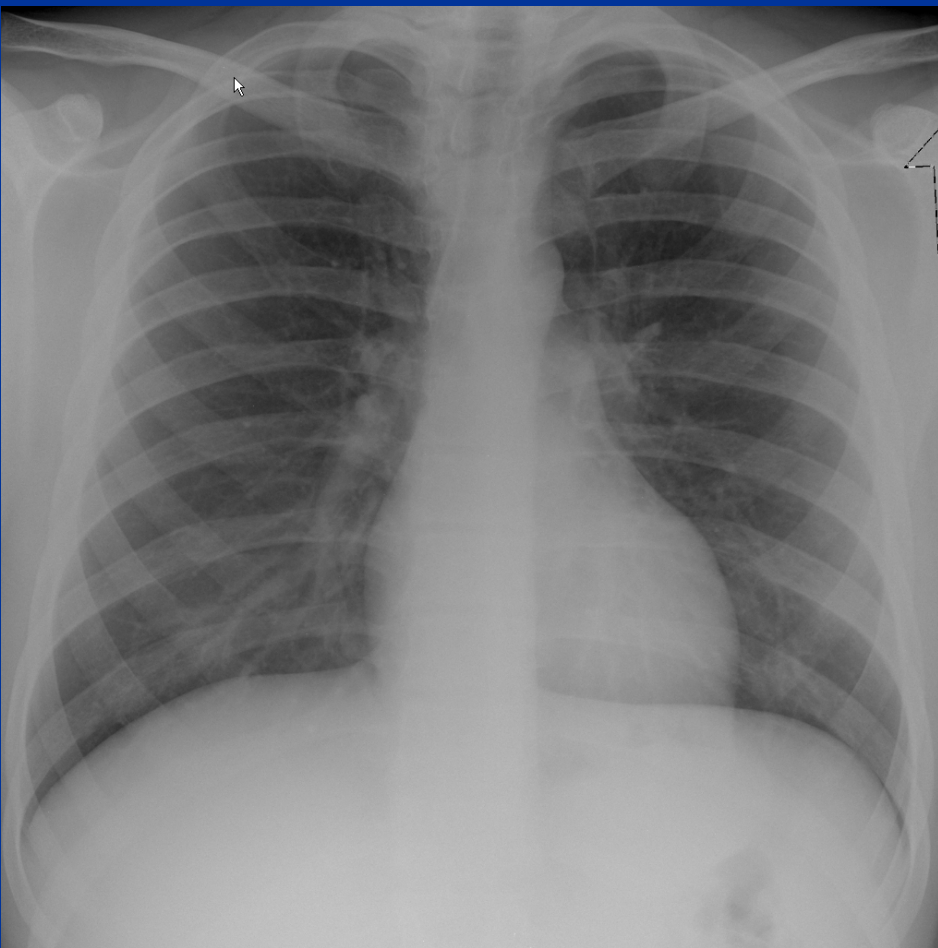
- Chest X-rays change with age
- Cooperation may be limited
- The thymus can cause confusion

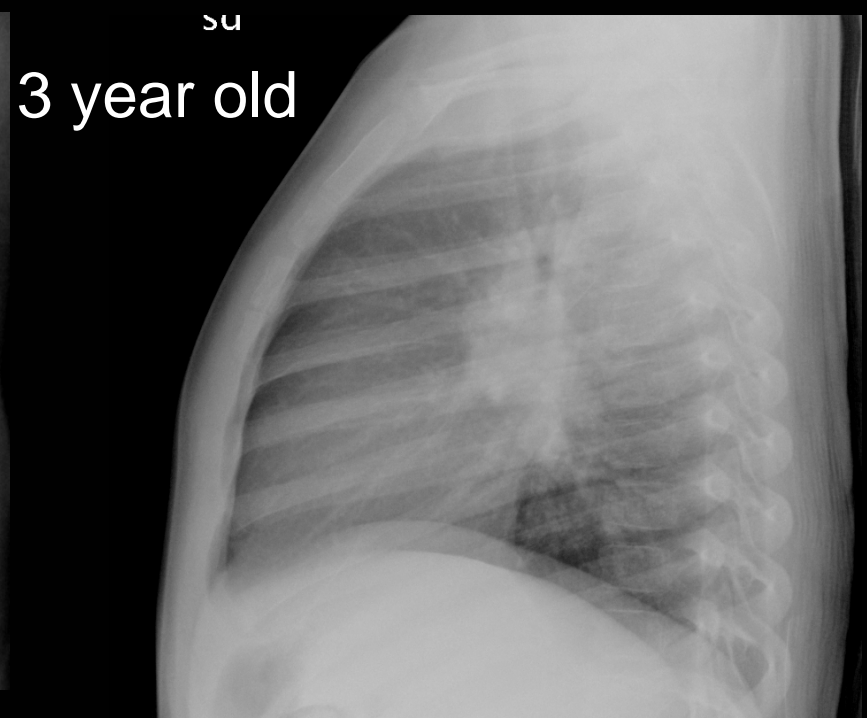
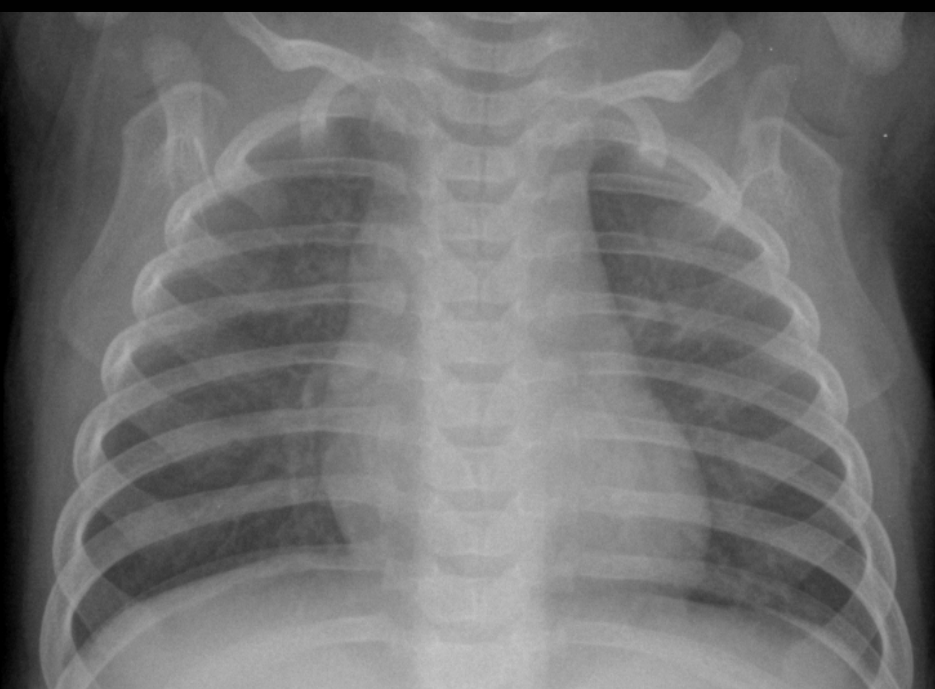
# Chest X-rays Change with Age

# Normal 3 Year Old

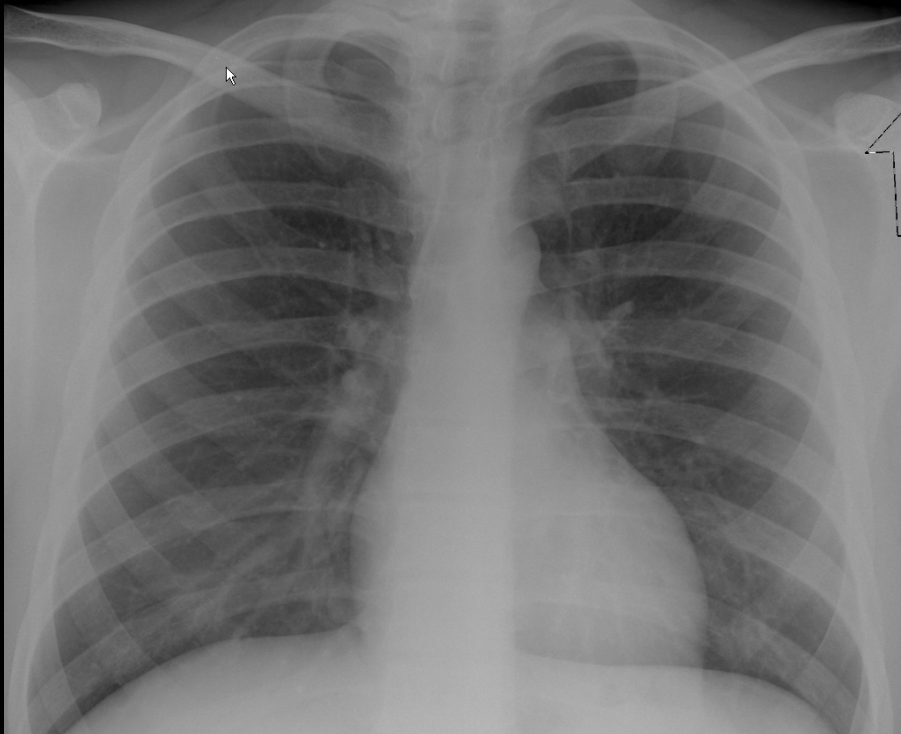


# Normal 12 Year Old

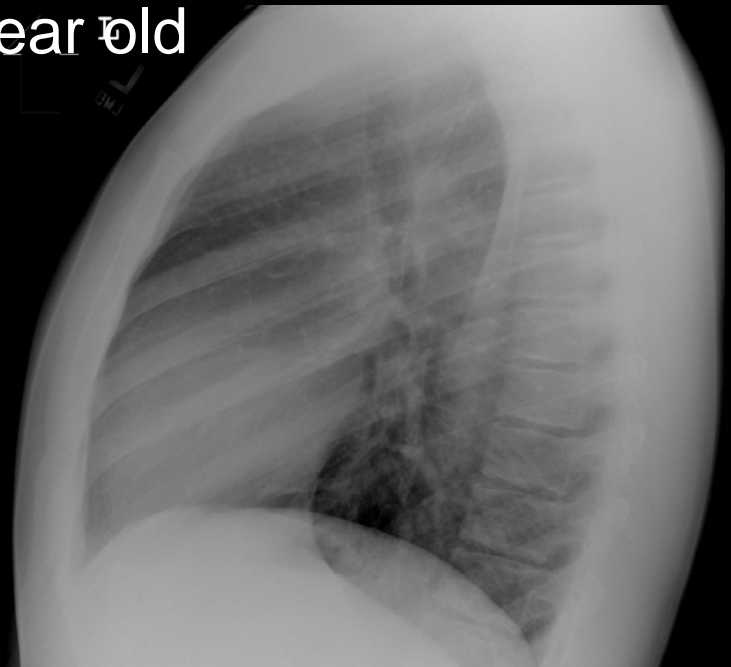




3 year old

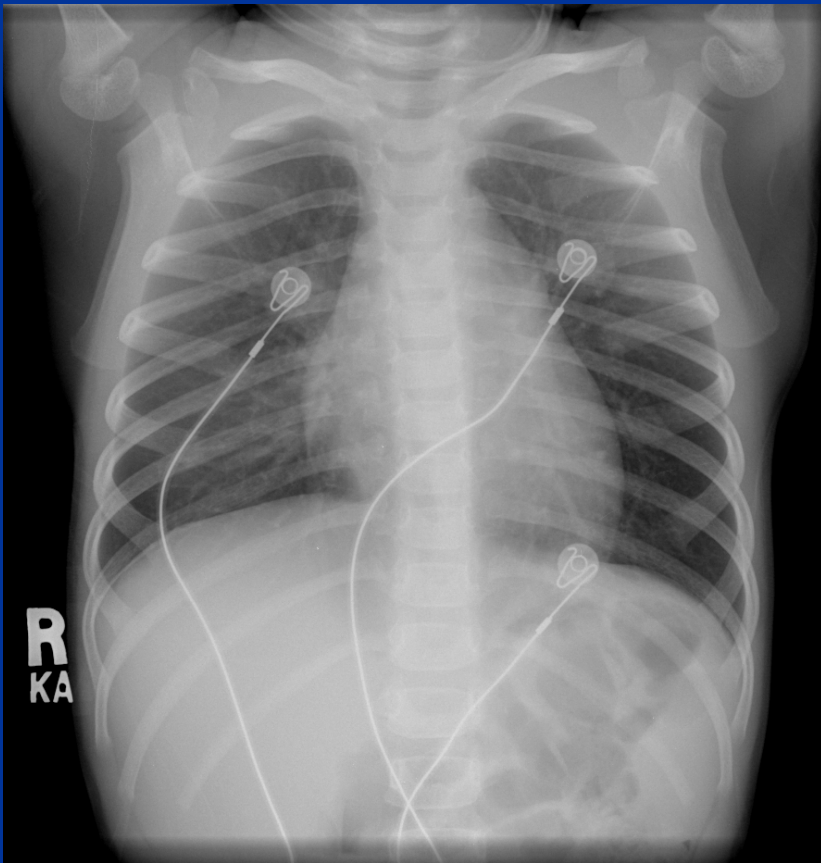


12 year old

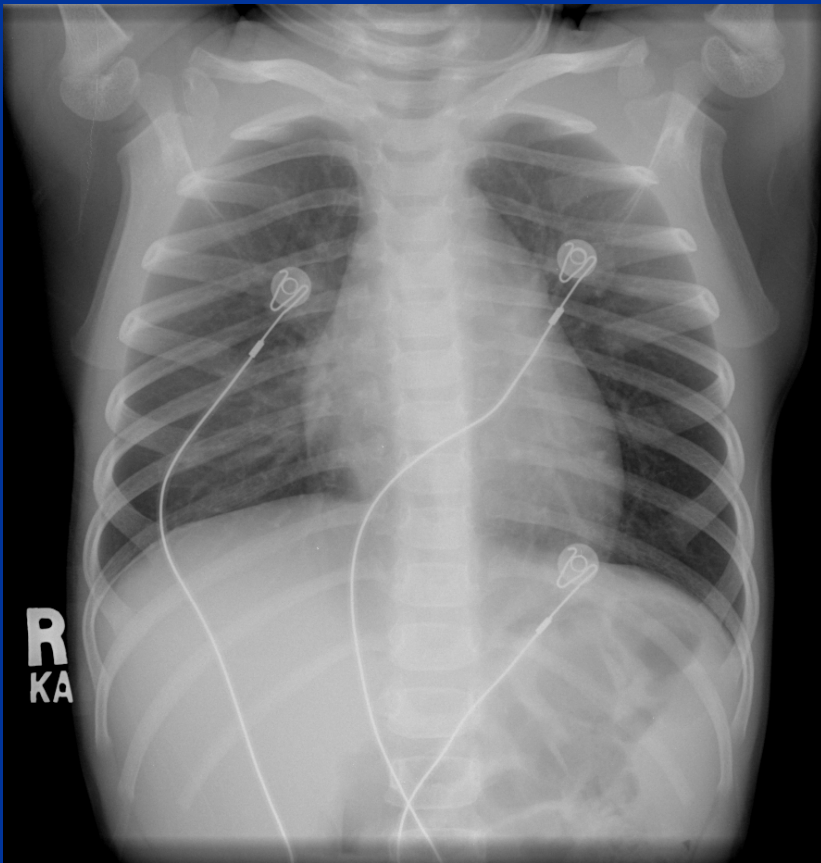


# One View or Two?

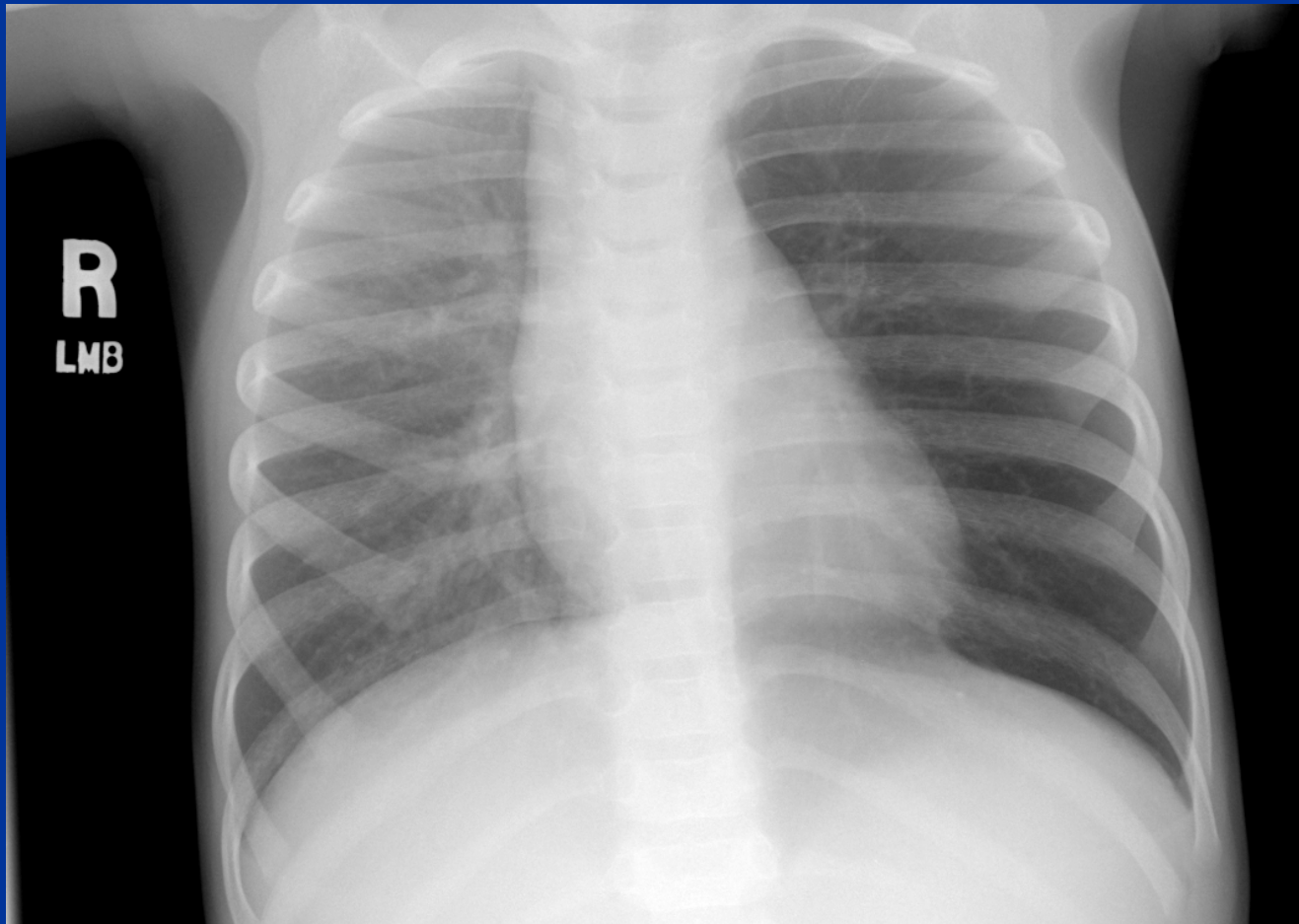
# Foreign Body Aspiration



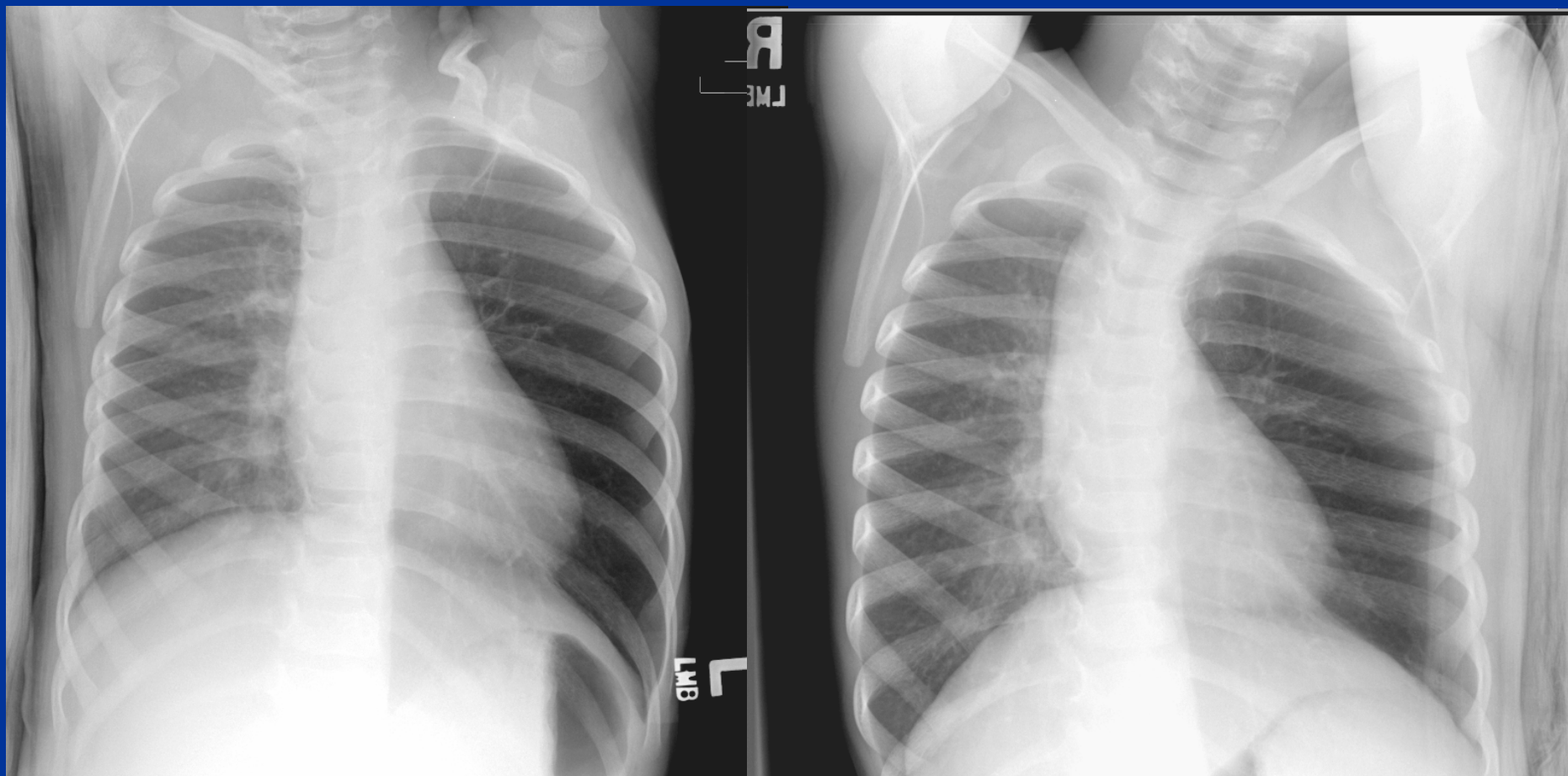
# Foreign Body Aspiration



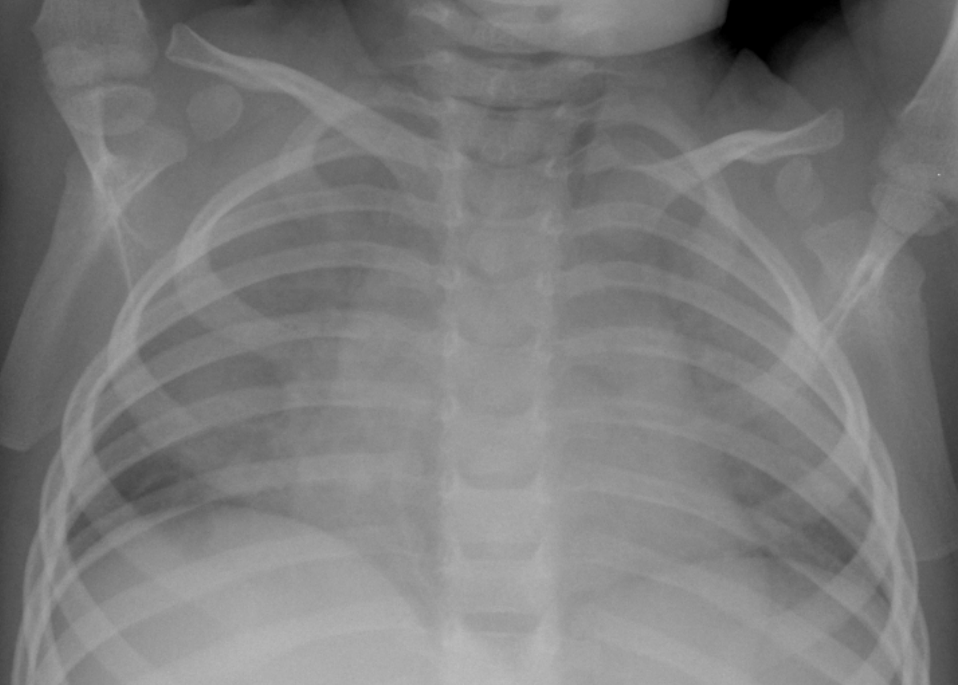
# More Than 2 Views

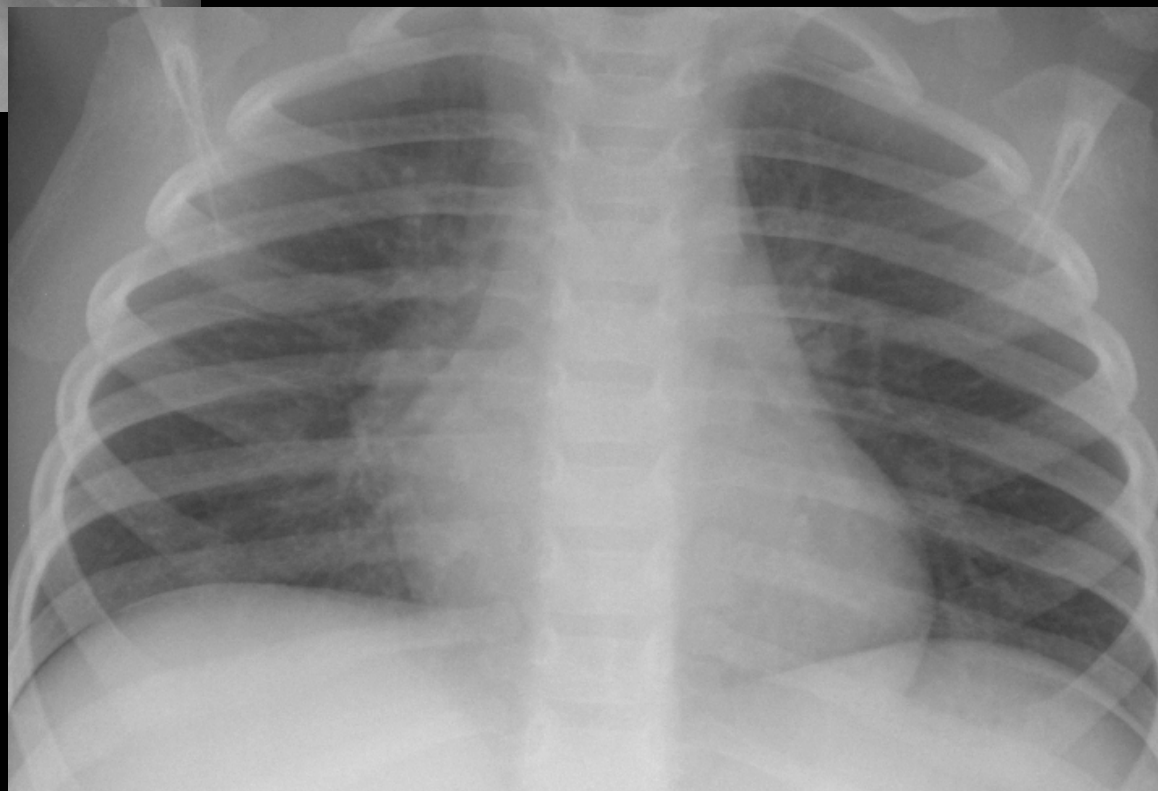
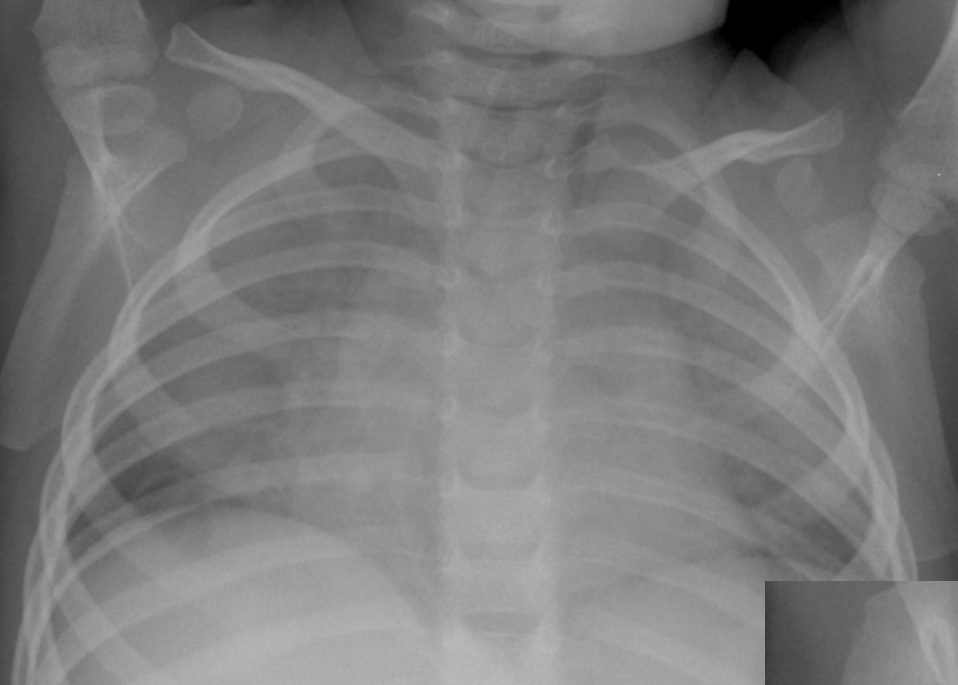


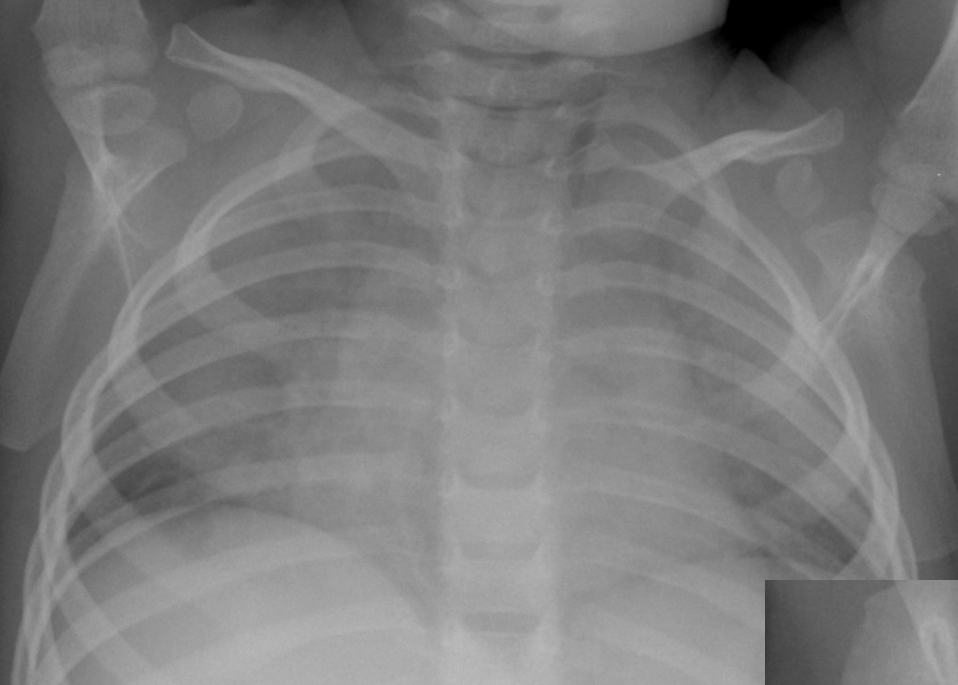
# Lateral Decubitus X-rays



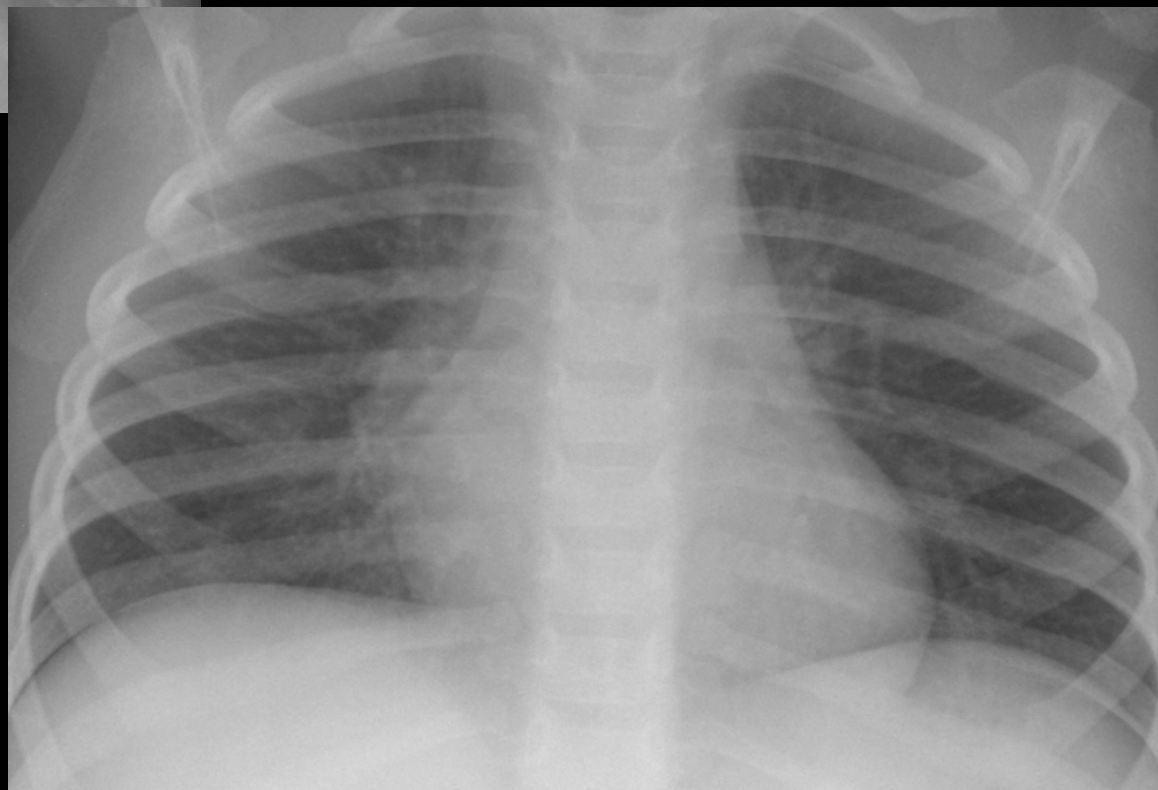
# Cooperation May Be Limited







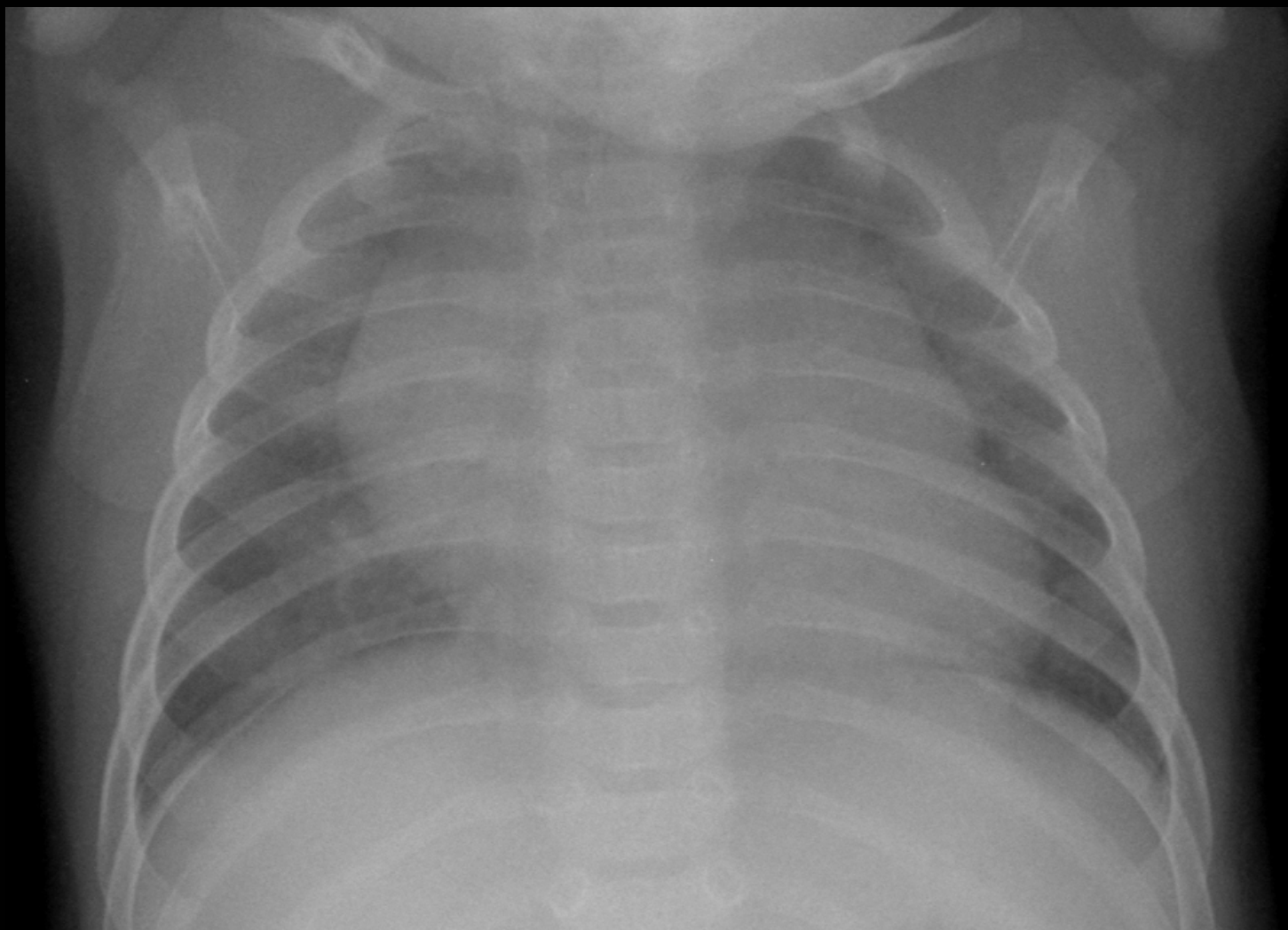
**Expiration**



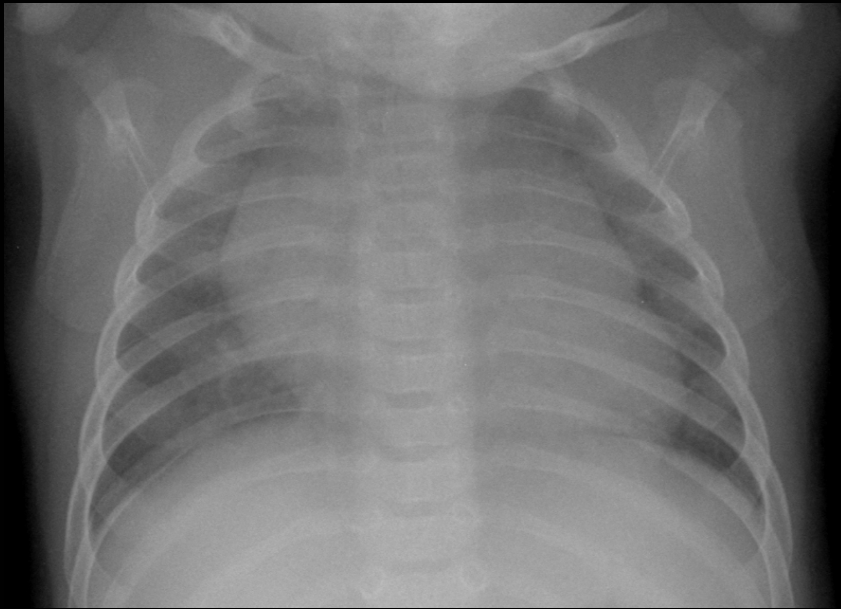
**Inspiration**

# Heart Size

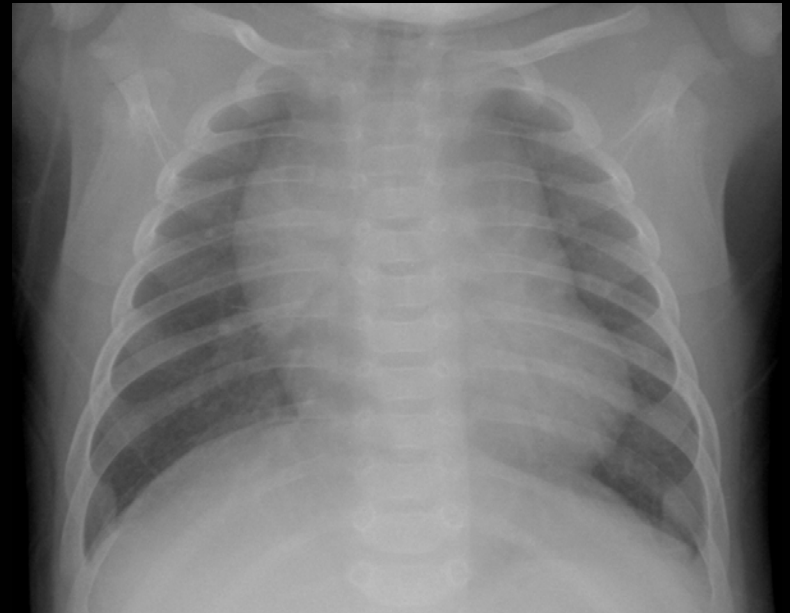
- In newborns, can be a little more than half the width of the chest
- The lateral film is often more accurate than the frontal film
- A good breath is required to judge heart size



# Lung Volume Affects the Appearance of the Heart

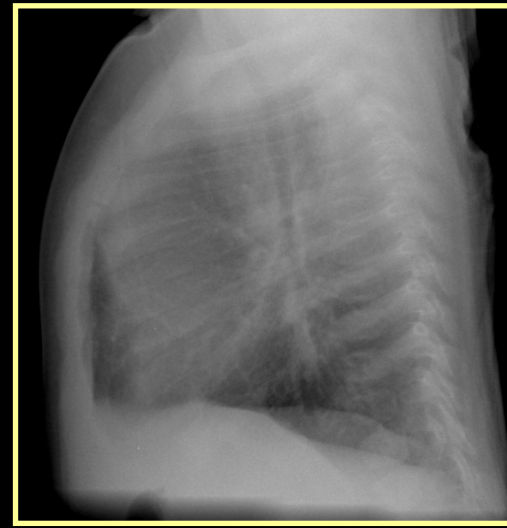
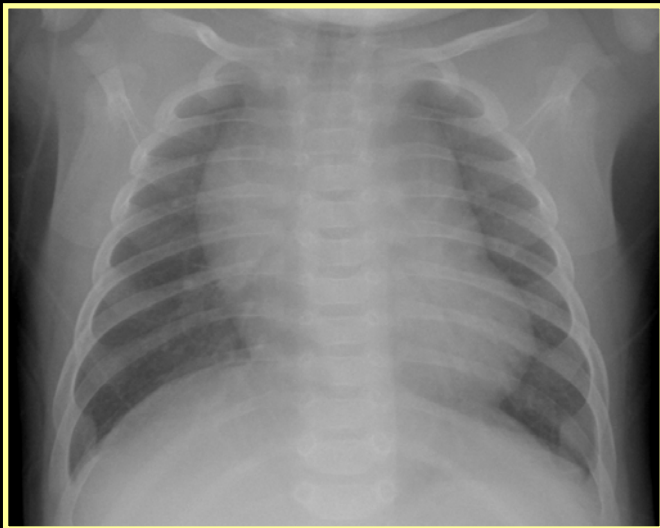
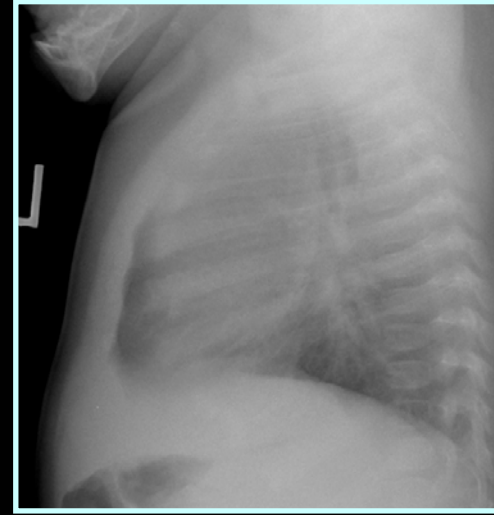
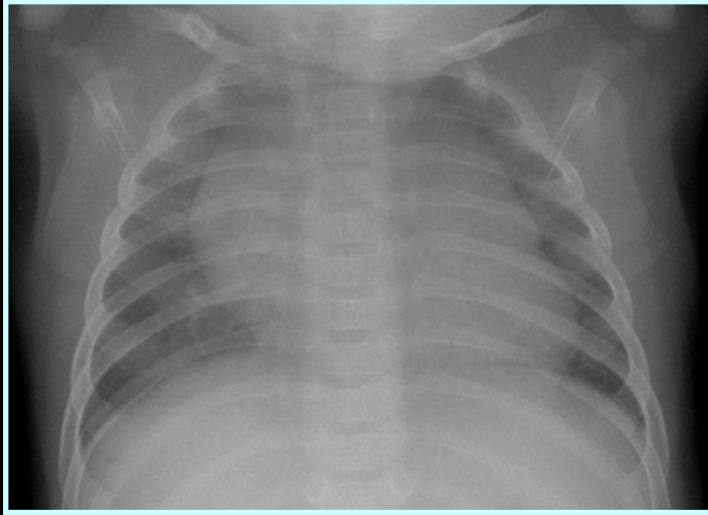


Expiration

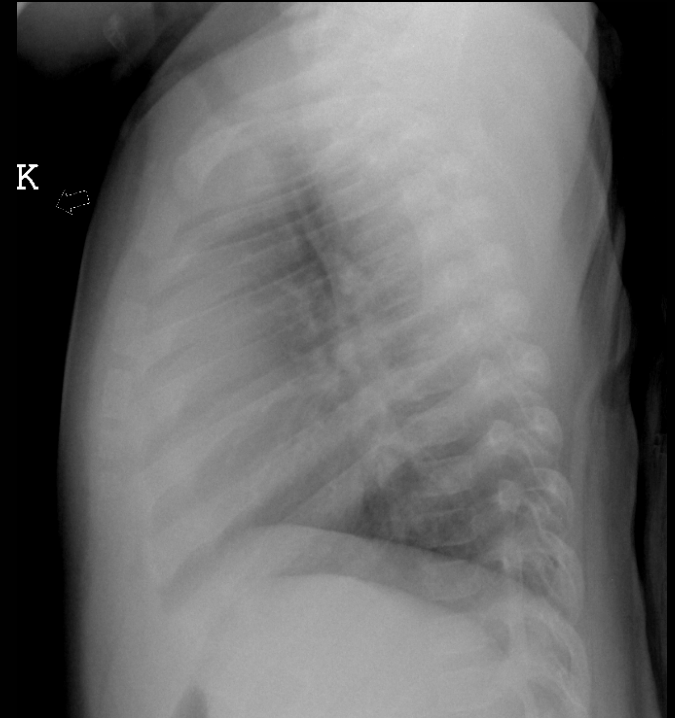
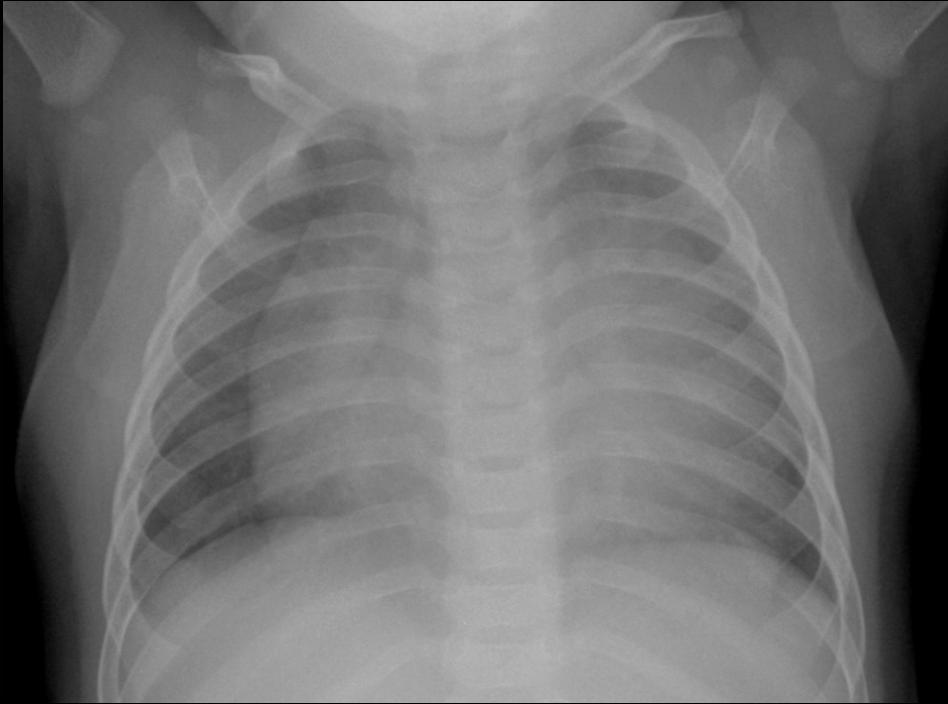


Inspiration

# Heart Size Changes Much More On the Frontal than the Lateral



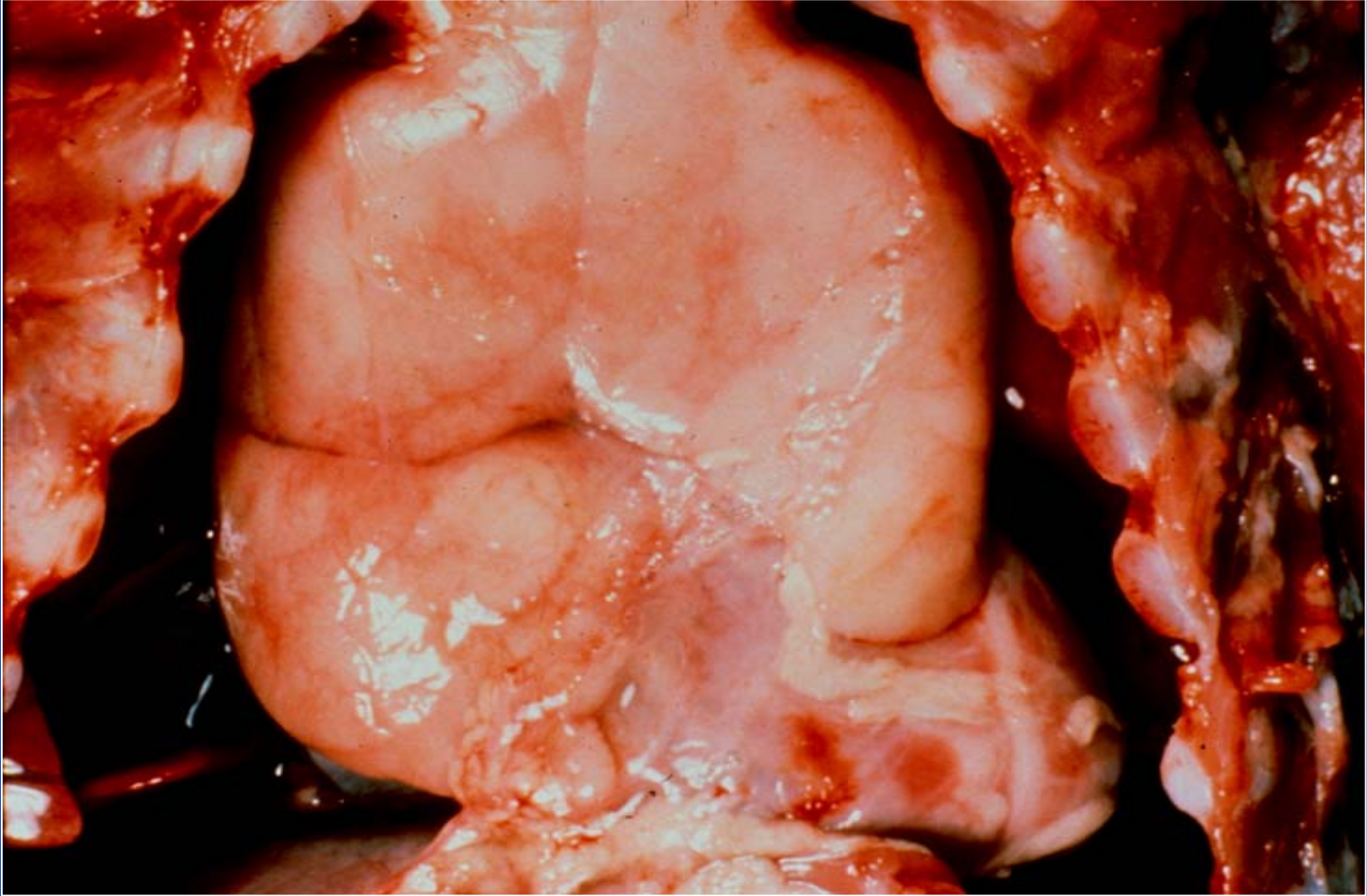
? Large Heart ?



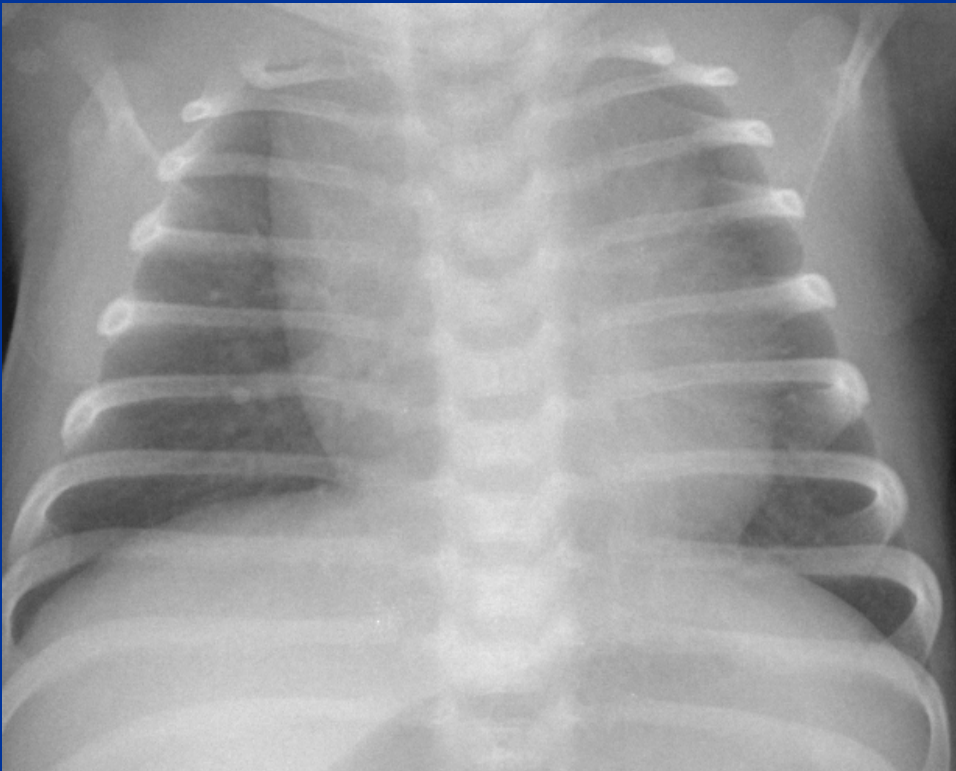
# Improving Interpretation of Children's Chest X-rays

- Make a file of chest X-rays of normal children at different ages
- Get 2 views of the chest
- Repeat low volume or rotated X-rays
- Someone who enjoys working with children will get better X-rays

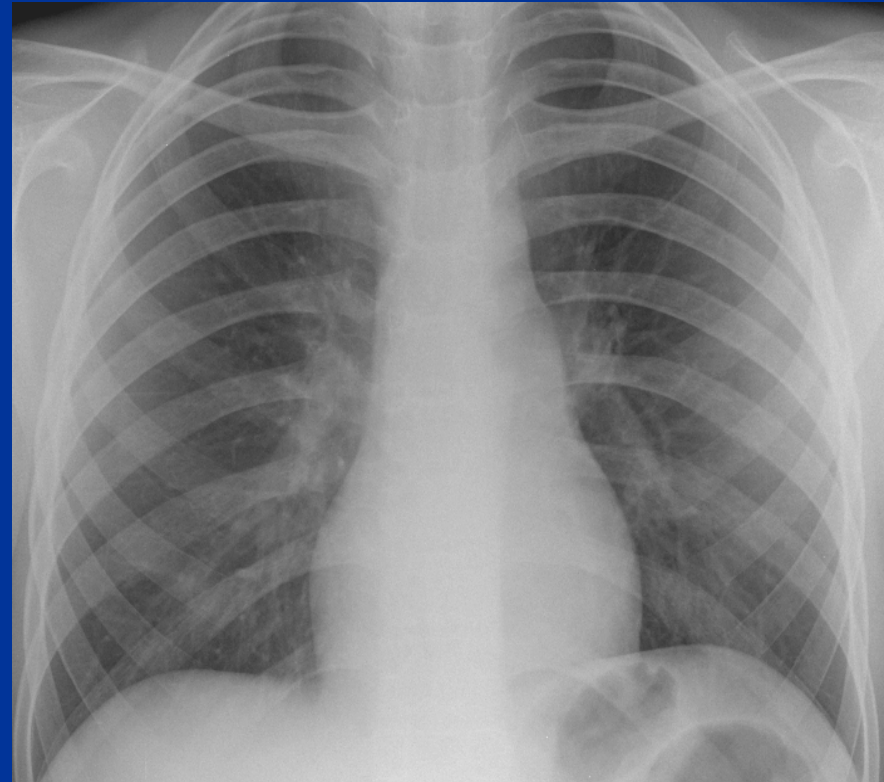
# The Thymus



# The Normal Thymus



Infant

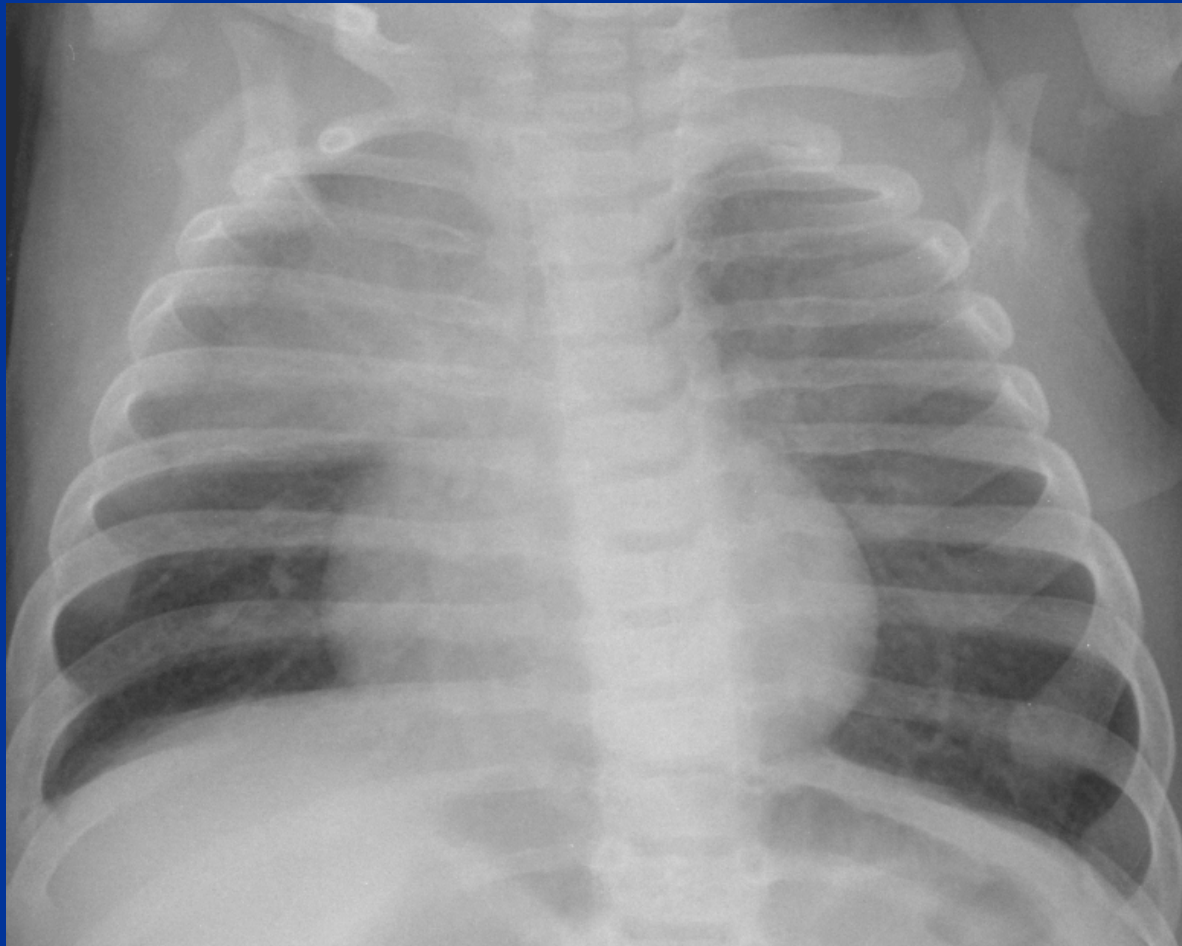


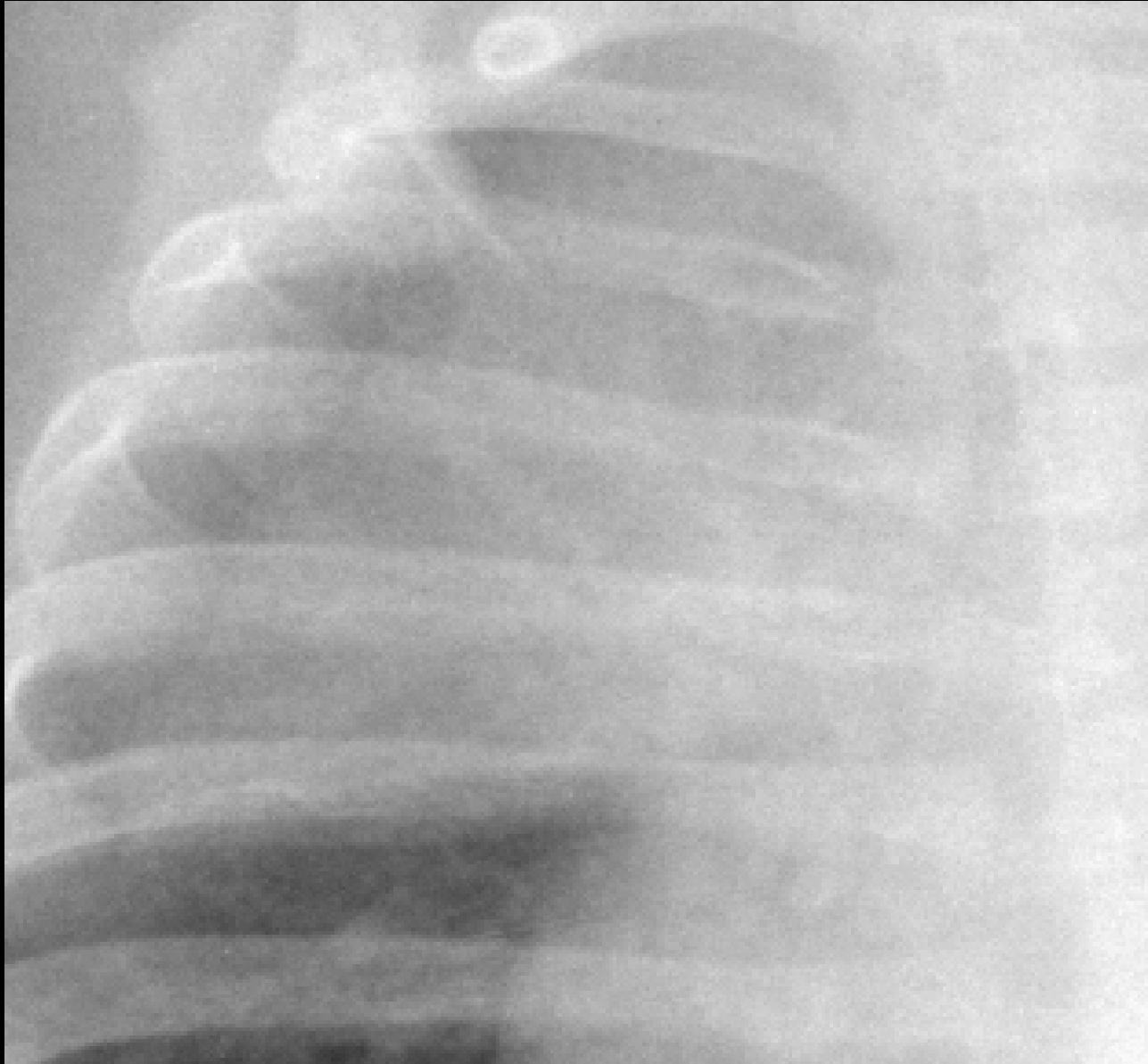
Adolescent

# The Thymus

- Increases in size from birth to puberty, but the child grows more, so the thymus appears smaller in older children
- Is highly variable in size and appearance
- Can shrink within hours due to illness
- May increase suddenly in size, especially after chemotherapy

# The Sail and Wave Signs

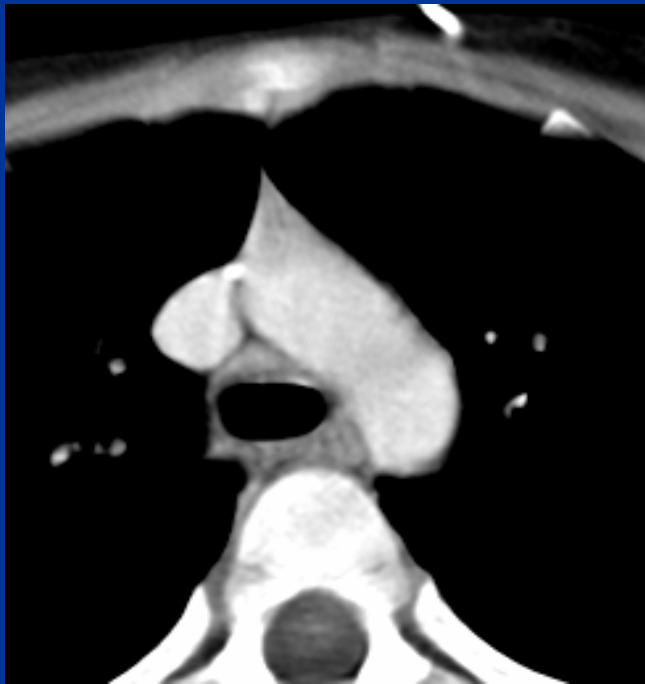




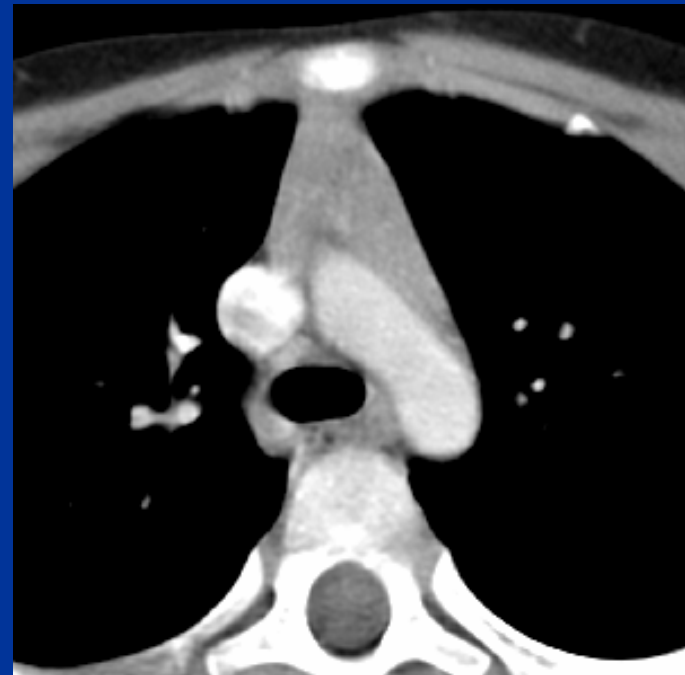
Alan S. Brody September 8, 2005

# Thymic Rebound

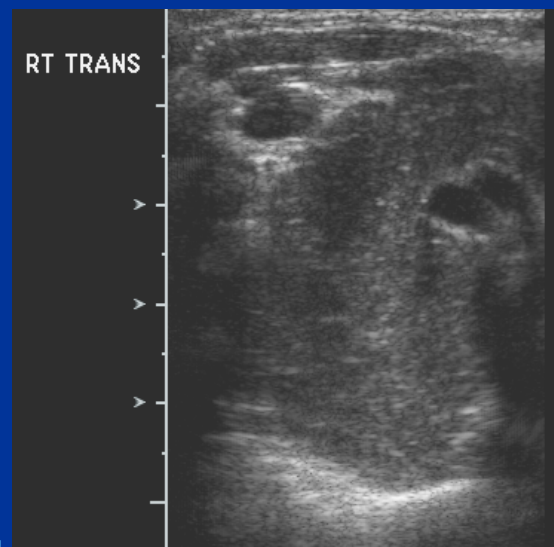
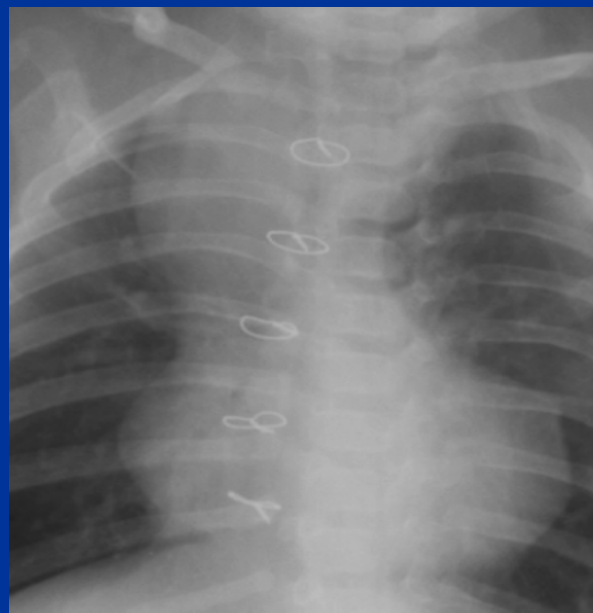
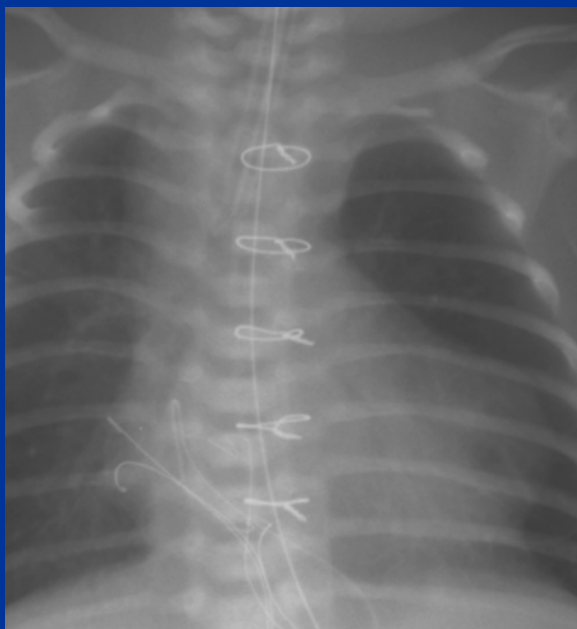
Child with Acute Leukemia



During  
Treatment



After  
Treatment



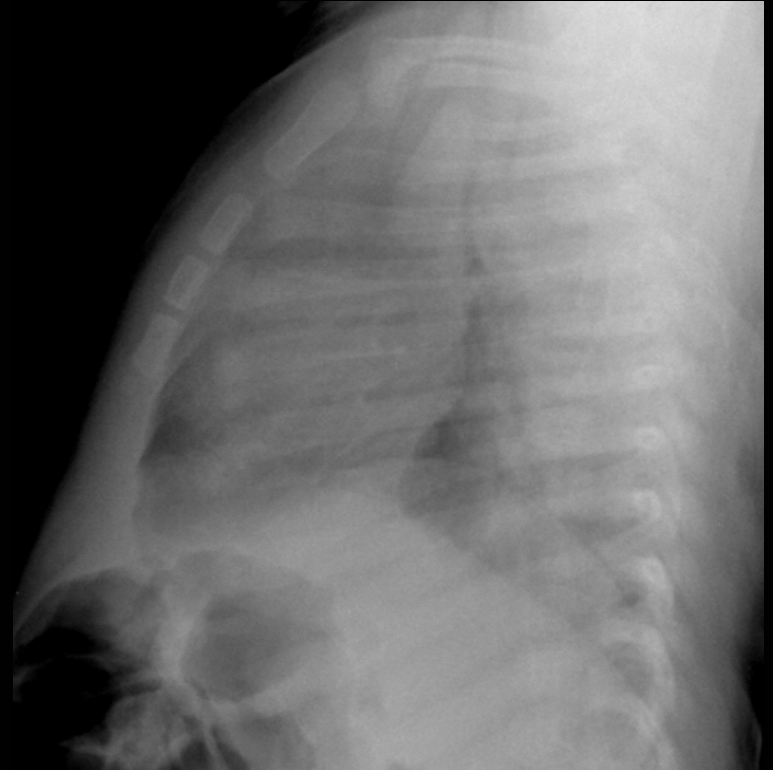
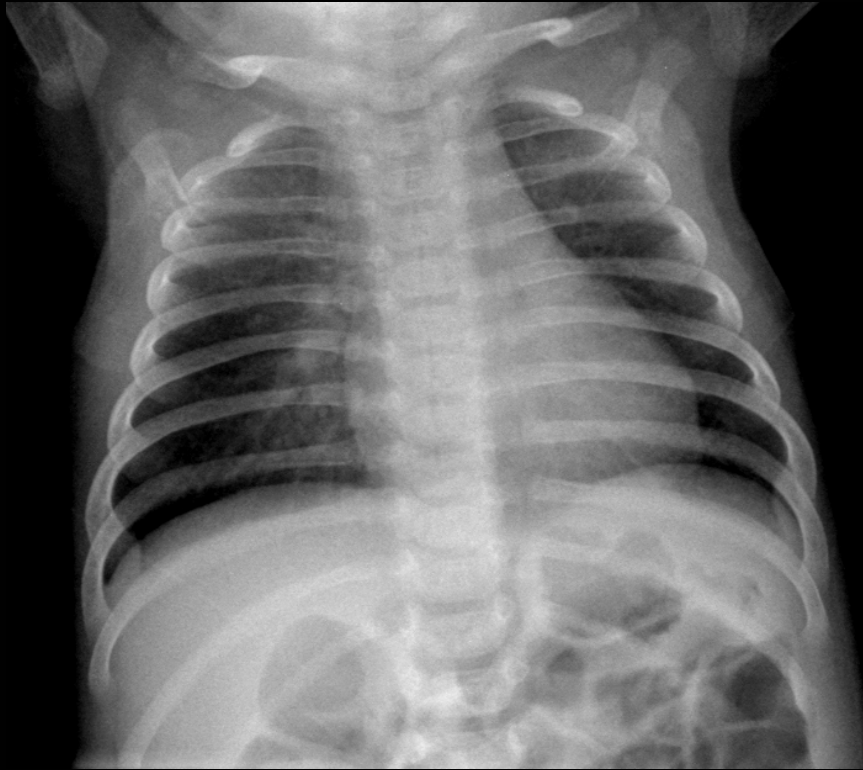
# Two Special Places to Look

"Experience is a hard teacher  
because she gives the test  
first, the lesson afterwards."  
-- Vernon Saunders Law

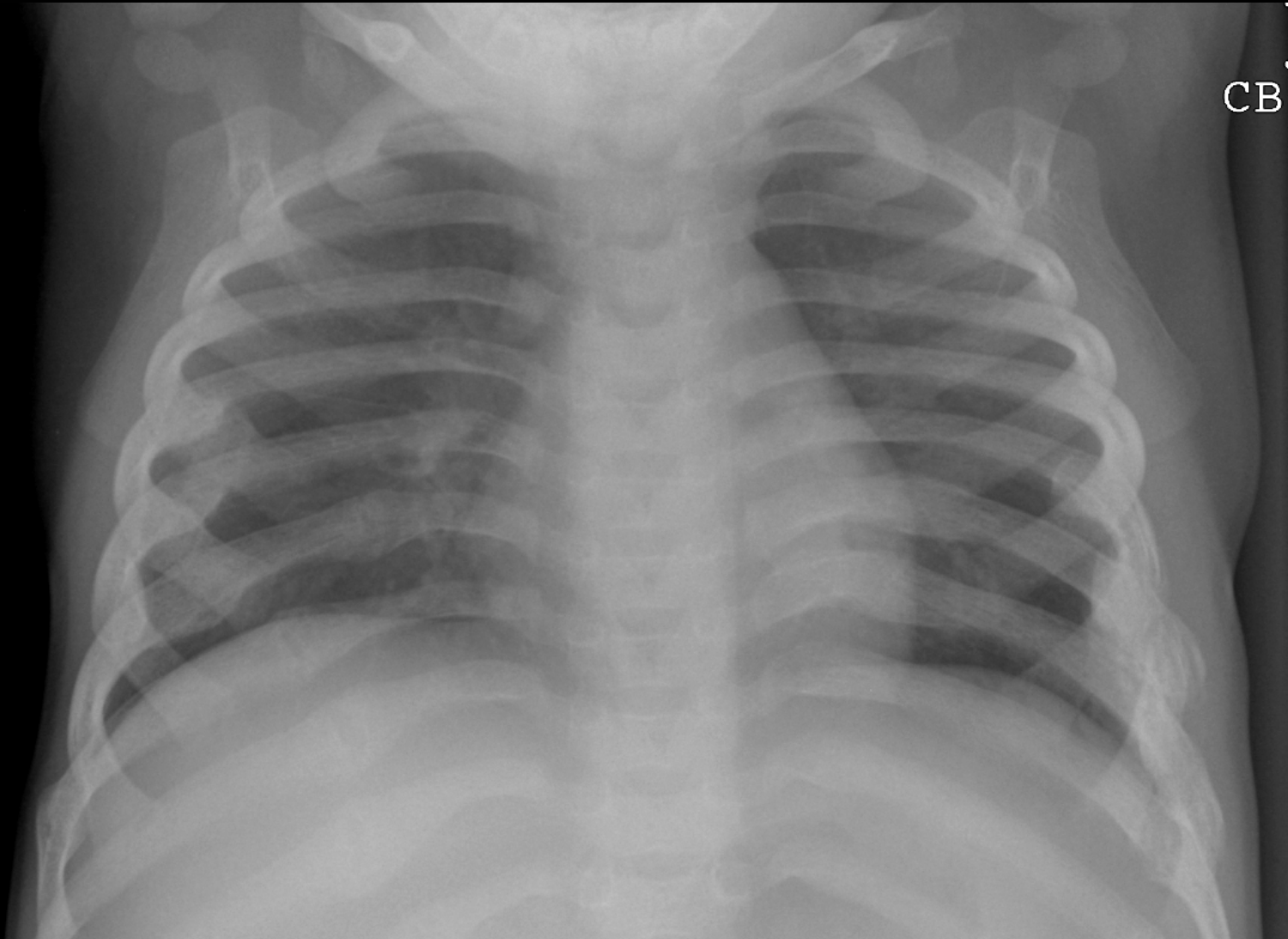
# A Test – Five Children

- One has a vascular abnormality
- One is suffering
- One has cancer
- One has pneumonia
- One is normal

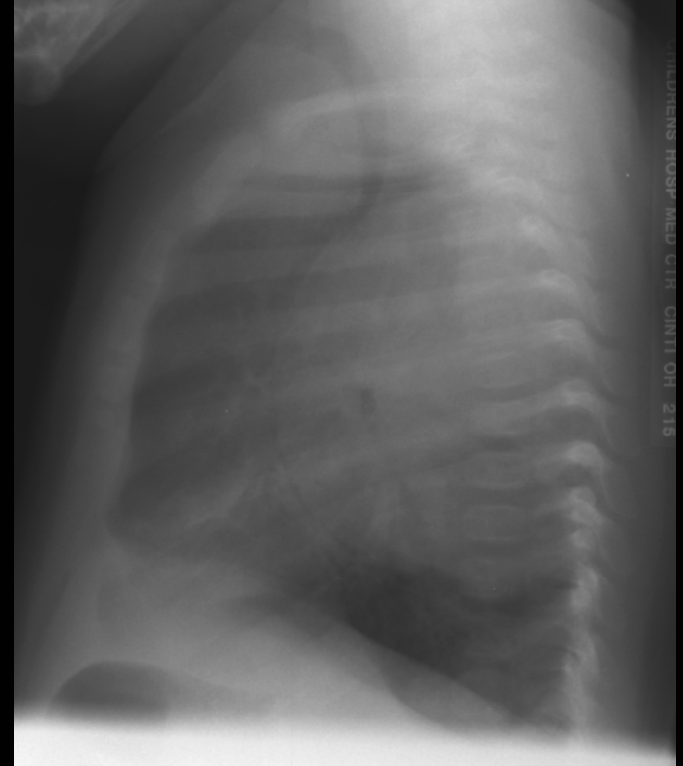
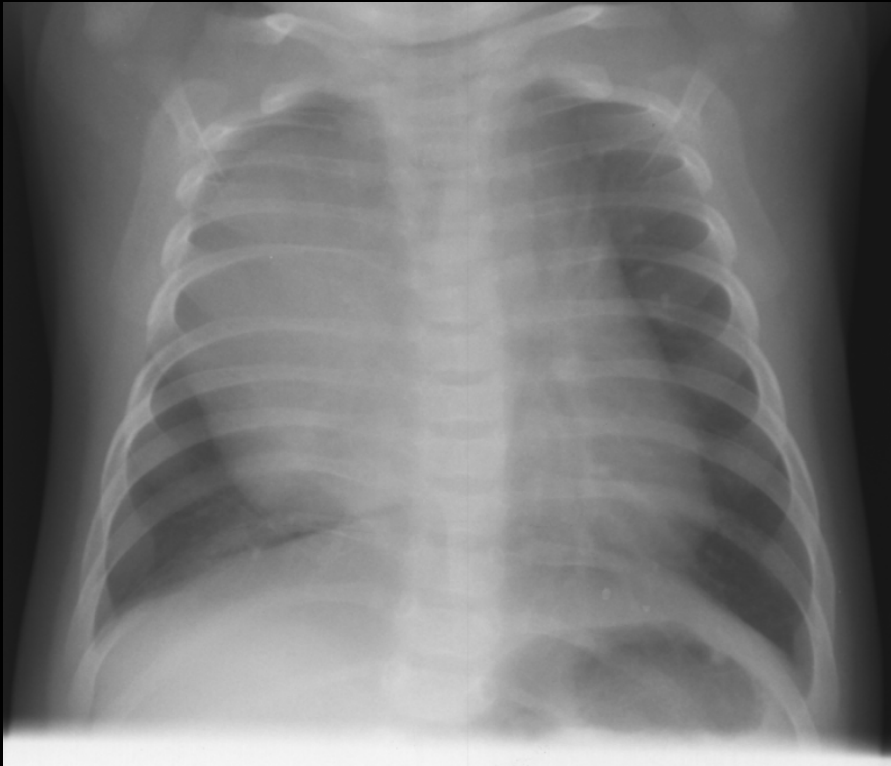
# Infant with Noisy Breathing



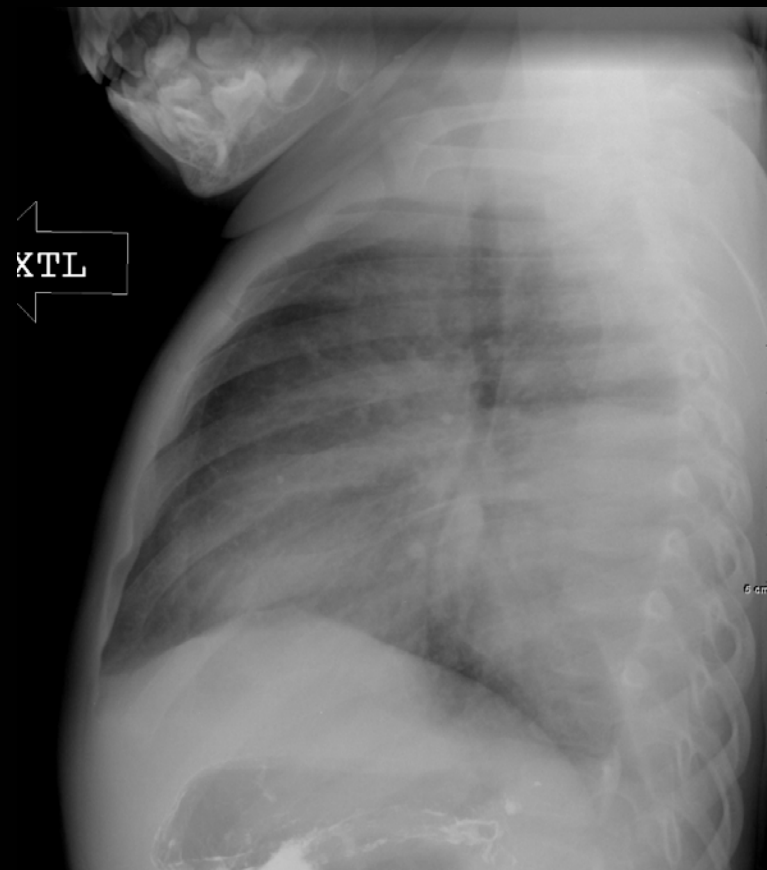
# 8 Month Old with Tachypnea



# One Year Old with Lethargy



# Two Year Old with Cough



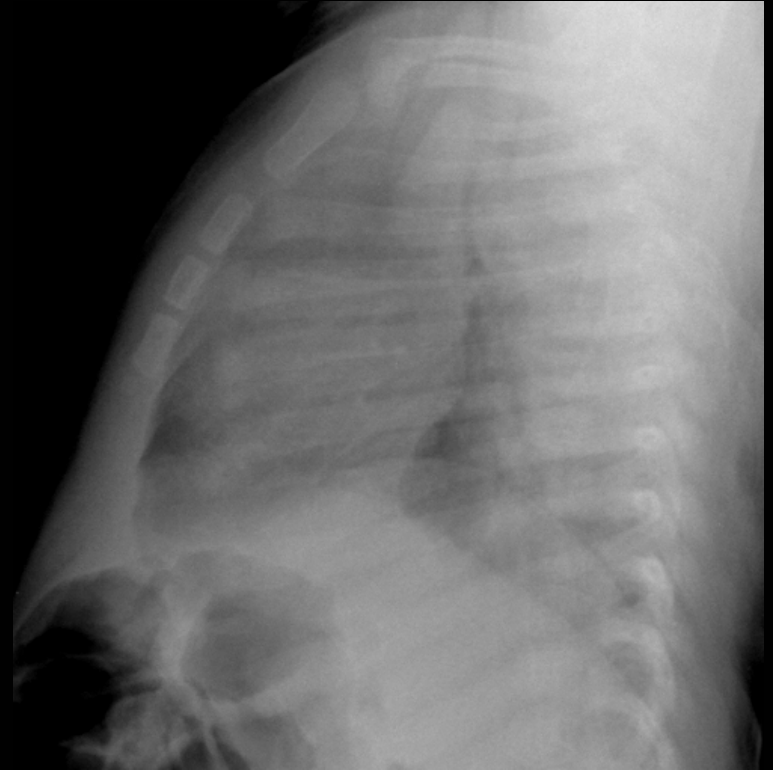
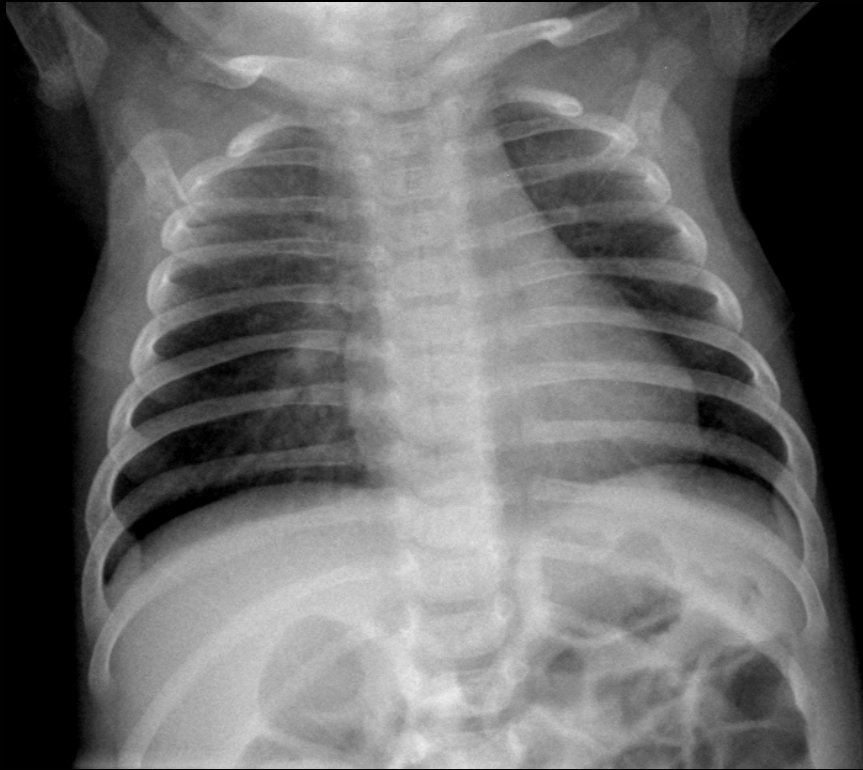
# 3 Year Old with A Palpable Mass



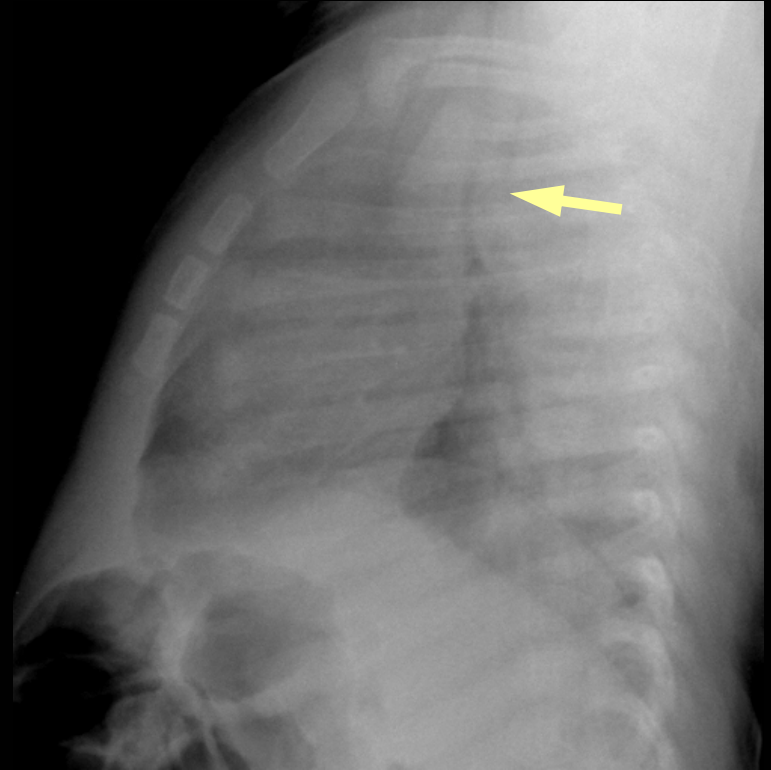
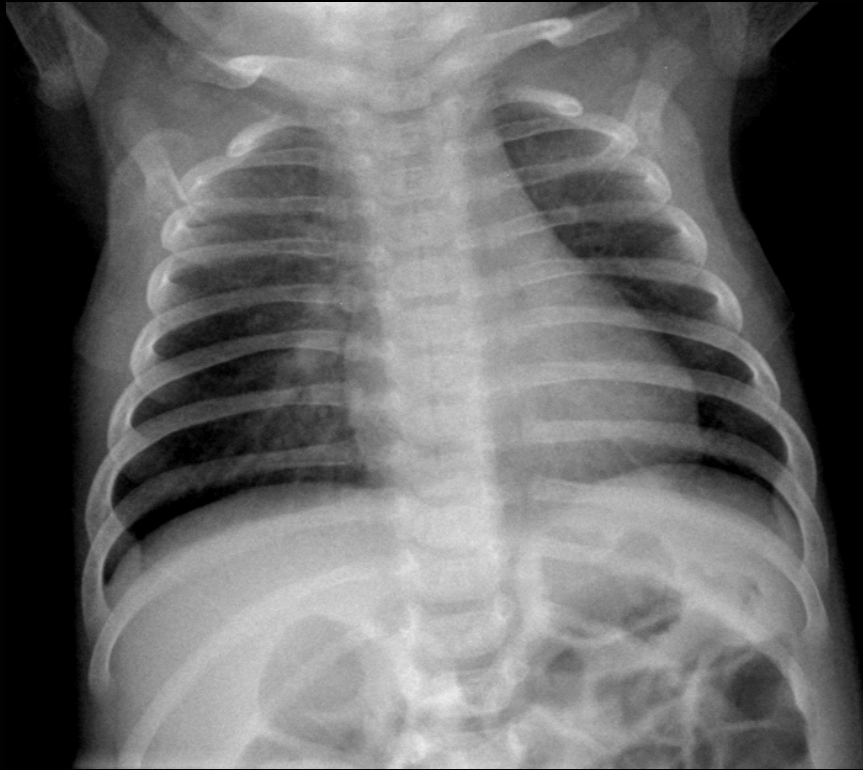
# Diagnoses

- Vascular ring caused by a double aortic arch
- Rib fractures from child abuse
- Paraspinous neuroblastoma
- Round pneumonia
- Bifid anterior rib

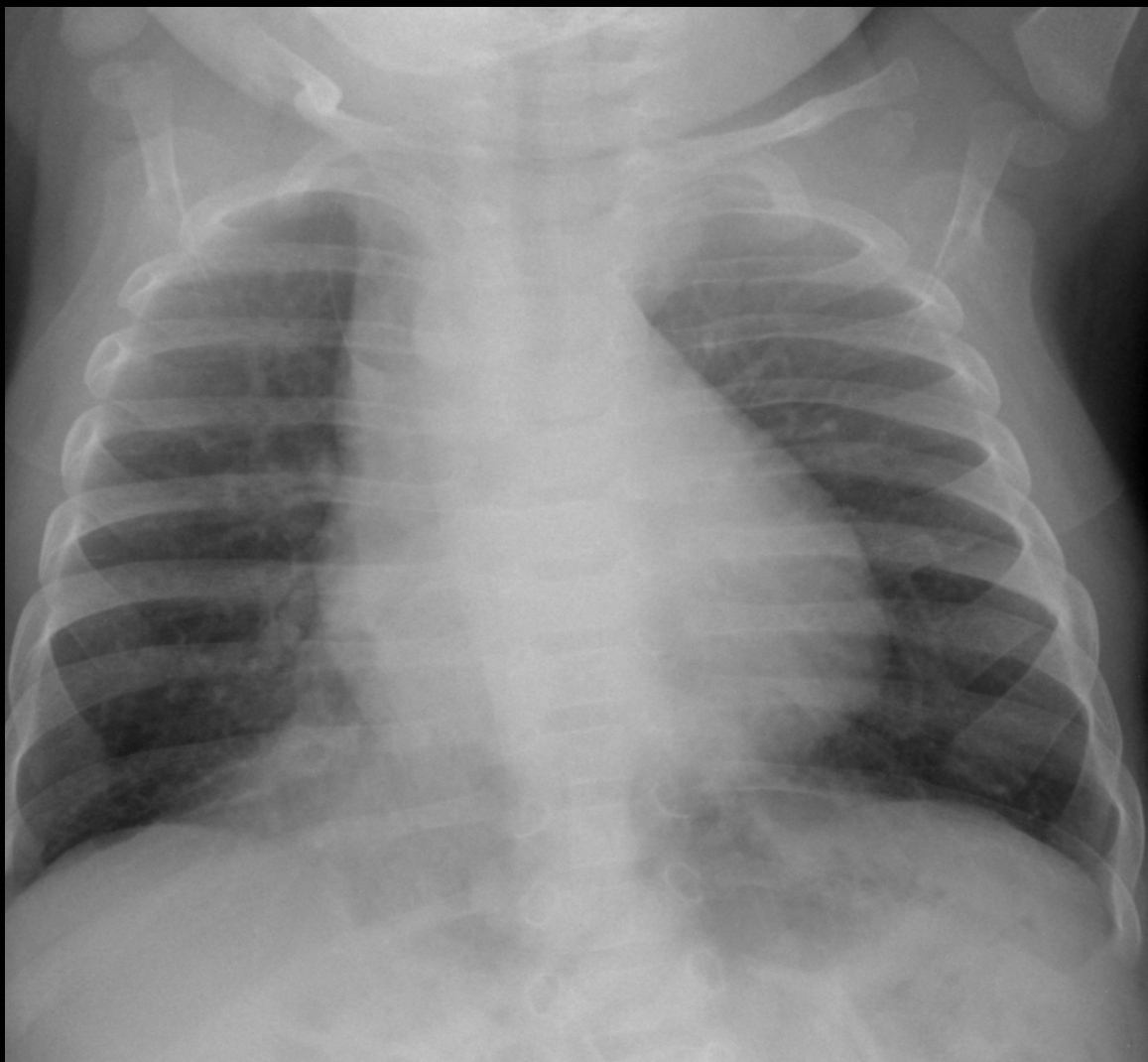
# Vascular Ring



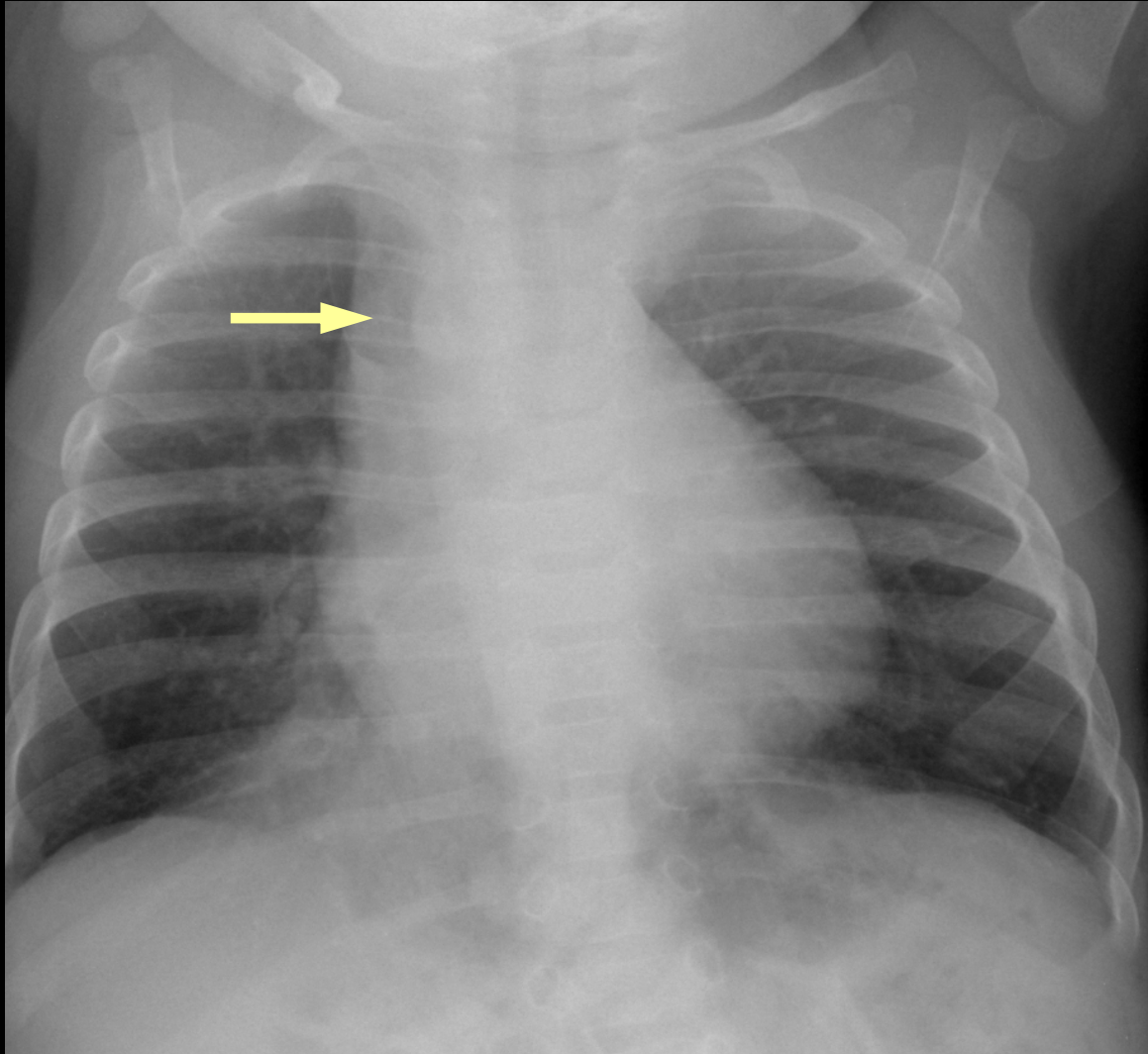
# Vascular Ring



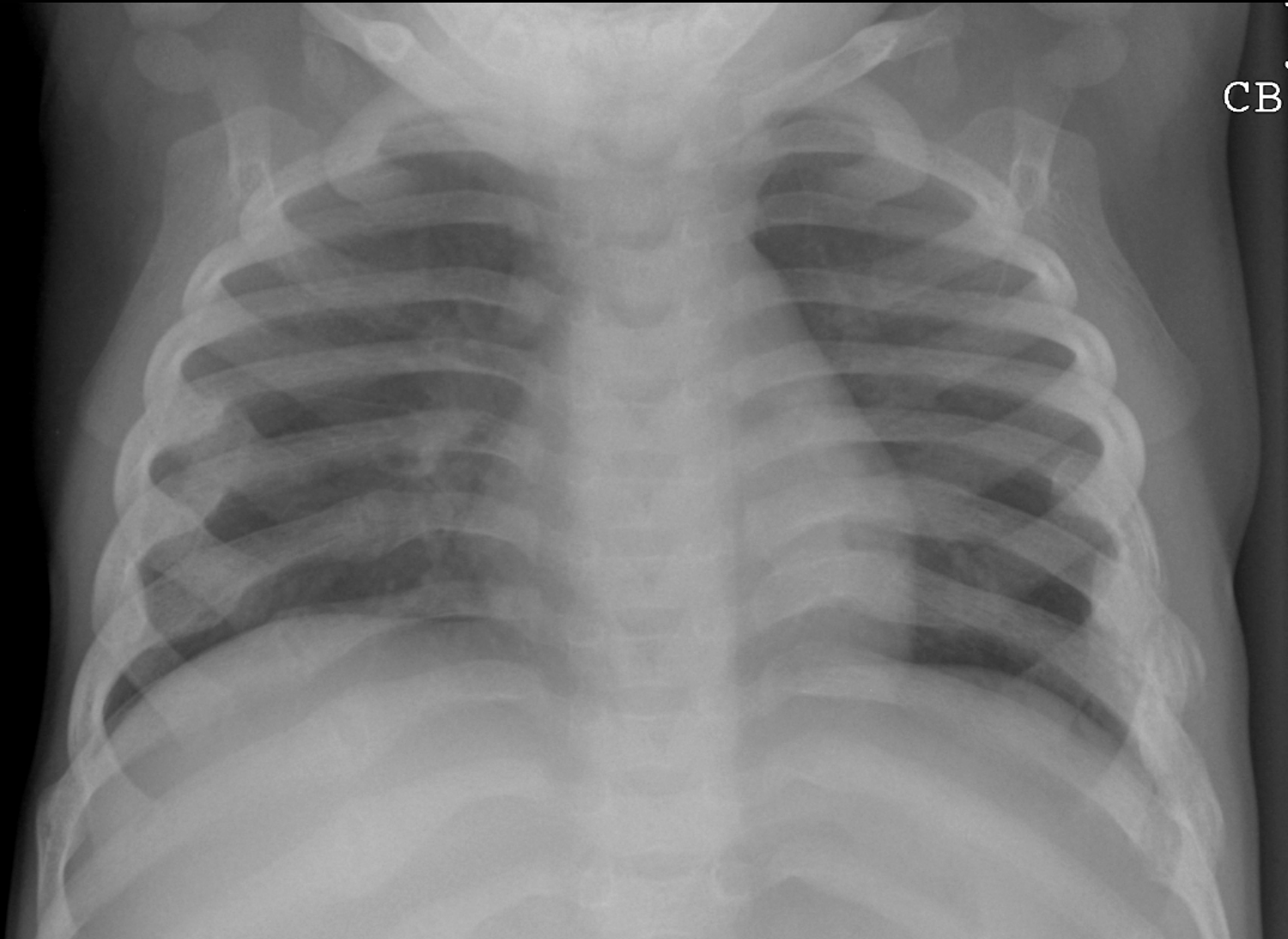




# Right Aortic Arch



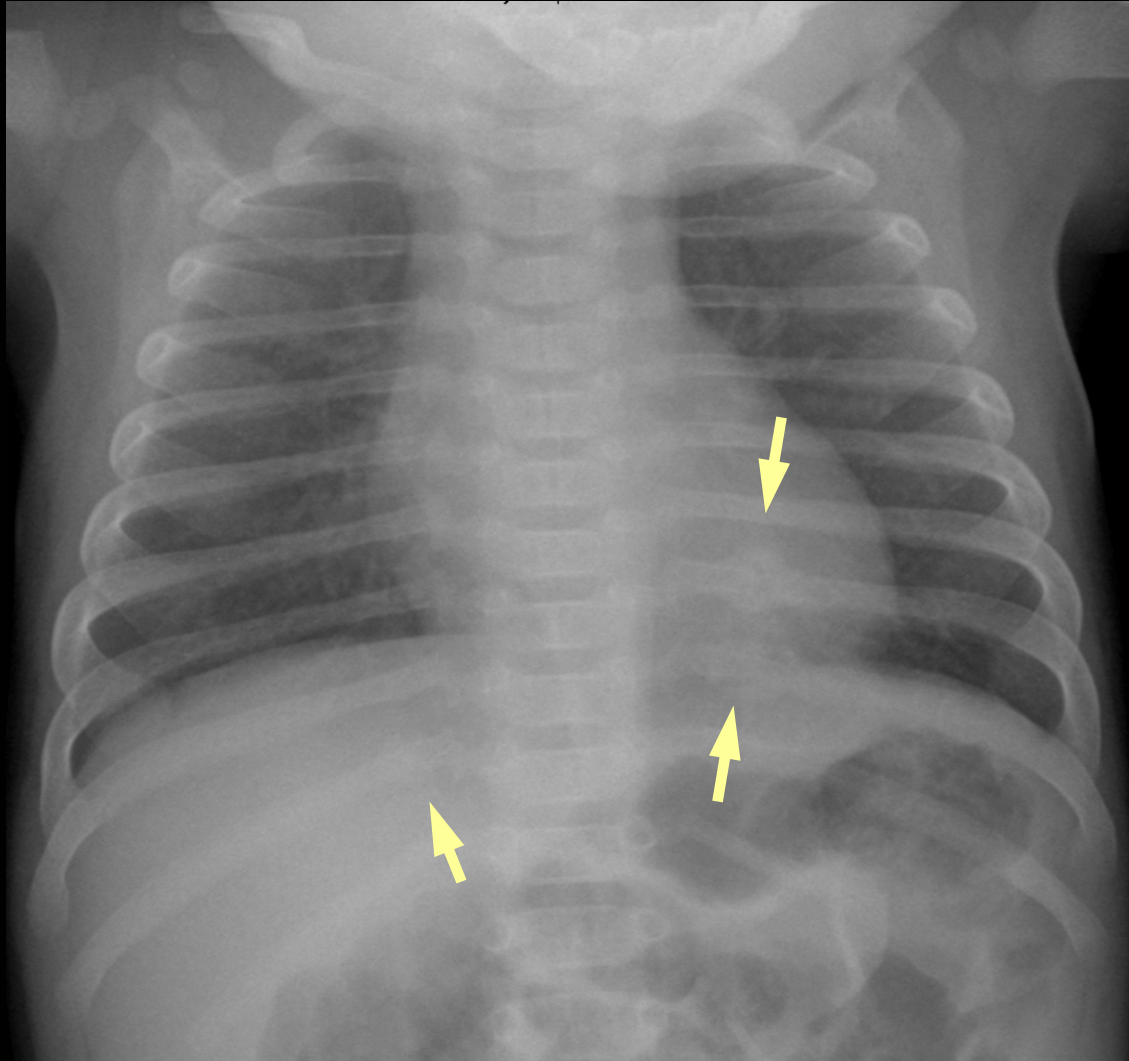
# Rib Fractures from Child Abuse



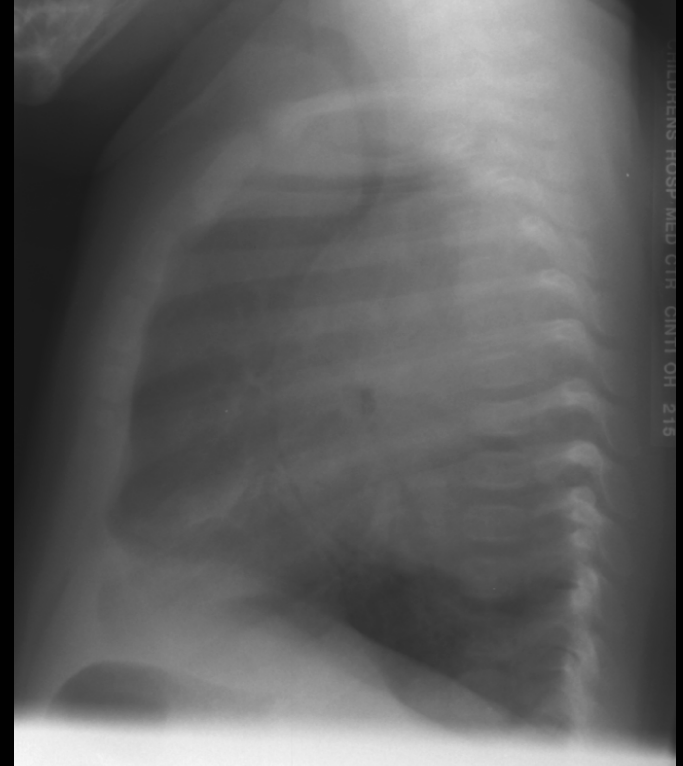
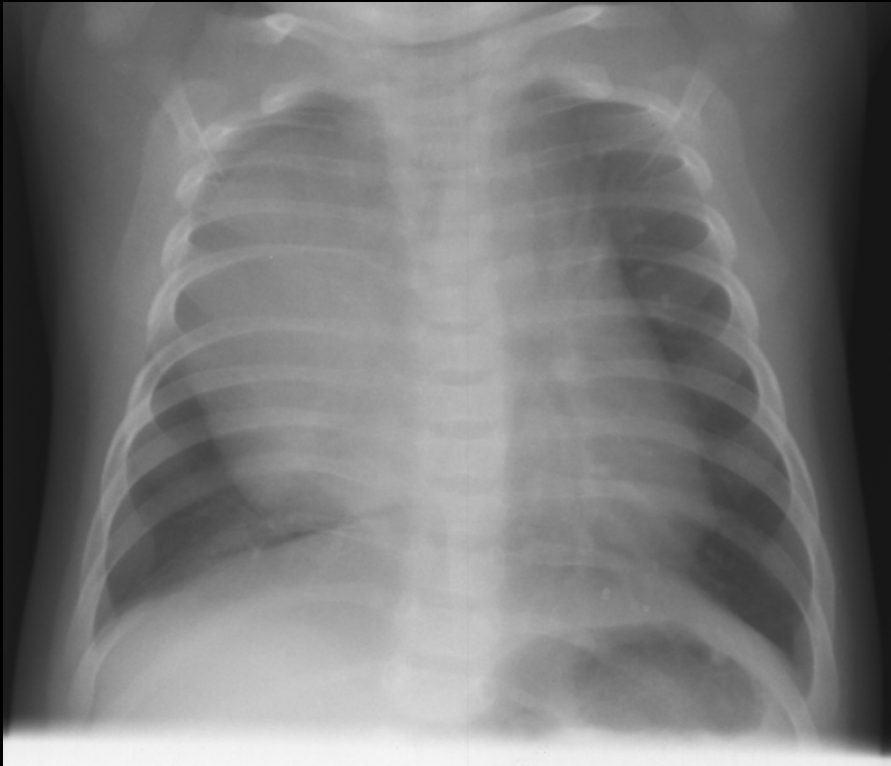
15 Month Old



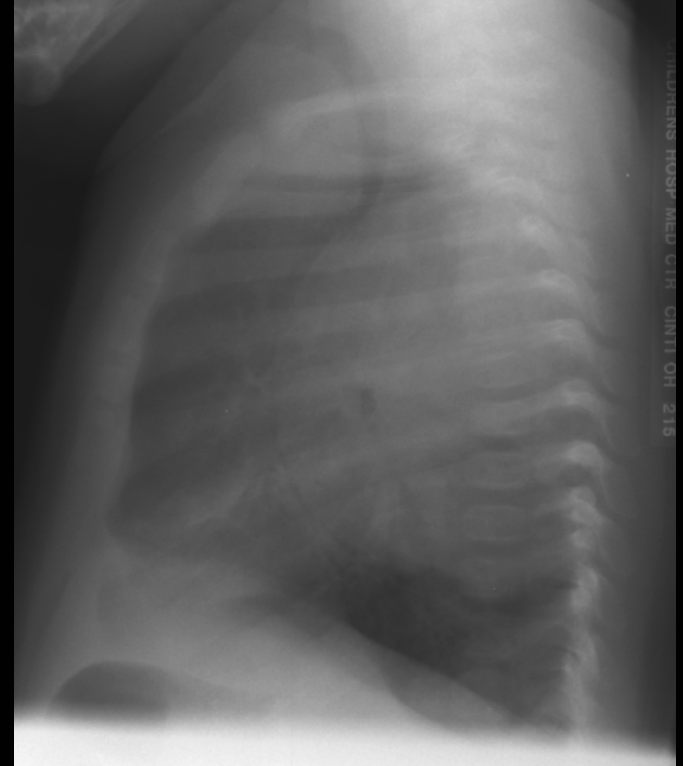
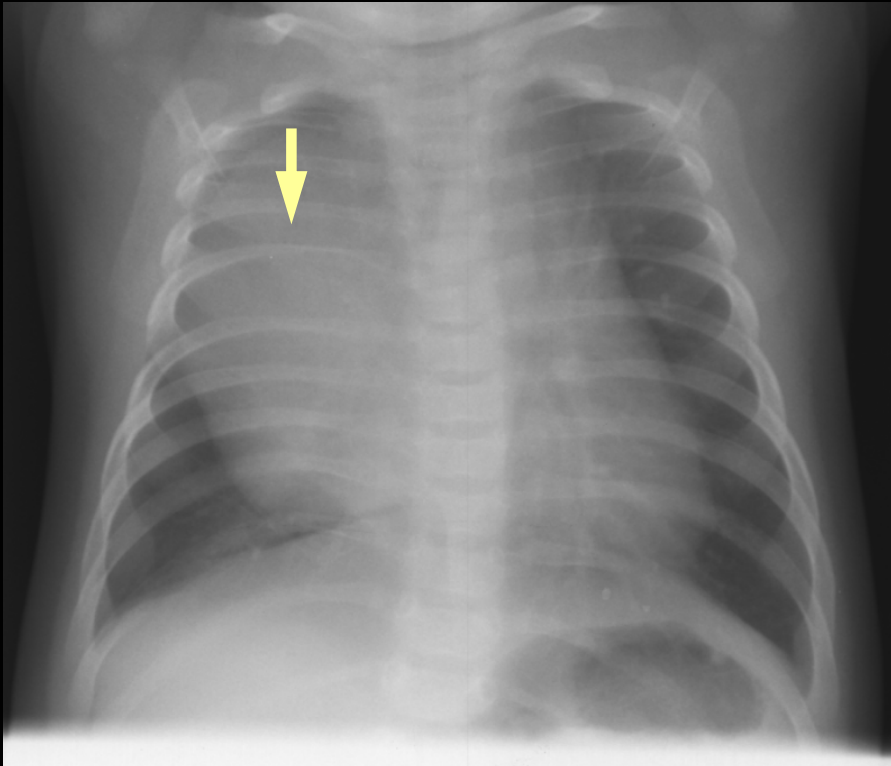
# Posterior Rib Fractures

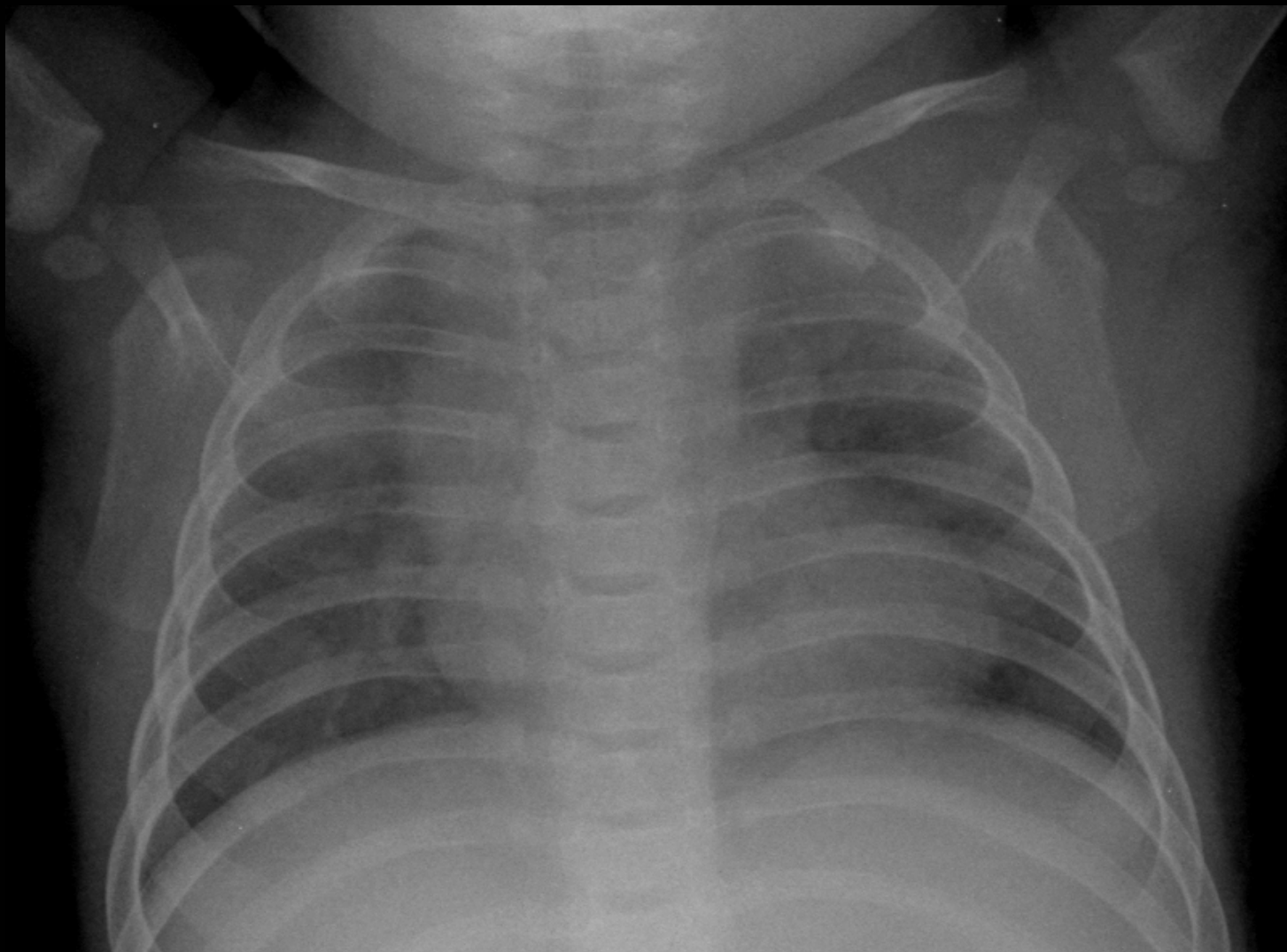


# Neuroblastoma

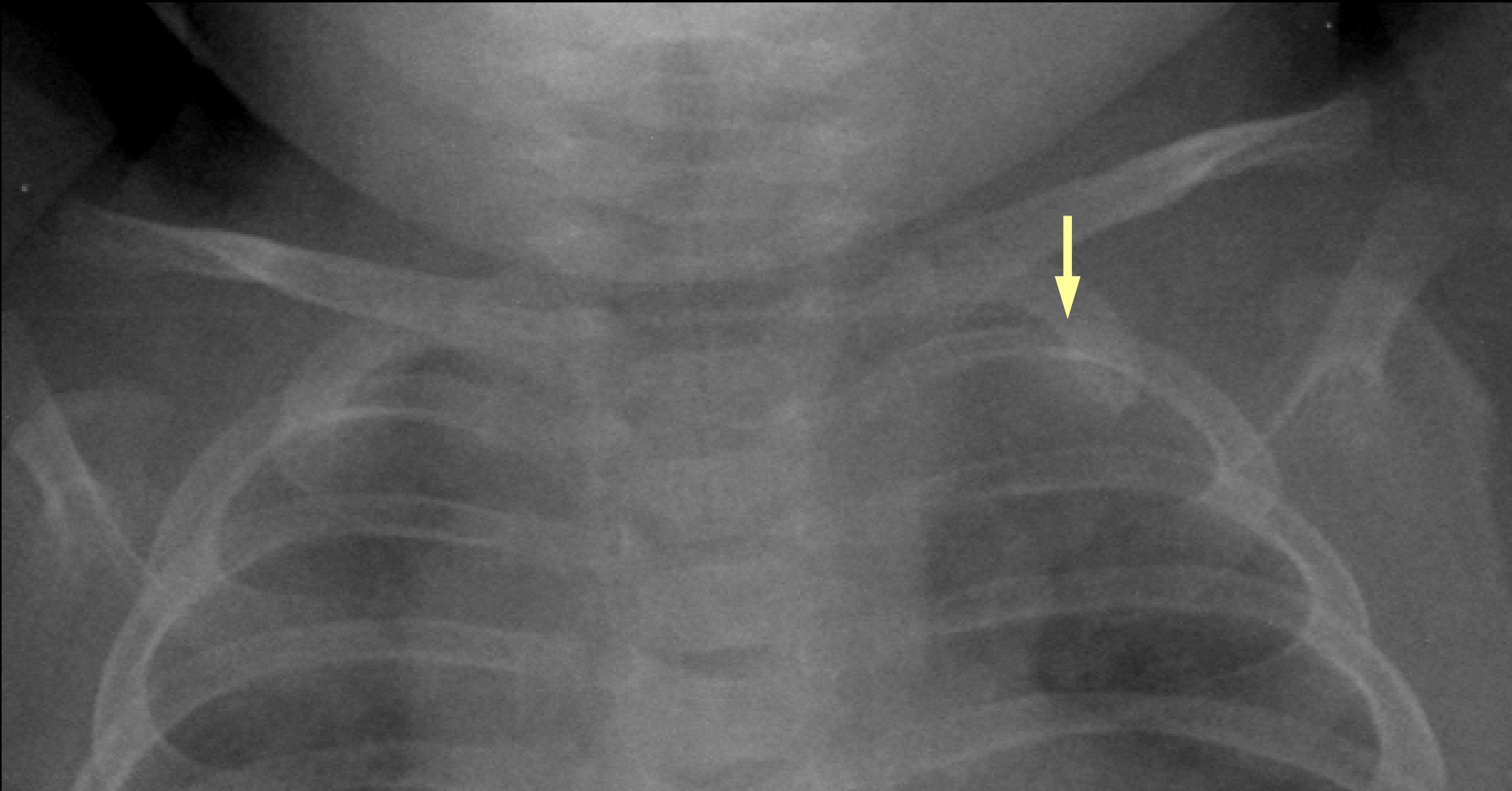


# Neuroblastoma



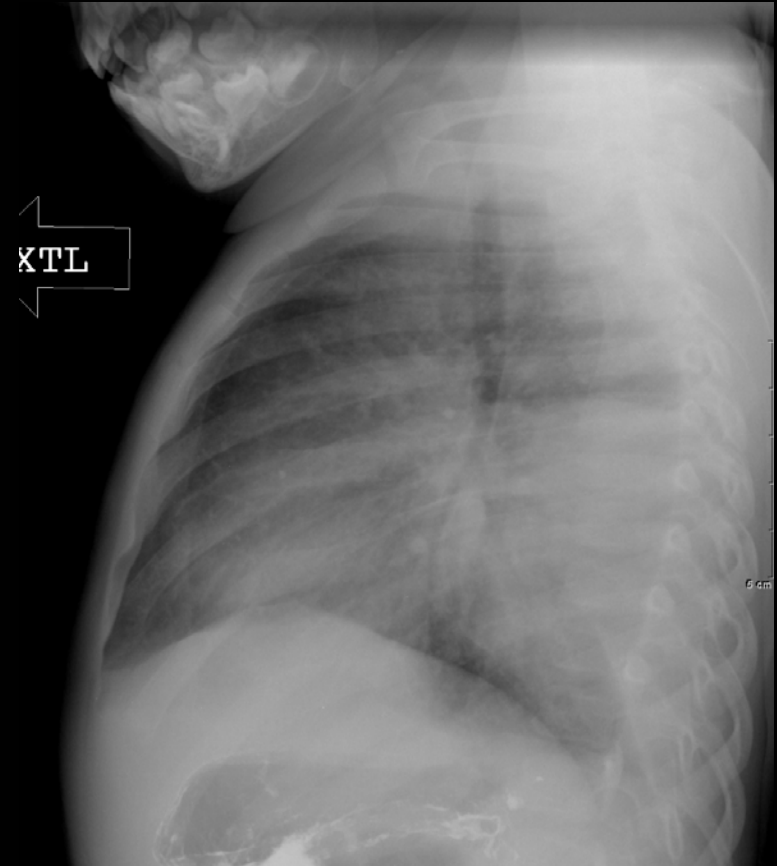


# Density and Abnormal Rib





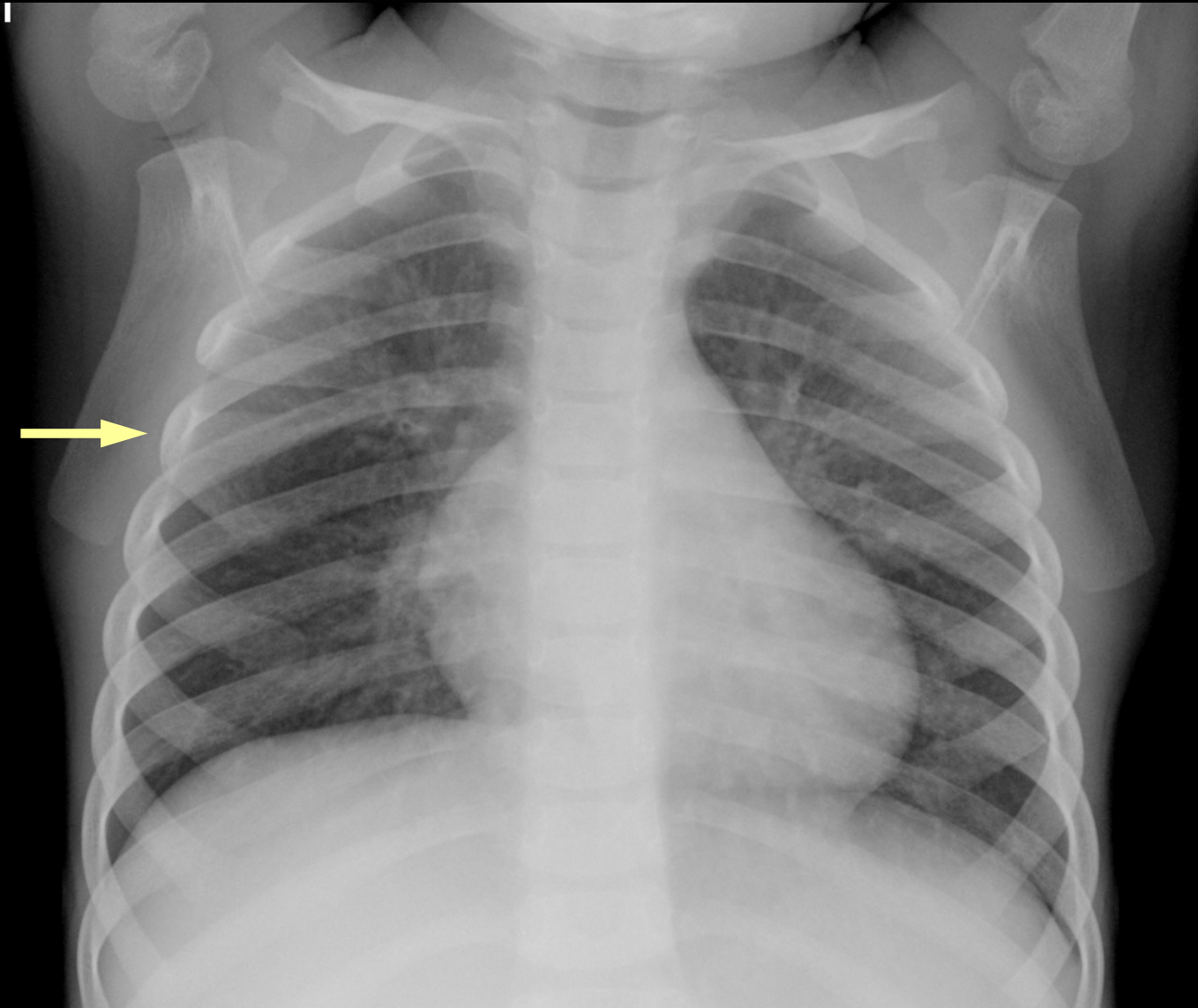
# Round Pneumonia



# Round Pneumonia

- Symptoms of pneumonia
- Lower lobe location
- Children 8 years old or younger
- No evidence of chest wall abnormality
- Pneumococcus
- Another chest X-ray in 1 to 2 weeks should show improvement

# Bifid Right 4<sup>th</sup> Rib



# Bifid Rib

- Common anatomic abnormality
- Frequently presents as an asymptomatic hard mass
- Anterior chest wall masses with normal chest X-rays do not require further imaging
- Donnelly et al. Radiology. 1997 Mar;202(3):829-31.

# Conclusion

- Pediatric chest X-rays are challenging
- Reference images and high quality studies help with interpretation
- Take an extra look at the ribs and the trachea

# Thank You for Your Attention

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