Surfactant deficiency disease (SDD) favored term

- a.k.a. respiratory distress syndrome & hyaline membrane disease (archaic)
- Common lung disease occurring in premature infants due to lack of surfactant
- Microatelectasis & abnormal pulmonary compliance are hallmarks of disease
- Common usage: Surfactant deficiency in premature newborns
- Less common: Meconium aspiration or pneumonia can cause surfactant deactivation
- Very uncommon: Primary surfactant deficiency due to genetic mutation affecting surfactant production

X-ray

- Premature infants < 32-weeks gestation at risk
- Initial findings are low lung volumes & diffuse reticular granular opacities
- High incidence of patent ductus arteriosus, which causes pulmonary edema ("whiteout" of lungs with cardiomegaly)
- Bronchopulmonary dysplasia eventually occurs in 17-55% of premature infants

SDD

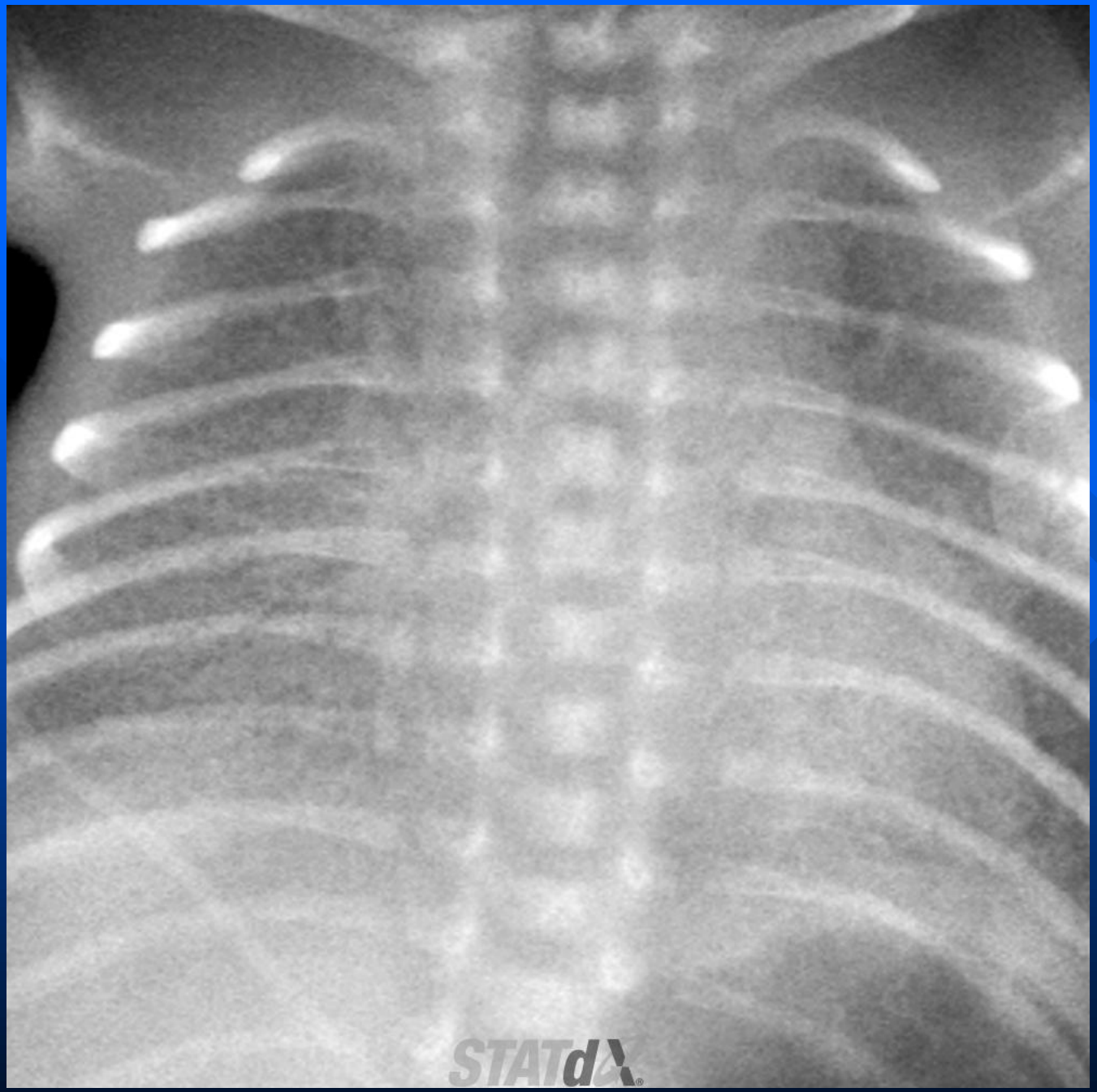
- Pathology
  - Surfactant normally coats alveoli & ↓ surface tension, allowing alveoli to stay open
  - Prematurity-related SDD: Immature type II pneumocytes cannot produce sufficient surfactant
  - Secondary SDD: Surfactant deactivation from meconium aspiration or infection
  - Primary SDD: Dysfunctional surfactant due to abnormalities of 1 of several gene products (especially SFTPB, SFTPC, ABCA3, TTF-1)
- Clinical Issues
  - Most common cause of death in live newborn infants
  - Acute complications: Alveolar rupture with barotrauma (pneumothorax, pneumomediastinum, pulmonary interstitial emphysema)

DDX:

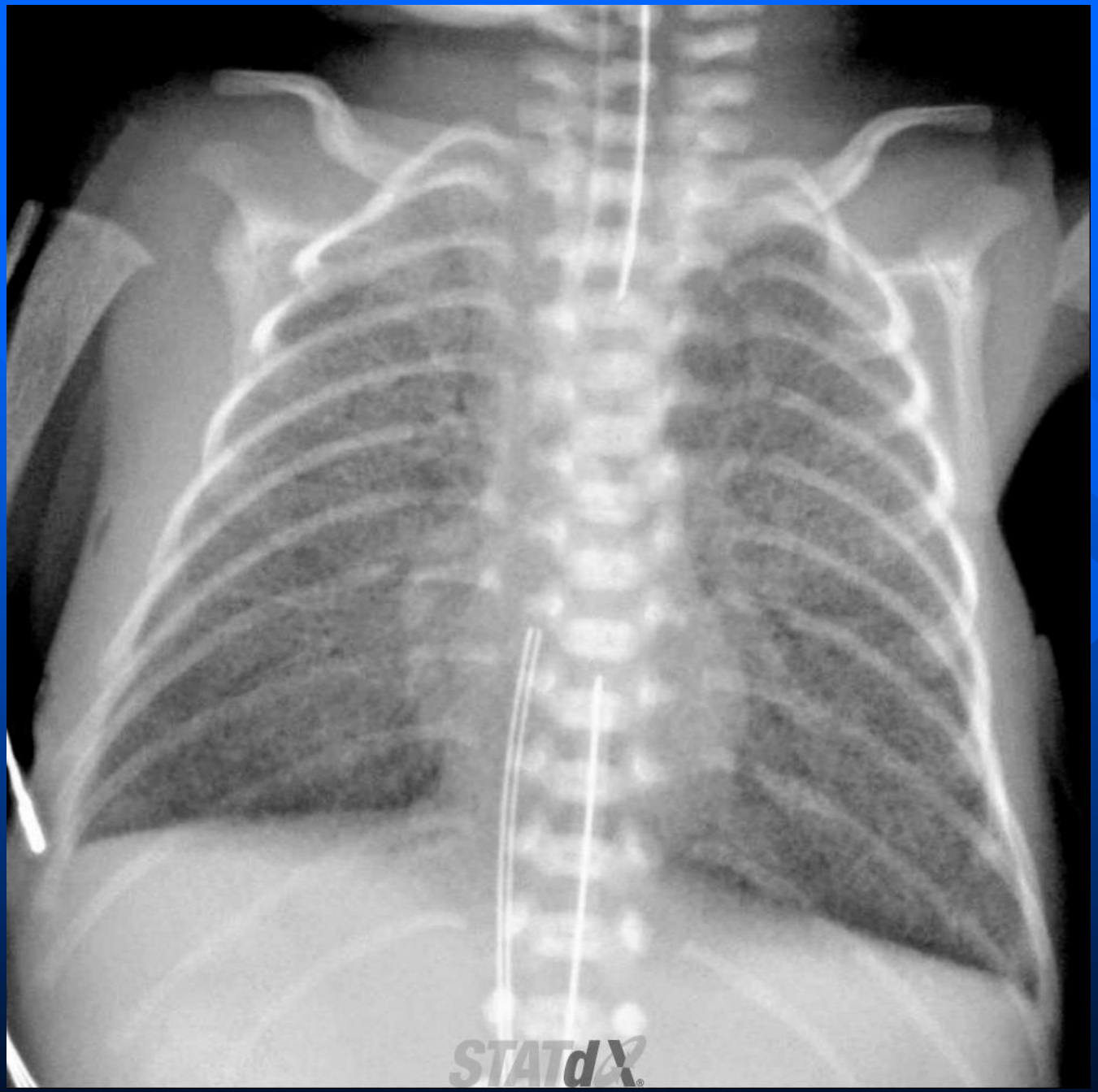
- Congenital Heart Disease
  - Echocardiography is gold standard for diagnosis
  - PDA is common in infants > 1,000 g
  - Usually closed with prostaglandin inhibitor
  - Transcatheter occlusion vs. surgery if contraindication present
- Group B Streptococcal Pneumonia
  - Very common in neonates, especially premature infants
  - Acquired during birth (25% of women colonized)
  - Bilateral granular opacities & low lung volumes
  - Pleural effusion common (67%): Only imaging finding that helps differentiate from SDD
- Meconium Aspiration Syndrome
  - Term infants
  - Rope-like densities radiating from hila
  - Usually high lung volumes
  - High incidence of barotrauma
- Transient Tachypnea of Newborn
  - Findings similar to pulmonary edema but resolve by 24-48 hours
  - Prominent interstitial markings with normal heart size
  - Pleural effusions may be present

Stages of pregnancy

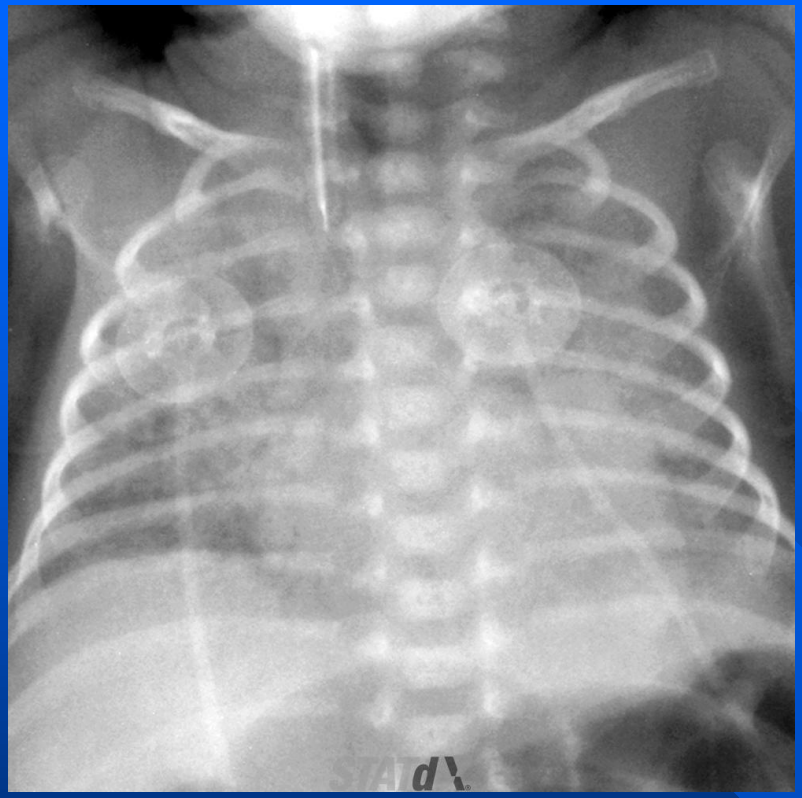
stage	starts	ends
Preterm[44]	-	at 37 weeks
Early term[45]	37 weeks	39 weeks
Full term[45]	39 weeks	41 weeks
Late term[45]	41 weeks	42 weeks
Postterm[45]	42 weeks	-



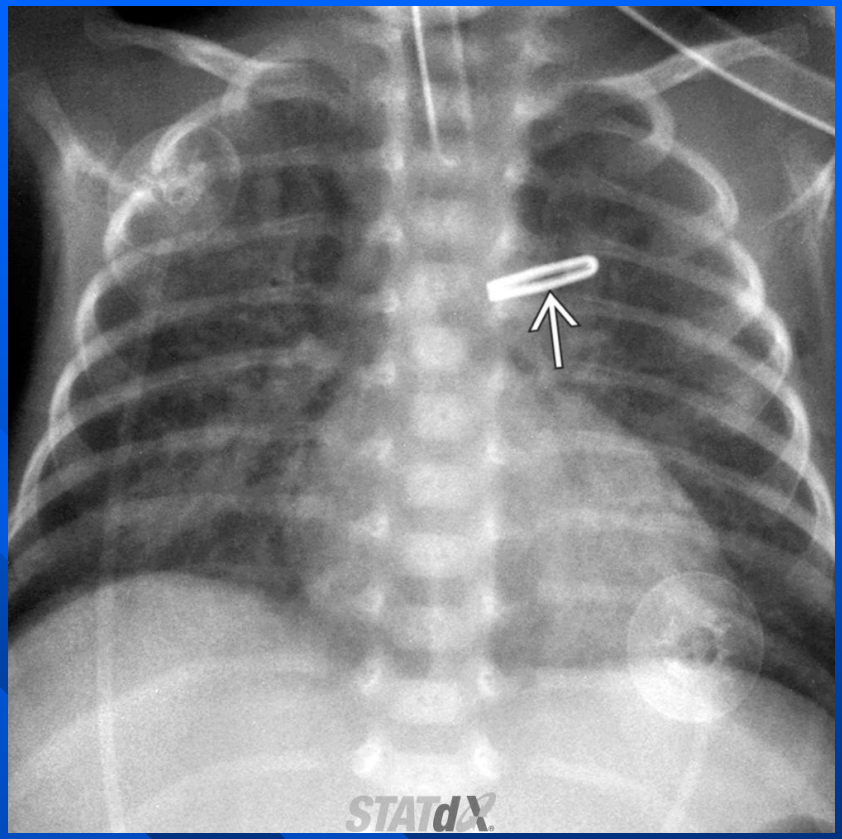
Frontal radiograph of the chest in a premature patient with surfactant deficiency disease (SDD) shows pulmonary hypoventilation & granular densities bilaterally.



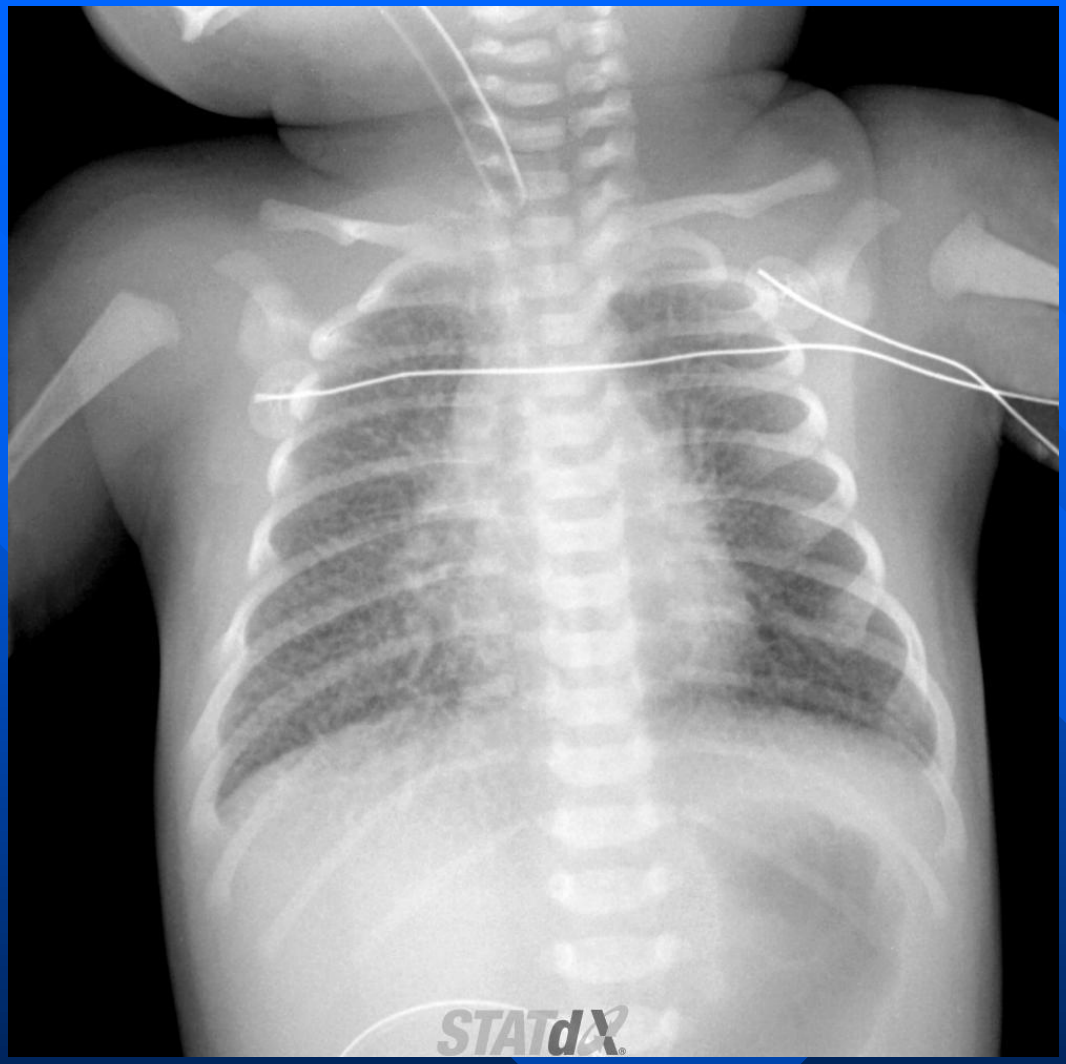
AP radiograph of the chest shows diffuse granular opacities with marked hyperinflation of the lungs. Although classically lung volumes are decreased in patients with SDD, artificial ventilation can make them hyperinflated, especially after surfactant administration.



AP radiograph of the chest in a 1 week old with SDD shows diffuse opacification of the lungs. This patient had a patent ductus arteriosus (PDA) that had reversed its direction of flow & was now causing pulmonary edema.



AP radiograph of the chest in the same patient shows increased aeration of the lungs after PDA ligation (with a surgical clip (white solid arrow) now in place).

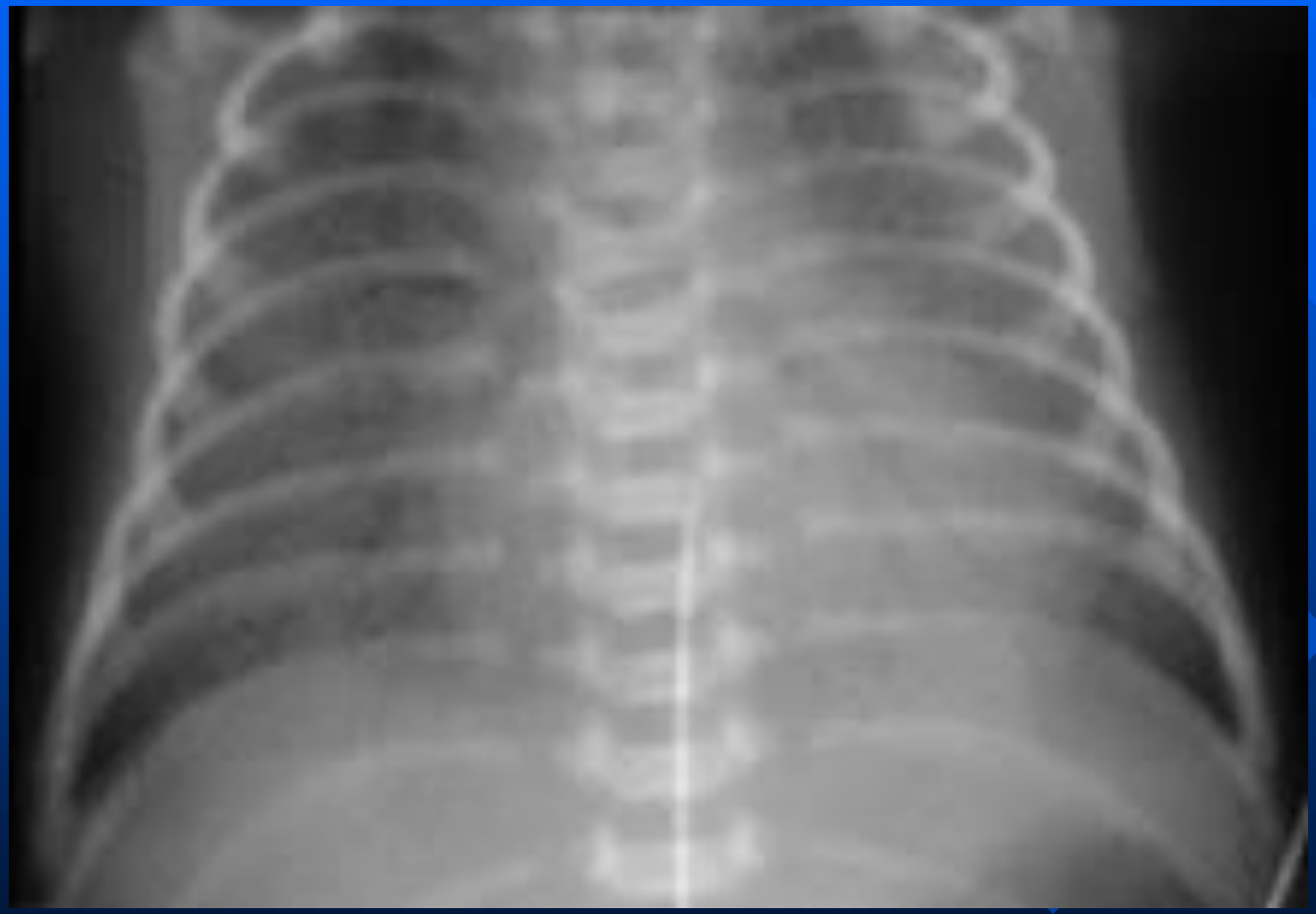


AP radiograph of the chest in a patient with neonatal pneumonia shows diffuse granular opacity that can look similar to the typical RDS patient.

Hyaline Membrane Disease

Bell shaped thorax with diffuse and symmetrical ground glass infiltrates

Hyaline Membrane Disease



diffuse and symmetrical ground glass infiltrates

Notes

- If humeral head ossification centers are present then the baby is term
- If they are not, all bets are off.