

Preterm Baby Part 1



Fifth year medical students
2022-2023



Classification of preterm based on **Based on gestational age**

Pictures

- **Extreme prematurity:**
 - less than 28 weeks' gestation

- **Very preterm infants :**
 - less than 32 more than 28





Late preterm

Late preterm

Gestation age between

34⁺⁰ - complete 36⁺⁰⁶ weeks

Don't deliver late-preterm infants unless medically indicated

LATE-PRETERM INFANTS should not be delivered unless there is an accepted maternal or fetal indication for delivery, according to a new ACOG Committee Opinion.

Late-preterm infants—those born between 34 weeks and zero days and 36 weeks and six days of gestation—are often mistakenly believed to be as physiologically and metabolically mature as term infants. However, late-preterm infants are at higher risk than term infants are of developing numerous substantial medical complications, resulting in higher rates of infant mortality, morbidity before initial hospital discharge, and hospital readmission in the first months of life.

"In the last decade, the proportion of births that were late-preterm births increased by 16%," said Ann R. Stark, MD, the American Academy of Pediatrics liaison to the ACOG Committee on Obstetric Practice. "Women and physicians need to be careful that when scheduling cesarean deliveries or inductions,

they do so only when maternal or fetal indications exist, such as preeclampsia or a nonreassuring fetal status."

Collaborative counseling by both obstetric and neonatal clinicians about the outcomes of late-preterm births is warranted unless precluded by emergent conditions, according to the Committee Opinion *Late-Preterm Infants*, which was published in the April issue of *Obstetrics & Gynecology*. Much of the Committee Opinion contains information on the health risks these infants face, as outlined in guidelines by the American Academy of Pediatrics.

Late-preterm infants are four times more likely than term infants are to have at least one medical condition diagnosed and three and a half times more likely to have two or more conditions diagnosed, according to the Committee Opinion. Late-preterm infants are more likely to be diagnosed with temperature instability, hypoglycemia, respiratory distress, apnea, jaundice, and feeding difficulties. ♀

Late preterm babies usually appear healthy at birth but may have:

- Trouble maintaining their body temperature.**
- difficulty with breastfeeding and bottle feeding.**
- risk for infections and jaundice**

characteristics of prematurity?

- - small baby,
- - pink or red skin, able to see veins
- - little body fat
- - little scalp hair, but may have lots of lanugo
- - weak cry and body tone
- - genitals may be small and underdeveloped



What causes prematurity?

1- Maternal factors:

- Previous preterm delivery
- Abnormal structure of the uterus.
- Cervical incompetence (inability of the cervix to stay closed during pregnancy).
- Drug abuse (such as cocaine).

2- Factors involving the pregnancy

- Abnormal or decreased function of the **placenta**.
- Placenta previa (low lying position of the placenta).
- Placental abruption (early detachment from the uterus).
- Premature rupture of membranes (amniotic sac).
- Polyhydramnios (too much amniotic fluid).

3- Factors involving the fetus

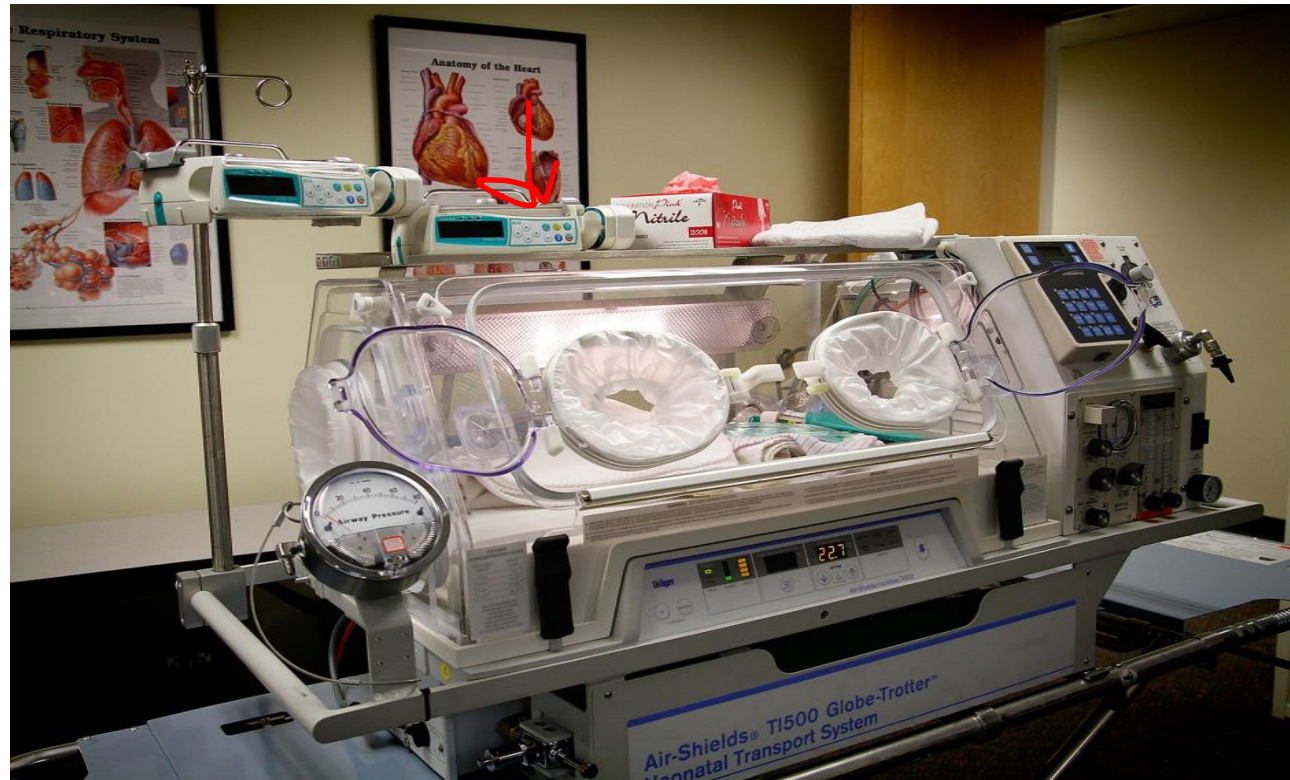
- When fetal behavior indicates the intrauterine environment is not healthy.
- Multiple gestation (twins, triplets or more).

support In delivery room :



RD
+ HR > 100

Transport of the preterm from Delivery room



MANAGEMENT SATGES

✓ Unstable stage:

❖ Birth up 3 to 5 days

✓ THE STABLE STAGE :

❖ >5 days

✓ Later Problem:

❖ when the baby is stabilized

Unstable stage Birth 3 to 5 days

- prevent Hypothermia



Thermo regulation care

Keep temperature 36.5- 37.4 C°

So put the baby in neutral thermal environment

Why

Premature Susceptibility to *Heat Loss*

Causes of Hypothermia Are:

- High surface area
- Thin non-keratinized skin
- Lack of insulating subQ fat
- Lack of thermogenic brown adipose tissue
- Inability to shiver
- Poor vasomotor response
- Poor central thermal control



Adverse Consequences of Hypothermia

Temp <36.5 C°

- High O₂ consumption
- High glucose usage
- decreased glycogen stores
- High energy expenditure
- reduced growth rate,
- **RDS**
- **metabolic acidosis**
- death

Complications of prematurity

RESPIRATORY DISTRESS

- Due to Immature surfactant
- Due to Immature lung :
 - Alveolation and vascularization of the Lungs
- Due to Immature musculature and in sufficient calcification of bony matrix

Due to Immature lung : Alveolation and vascularization of the Lungs

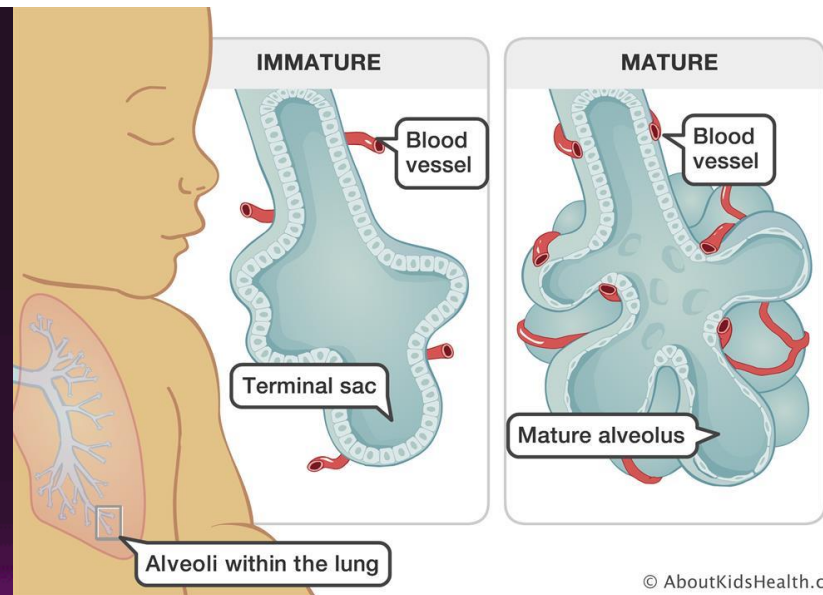
Premature* **Term***

8 weeks GA 16 weeks GA 24 to 35 weeks GA 36 weeks to 3 years

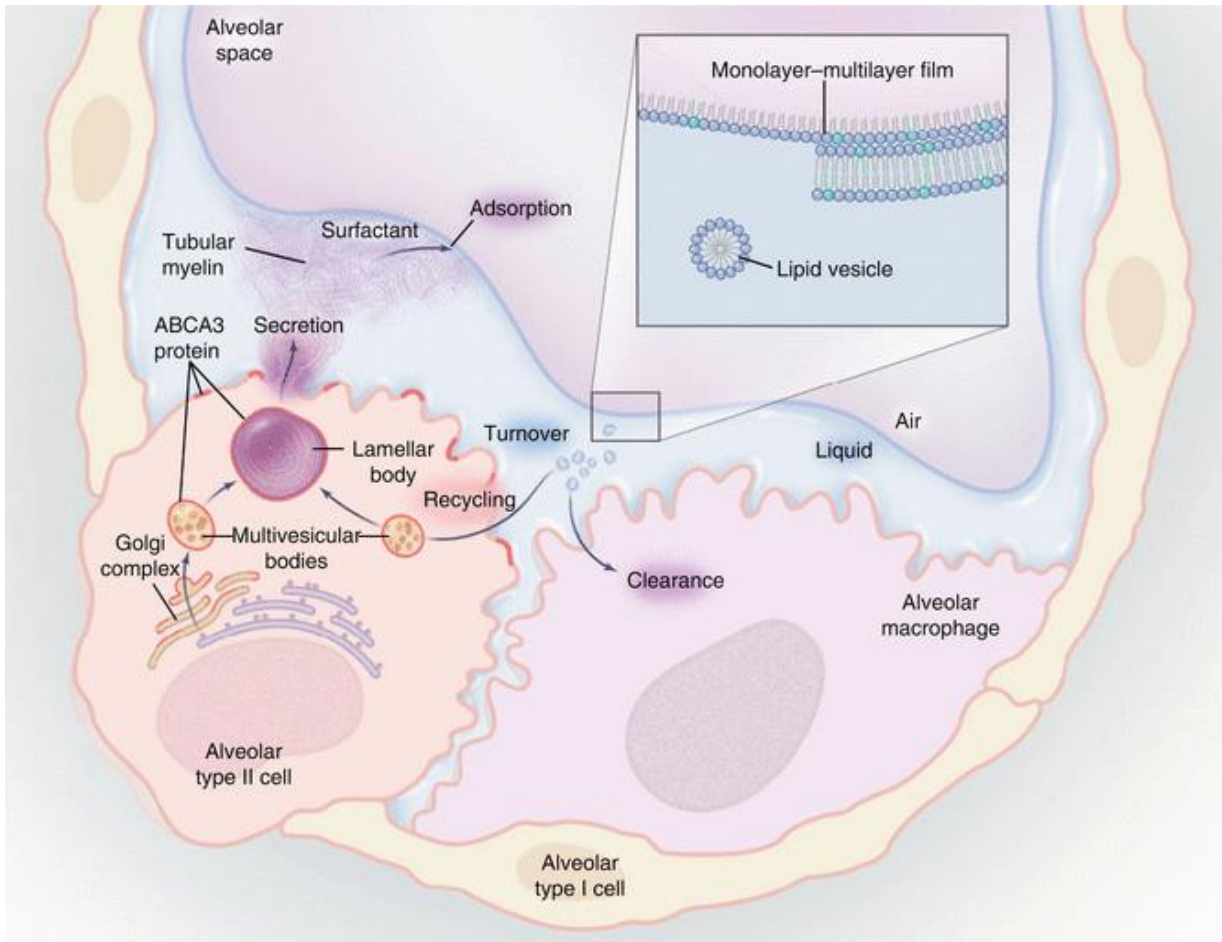
- Although alveoli are present in some infants as early as 32 weeks GA, they are not uniformly present until 36 weeks GA¹

*Pictures are artistic renditions of lung development and are designed to emphasize terminal acinus development and not the entire conducting airway system.²

1. Langston C et al. *Am Rev Respir Dis.* 1984;129:607-613.
2. Adapted from Moore KL, Persaud TVN. *The respiratory system.* In: *The developing human: clinically oriented embryology.* 7th ed. Philadelphia: Saunders, 2003. p. 241-53.

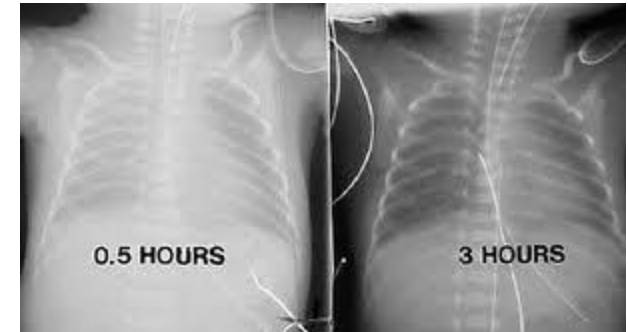
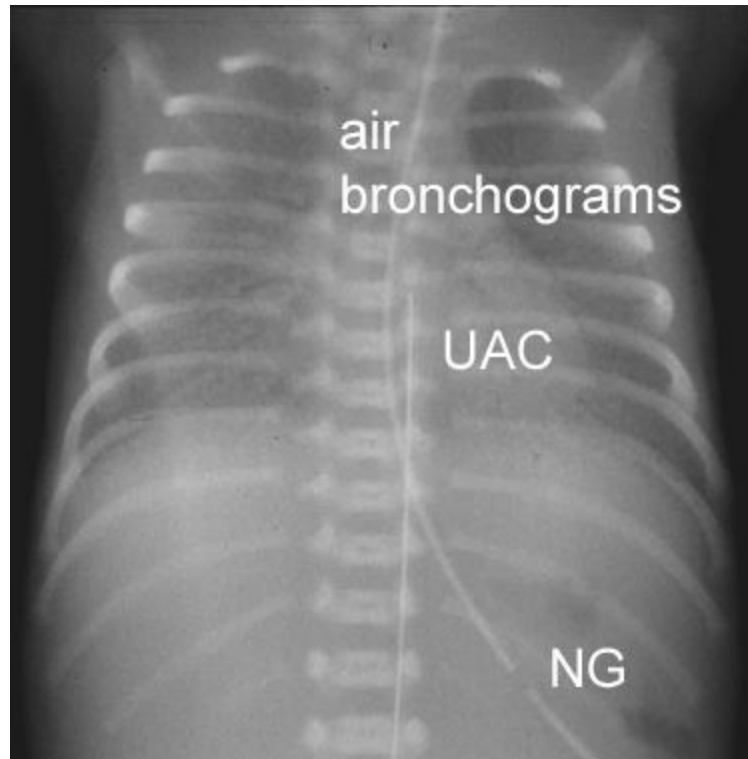


Immature surfactant



Types of Respiratory problems

1- Respiratory distress syndrome



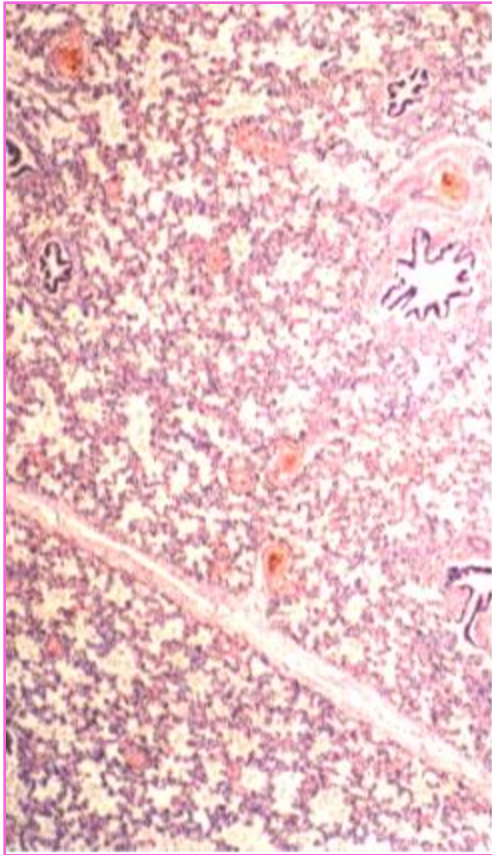
Hyaline membrane disease
=
respiratory distress syndrome.

-

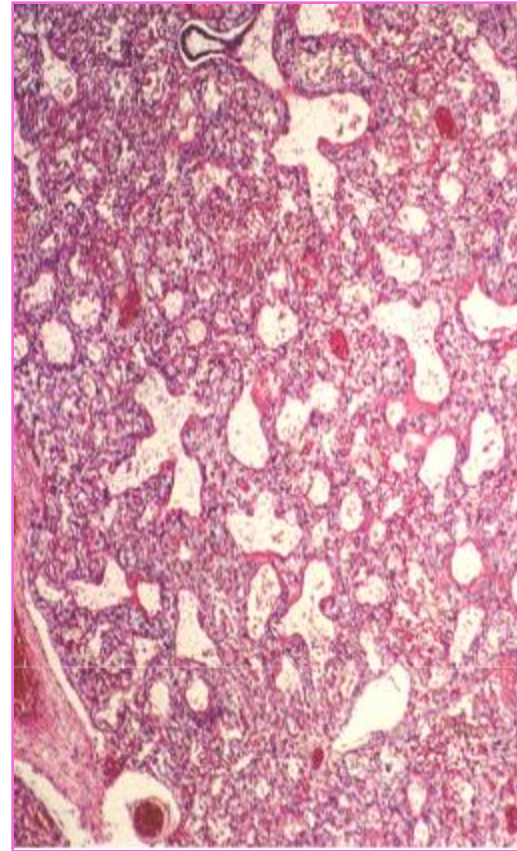
a condition in which the air sacs cannot stay open due to lack of surfactant in the lungs.

Histology

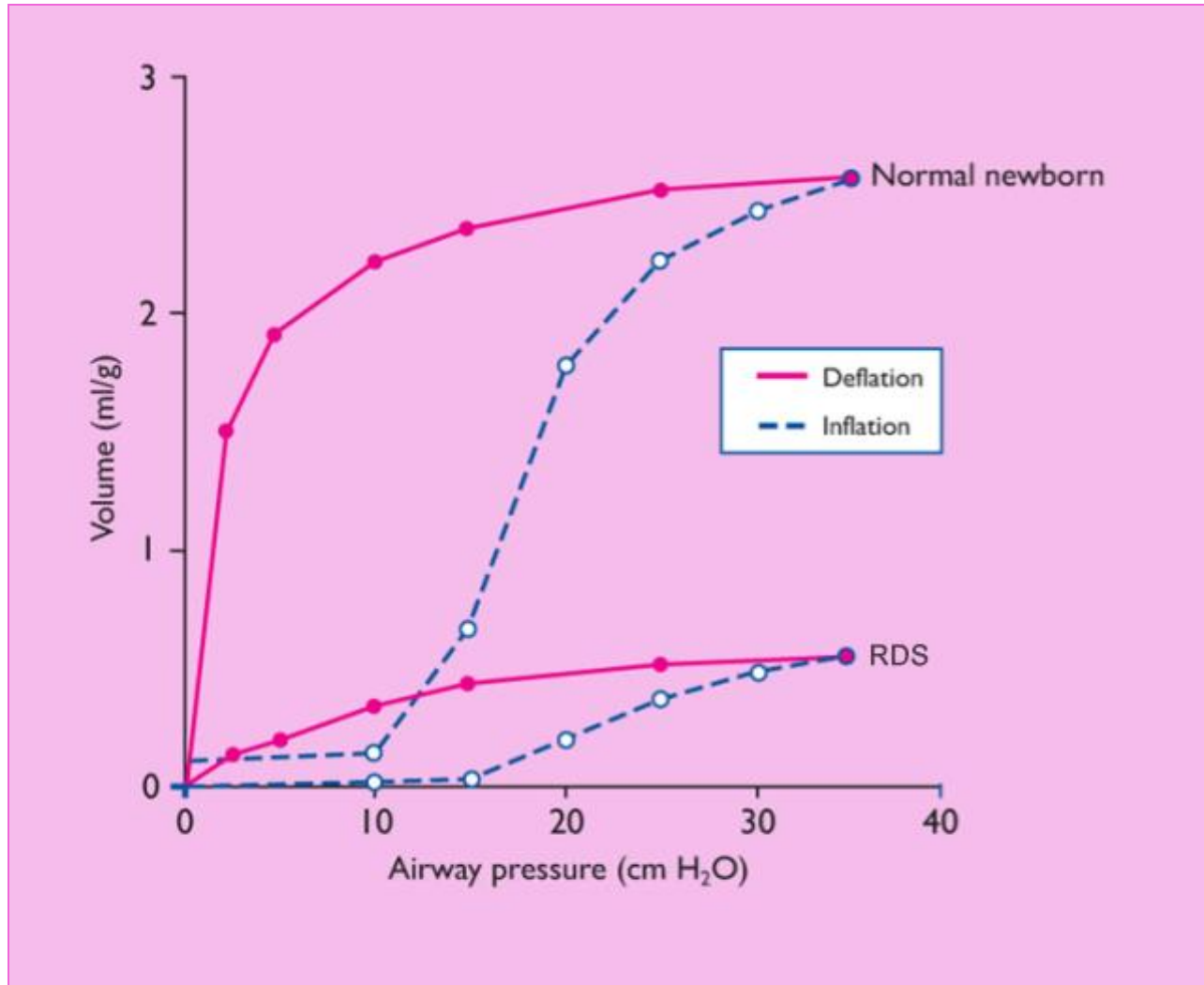
Normal



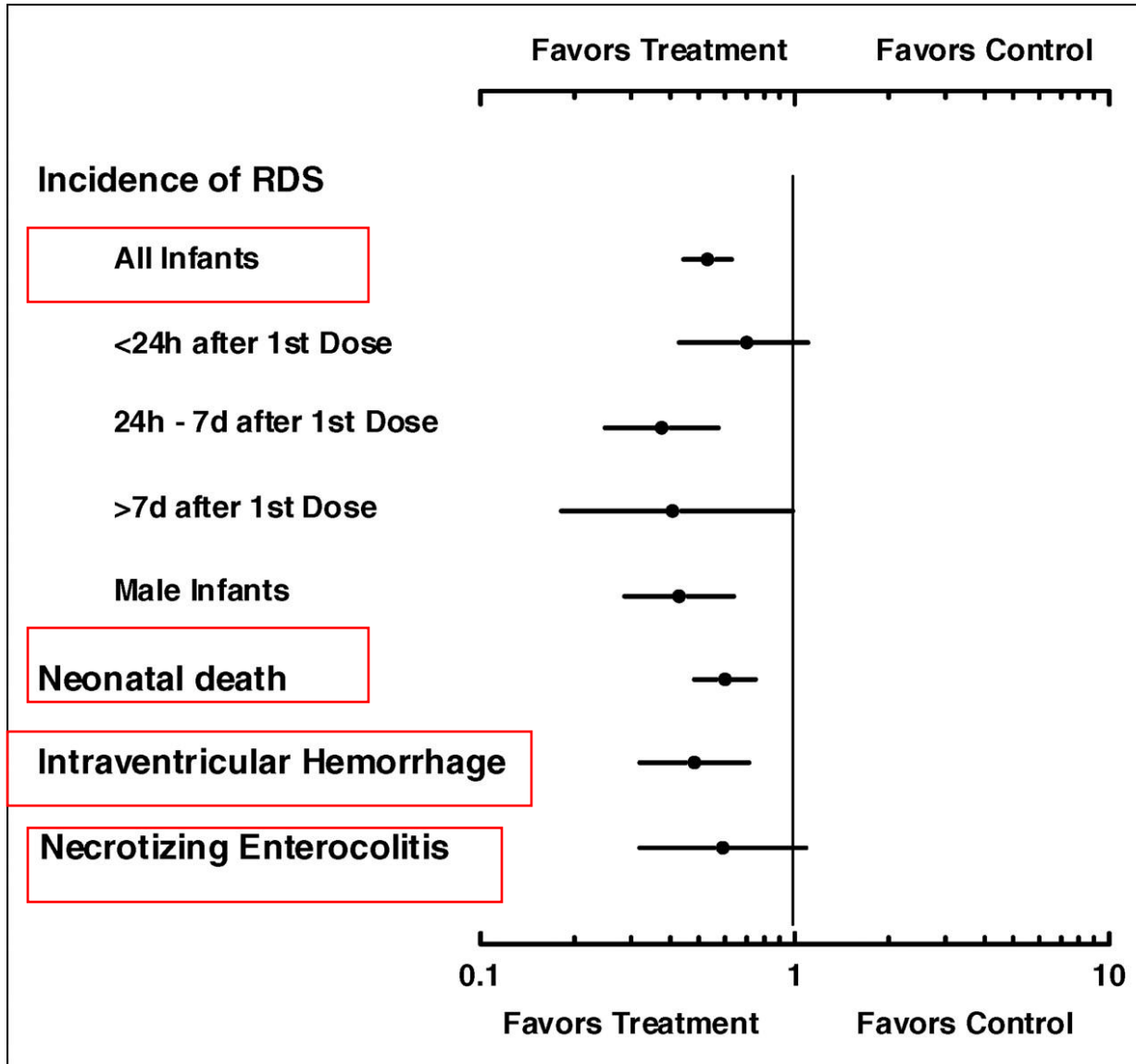
RDS



RDS: Reduction in compliance



Role of antenatal steroids

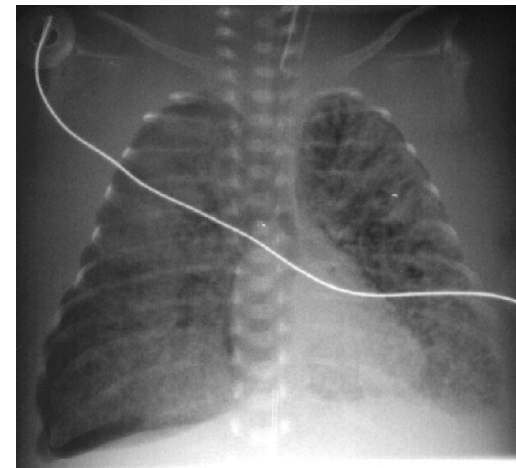
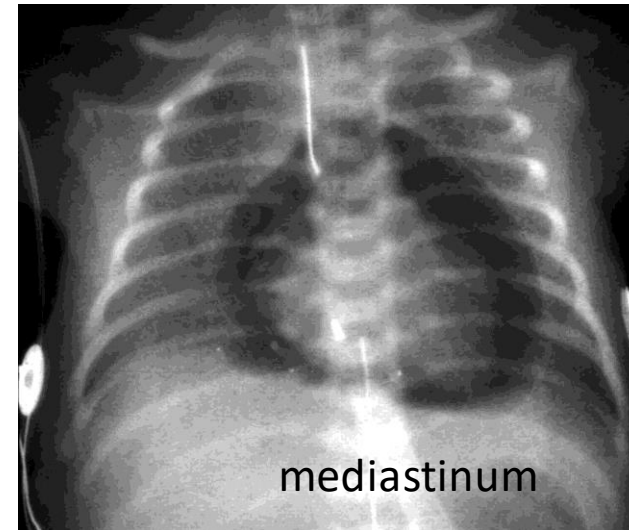
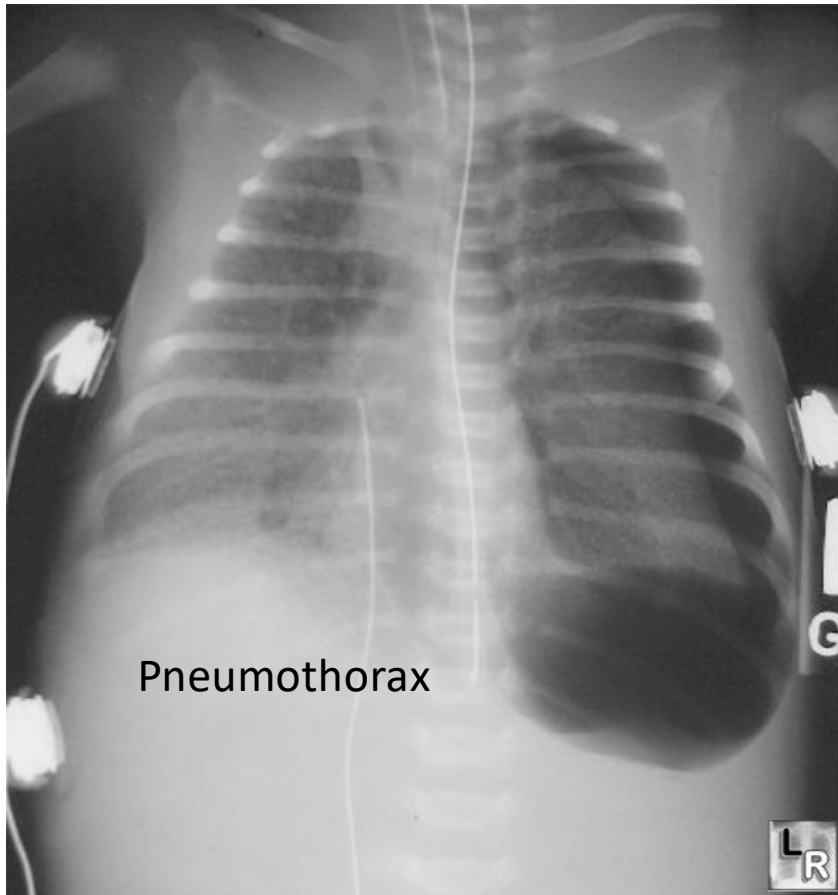


Resp support:

Be aware of complication of Respiratory distress syndrome

Air leaks

Air leaking out of the lung spaces into other tissues



Pulmonary
interstitial
emphysema

Respiratory Management



- Support ventilation
 - None invasive and invasive
- Surfactant
 - When to give
 - FiO₂ requirement > 30% all babies with a clinical diagnosis of RDS, especially in the early phase of worsening disease.

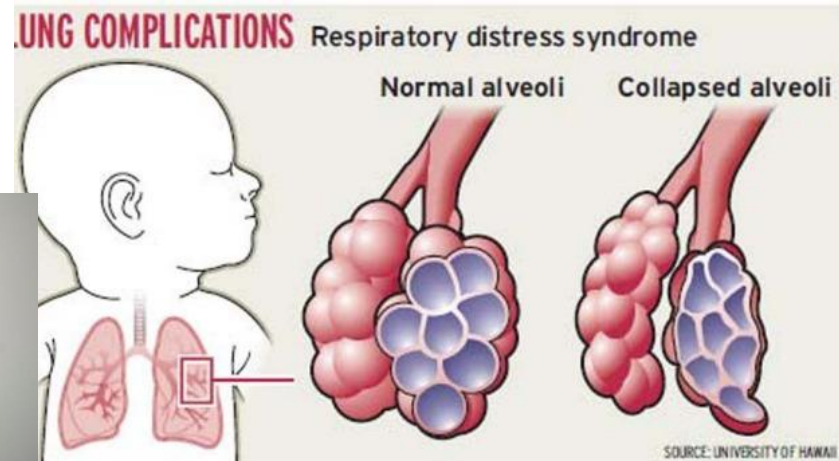
Respiratory management of RDS

1- SURFACTANT

2- Respiratory support:

-

Respiratory Distress in Newborn

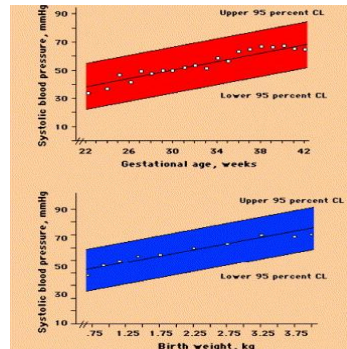
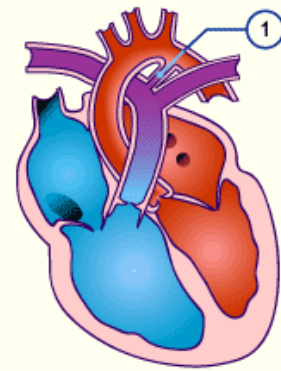


• Anticipate cardiac Complications

3-cardiovascular:

a. Patent ductus arteriosus (PDA)

b. Hypotension



Patent Ductus Arteriosus (PDA)

- Premature infants at risk OF PDA
- Duct does not respond to “close” signals (O₂+PGs)
- Leads to symptoms of congestive heart failure
- Treated by fluid restriction, NSIAD, Paracetamol,
interventional catheter closure (rare surgical ligation)

Complications of prematurity?

4 - Metabolic problems

- fluid loss through skin
 - (thin skin, no Keratin, Rapid Respiratory rate, from warmer and large Surface area)
- Have immature kidney
 - that cannot concentrate or regulate electrolytes and the buffer well)
- Na Imbalance
- Ca Imbalance
- K imbalance
- Glucose imbalance (Risk of hypo and hyperglycemia)

SKIN CARE

- TAPES ON SKIN
- **Nasal damage**



NASAL INJURY

Complications of prematurity?

6- INFECTION

- Risk of infection

Decrease IGs
Complement , T cell
and B cell dysfunction

Follow infection control regulations

Nutritional support

- NUTRITION FOR METABOLICALLY STABLE INFANT

- A) **parenteral nutrition**- on admission with GIR 6-8
- aminoacids start at 3-3.5g/kg/d increase by 0.5g/kg/d ----
max 3.5-4g/kg/d
- intravenous lipids(20%)- start by 24 hrs-0.5-1g/kg/d increase
by 0.5g/kg/d upto 3g/kg/d
Monitor TG levels - <200mg/dl

Early enteral nutrition

Trophic feeding/ Gut priming

Practice of feeding very small amounts of enteral nourishment to stimulate development of the immature GIT

Advantages:

- Improves GI motility
- Enhances enzyme maturation
- Improves mineral absorption
- Lowers incidence of cholestasis
- Shortens time to regain birth weight

Feeding problems

- Difficulty in self feeding
- In coordination of sucking and swallowing
- Abdominal distension
- Regurgitation and aspiration

➤ unable to coordinate suck and swallow before 34 weeks gestation.

Family support ✓



- The family dynamics are greatly disturbed.
- The problems and issues should be handled with equanimity, compassion, concern and caring attitude of the health team.
- Encouraged to touch and talk with her baby.
- Provide kangaroo-mother-care.
- Emotional support and guidance.

✓ THE STABLE STAGE >3-5 days

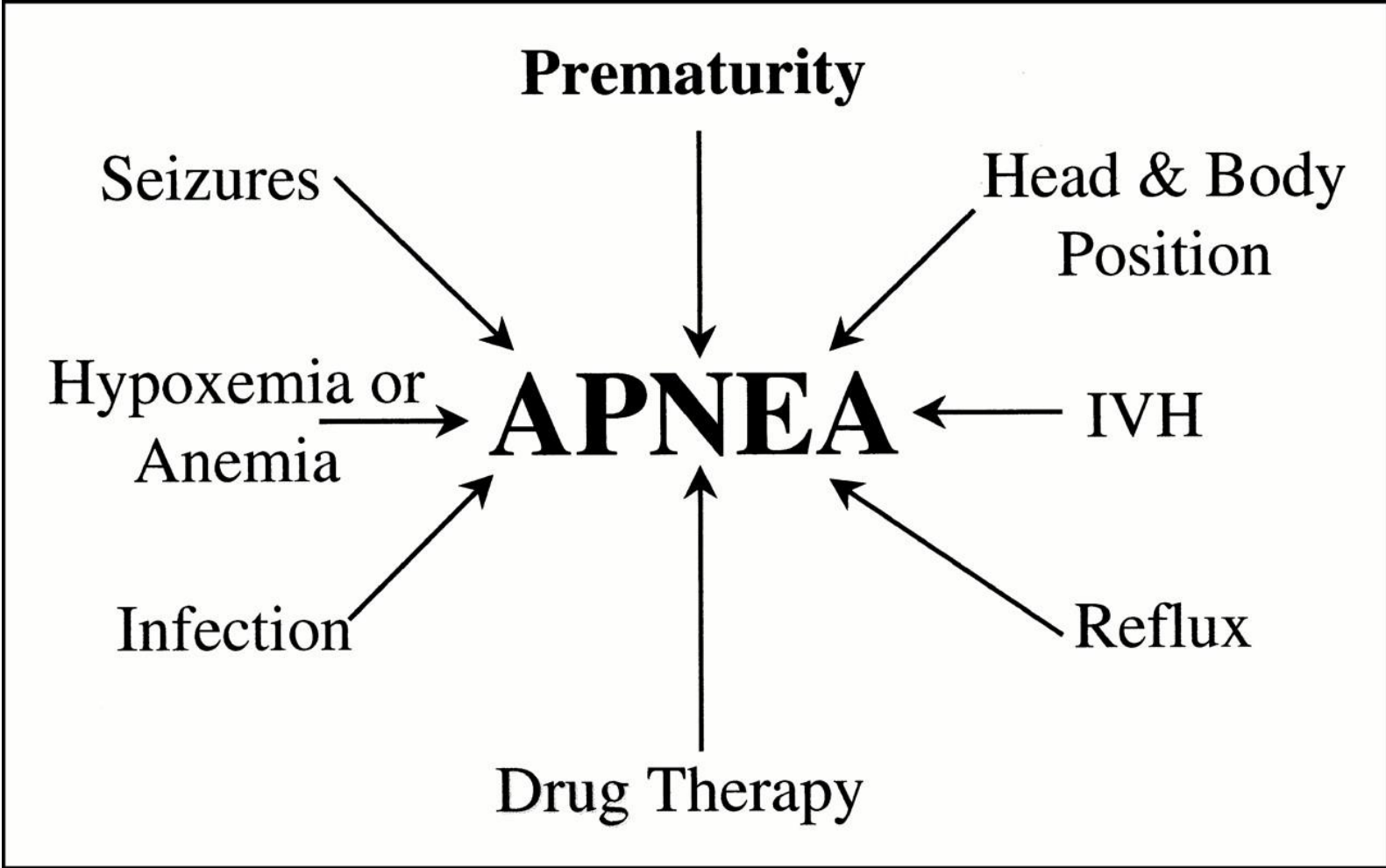
- **APNEA OF PREMATURITY**
- **GI problems**
- **VESSEL ACCESS**
- **Infection**
- **NEC**
- **Neurologic**



Defined as:

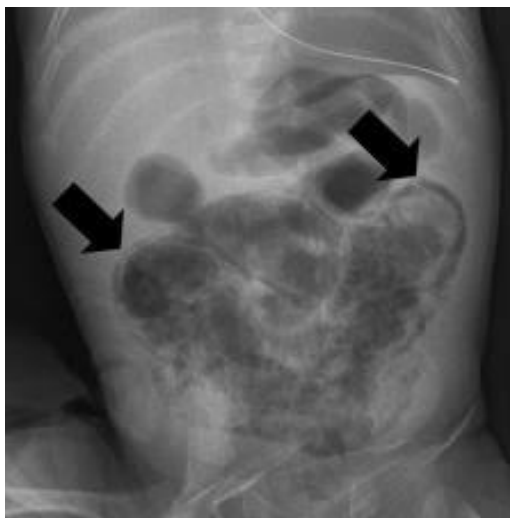
- the cessation of breathing for > 20 seconds (apnea)
- or
- cessation of breathing for less than 20 seconds if it is accompanied by bradycardia or oxygen (O₂) desaturation.

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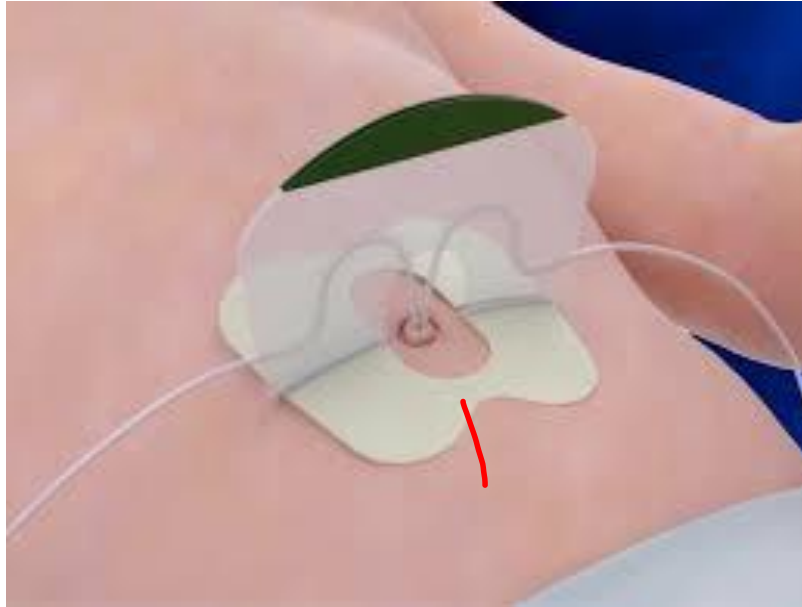


GI problems

- NEC

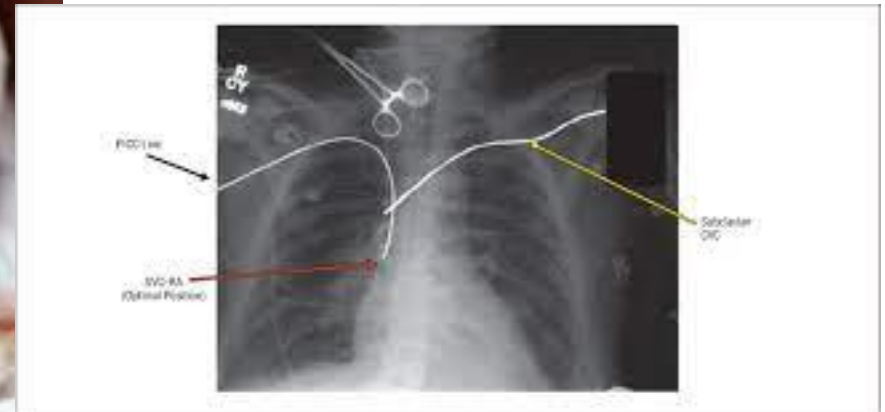


Vascular Access



Umbilical cord
catheterization

Vascular Access



Peripheral inserted central catheters catheterization

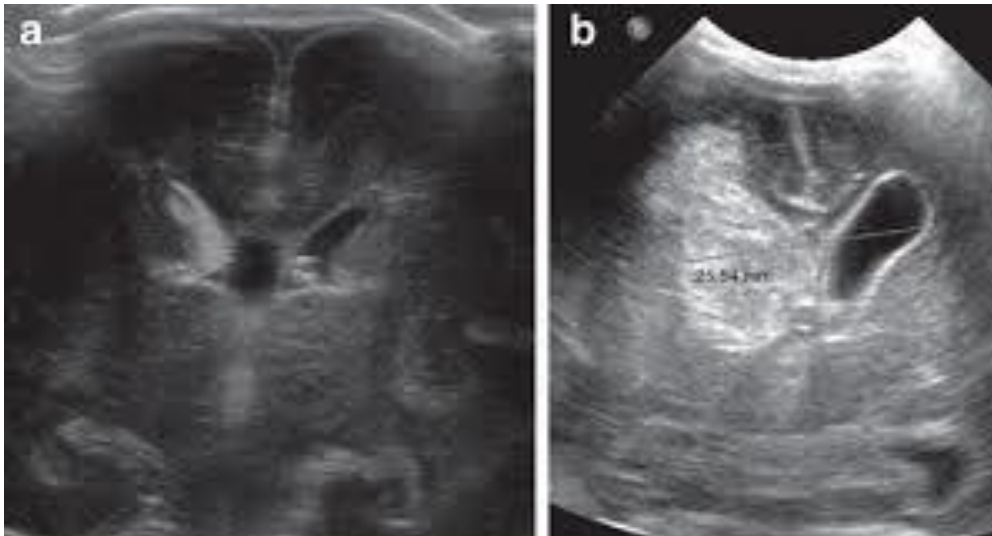
PICC Lines

- Infections –
 - premature infants are more susceptible to infection and may require antibiotics

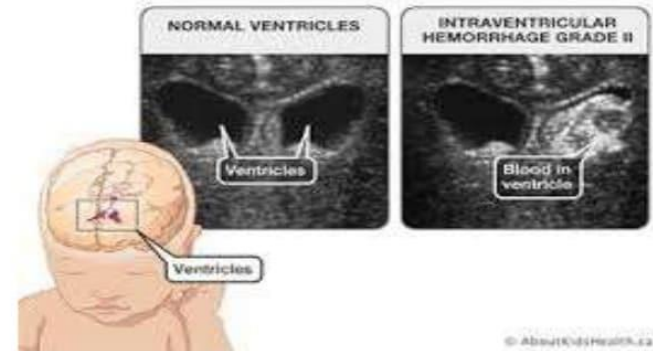


Invasion of
barrier

Neurologic



INTRAVENTRICULAR HEMORRHAGE



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BY,
Ms. Sheen. S. P. Belsylin
M.Sc Nursing 1st year

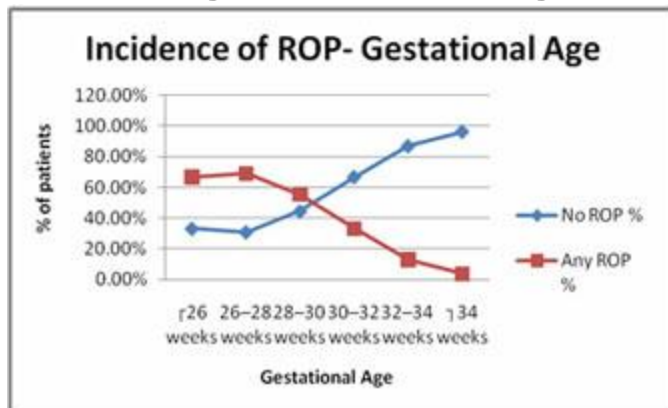
Later Problem when the baby is stabilized

- Retinopathy of prematurity (**ROP**)
- Infection
- Chronic lung disease
- Metabolic Bone disease
- Neurologic
 - Post hemorrhagic hydrocephalys
 - Periventricular Leukomalacia (PVL)
- Anemia of prematurity

Retinopathy of prematurity (ROP)

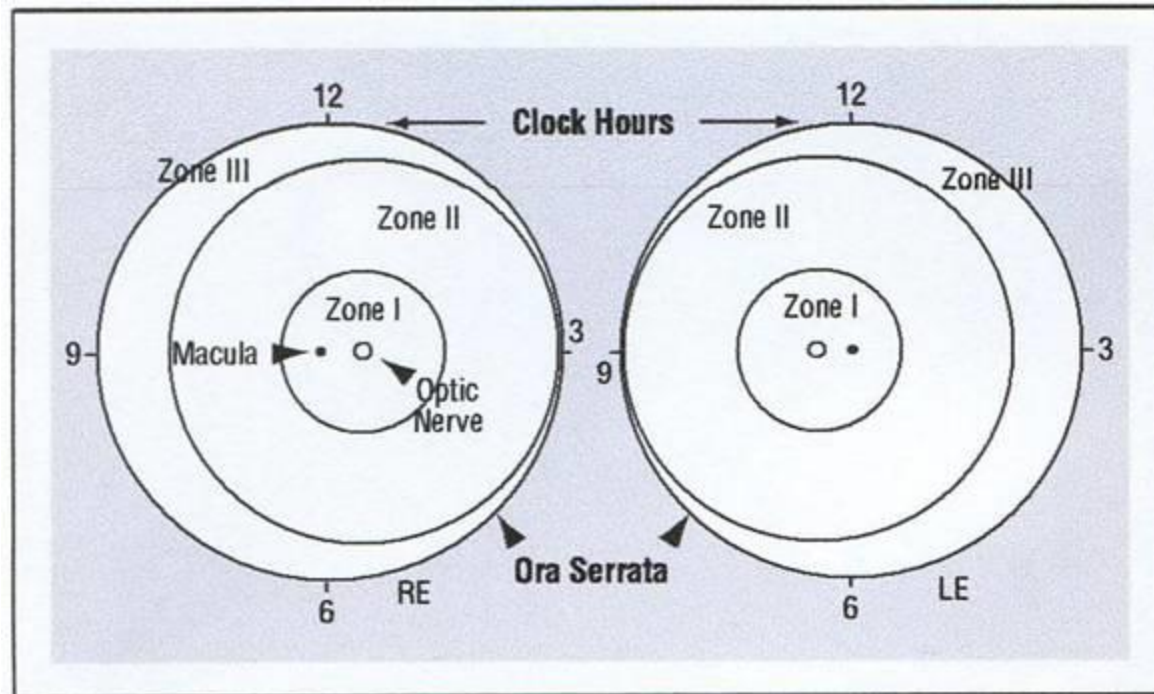
Pathogenesis and clinical features

- Incomplete retinal vascularisation.
- Vessels migrate from disc to periphery weeks.
- Mature vessels extend to nasal ora at 36 weeks.
- Vessels extend to temporal ora at 39-41 weeks.
- Related to gestational age (GA) and birth weight (bw).



Classification of ROP

- International Classification of Retinopathy of Prematurity (ICROP)
- Describe ROP according to - Zone, Extent and Stage.



Classification of ROP cont.

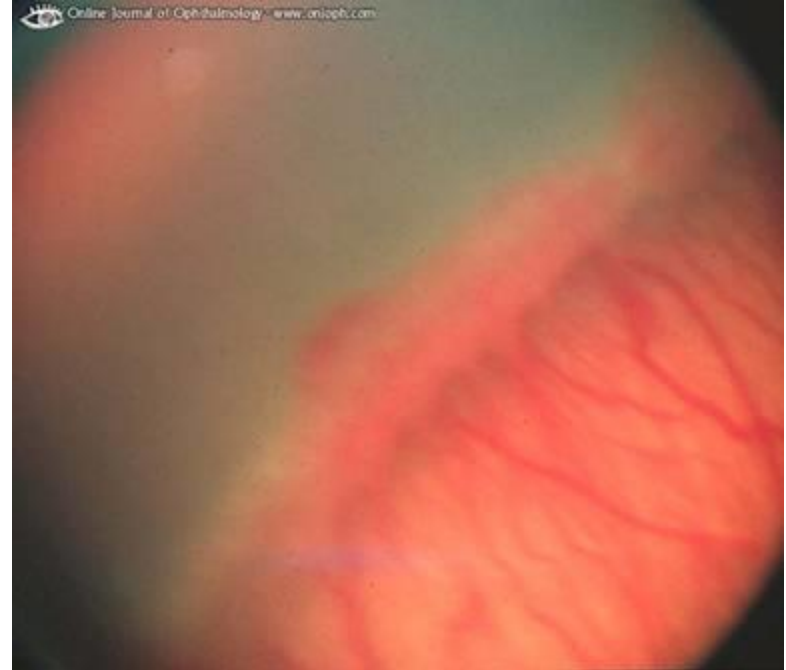
- Staging:

5 stages - describe abnormal vascular response. Most severe stage is used to determine the stage of the eye as whole.

- Stage 1: Demarcation line



- Stage 2: Ridge



Classification of ROP cont.

- Stage 3: Extaretinal Fibrovascular Proliferation
- Stage 4: Partial Retinal Detachment
- Stage 5: Total Retinal Detachment



Classification of ROP cont.

- Plus disease –
signs indicating severity.
Venous dilatation or
arteriolar tortuosity



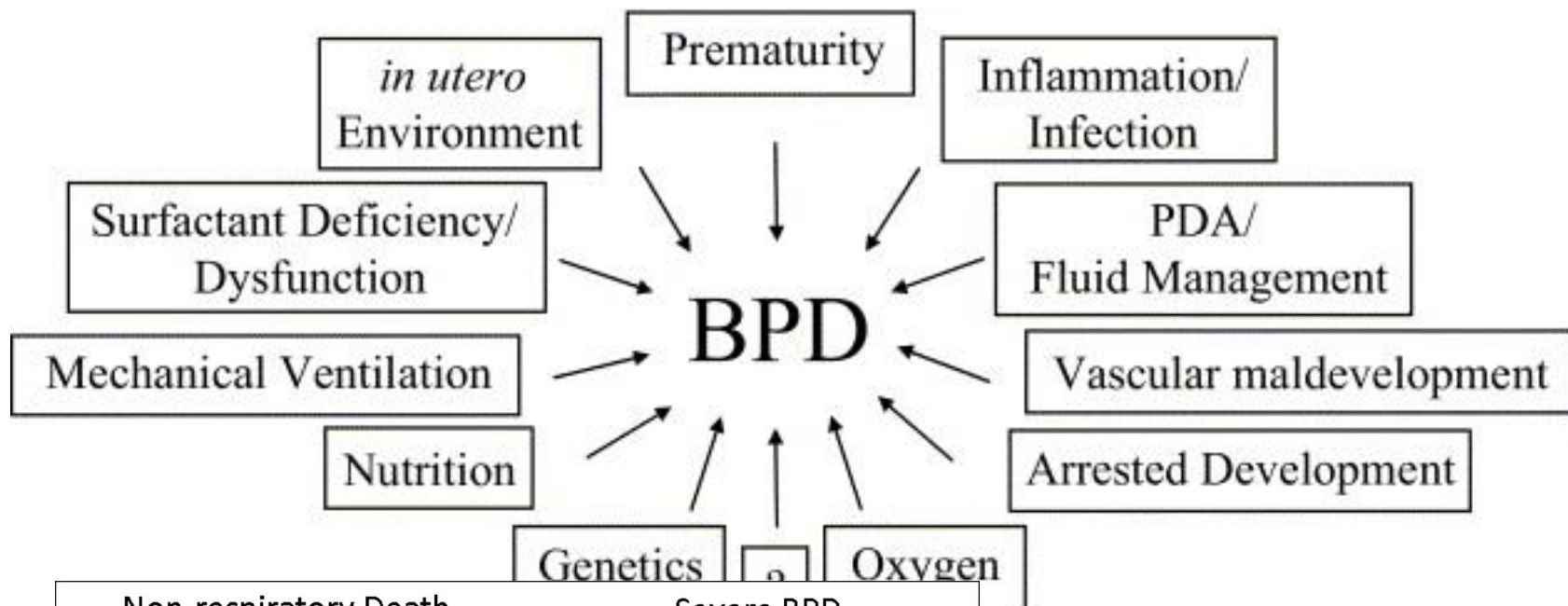
Later Problem when the baby is stabilized

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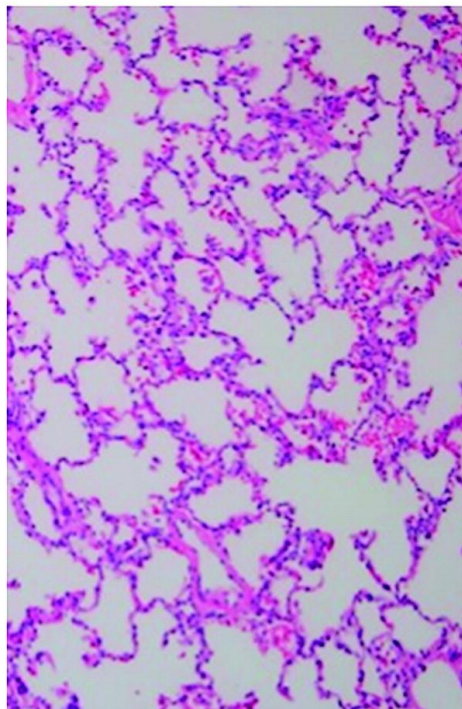
- Infections –
 - premature infants are more susceptible to infection and may require antibiotics



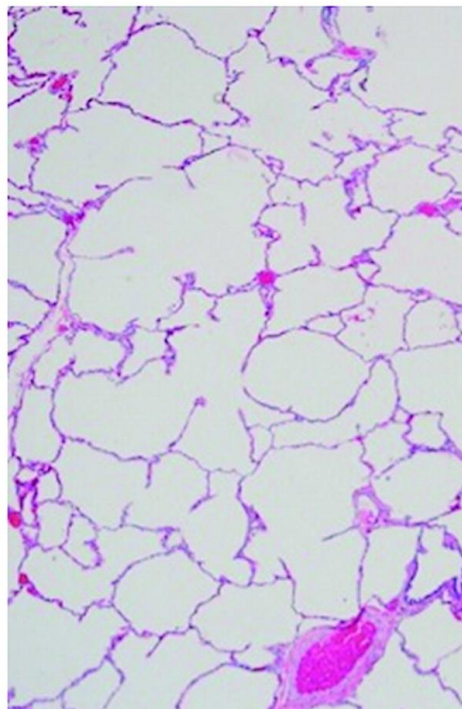
Invasion of
barrier



Non-respiratory Death



Severe BPD



Metabolic bone disease of preterm (MBDP)

- **DEFINITION**

- Is a **Metabolic Bone Disease of Preterm** infants
- in which **decreased bone mineral** content occurs mainly as a result of lack of adequate Ca & P
- From
 - decrease intake in extra uterine life
 - insufficient in utero supply (mainly last trimester and last trimester .
- Screen. (If ≤ 30 wks if ≤ 1.5 kg) at 4 weeks then weekly (mainly if **<1kg, <28 wk and TPN > 2 wks**)
- Dx
 - Low P <4mg/dl IU/L. (< 1.25 mmol/l)
 - High Alk P > 600
 - PTH. > 7 pmol/L
 - Bone on Xray (osteopenia, Fraying, Fracture)

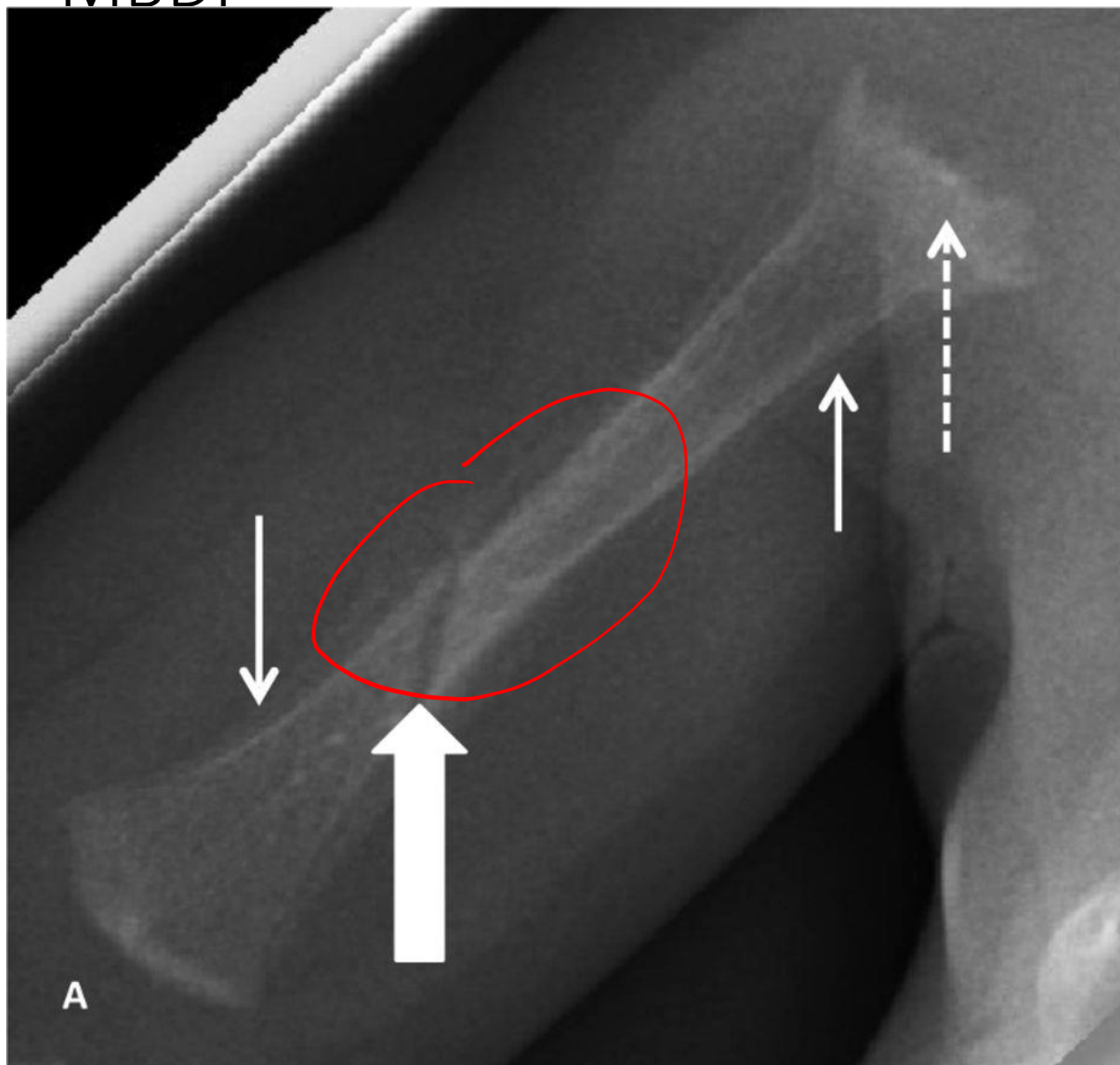
Metabolic bone disease of preterm (MBDP)

- Management

- Fortification of BREAST milk
- Vitamin D
- D/C medication
 - (steroid, caffeine, frusemide, PPI)
- Physical therapy
- Safe handling
- PARENT EDUCATION of safe handling

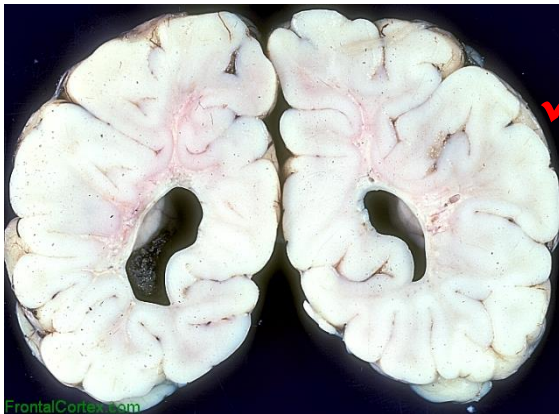


MBDP



Neurologic complications :

- periventricular leukomalacia - softening of tissues of the brain around the ventricles



✓ Later Problem when the baby is stabilized

Anemia of Prematurity

- Why does it happen ?
- Blood loss
- Shortened RBC lifespan
 - Preterm 40-60 days
- Inadequate RBC production
 - Suboptimal erythropoiesis in response to hypoxia
 - Switch from hepatic to renal O₂ sensor not till term

When can a premature baby go home from the hospital



When can a premature baby go home from the hospital?

- serious **illnesses** are resolved
- stable **temperature** - able to stay warm in an open crib
- taking all **feedings** by breast or bottle
- no recent **apnea** or low heart rate
- - **parents** are able to provide care including medications and feedings
- > **35** weeks and > **1.8-2** kg



Screening before discharge

Screening

1. Congenital anomalies – Internal and external; SpO2 screening for CHD (>10% difference suggestive)
2. Hearing screening prior to discharge in all newborn (AAP)
 - Risk factors- F/h/o SNHL, In utero infections, NNH requiring Exchange transfusion, Ototoxic medication >5d/+loop diuretics, Mech ventilation >10d
 - OAE- Simpler, Middle & inner ear assessed, all ages.
 - ABR- Can diagnose auditory neuropathy(dyssynchrony), recommended for high-risk infants admitted in NICU, within 1st 3mo.
3. Visual impairment: ROP screening using indirect ophthalmoscopy at PN age of 3wks in high risk infants: Severe RDS, Hypotension req vasopressors, Surgery in 1st several wks
- 4- Metabolic screen and repeat. Thyroid function and 6-8 weeks

What to Teach Parents before discharge

Teach Parents before discharge

- CPR



WHICH INFANTS ARE AT GREATEST RISK for SIDS?

- Increase risk with
- The lower the gestational
- The lower the birthweight
- A combination of these increases the risk by more than each factor alone





For parents



For Baby < 28 weeks in RSV season

Later follow up Screen for Neurodevelopment Delay

Early Preterm (EPT) Infants Experience Multiple Delays

Compared with full-term infants, EPT are more likely to have :

- Delays in fine and gross motor functioning
- Delays in sensory integration
- Delays in cognitive functioning
- Delays in communication
- Behavioral and socio-emotional problems



(Kerstjens, et al., 2011 citations: Stephens & Vohr, 2009; Saigal & Doyle, 2008; Taylor, Klein, & Hack, 2000; Marlow, 2004; Hokken-Koelega, 2017)

Thank You

