

# Neonatal Jaundice

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# Definition

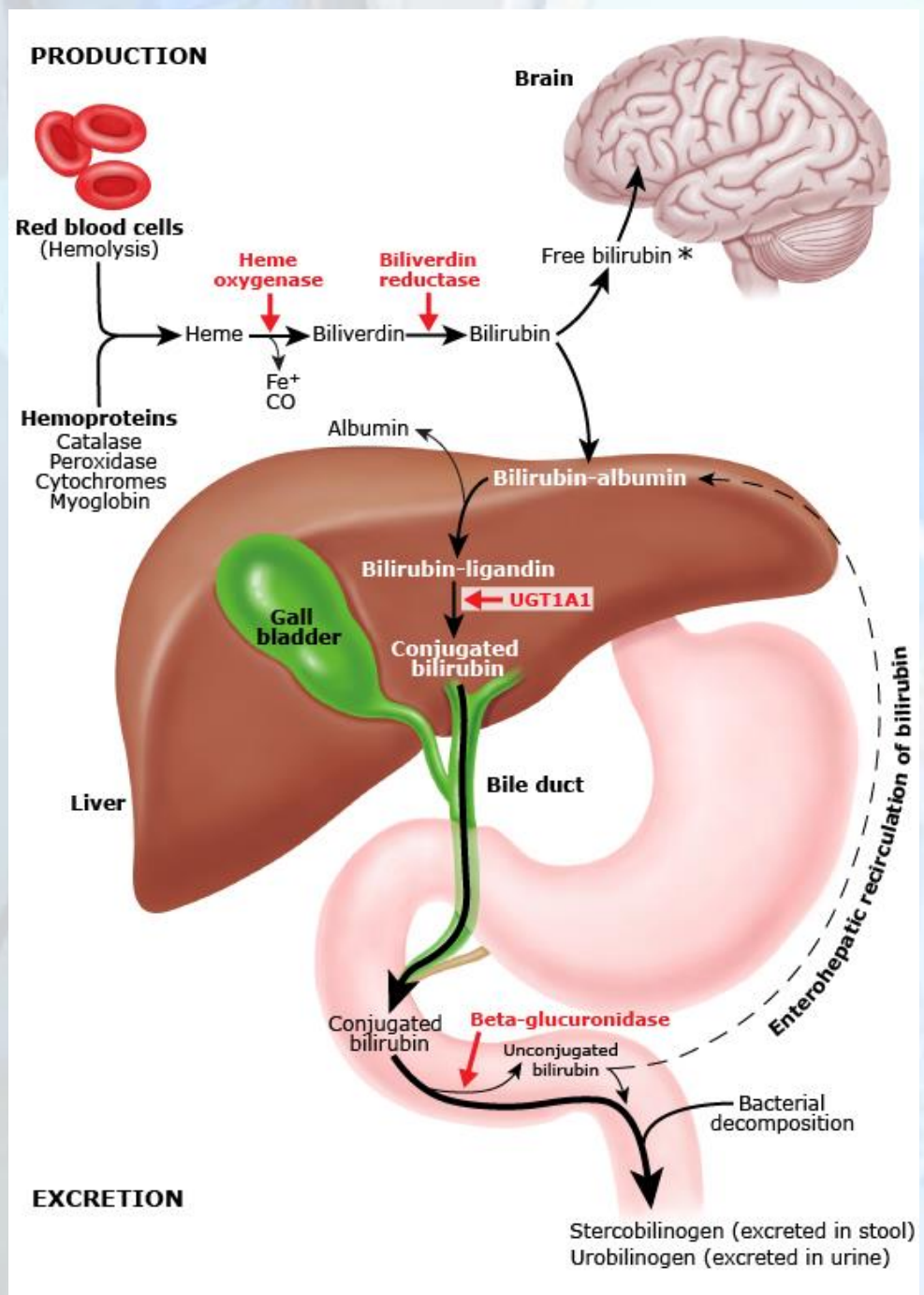
- Jaundice is the yellow color of the skin and sclera by deposits of bilirubin

When is visible?

Adults sclera > 2 mg/dl

Newborn skin > 5 mg/dl





## Bilirubin Metabolism



# Types of Bilirubin

## Unconjugated bilirubin(Indirect)

- Fat soluble
- Can cross BBB
- Toxic to brain

## Conjugated bilirubin (direct)

- Conjugated with glucuronic acid
- Water soluble
- Excreted in urine and stool
- Not toxic



# Incidence

- Term Occurs in 60%
- Preterm infants 80%

Jaundice is the most common medical condition that requires medical attention in newborns.

# Types of Jaundice

Physiologic jaundice

Pathologic jaundice



# Possible Causes of Physiological Jaundice

Increased red cell mass

Shortened red blood cell life span

Hepatic immaturity of ligandin and glucuronyl transferase



# Pathological jaundice

Appears within 24 hr.

Rise  $>5$  mg/dl/day or  $>0.5$ mg/dl/hr

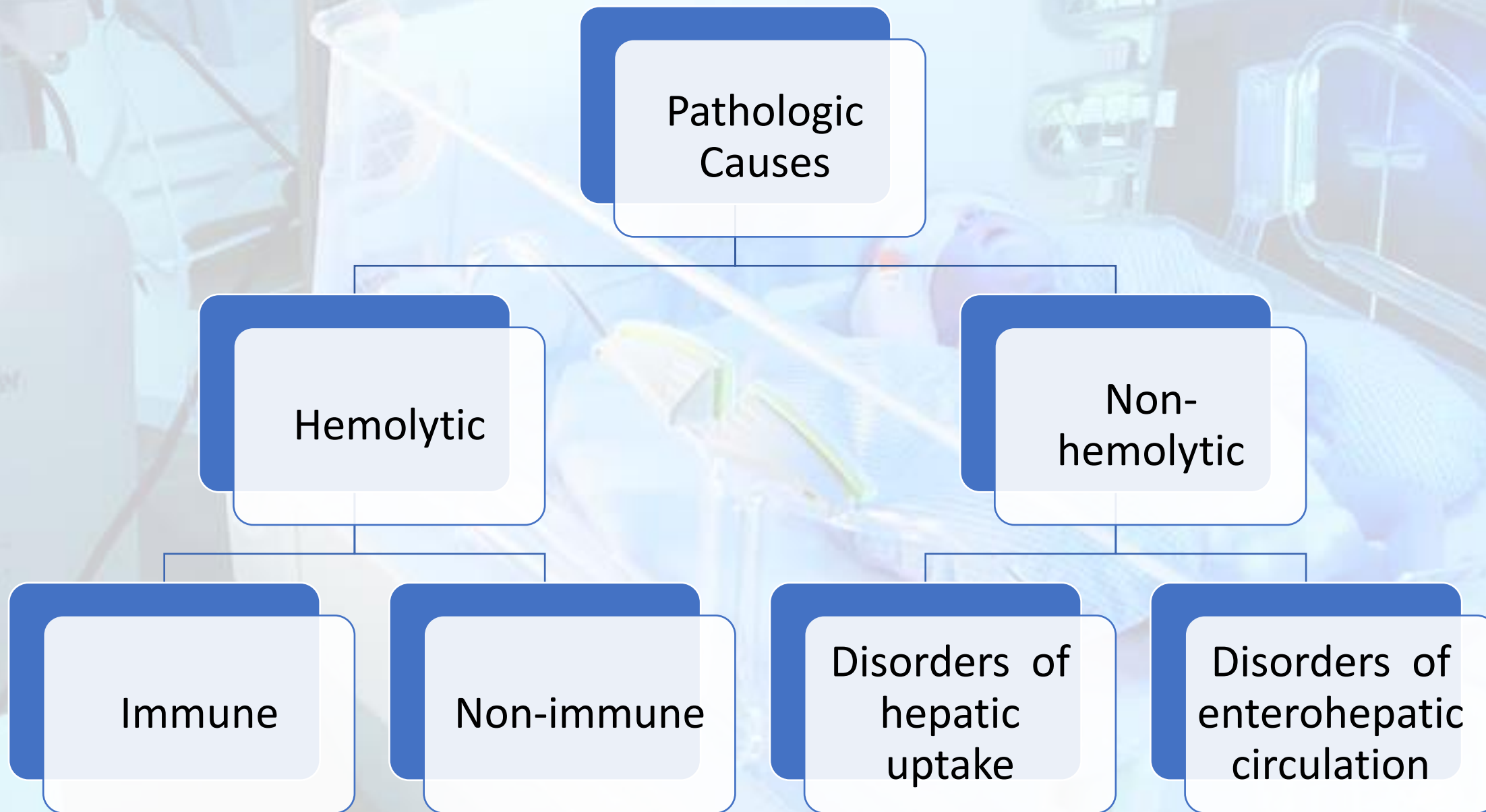
Level  $>13$ - $15$  mg/dl in term,  $>10$ mg/kg in preterm

Persisting  $> 14$  days

Light color stool/dark urine

Direct bilirubin  $>1.5$  mg/dl







# Immune Causes

Rh incompatibility

ABO incompatibility

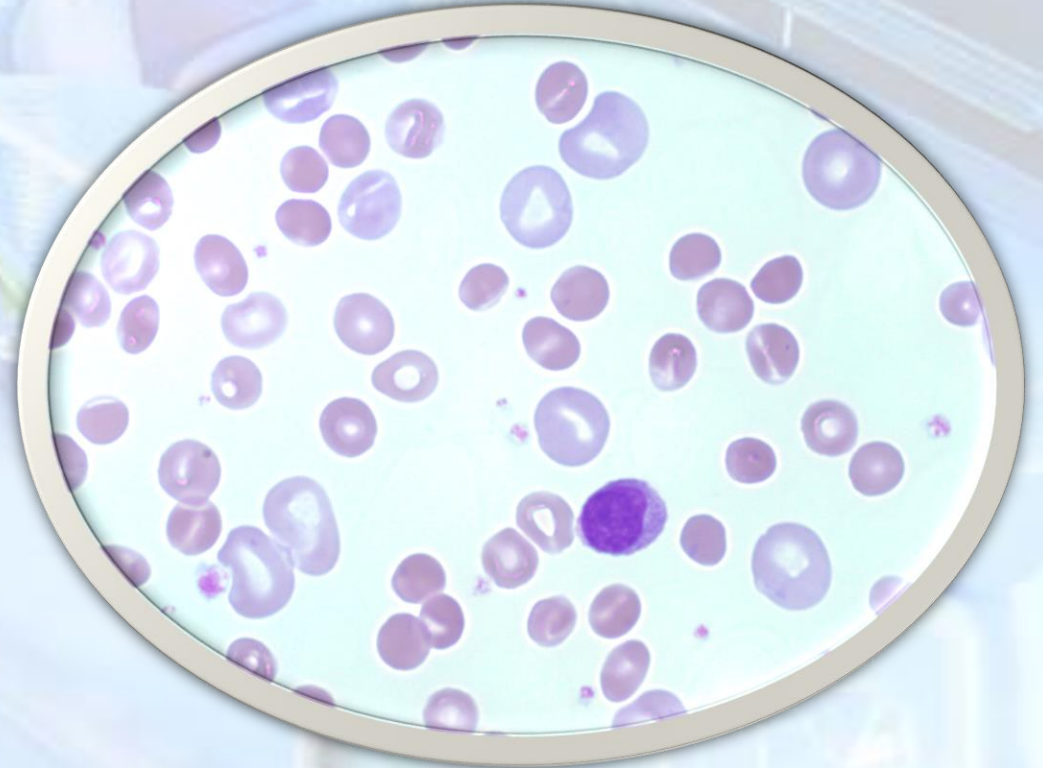
Other blood group incompatibilities

# Non Immune Causes

- G6PD deficiency
- Pyruvate kinase deficiency
- Hexokinase deficiency
- Congenital erythropoietic porphyria
- Other biochemical defects

# Non Immune Causes

- Hereditary spherocytosis
- Hereditary elliptocytosis
- Infantile pyknocytosis
- Other
- Infection
- Sequestration
- Polycythemia





# Disorders Of Hepatic Uptake



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- **Disorders of conjugation**
- Crigler najjar syndrome type 1&2
- Gilbert syndrome
- Transient familial neonatal hyperbilirubinemia (Lucey – driscoll syndrome)
- Pyloric stenosis
- Hypothyroidism

# Disorders Of Enterohepatic Circulation



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Breastfeeding jaundice

Breast milk jaundice

Drugs

# Sequalae of Unconjugated Hyperbilirubinemia

- **Transient encephalopathy or ABE**

Lethargy

Poor feeding

Hypotonia

High pitched cry

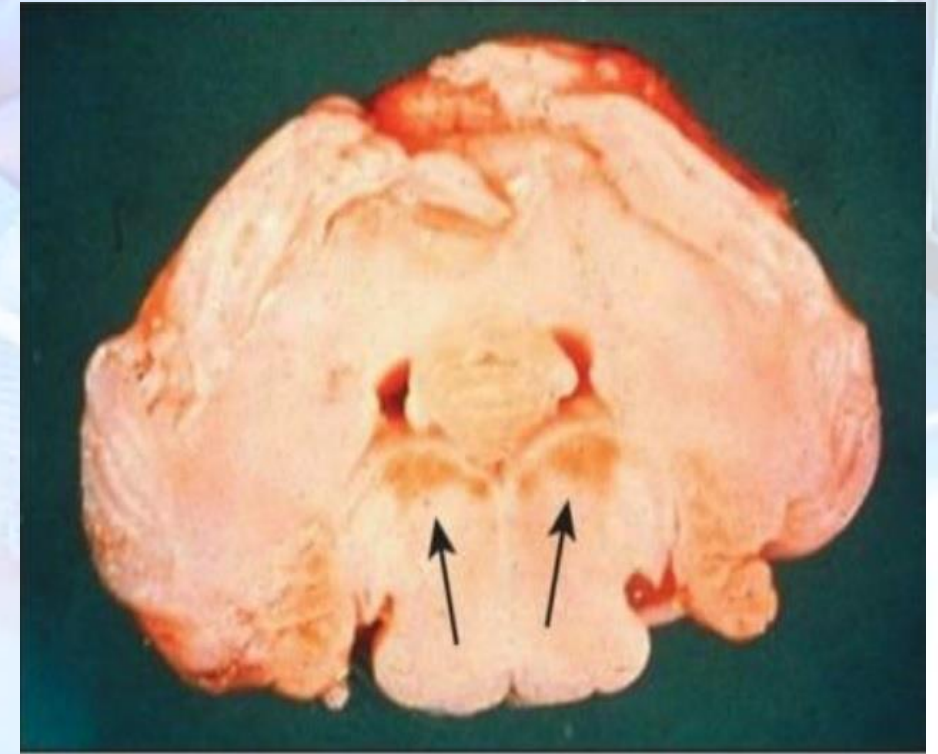
**In severely jaundiced infant**

- **Kernicterus**



# Kernicterus

- Indirect bilirubin is deposited in brain.
- Staining and necrosis of neurons in the basal ganglia , hippocampal cortex , subthalamic nuclei and cerebellum







# Kernicterus

- **Clinical presentation**
- **Phase 1** : poor sucking , hypotonia , depressed sensorium , fever
- **Phase 2** : hypertonia , opisthotonos.
- **Phase 3** : high – pitched cry , hearing and visual abnormalities , poor feeding , athetosis , seizures.



# Kernicterus

- **Sequelae of kernicterus :**
- Choreoathetoid cerebral palsy
- Upward gaze palsy
- Sensorineural hearing loss
- Dental dysplasia

# Visual Estimation Of Jaundice

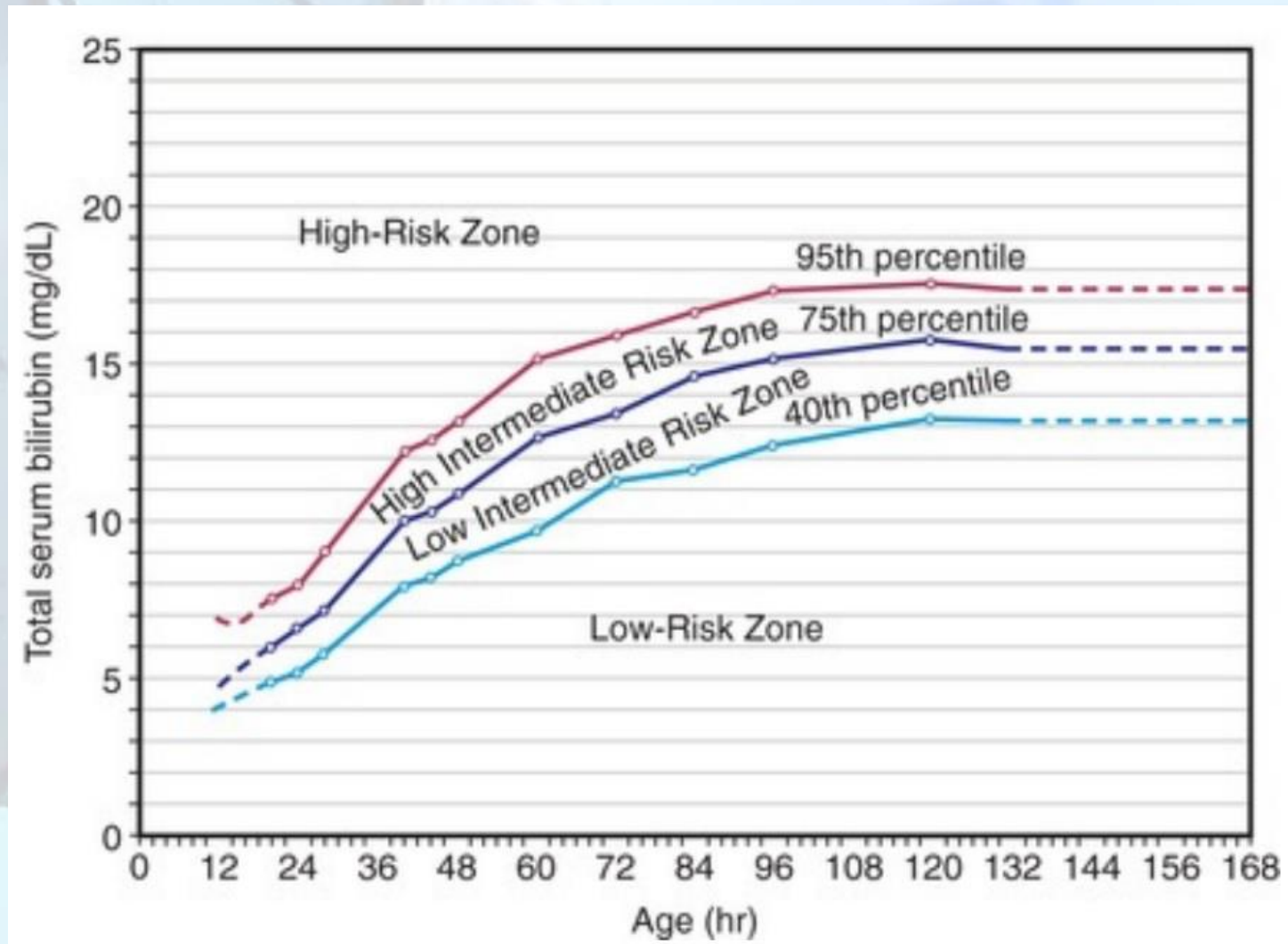
## Kramer's Rule

1. Grade 1 (Face and neck only): 10 mg/dl
2. Grade 2 (Upper trunk up to umbilicus): 15 mg/dl
3. Grade 3 (Lower trunk below umbilicus to knee): 20 mg/dl
4. Grade 4 (Arms and lower legs below knee): 25 mg/dl
5. Grade 5 (Palms and soles): >25 mg/dl





# Assessment Before Discharge





# Risk Factors for Development of Severe Hyperbilirubinemia

## MAJOR RISK FACTORS

- TSB or TcB in the high-risk zone
- Jaundice in the 1st 24 hr
- Blood group incompatibility
- Other hemolytic disease (G6PD deficiency)

# Risk Factors for Development of Severe Hyperbilirubinemia

## MAJOR RISK FACTORS

- Gestational age 35-36 wk
- Previous sibling received phototherapy
- Cephalohematoma or significant bruising
- Exclusive breastfeeding
- East Asian race

# Risk Factors for Development of Severe Hyperbilirubinemia

## MINOR RISK FACTORS

- TSB or TcB level in the high intermediate-risk zone
- Gestational age 37-38 wk
- Jaundice before discharge
- Previous sibling with jaundice
- diabetic mother
- Maternal age  $\geq 25$  yr
- Male gender

# Risk Factors for Development of Severe Hyperbilirubinemia

## DECREASED RISK

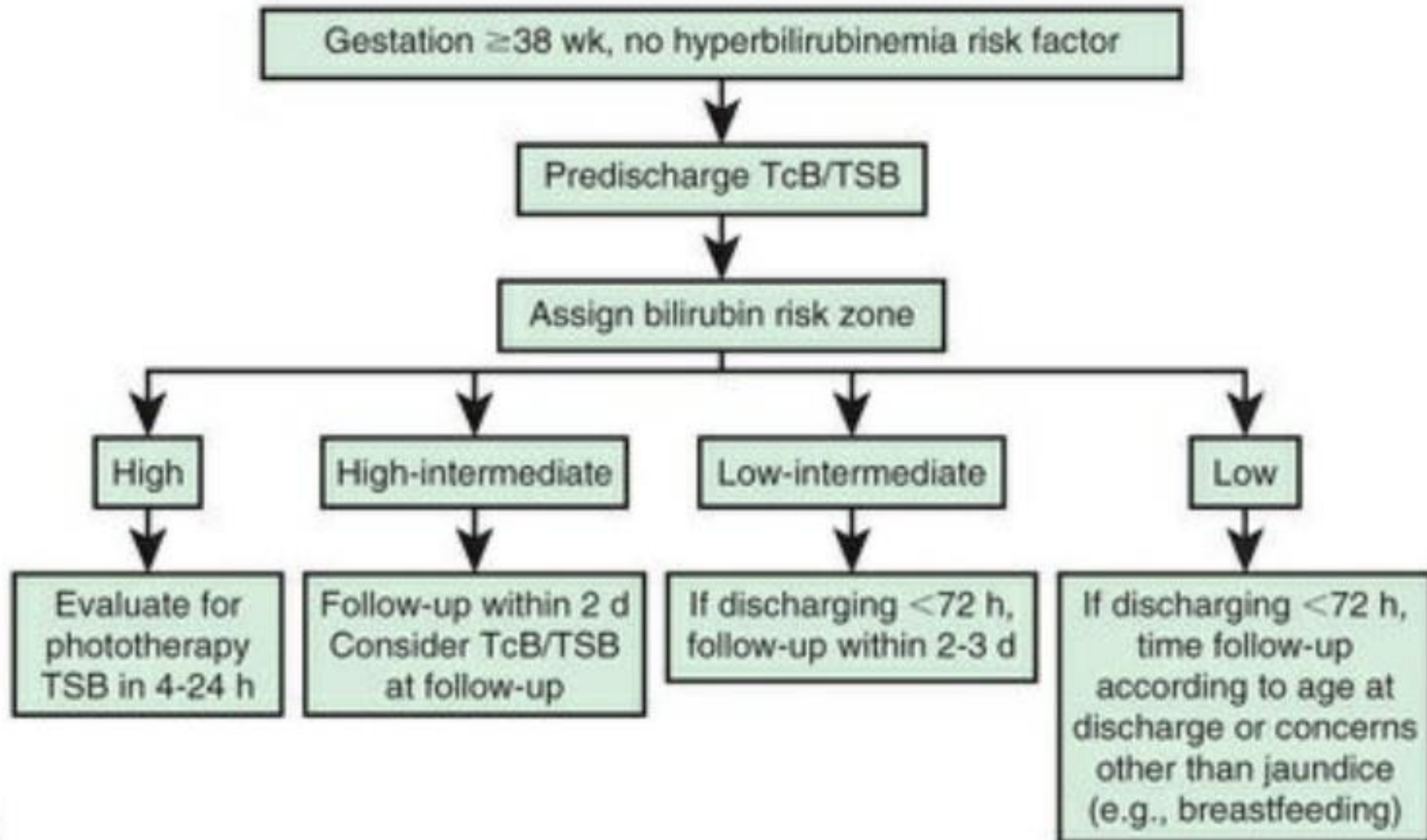
- TSB or TcB level in the low-risk zone
- Gestational age  $\geq 41$  wk
- Exclusive bottle feeding
- Black race
- Discharge from hospital after 72 hr



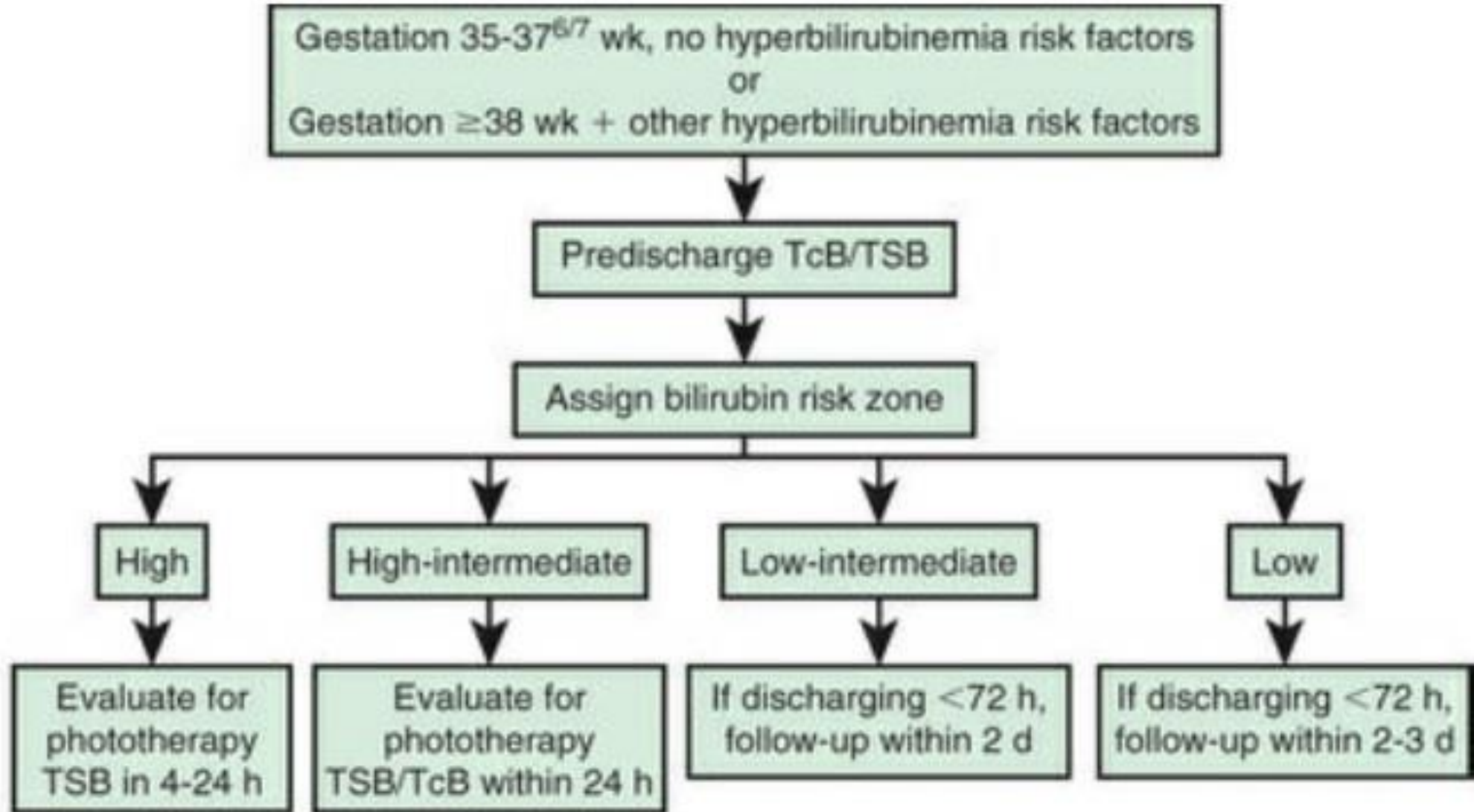
# Assessment Before Discharge



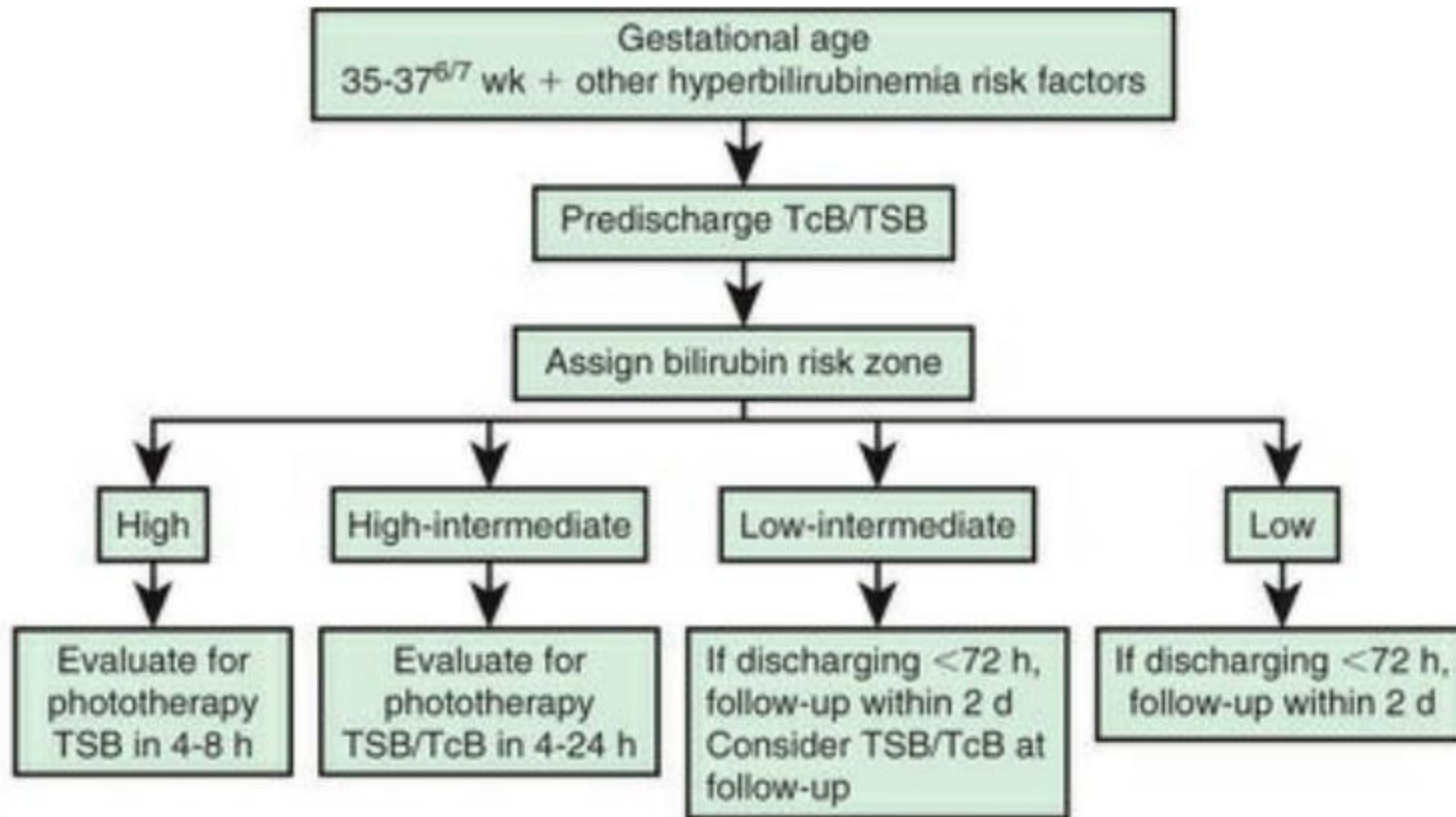
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# Assessment Before Discharge



# Assessment Before Discharge







# Lab Data

- Indirect and direct bilirubin levels
- Blood typing
- Coombs test
- Complete blood count
- Blood smear, reticulocyte count
- Serum albumin
- G6PD
- End ETCO
- Free bilirubin





# Treatment

- Goals

Prevention of kernicterus

Maintenance hydration & nutrition

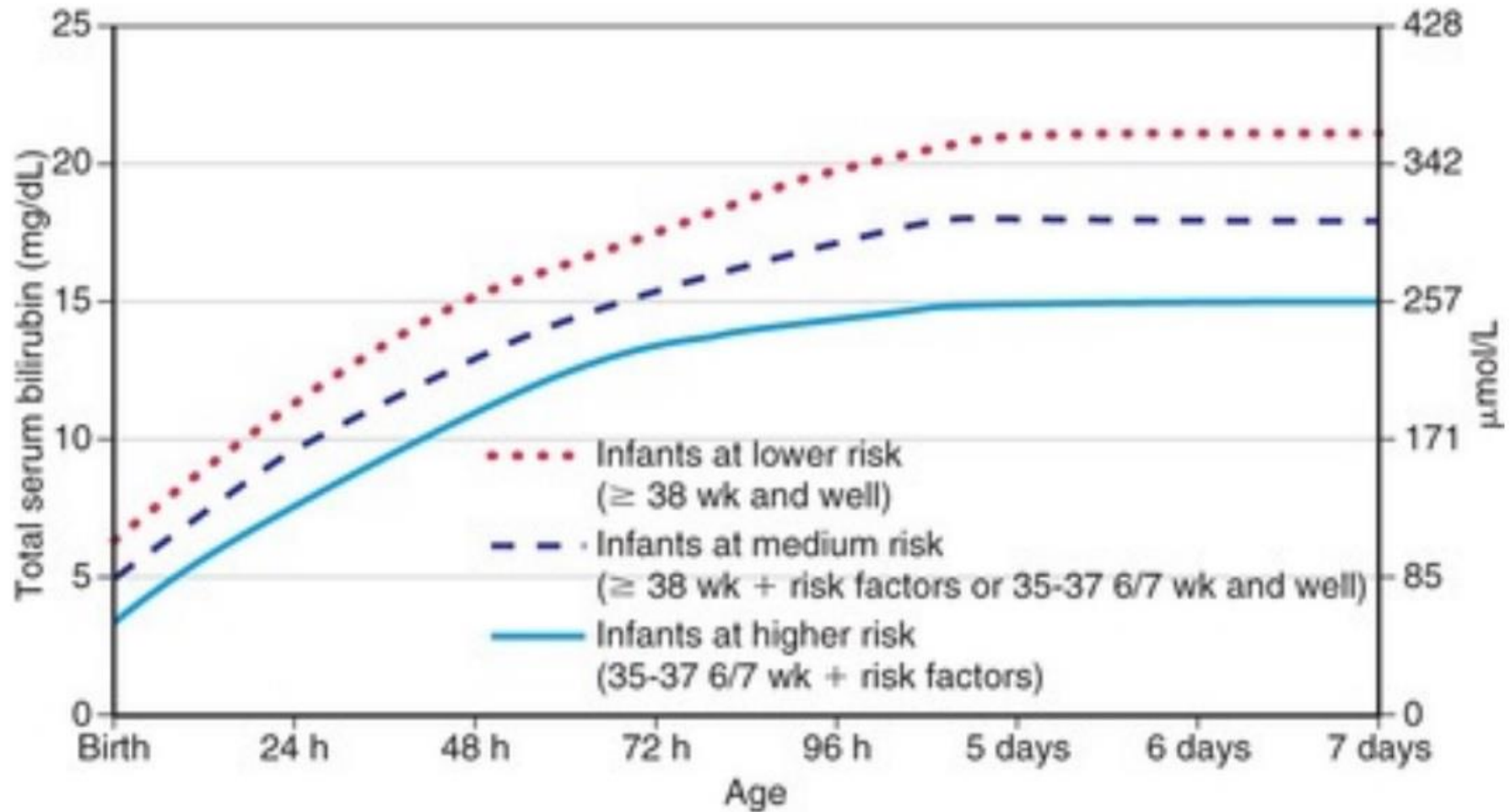
- Interventions

Phototherapy

Pharmacologic

Exchange transfusion

# Phototherapy



# Phototherapy

**TABLE  
91.4**

## **Suggested Guidelines for Initiating Phototherapy or Exchange Transfusion in Premature Infants**

Gestational Age (wk)	Phototherapy TB (mg/dL) [μmol/L]	Exchange Transfusion TB (mg/dL) [μmol/L]
<28 0/7	5-6 [86-103]	11-14 [188-239]
28 0/7-29 6/7	6-8 [103-137]	12-14 [205-239]
30 0/7-31 6/7	8-10 [137-171]	13-16 [222-274]
32 0/7-33 6/7	10-12 [171-205]	15-18 [257-308]
34 0/7-34 6/7	12-14 [205-239]	17-19 [291-325]

TB, Total bilirubin.

Adapted from Maisels MJ, Watchko JF, Bhutani VK, et al. An approach to the management of hyperbilirubinemia in the preterm infant less than 35 weeks' gestation. *J Perinatol*. 2012;32:660-664.



# Phototherapy



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# Home Phototherapy

Advantages

Disadvantages

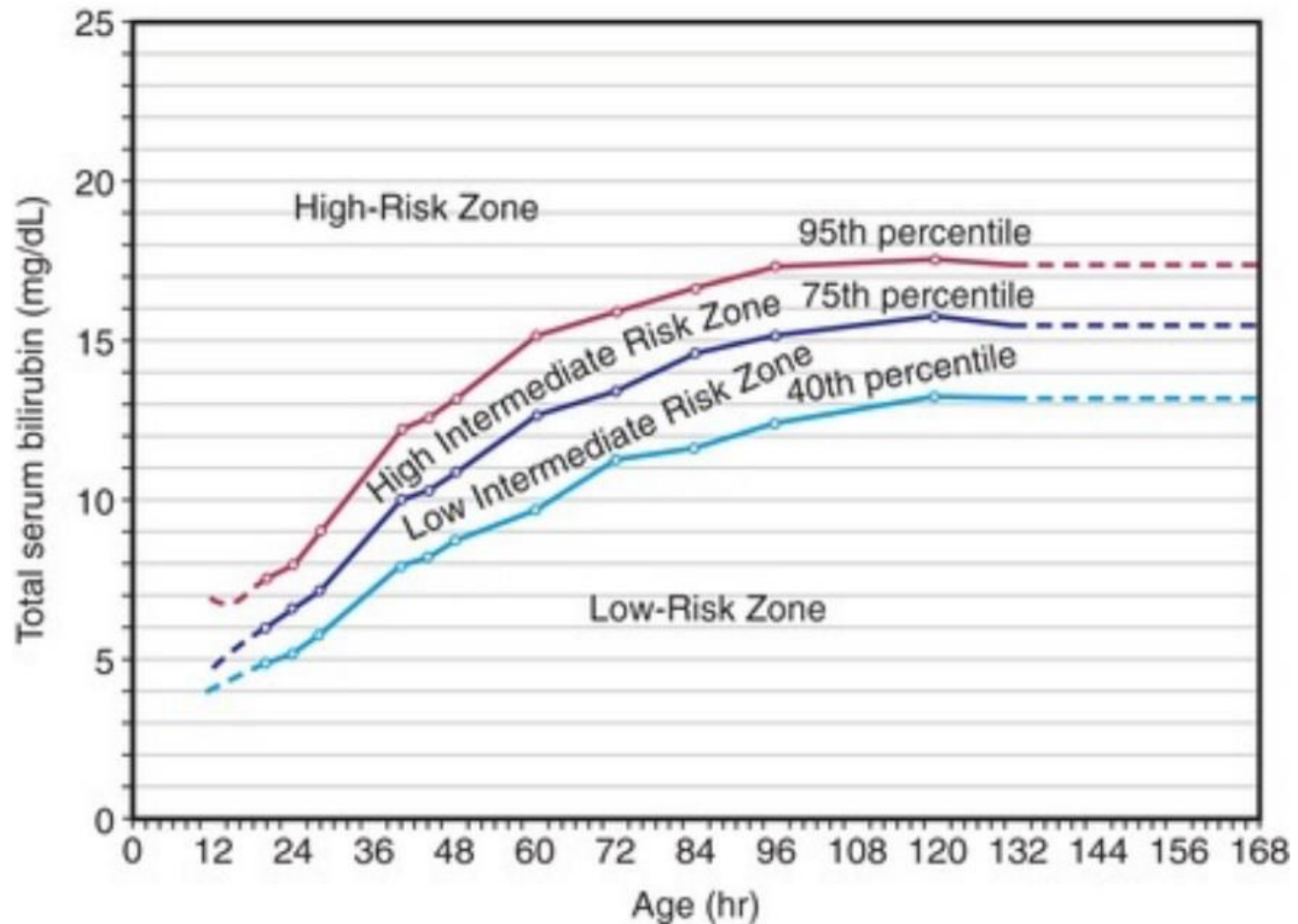
# Complications Phototherapy

- Dehydration
- Increased IWL
- Loose stool
- Irritability, lethargy
- Skin rashes
- Overheating
- Retinal injury
- Skin bronzing in direct hyper bilirubinemia



# Discontinue The Phototherapy

- Term & without R.F. under 75%
- Preterm or with R.F. under 40%



# Phototherapy



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- **Follow Up**
- Under 37 wk.
- With positive DAT test
- Treated in first 72 hr.

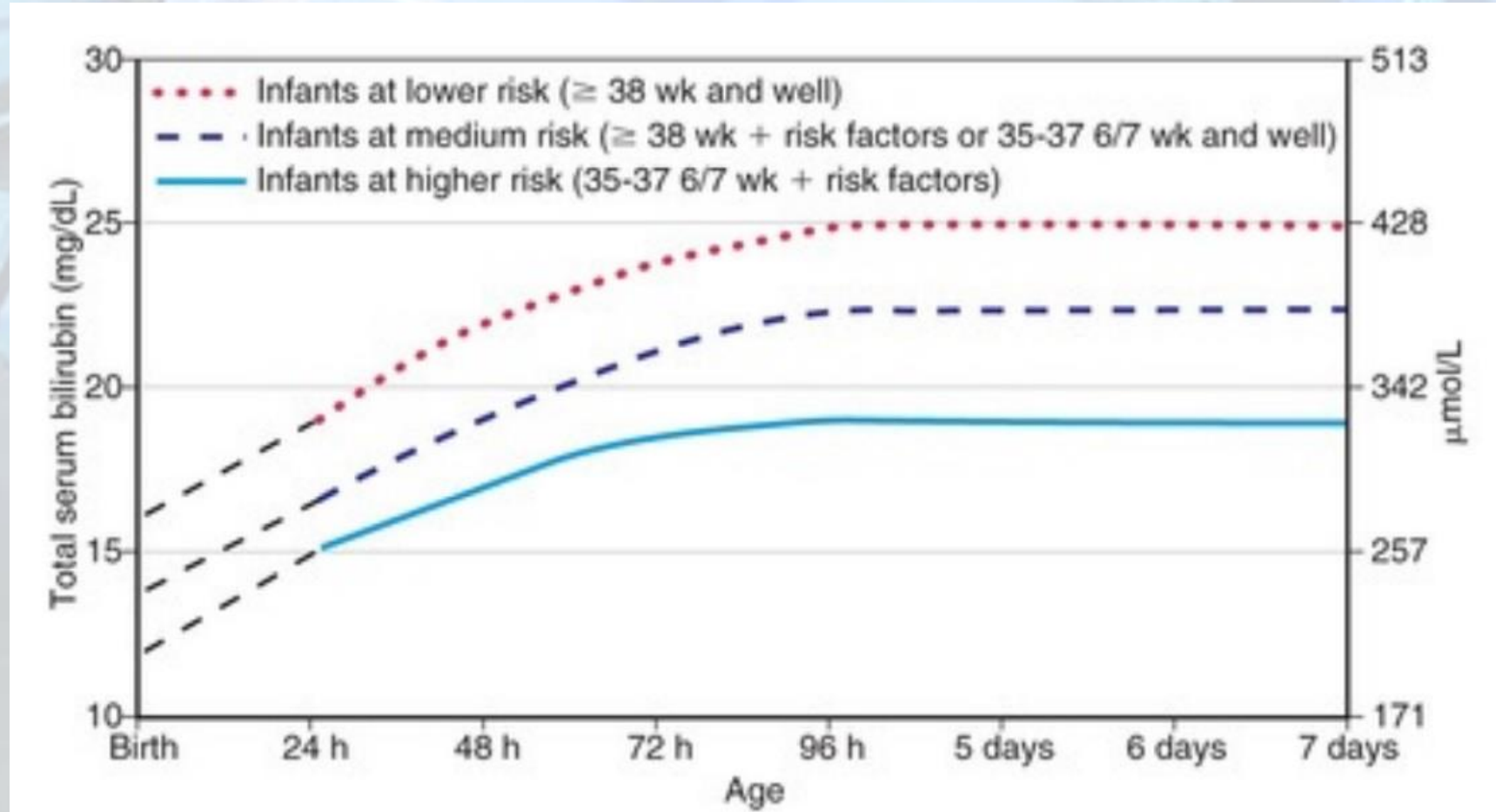


# Pharmacological Therapy

- Phenobarbital
- Metalloporphyrins
- Others
- IVIG



# Exchange Transfusion



# Exchange Transfusion

- The total amount of blood exchanged is  $2 \times 85 \text{ ml/kg}$





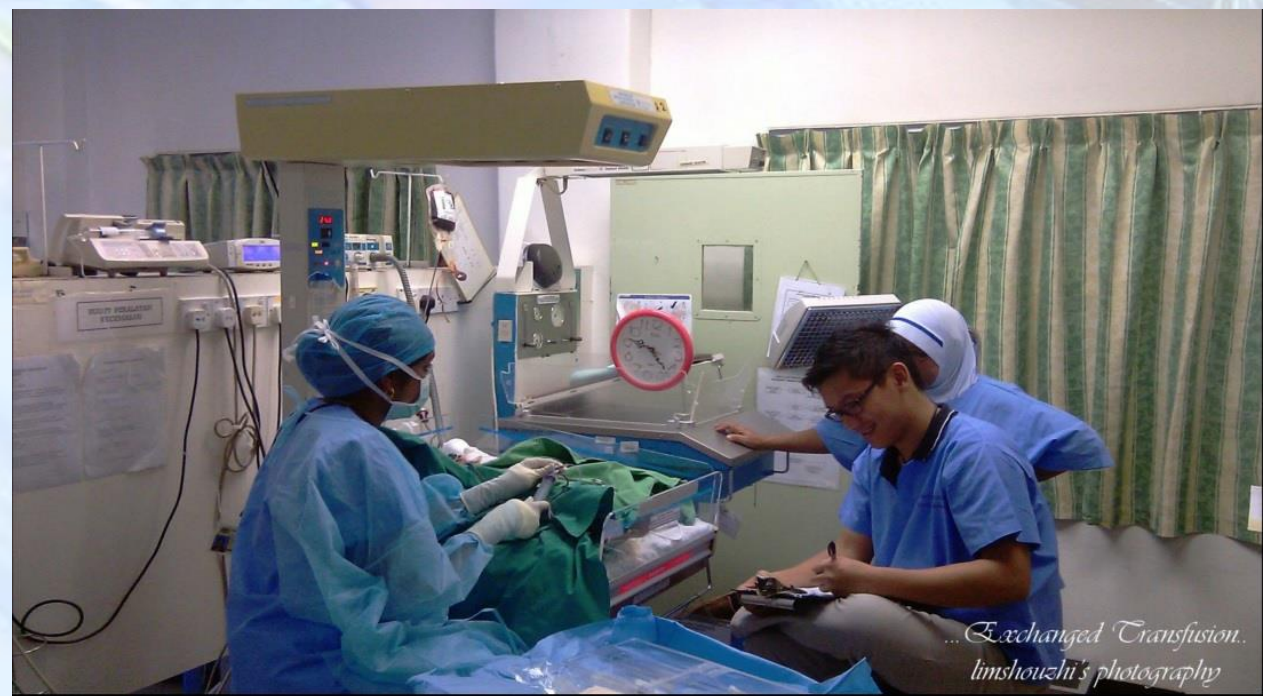
# Complications

- Thrombocytopenia
- Portal vein thrombosis
- Umbilical or portal vein perforation
- NEC
- Arrhythmia – cardiac arrest



# Complications

- Hypocalcemia – hypomagnesemia
- Hyperglycemia – hypoglycemia
- Infection
- Graft versus host disease







**THANK YOU**