

Neonatal Jaundice

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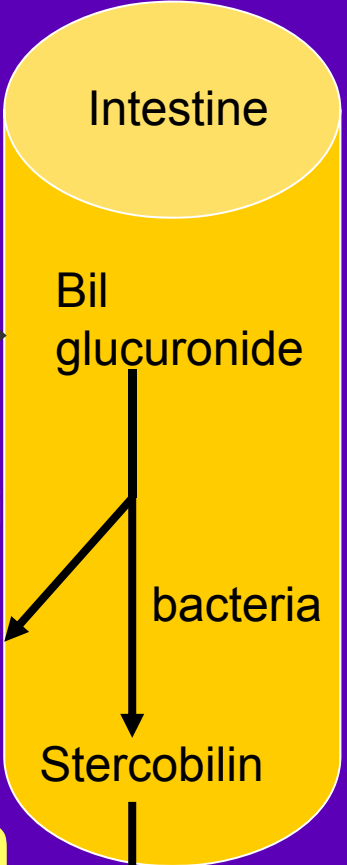
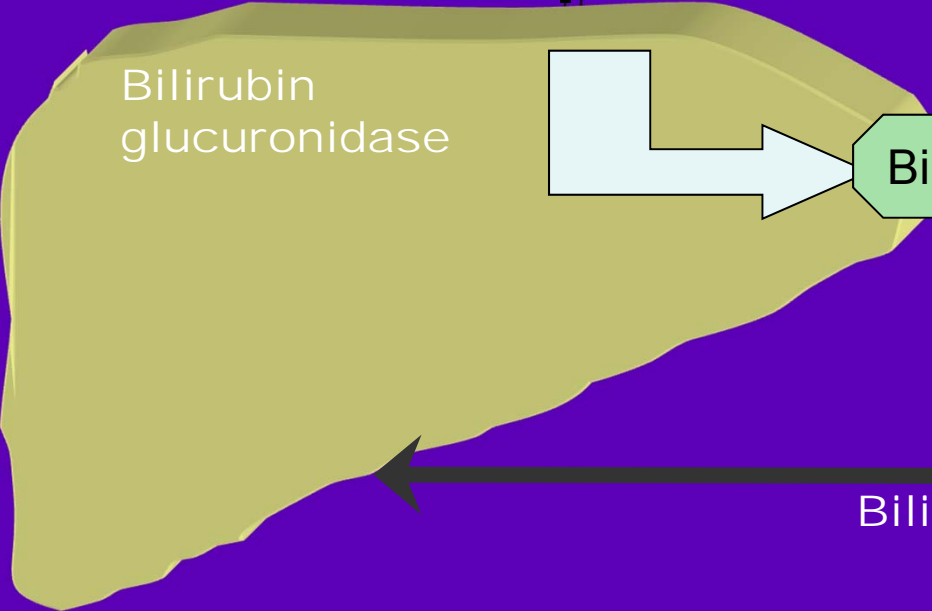
- Visible form of bilirubinemia
 - Adult sclera $>2\text{mg / dl}$
 - Newborn skin $>5\text{ mg / dl}$
- Occurs in 60% of term and 80% of preterm neonates
- However, significant jaundice occurs in 6 % of term babies

Hb → globin + haem
1g Hb = 34mg bilirubin

Non - heme source
1 mg / kg

Bilirubin

Ligandin
(Y - acceptor)



β glucuronidase

Bilirubin

Bilirubin metabolism

Clinical assessment of jaundice

Area of body	Bilirubin levels mg/dl
Face	4-8
Upper trunk	5-12
Lower trunk & thighs	8-16
Arms and lower legs	11-18
Palms & soles	> 15

Physiological jaundice

Characteristics

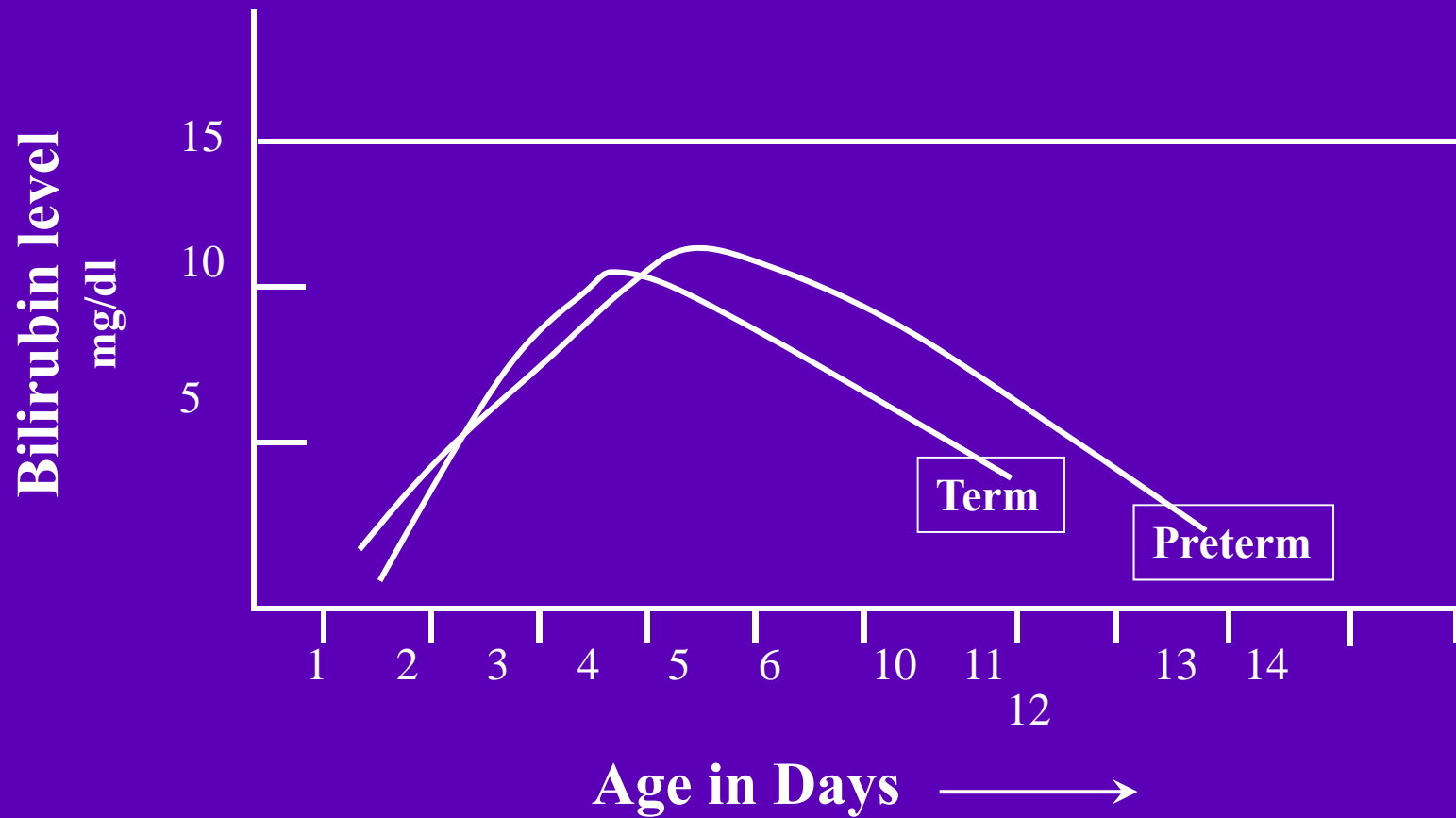
- Appears after 24 hours
- Maximum intensity by 4th-5th day in term & 7th day in preterm
- Serum level less than 15 mg / dl
- Clinically not detectable after 14 days
- Disappears without any treatment

Note: Baby should, however, be watched for worsening jaundice

Why does physiological jaundice develop?

- Increased bilirubin load
- Defective uptake from plasma
- Defective conjugation
- Decreased excretion
- Increased entero-hepatic circulation

Course of physiological jaundice



Pathological jaundice

- Appears within 24 hours of age
- Increase of bilirubin > 5 mg / dl / day
- Serum bilirubin > 15 mg / dl
- Jaundice persisting after 14 days
- Stool clay / white colored and urine staining clothes yellow
- Direct bilirubin > 2 mg / dl

Causes of jaundice

Appearing within 24 hours of age

- Hemolytic disease of NB : Rh, ABO
- Infections: TORCH, malaria, bacterial
- G6PD deficiency

Appearing between 24-72 hours of life

- Physiological
- Sepsis
- Polycythemia
- Concealed hemorrhage
- Intraventricular hemorrhage
- Increased entero-hepatic circulation

Causes of jaundice

After 72 hours of age

- Sepsis
- Cephalhaematoma
- Neonatal hepatitis
- Extra-hepatic biliary atresia
- Breast milk jaundice
- Metabolic disorders

Risk factors for jaundice

JAUNDICE

- J - jaundice within first 24 hrs of life
- A - a sibling who was jaundiced as neonate
- U - unrecognized hemolysis
- N – non-optimal sucking/nursing
- D - deficiency of G6PD
- I - infection
- C – cephalhematoma /bruising
- E - East Asian/North Indian

Common causes in India

- Exaggerated physiological
- Blood group incompatibility – ABO, Rh
- G₆PD deficiency
- Bruising and cephalhaematoma
- Intrauterine and postnatal infections
- Breast milk jaundice

Approach to jaundiced baby

- Ascertain birth weight, gestation and postnatal age
- Ask when jaundice was first noticed
- Assess clinical condition (well or ill)
- Decide whether jaundice is physiological or pathological
- Look for evidence of kernicterus* in deeply jaundiced NB

**Lethargy and poor feeding, poor or absent Moro's, opisthotonus or convulsions*

Workup

- Maternal & perinatal history
- Physical examination
- Laboratory tests (must in all)*
 - Total & direct bilirubin*
 - Blood group and Rh for mother and baby*
 - Hematocrit, retic count and peripheral smear*
 - Sepsis screen
 - Liver and thyroid function
 - TORCH titers, liver scan when conjugated hyperbilirubinemia

Management

- Rationale: reduce level of serum bilirubin and prevent bilirubin toxicity
- Prevention of hyperbilirubinemia: early feeds, adequate hydration
- Reduction of bilirubin levels: phototherapy, exchange transfusion, drugs

Phototherapy equipment

- White light tubes 6-8*/ 4 blue light tubes
- Cradle or incubator
- Eye shades

*May use 150 W halogen bulb

Babies under phototherapy



Baby under conventional phototherapy



Baby under triple unit intense phototherapy

Phototherapy

Technique

- Perform hand wash
- Place baby naked in cradle or incubator
- Fix eye shades
- Keep baby at least 45 cm from lights, if using closer monitor temperature of baby
- Start phototherapy

Phototherapy

- Frequent extra breast feeding every 2 hourly
- Turn baby after each feed
- Temperature record 2 to 4 hourly
- Weight record- daily
- Monitor urine frequency
- Monitor bilirubin level

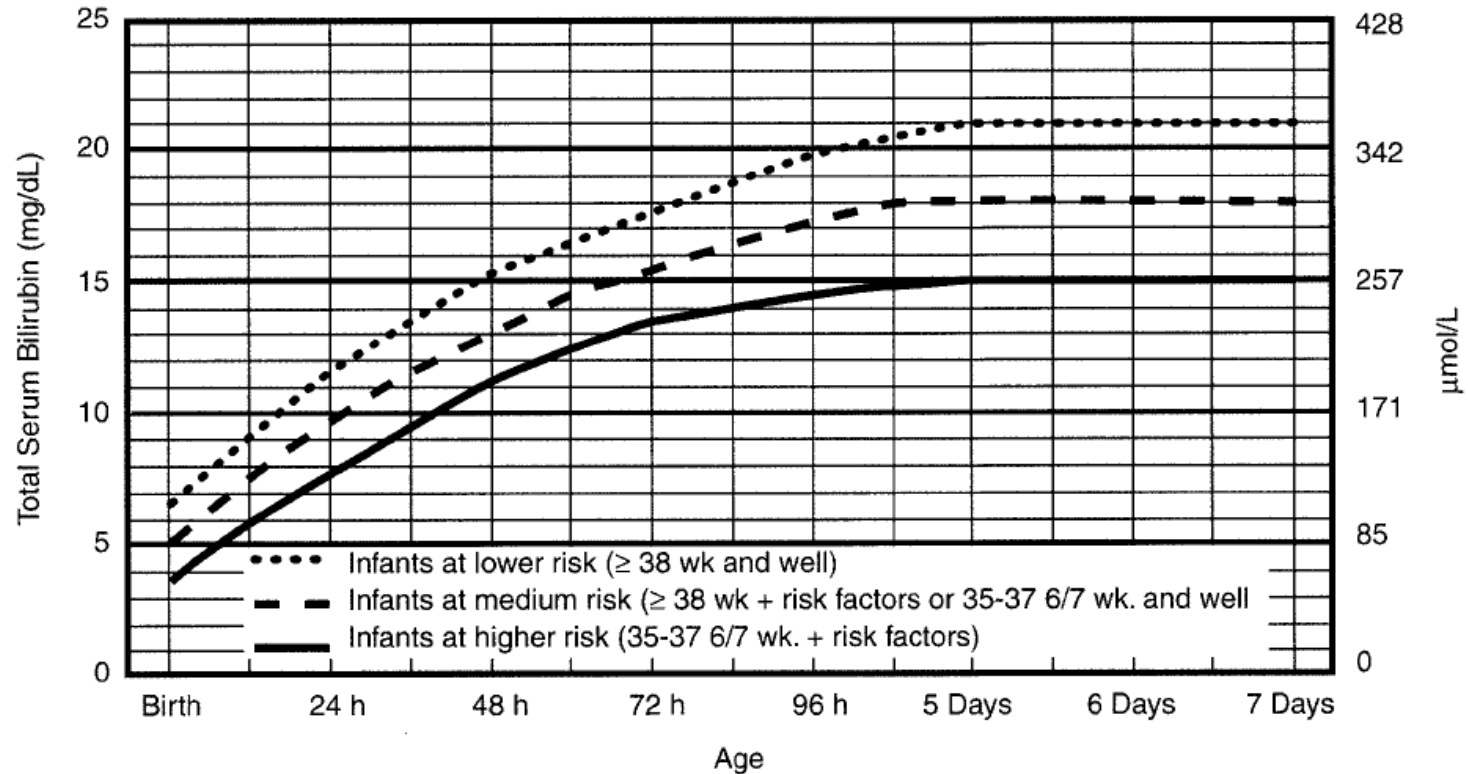
Side effects of phototherapy

- Increased insensible water loss
- Loose stools
- Skin rash
- Bronze baby syndrome
- Hyperthermia
- Upsets maternal baby interaction
- May result in hypocalcemia

Choice of blood for exchange blood transfusion

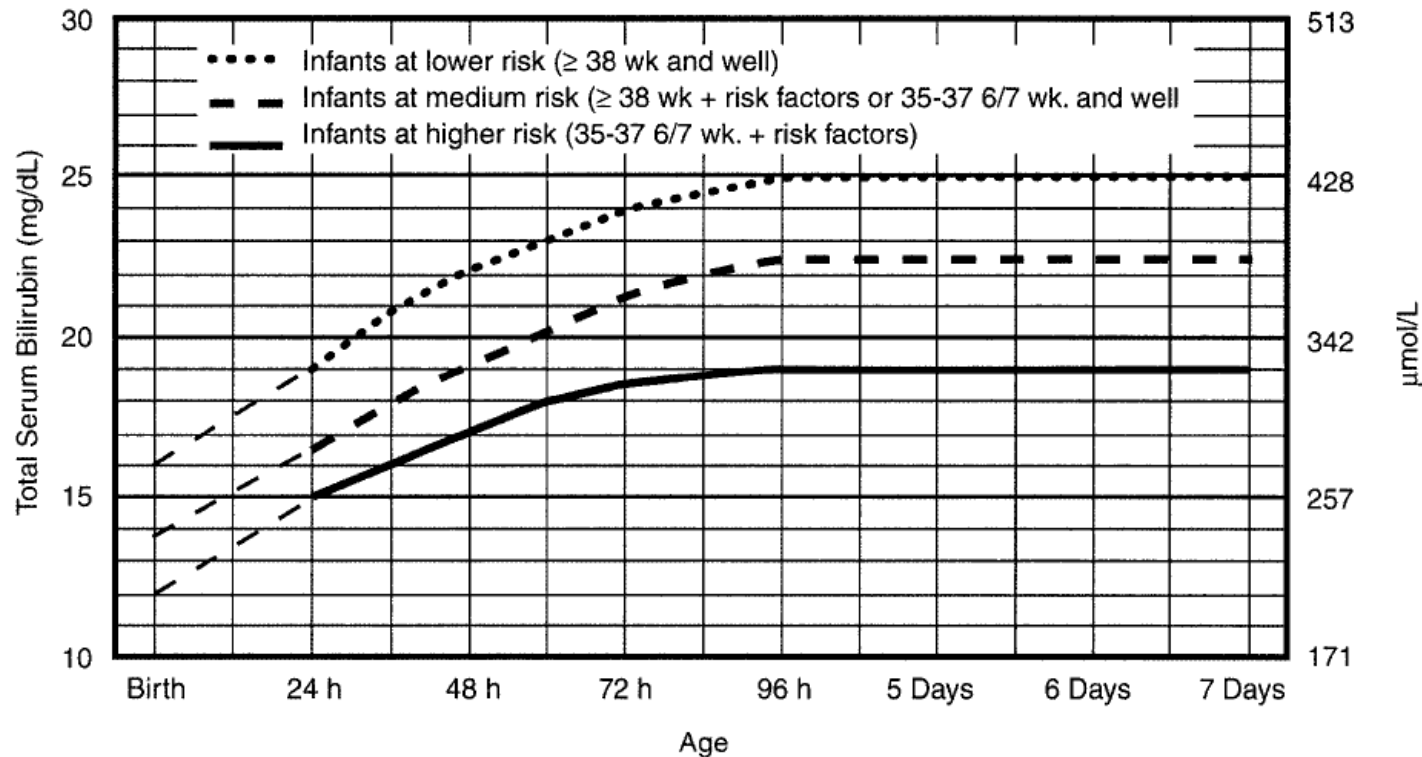
- ABO incompatibility
 - Use O blood of same Rh type, ideal O cells suspended in AB plasma
- Rh isoimmunization
 - Emergency 0 -ve blood
Ideal 0 -ve suspended in AB plasma or baby's blood group but Rh -ve
- Other situations
 - Baby's blood group

Phototherapy



- Use total bilirubin. Do not subtract direct reacting or conjugated bilirubin.
- Risk factors = isoimmune hemolytic disease, G6PD deficiency, asphyxia, significant lethargy, temperature instability, sepsis, acidosis, or albumin $< 3.0\text{g/dL}$ (if measured)
- For well infants 35-37 6/7 wk can adjust TSB levels for intervention around the medium risk line. It is an option to intervene at lower TSB levels for infants closer to 35 wks and at higher TSB levels for those closer to 37 6/7 wk.
- It is an option to provide conventional phototherapy in hospital or at home at TSB levels 2-3 mg/dL (35-50mmol/L) below those shown but home phototherapy should not be used in any infant with risk factors.

Exchange Transfusion



- The dashed lines for the first 24 hours indicate uncertainty due to a wide range of clinical circumstances and a range of responses to phototherapy.
- Immediate exchange transfusion is recommended if infant shows signs of acute bilirubin encephalopathy (hypertonia, arching, retrocollis, opisthotonos, fever, high pitched cry) or if TSB is ≥ 5 mg/dL ($85 \mu\text{mol/L}$) above these lines.
- Risk factors - isoimmune hemolytic disease, G6PD deficiency, asphyxia, significant lethargy, temperature instability, sepsis, acidosis.
- Measure serum albumin and calculate B/A ratio (See legend)
- Use total bilirubin. Do not subtract direct reacting or conjugated bilirubin
- If infant is well and 35-37 6/7 wk (median risk) can individualize TSB levels for exchange based on actual gestational age.

Prolonged indirect jaundice

Causes

- Crigler Najjar syndrome
- Breast milk jaundice
- Hypothyroidism
- Pyloric stenosis
- Ongoing hemolysis, malaria

Conjugated hyperbilirubinemia

Suspect

- High colored urine
- White or clay colored stool

Caution

- ☞ Always refer to hospital for investigations so that biliary atresia or metabolic disorders can be diagnosed and managed early

Conjugated hyperbilirubinemia

Causes

- Idiopathic neonatal hepatitis
- Infections -Hepatitis B, TORCH, sepsis
- Biliary atresia, choledochal cyst
- Metabolic -Galactosemia, tyrosinemia, hypothyroidism
- Total parenteral nutrition