

**С.Ж. АСФЕНДИЯРОВ АТЫНДАҒЫ
ҚАЗАҚ ҰЛТТЫҚ МЕДИЦИНА
УНИВЕРСИТЕТІ**



**КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ
МЕДИЦИНСКИЙ
УНИВЕРСИТЕТ ИМЕНИ С.Д.
АСФЕНДИЯРОВА**

Кафедра : Неонатология

Algorithm of differential diagnosis of Neonatal Jaundice

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Neonatal Jaundice

Healthy baby



Baby with severe jaundice



Neonatal Jaundice

- 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

What is the Neonatal Jaundice?

- Neonatal Jaundice(also called Newborn jaundice) is a condition marked by high levels of bilirubin in the blood.

The increased bilirubin cause the infant's skin and whites of the eyes(sclera) to look yellow.

Causes of Jaundice according to time of appearance

1. Appearing at birth or within 24 hours of age
 - Hemolytic disease of newborn
 - Infections: intrauterine virus, bacterial, malaria
 - G-6PD deficiency

2. Appearing between 24-72 hours of life

- Physiological
- Sepsis neonatorum
- Polycythemia
- Concealed hemorrhages: cephalhematoma, subarachnoid bleed, IVN.

3. Appearing after 72 hrs and within 1st week

- Sepsis
- Syphilis
- Toxoplasmosis

4. Jaundice appearing after 1 week

- Neonatal hepatitis (common)
- Breast Milk jaundice
- Extrahepatic biliary atresia
- Metabolic disorders

Special characteristic in neonates

1) More bilirubin produced

- Much more hemolysis
- The life-length of hemolysis (70-80)

2) The low capability of albumin on unconjugated bilirubin transportation

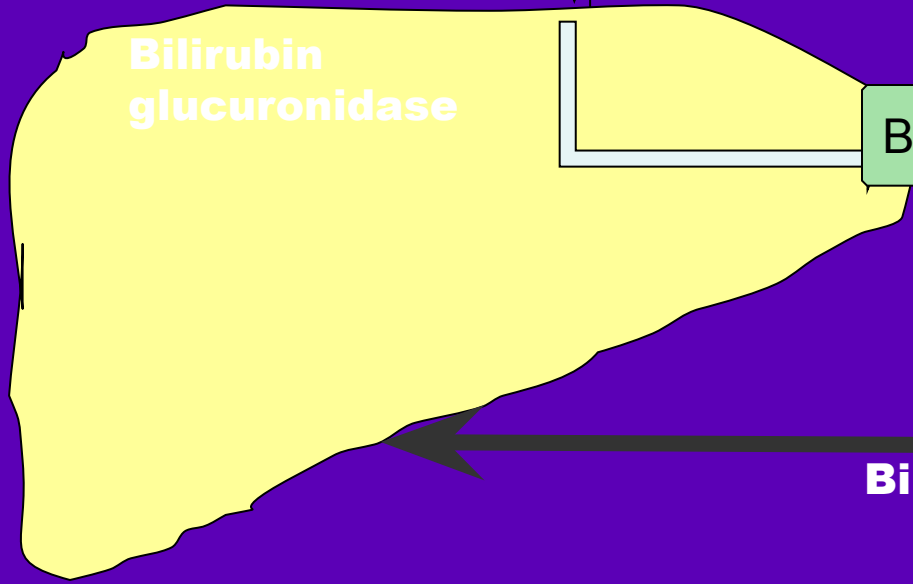
- Acid intoxication
- Less albumin in neonates

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

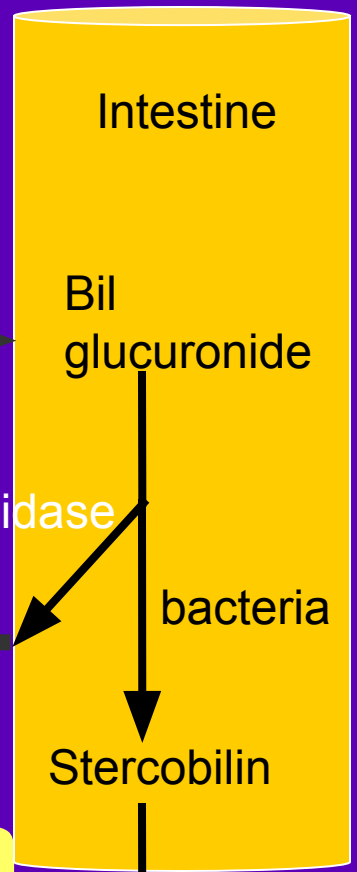
Non - heme source
1 mg / kg

Bilirubin

Ligandin
(Y - acceptor)



Bil glucuronide



β glucuronidase

bacteria

Stercobilin

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

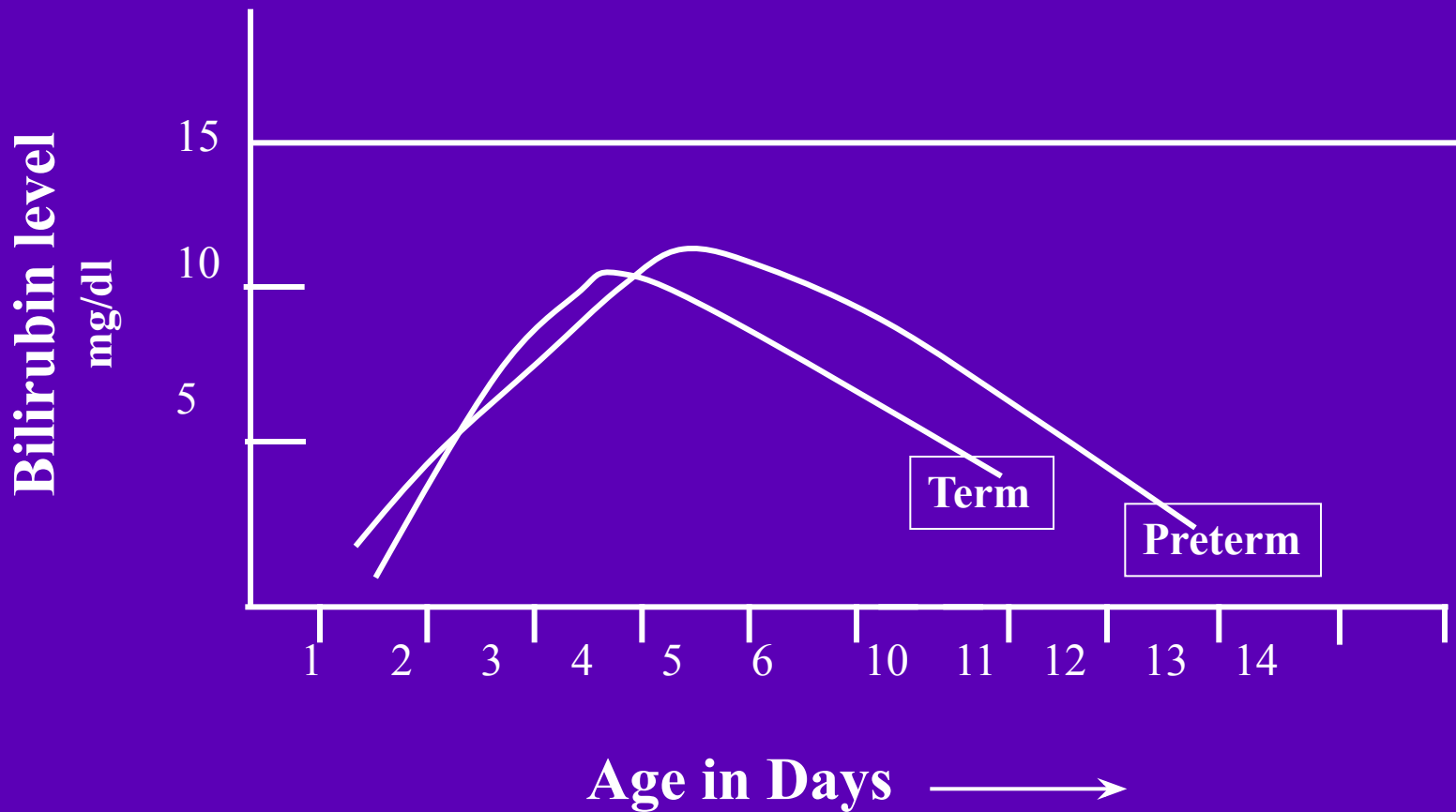
- Appears after 24 hours
- Maximum intensity by 4th-5th day in term & 7th day in preterm
- Serum level less than 15 mg / dl
- Clinically not detectable after 14 days
- Disappears without any treatment

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

The general symptoms of Neonatal Jaundice

- Yellow skin
- Yellow eyes(sclera)
- Sleepiness
- Poor feeding in infants
- Brown urine
- Fever
- High-pitch cry
- vomiting

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

- Physiological
- Blood group incompatibility
- G₆PD deficiency
- Bruising and cephalhaematoma
- Intrauterine and postnatal infections
- Breast milk jaundice

Approach to jaundiced baby

- Ascertain birth weight, gestation and postnatal age
- 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*

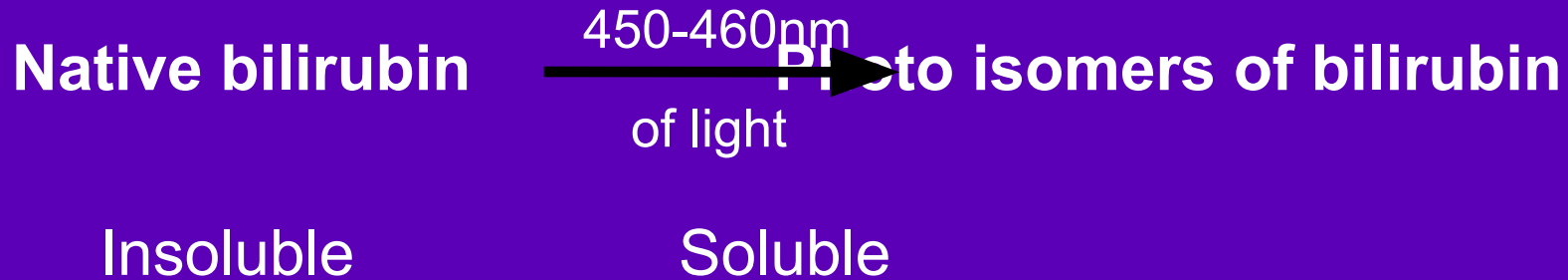
Workup

- 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

Principle of phototherapy

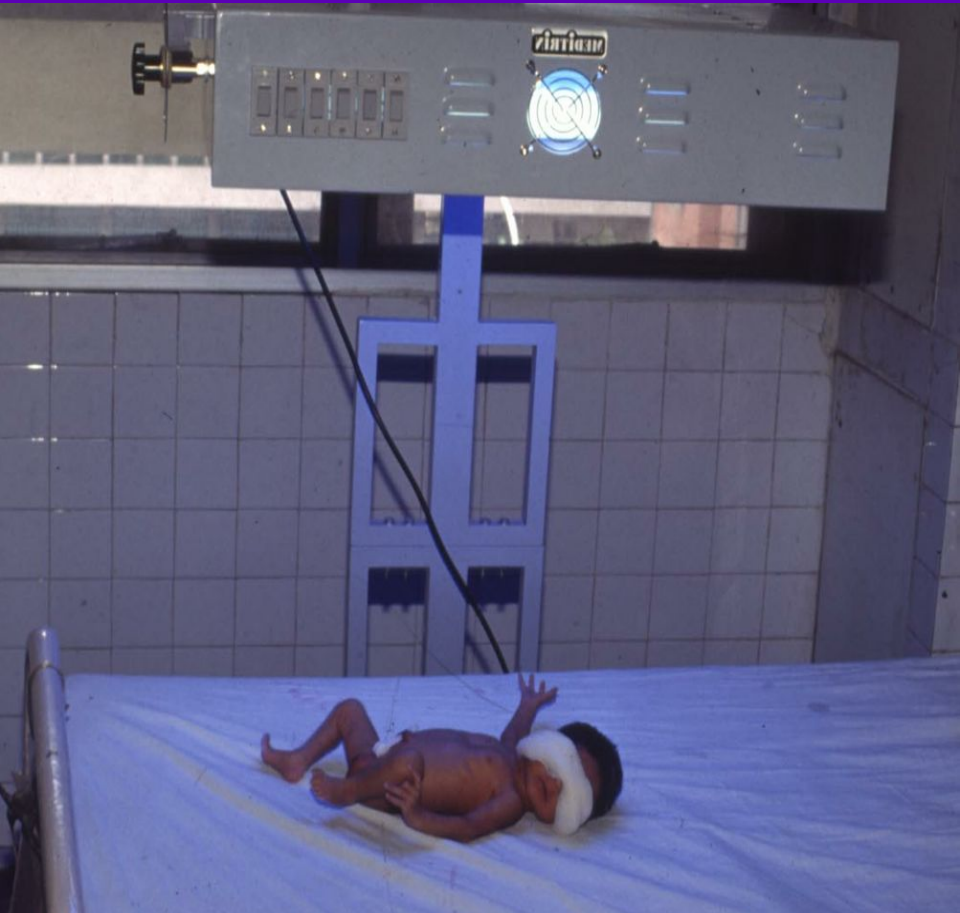


Phototherapy equipment

- 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

Differential Diagnoses

- Breast Milk Jaundice
- Cholestatis
- Dubin-Johnson Syndrome
- GalactoseMIA
- Hemolytic Disease of Newborn
- Hepatits B
- Pediatric Biliary Atresia
- Pediatric Cytomegalovirus Infection
- Pediatric Duodenal Atresia
- Pediatric Hypothyroidism

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 O -ve blood
Ideal O -ve suspended in AB plasma or baby's blood group but Rh -ve
- Other situations
 - Baby's blood group

Maisel's chart

Sr Bilirubin (mg/dl)	Birth weight	Age in hrs			
		< 24	24 – 48	49 – 72	>72
<5	All				
5-9	All	Phototherapy if hemolysis			
10-14	< 2500g	Phototherapy if hemolysis	PHOTOTHERAPY		
	> 2500g			Investigate if bilirubin > 12mg%	
15-19	< 2500g	EXCHANGE		Consider Exchange	
	> 2500g			Phototherapy	
≥ 20	All	EXCHANGE			

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

Literatures

1. Guidelines for detection, management and prevention of hyperbilirubinemia in term and late preterm newborn infants.
2. John P. Cloherty, Eric C. Eichenwald, Ann R, Stark. Manual of neonatal care. 2008, 278