# Neonatal Jaundice: Physiological and Pathological Jaundice

Neonatal jaundice refers to the yellow discoloration of a newborn's skin and sclera due to elevated levels of **bilirubin** in the blood (hyperbilirubinemia). Bilirubin is a yellowish pigment produced from the breakdown of red blood cells.

- Clinical jaundice manifests in neonates when bilirubin > 85 μmol/L (5 mg/dL).
- In adults, visible jaundice appears at lower bilirubin levels (~34 µmol/L or 2 mg/dL).

### Pathophysiology & Basic Concepts

• Hemoglobin Breakdown:

Red blood cells (RBCs) contain hemoglobin (Hb), which carries oxygen. When RBCs age (~120 days lifespan), they are removed by the reticuloendothelial system (liver and spleen). Hb breaks down into:

- Globin (reused by the body as protein)
- **Heme** (iron compound broken down into bilirubin)
- **Bilirubin** is produced from heme and normally processed by the liver to be excreted. Accumulation causes yellow staining (jaundice).
- Newborns have high Hb (18-19 g/dL) to meet fetal oxygen needs. After birth, Hb drops to ~11 g/dL in the first week, causing increased RBC breakdown and bilirubin production, often exceeding the newborn liver's processing capacity leading to physiological jaundice.

# **Types of Neonatal Jaundice**

- 1. Physiological Jaundice
  - Occurs typically after the first 24 hours of life.
  - Peaks by day 3-5 and resolves by day 10.
  - Due to immature liver enzymes and high RBC turnover.
  - Commonly seen in normal newborns; usually harmless.
  - Risk factors: prematurity, bruising, polycythemia, breastfeeding.
- 2. Pathological Jaundice
  - Appears within the first 24 hours or persists beyond 2 weeks.
  - Caused by factors disrupting bilirubin metabolism or causing excessive RBC destruction.
  - May cause muddy or generalized jaundice.
  - Causes include:
    - Hemolytic diseases (Rhesus or ABO incompatibility)
    - Hypoxemia
    - Sepsis
    - Endocrine/metabolic disorders
    - · Bile duct obstruction
    - Hypoglycemia

# **Clinical Significance and Risks**

- **Bilirubin toxicity**: High unconjugated bilirubin crosses the blood-brain barrier? deposits in brain nuclei (basal ganglia, hippocampus, etc.) causing **kernicterus** (permanent brain damage).
- High serum bilirubin is an emergency to prevent neurological injury.

# **Diagnosis and Investigations**

- Serum Bilirubin (SBR) measurement is key.
- · Assess mother's and baby's blood group and Rh factor.
- Coombs test to detect immune hemolysis.
- Check Hb for anemia and signs of hemolysis.
- Screen for infection if suspected.

### Indications to investigate further:

- Jaundice within 24 hours of life.
- Jaundice persisting beyond 10 days.
- SBR above treatment thresholds (e.g., >250 µmol/L in term infants).
- Jaundice in a sick newborn.

### **Management**

#### Goals:

- Prevent bilirubin encephalopathy.
- Treat underlying cause.
- · Maintain hydration and nutrition.

#### **Phototherapy**

- Converts unconjugated bilirubin into water-soluble forms (biliverdin) that can be excreted.
- Uses blue light wavelength (400-500 nm).
- Indicated for:
  - Jaundice in first 24 hours
  - Deep jaundice (palms and soles)
  - · Premature infants with jaundice
  - Hemolytic jaundice

#### Adverse effects:

- Dehydration and increased water loss
- Loose stools
- Irritability or lethargy
- Skin rash
- Overheating
- Retinal injury (protect eyes)
- Tanning/bronze baby syndrome

#### Medcrine

www.medcrine.com

Potential nutritional deficiencies (vitamins, calcium)

### **Exchange Transfusion**

- Considered if phototherapy fails or bilirubin rises rapidly.
- · Removes bilirubin and antibody-coated RBCs.
- Thresholds vary but often around 400-430 µmol/L bilirubin.

# **Adjunctive Treatments**

- Phenobarbital: Accelerates bilirubin clearance.
- Tin-mesoporphyrin: Inhibits heme oxygenase enzyme (bilirubin production).
- IV immunoglobulin (IVIG): Reduces hemolysis in immune-mediated jaundice.
- Activated charcoal: Binds bilirubin in the gut (experimental).

# **Nursing and Supportive Care**

- Ensure adequate feeding and hydration.
- Monitor bilirubin levels regularly during treatment.
- Educate parents on signs of worsening jaundice.
- Protect baby's eyes during phototherapy.
- Monitor for adverse effects of treatment.

# **Summary**

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Onset	After 24 hours	Within 24 hours or prolonged
		jaundice
Duration	Resolves by day 10	>2 weeks, may be persistent
Cause	Immature liver, high RBC	Hemolysis, infection, metabolic
	turnover	disorders
Severity	Mild	Often severe, may cause
		kernicterus
Treatment	Usually none or phototherapy	Phototherapy, exchange
		transfusion, treat cause

Pathological Jaundice

Physiological Jaundice