

NEONATAL HYPERBILIRUBINEMIA

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Normal values

- Normal adult bilirubin level: < 1 mg/dl.
- Adults appear jaundiced when serum bilirubin level is > 2 mg/dl.
- Newborn appear jaundiced when serum bilirubin is > 7 mg/dl.

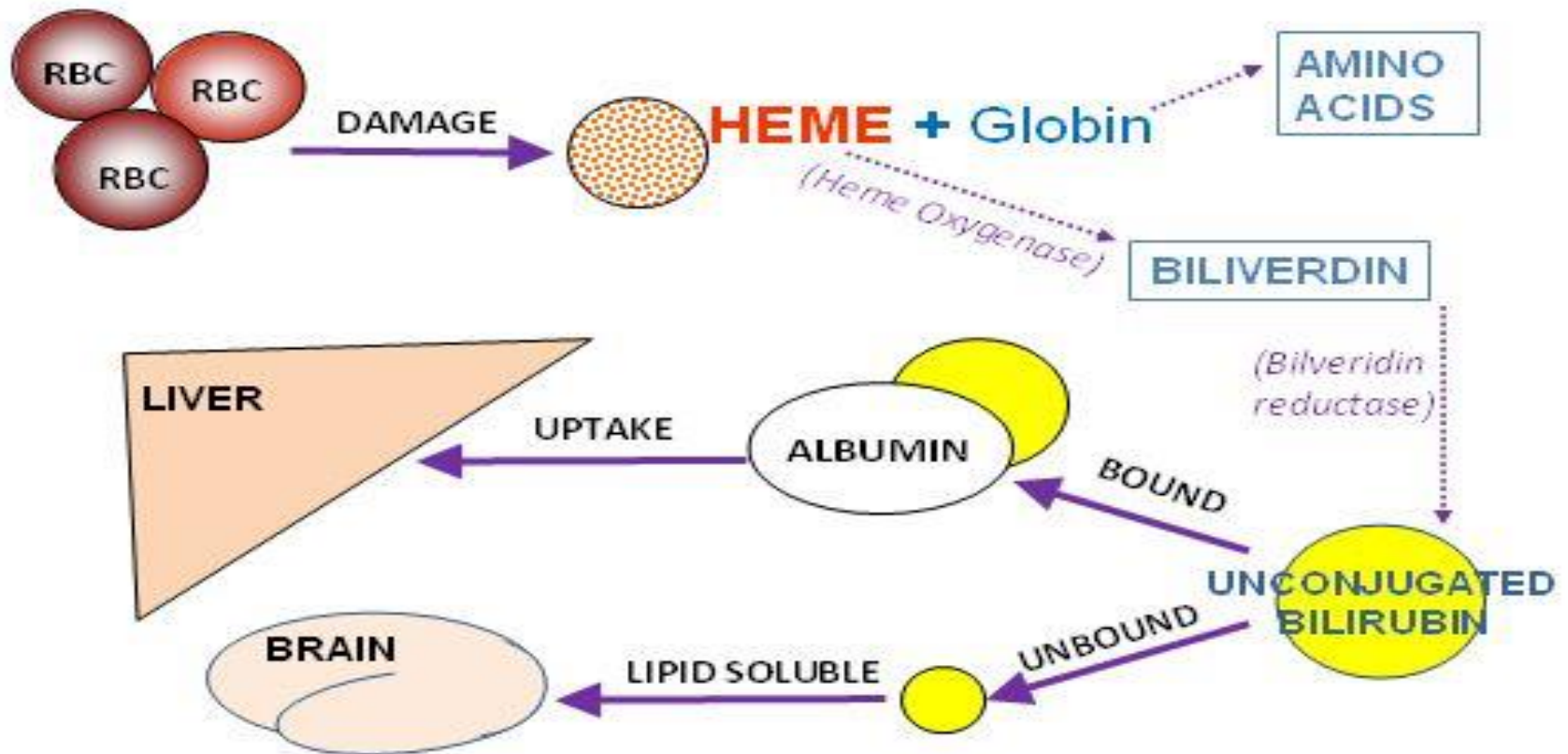
- 85 % of all term newborns develop hyperbilirubinemia.
- Most preterm babies develop jaundice.

Source of bilirubin

- RBC breakdown (75%) -1 gm of hemoglobin produce 34mg of bilirubin.
- Early labelled bilirubin (25%)-Hb released from bone marrow, other heme containing proteins

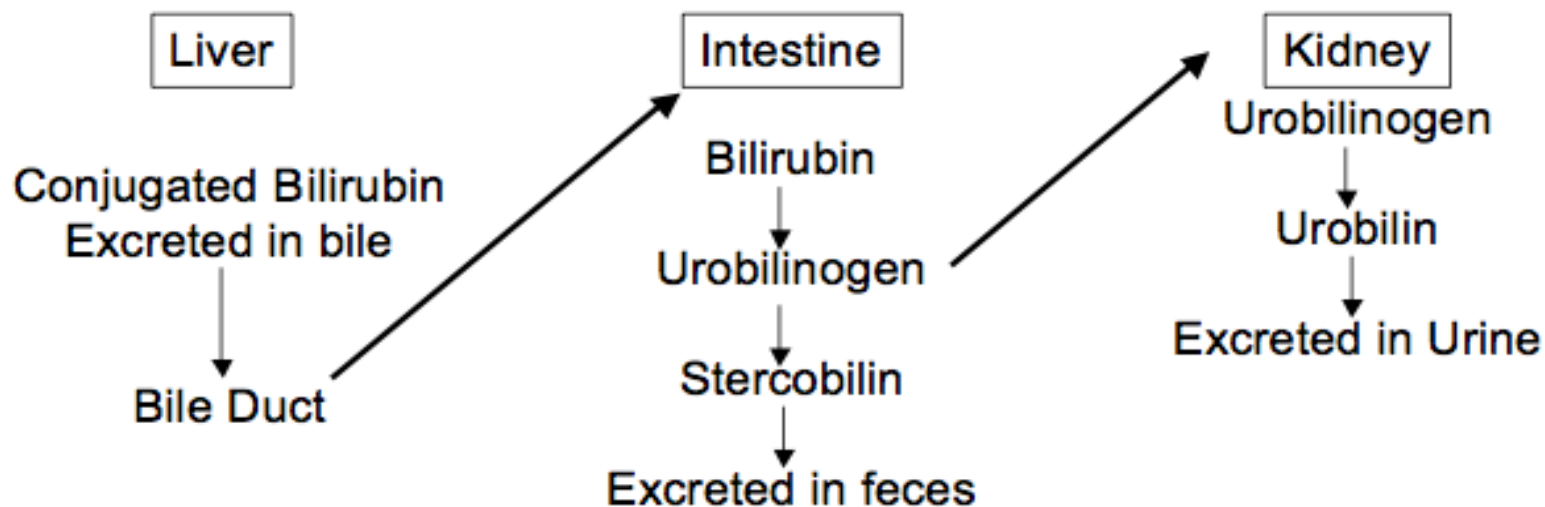
BILIRUBIN METABOLISM

Bilirubin Metabolism



Bilirubin Excretion

Excreted actively by the liver in bile



PHYSIOLOGICAL JAUNDICE

- "Normal " jaundice of newborn
- Appears after 24 hrs of life
- Peaks between 3 rd and 5th days
- Peak value is usually 6-8 mg/dl ; maximum upto 12 mg/dl.

In preterm

- Appears after 24 hrs
- Peaks on 5th day
- Peak usually 10-12 mg/dl ;sometimes upto 15.

Reason

- Increased RBC volume
- Decreased RBC survival
- Increased turn-over of non-Hb
- Defective uptake of bilirubin by liver
- Defective conjugation
- Decreased hepatic excretion
- Increased enterohepatic circulation

NON PHYSIOLOGIC JAUNDICE

- Onset before 24 hrs of age
- Any level requiring phototherapy
- Rise in serum bilirubin level of $>0.2\text{mg/dl/hr}$
- Signs of underlying illness
- Persistent jaundice $\rightarrow$ 8 days in term and >14 days in preterm

Breast feeding jaundice

- Due to decreased intake of milk
- Slower bilirubin excretion increased enterohepatic circulation.
- Peak > 15 mg/dl.
- Encourage breast feeding

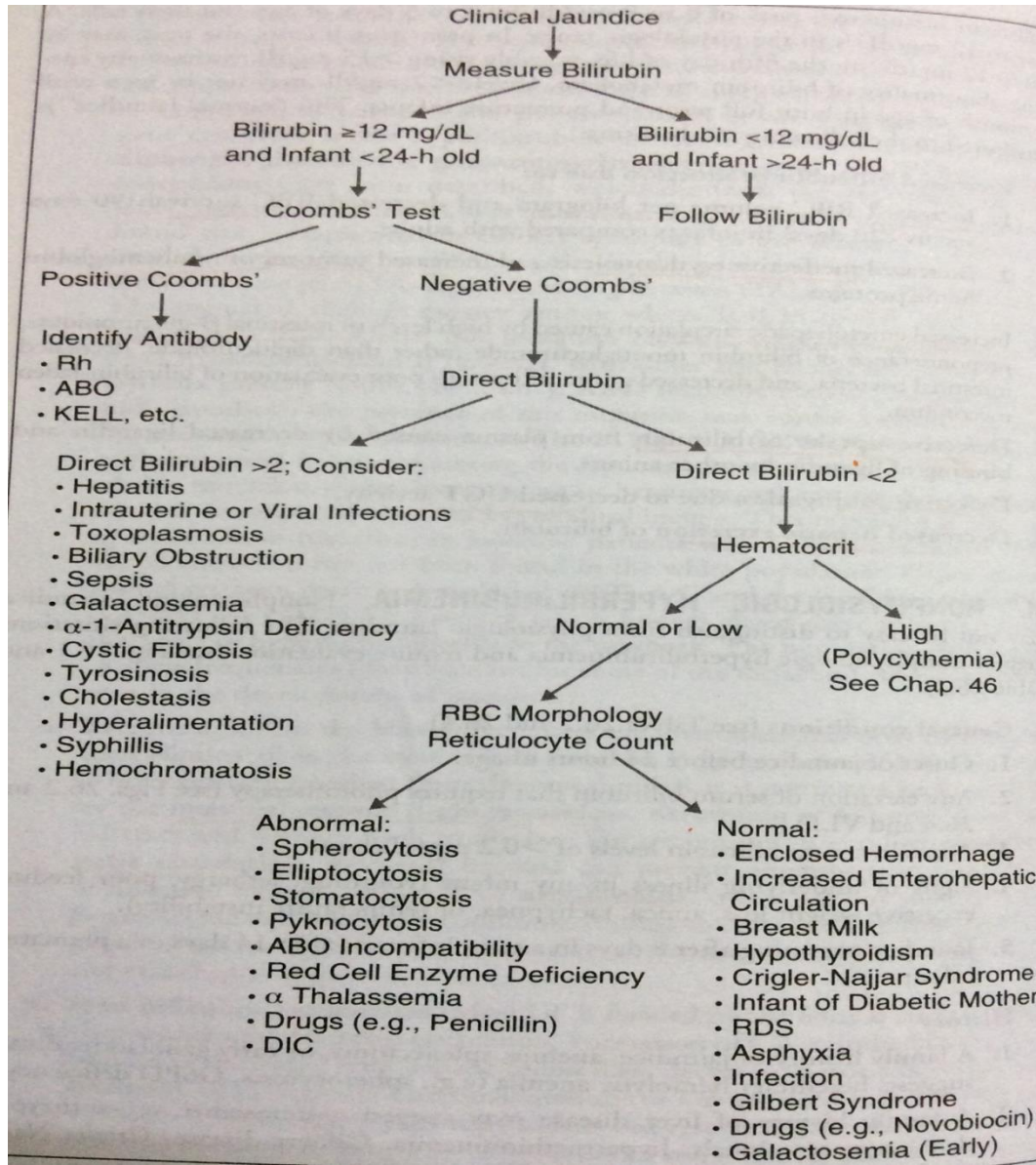
Breast milk jaundice

- Late onset - beyond day 4
- Bilirubin level reach 20-30 mg/dl by 14 days
- Level fall slowly at 2 wks if breast feeding is continued
- Level drops within 48 hrs of stopping breast feeding.

Causes of neonatal jaundice

- Blood disorders-incompatibility,enzyme disorders,abnormal RBC shapes
- Extra vascular blood,polycythemia.
- Metabolic and endocrine disorders
- TORCH infections,Infant of diabetic mother,sepsis
- Obstructive disorders

Approach ...



History

- Family history of jaundice, anaemia, splenectomy, gall bladder surgery-hereditary haemolytic anemias

History

- Family history of liver disease-metabolic liver disease
- Sibling with jaundice-blood group incompatibility,breast milk jaundice
- Maternal illness during pregnancy - TORCH,IDM
- Maternal drug intake-sultana
ides,nitrofurantoin,antimalarials,oxytocin

Examination

- Prematurity
- SGA
- Microcephaly
- Pallor, petechiae, extra-vascular blood
- Hepatosplenomegaly
- Features of hypothyroidism
- Infection
- Chorioretinitis

Assessment

- Visual inspection-not reliable

Schema for grading extent of jaundice



Grade	Extent of Jaundice
0	None
1	Face and neck only
2	Chest and back
3	Abdomen below umbilicus to knees
4	Arms and legs below knees
5	Hands and Feet

Assessment

- Total serum bilirubin estimation
- Trans-cutaneous bilirubinometry
- end-tidal carbon monoxide estimation

Bilirubin toxicity

- Kernicterus- yellow staining of brain with neuronal injury
- Acute bilirubin toxicity-hypotonia,lethargy in early phase;Hypertonia of extensor muscles in intermediate phase &pronounced opisthotonos in late phase
- Chronic bilirubin encephalopathy - deafness,choreoathetosis,deafness,dental dysplasia,intellectual deficits.

Management

- Phototherapy
- Exchange transfusion
- IVIG in immune haemolytic anemia
- Phenobarbital
- Metalloporphyrins

PHOTOTHERAPY

- Special blue lamps with wave length 425 to 475 used
- Cool white lamp with peak between 550 and 600(range 380-700nm) can also be used

Photochemical reactions

- Photoisomerization-natural isomer converted into less toxic polar isomer and excreted in bile
- Structural isomerization-converts bilirubin to lumibilirubin and is excreted in bile and urine
- Photo-oxidation- converts to small polar products& excreted in urine

Technique



Side effects

- Insensible water loss
- Watery diarrhoea
- Hypocalcemia
- Retinal damage
- Tanning
- Bronze baby syndrome
- Mutation,DNA strand breaks
- Upsets maternal-infant bonding

EXCHANGE TRANSFUSION

- Removes partially hemolysed & antibody coated RBCs
- Removes bilirubin

Indication

- When phototherapy fails
- To correct anemia and improve heart failure
- To stop hemolysis and bilirubin production by removing antibodies
- Cord bilirubin $>4.5\text{mg/dl}$
- Bilirubin level rising $> 1\text{mg/dl/hr}$
- Level $>20\text{mg/dl}$

Which blood to use?

- Fresh < 7 days old irradiated blood
- HCT 45-50%
- O neg cross matched against mother

Technique

Exchange transfusion



Complications

- Hypocalcemia, hypoglycaemia, hypomagnesaemia, Hypercalcemia
- Acid-base balance-late metabolic alkalosis
- Bleeding
- Infection embolization, thrombosis, infarction
- Hemolysis
- GVHD
- Hypo/hyper thermia, NEC

CHOLESTATIC JAUNDICE

- Failure to excrete conjugated bilirubin
- Conjugated bilirubin $>2\text{mg/dl}$ or $>15\%$ of total