

# Degradation of HEME

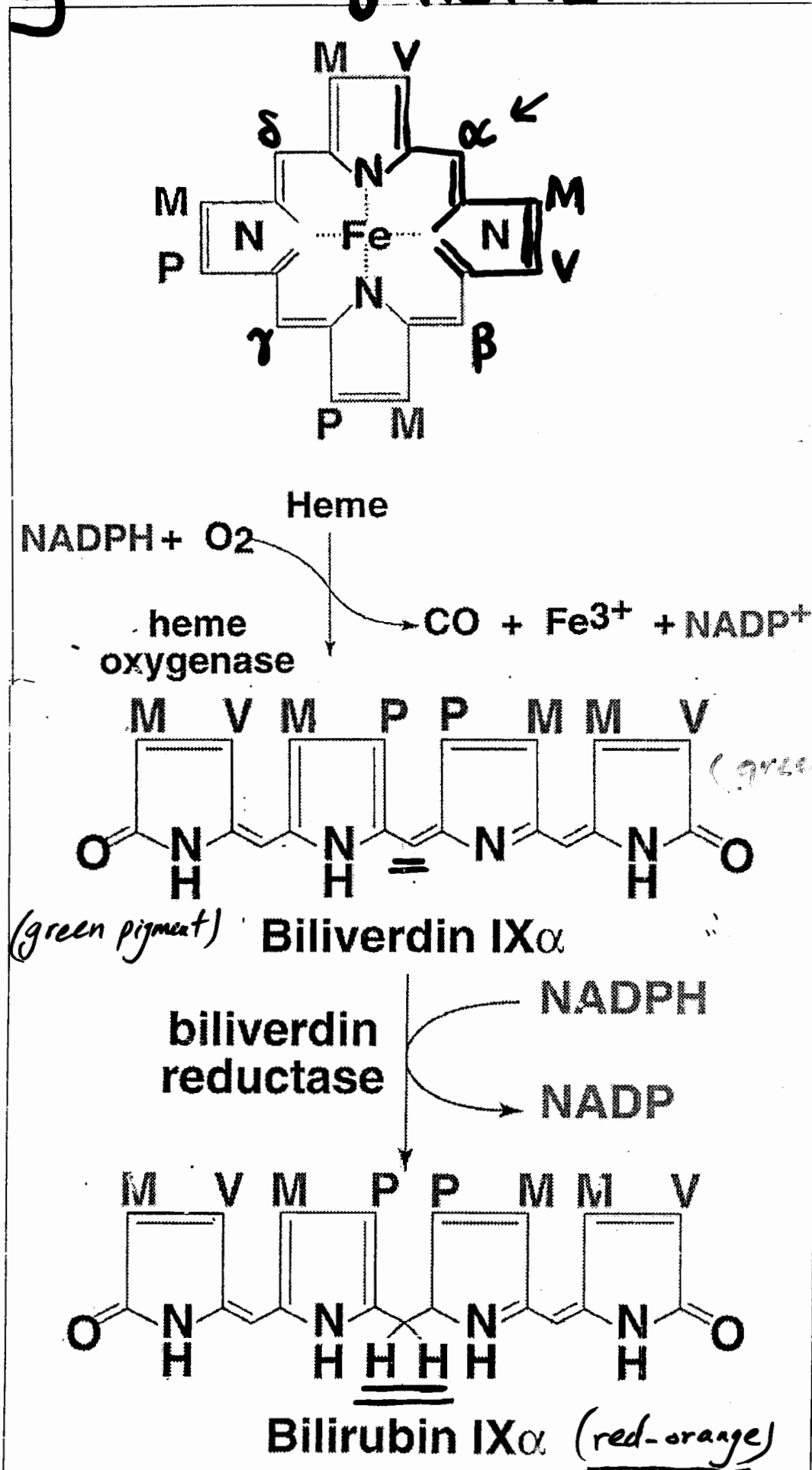


Figure: 24\_12b  
Formation of bilirubin from heme.

# Breakdown of Hemoglobin 2

• After 120 d  
mainly (in liver & spleen)

→ Globin

↓  
Amino acids

↓  
reutilized

• 85% from senescent RBC

→ Heme → Bilirubin

• Biliverdin is  
more soluble than  
Bilirubin

• Bilirubin is  
a Potent Antioxidant

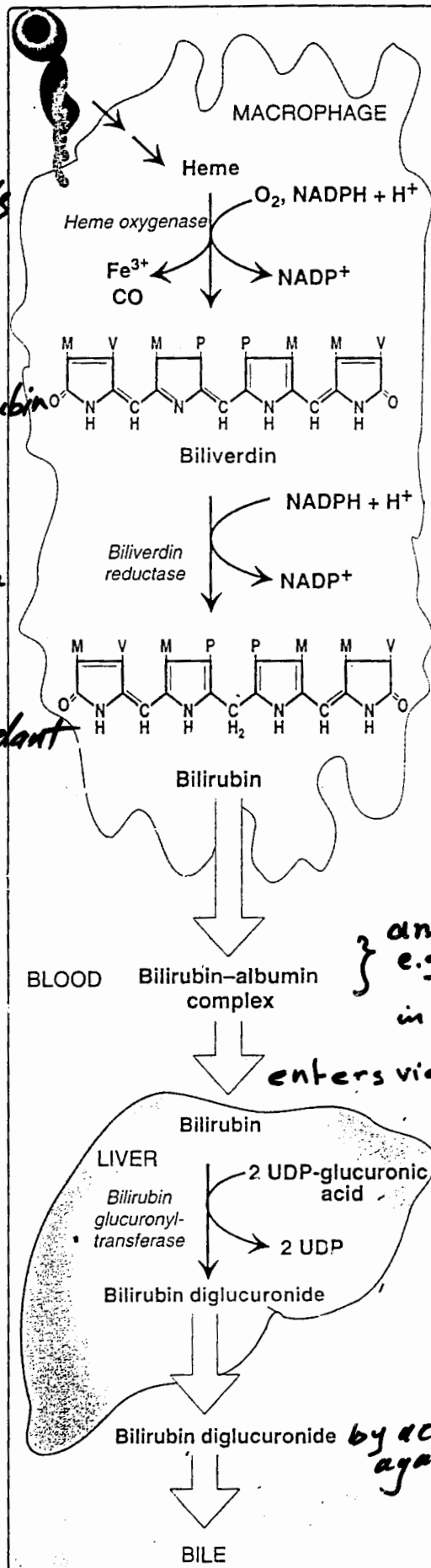
Bilirubin



→ Urobilinogen

↓  
Stercobilin  
gen

↓  
Stercobilin



} anionic drugs  
e.g. salicylates, sulfonamides  
displaces bilirubin  
in infants → neural damage

enters via facilitated diffusion

by active transport  
against gradient

# Conjugation of Bilirubin (CB)

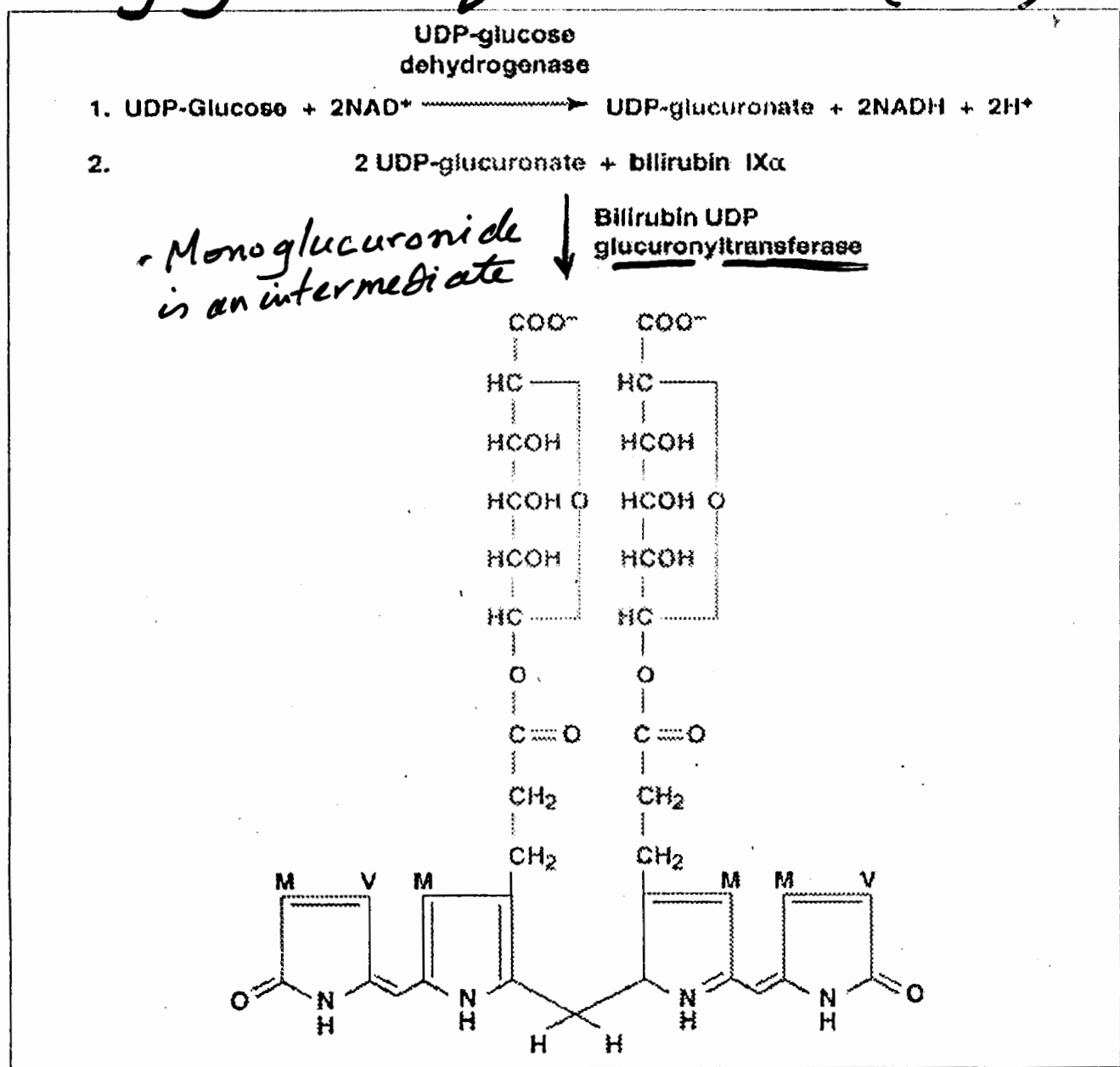
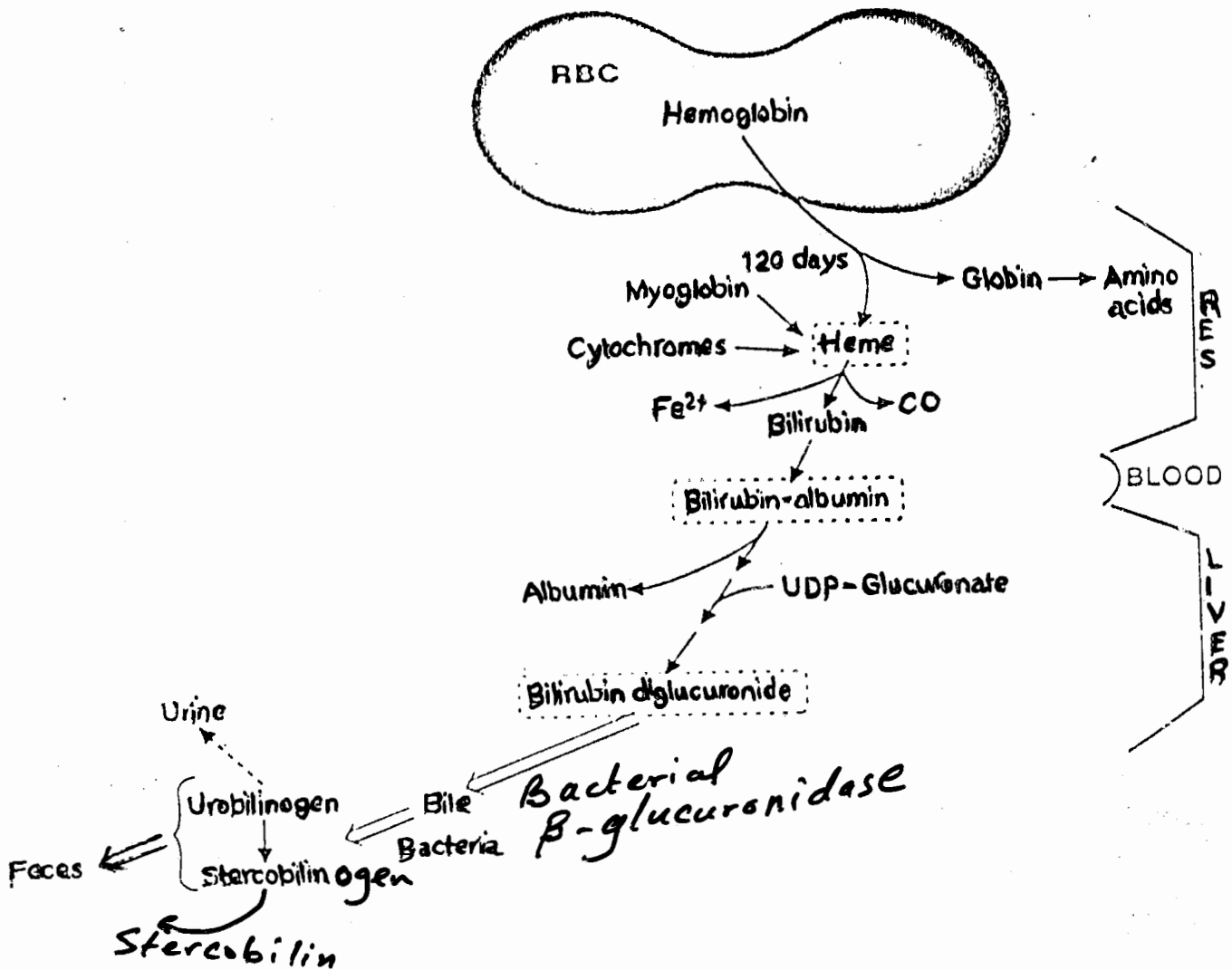


Figure: 24\_13  
Biosynthesis of bilirubin diglucuronide.  
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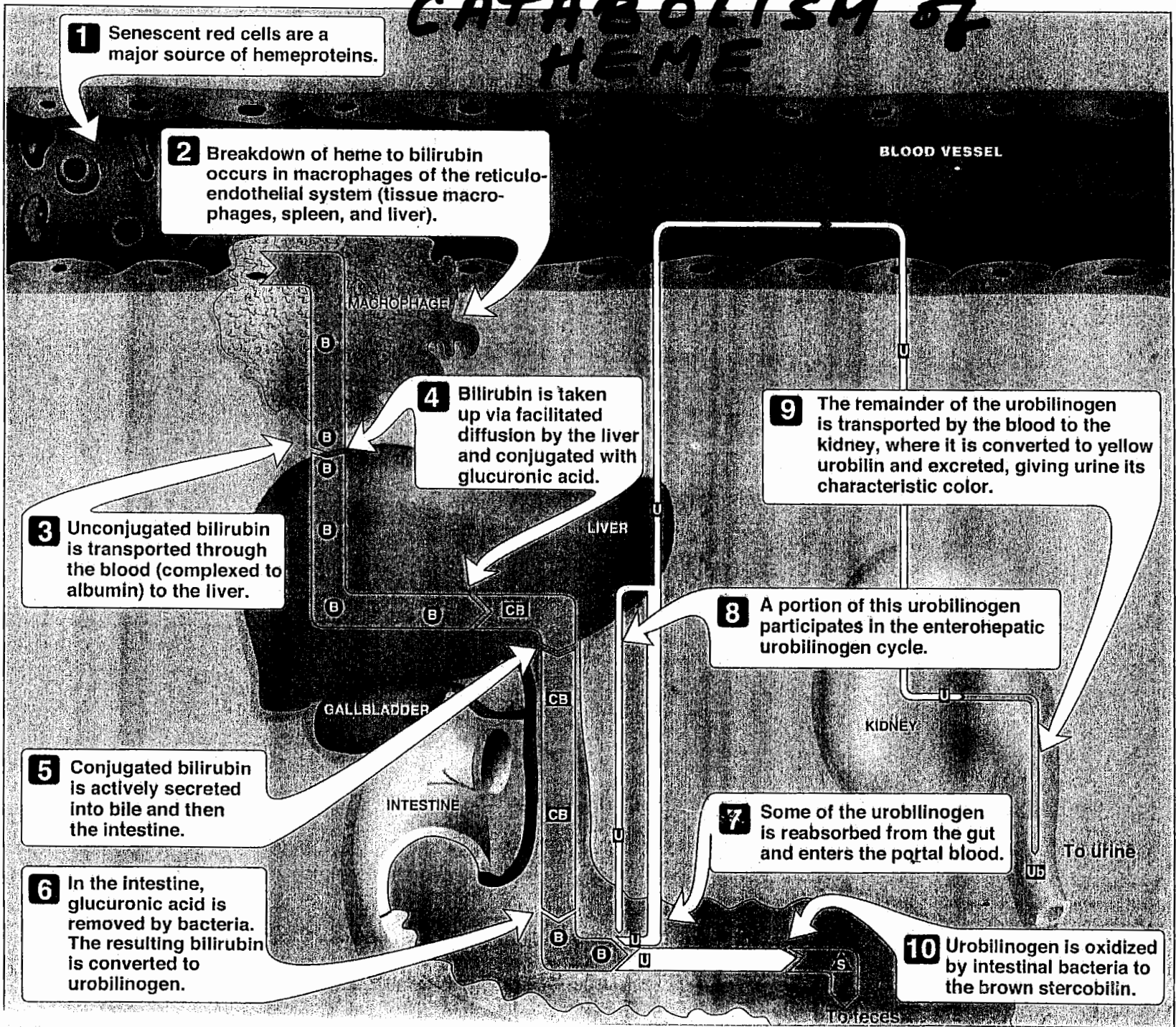
# Overview of Heme Degradation

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# CATABOLISM OF HEME

5a



**1** Senescent red cells are a major source of hemeproteins.

**2** Breakdown of heme to bilirubin occurs in macrophages of the reticulo-endothelial system (tissue macrophages, spleen, and liver).

**3** Unconjugated bilirubin is transported through the blood (complexed to albumin) to the liver.

**4** Bilirubin is taken up via facilitated diffusion by the liver and conjugated with glucuronic acid.

**5** Conjugated bilirubin is actively secreted into bile and then the intestine.

**6** In the intestine, glucuronic acid is removed by bacteria. The resulting bilirubin is converted to urobilinogen.

**9** The remainder of the urobilinogen is transported by the blood to the kidney, where it is converted to yellow urobilin and excreted, giving urine its characteristic color.

**8** A portion of this urobilinogen participates in the enterohepatic urobilinogen cycle.

**7** Some of the urobilinogen is reabsorbed from the gut and enters the portal blood.

**10** Urobilinogen is oxidized by intestinal bacteria to the brown stercobilin.

To feces

D2

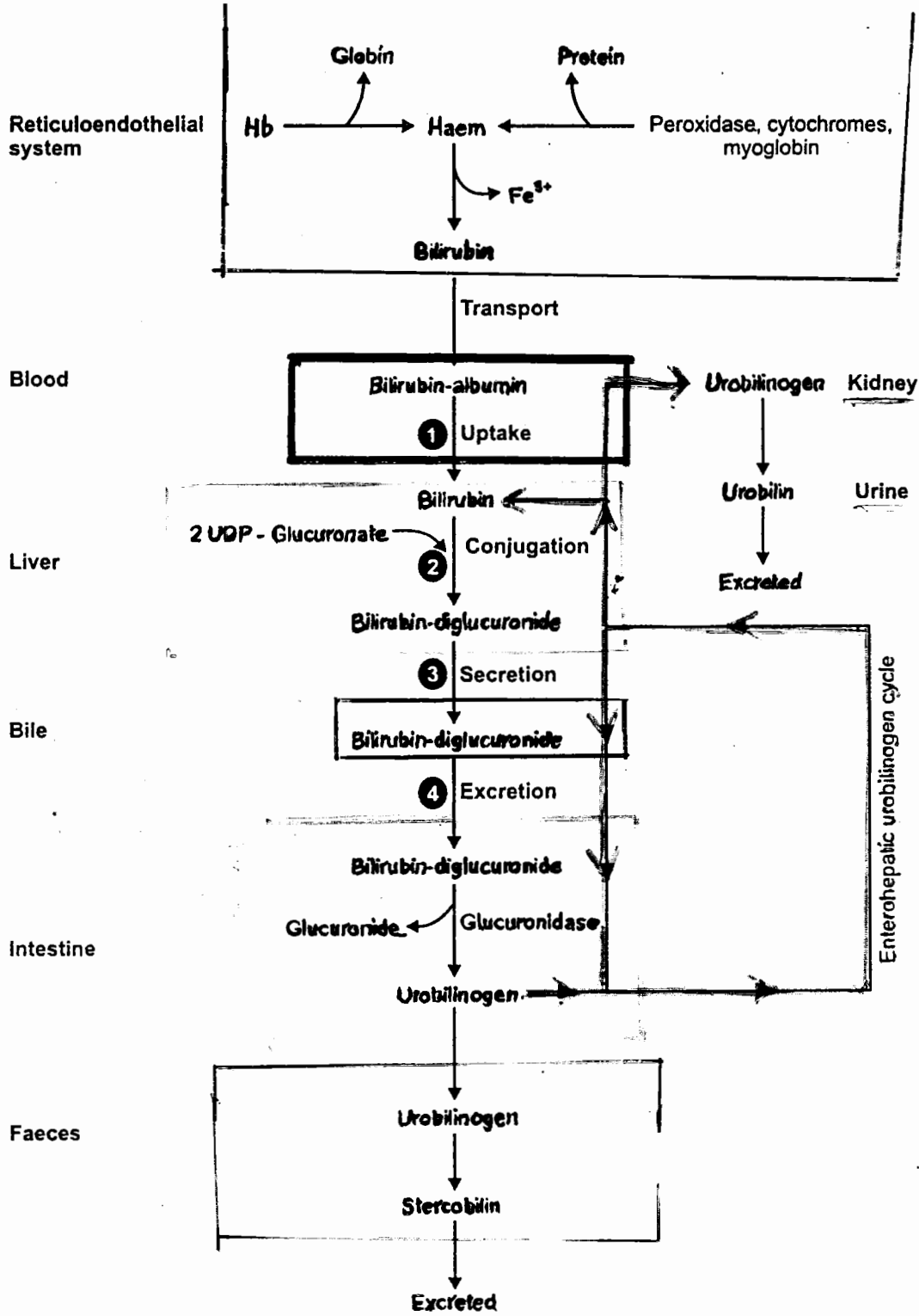
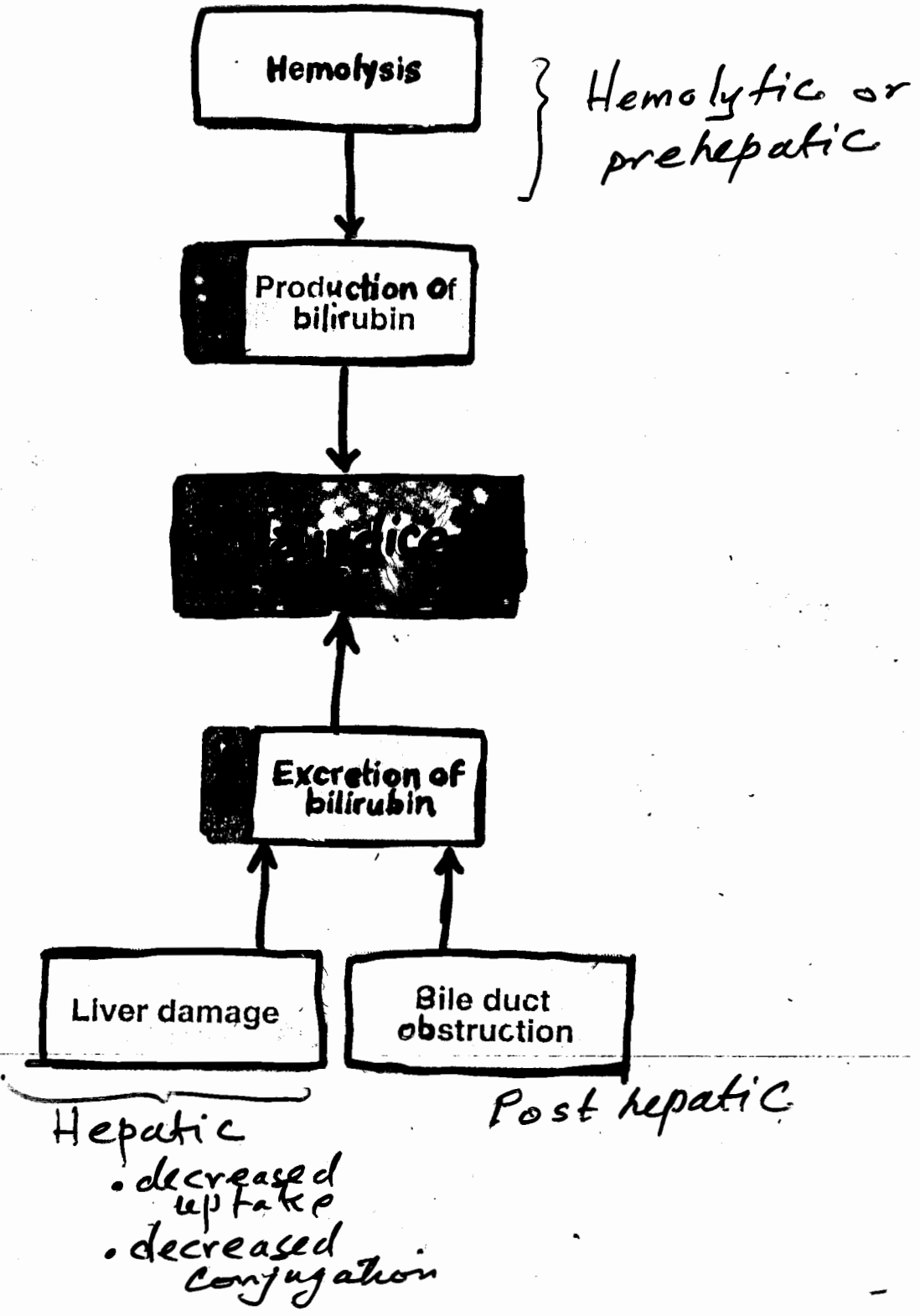
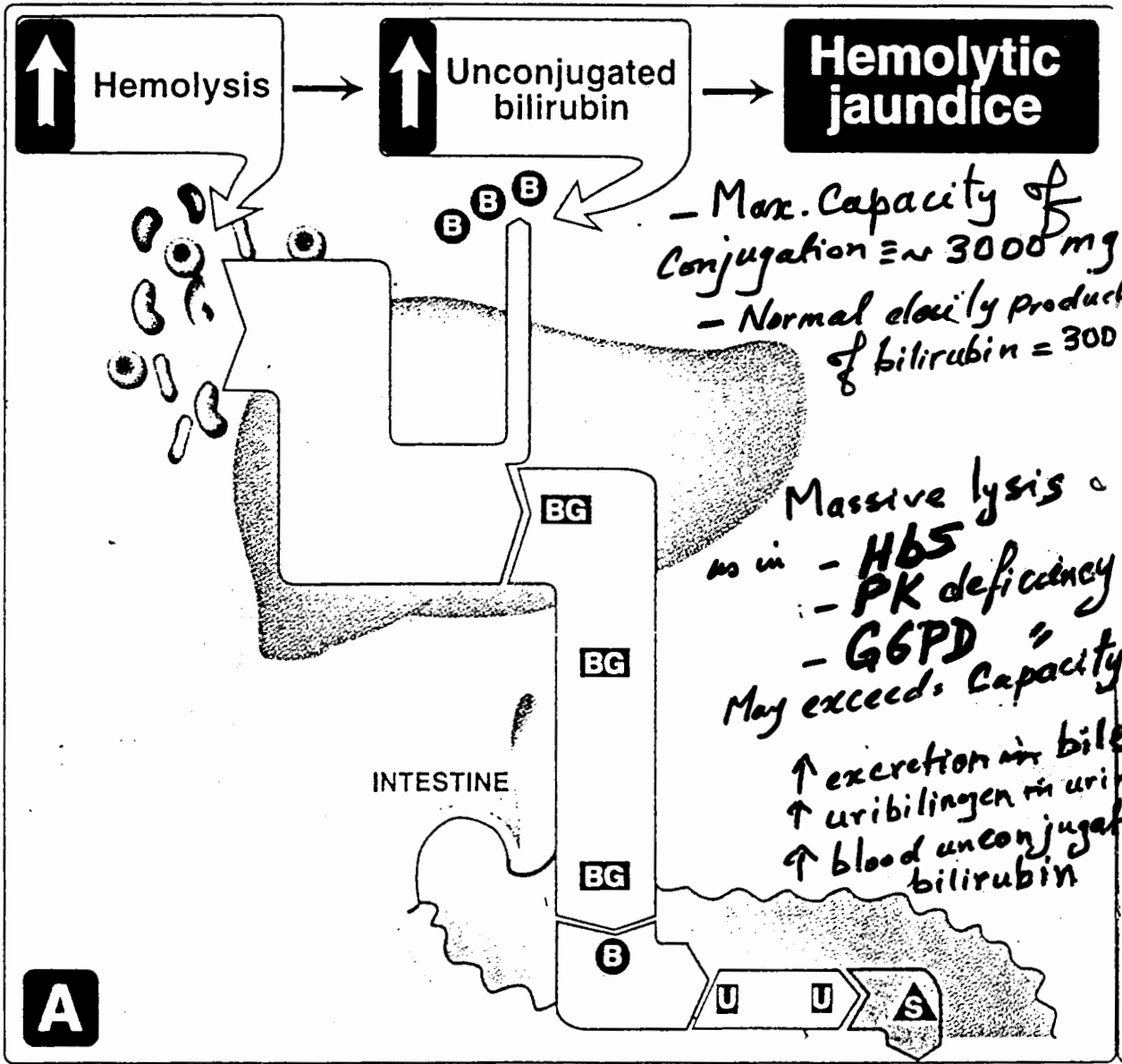


Figure 18.6: Schematic representation of normal bilirubin metabolism

- Total Bilirubin 0.1 to 1.0 mg/dl
- Conjugated bilirubin 0.1 to 0.4 mg/dl
- Unconjugated " 0.2 to 0.7 mg/dl



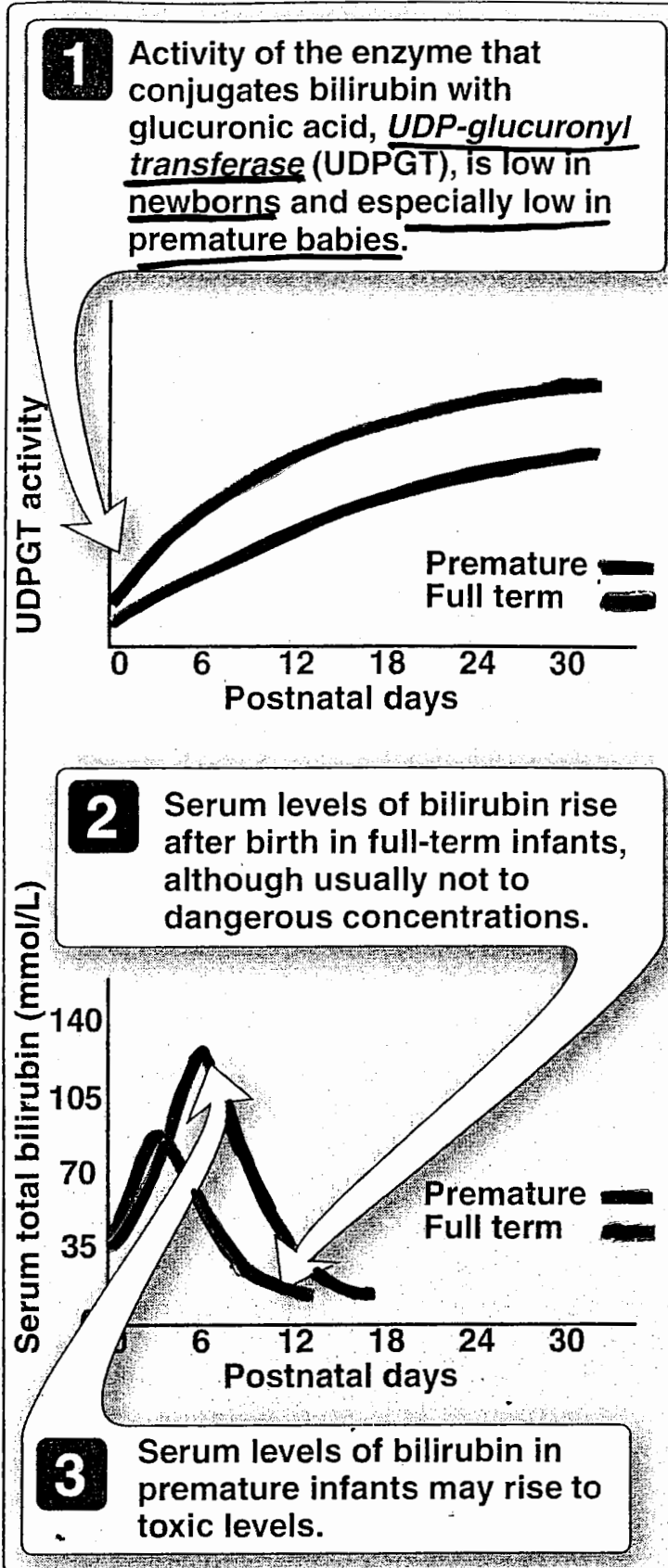


- Hepato cellular jaundice  
 Damage to liver

↑ unconjugated blood bilirubin  
 ↓ secretion of conjugated  
 ↑ Urobilinogen in urine

- Obstructive Jaundice





**Figure 21.12**  
Neonatal jaundice.

# Jaundice in Newborns

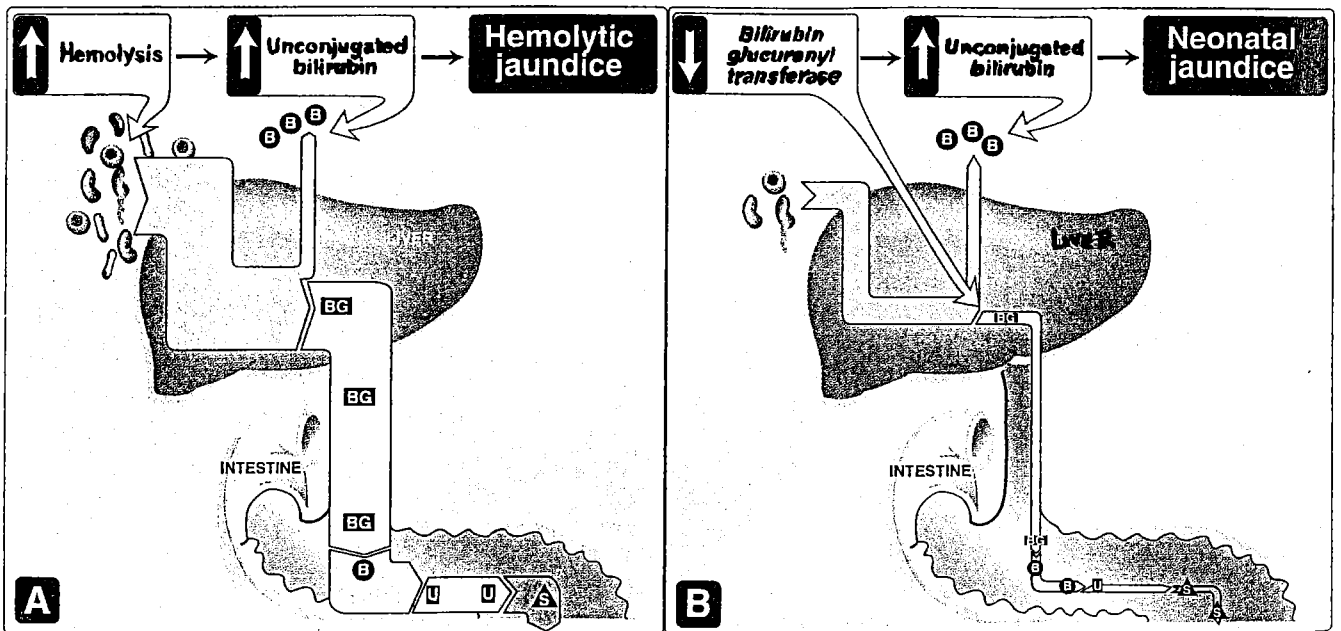


Figure 21.11

Alterations in the metabolism of heme. A. Hemolytic jaundice. B. Neonatal jaundice. [Note: The enterohepatic circulation of urobilinogen is omitted for simplicity.] BG = bilirubin glucuronide; B = bilirubin; U = urobilinogen; S = stercobilin.

## - Genetic Deficiency of Conjugation :-

Varying degree of transferase deficiency

- Crigler - Najjar I + II } more severe
- Gilbert → mild

- Dubin-Johnson & Rotor syndromes (rare deficiency in protein)  
 → Defective secretion of conjugated

## - Laboratory test for Bilirubin level

The Van der Bergh reaction  
 Diazotized sulfanilic acid →  
 - Methanol → Direct  
 + Methanol → Total

## - photo therapy

Blue fluorescent light  
 Bilirubin → Polar & water soluble isomer