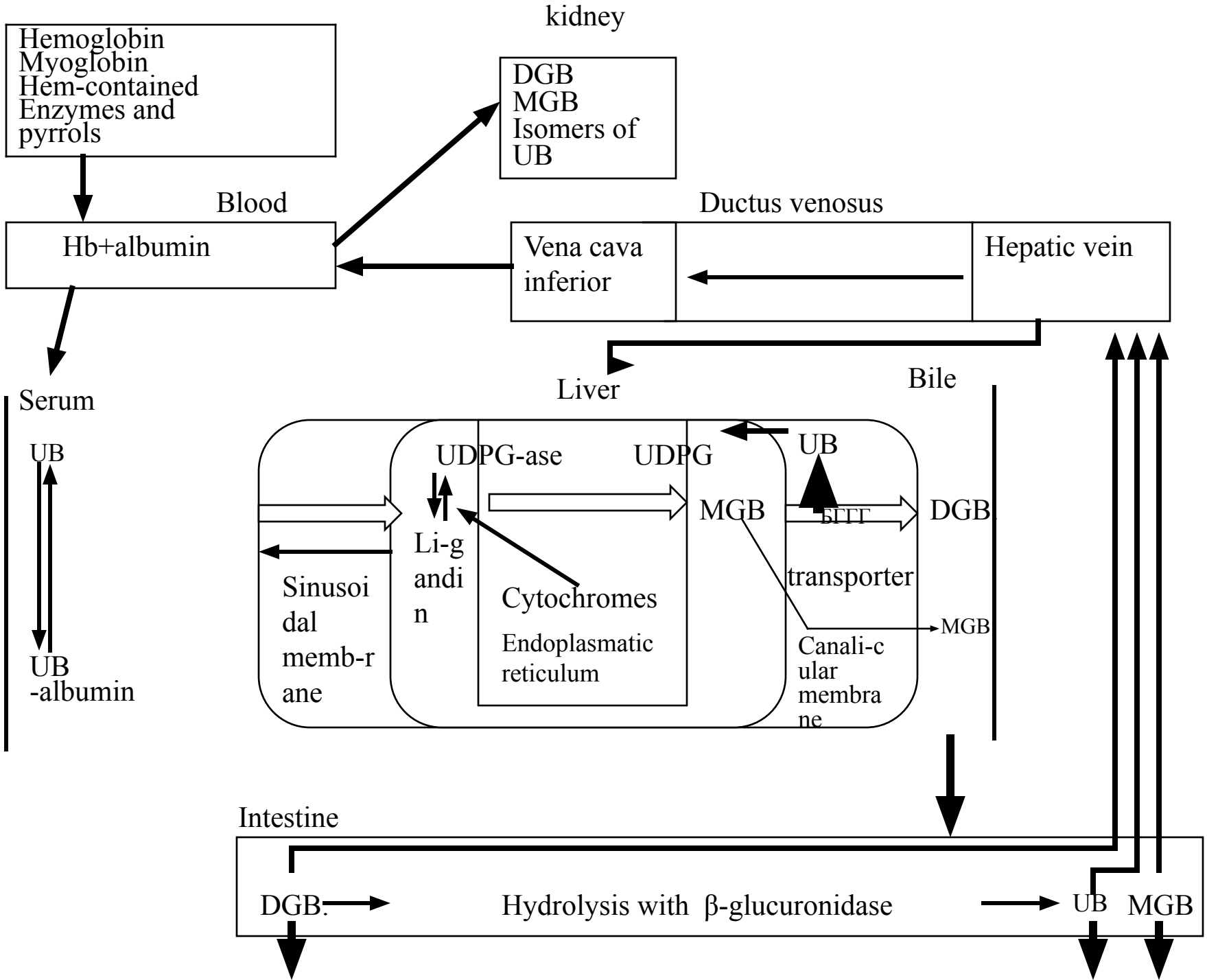
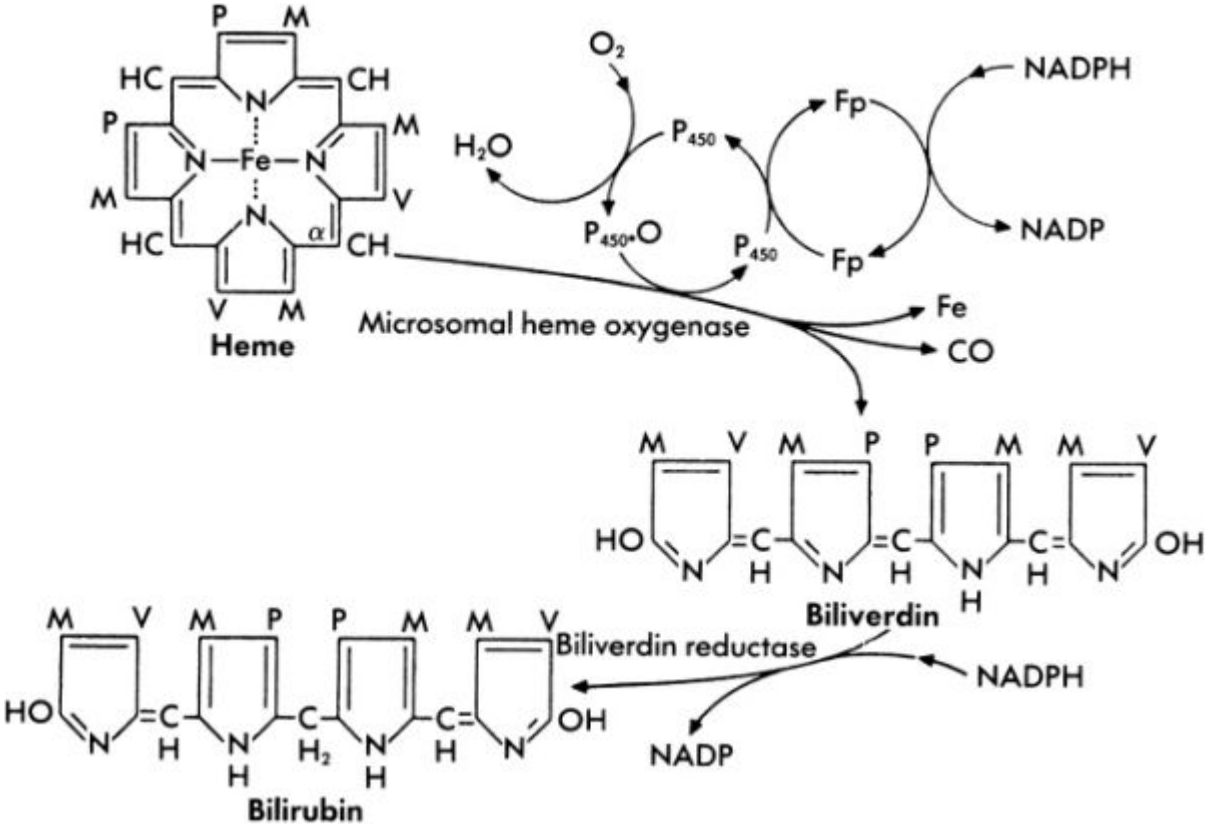
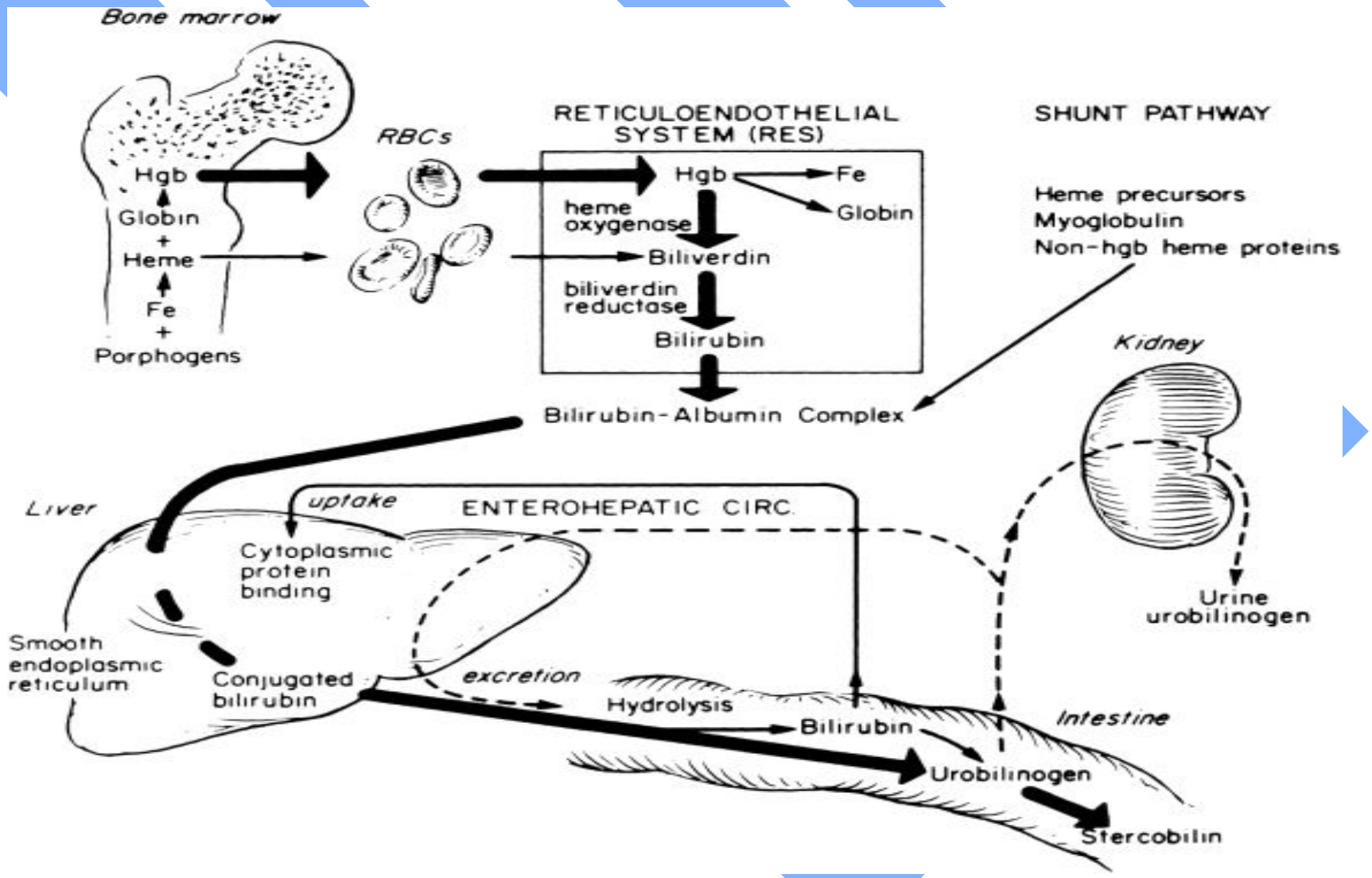
Origin, differential diagnosis and thrapy of jaundices in neonates

Assistant professor of hospital pediatrics department

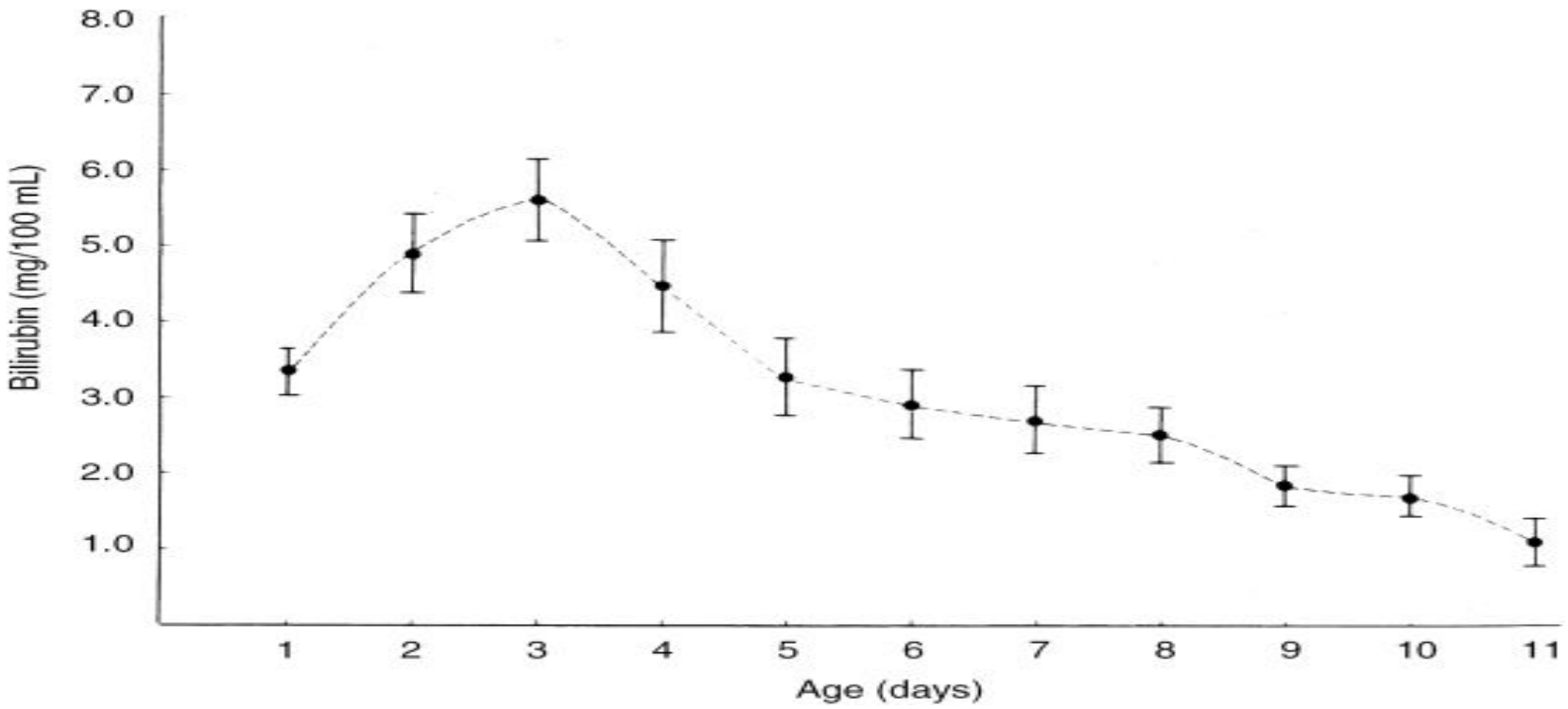

kidney
Hemoglobin
Myoglobin
Hem-contained
Enzymes and
pyrrols
DGB
MGB
Isomers of
UB
Blood
Hb+albumin
Ductus venosus
Vena cava
inferior
Hepatic vein
Liver
Bile
Serum
UB
UB
-albumin
UDPG-ase
UDPG
UB
MGB
БГГГ
DGB
Li-g
andi
n
Sinusoi
dal
memb-r
ane
Cytochromes
Endoplasmatic
reticulum
transporter
MGB
Canali-c
ular
membra
ne
Intestine
DGB
Hydrolysis with β-glucuronidase
UB
MGB



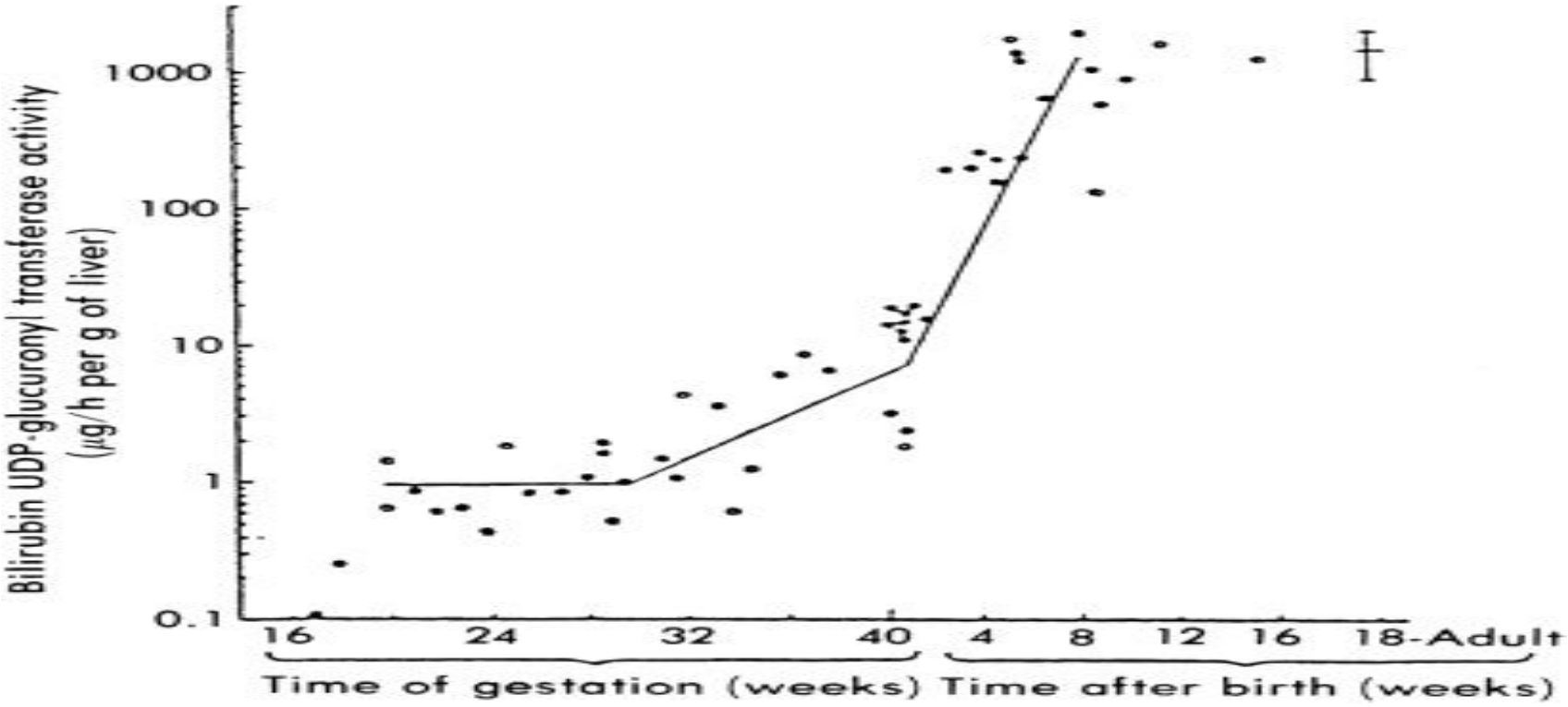
Catabolism of heme to bilirubin by microsomal heme oxygenase and biliverdin reductase. *(From Tenhunen R et al: The enzymatic conversion of hemoglobin to bilirubin. Trans Assoc Am Physicians 82:363, 1969, with permission.)*



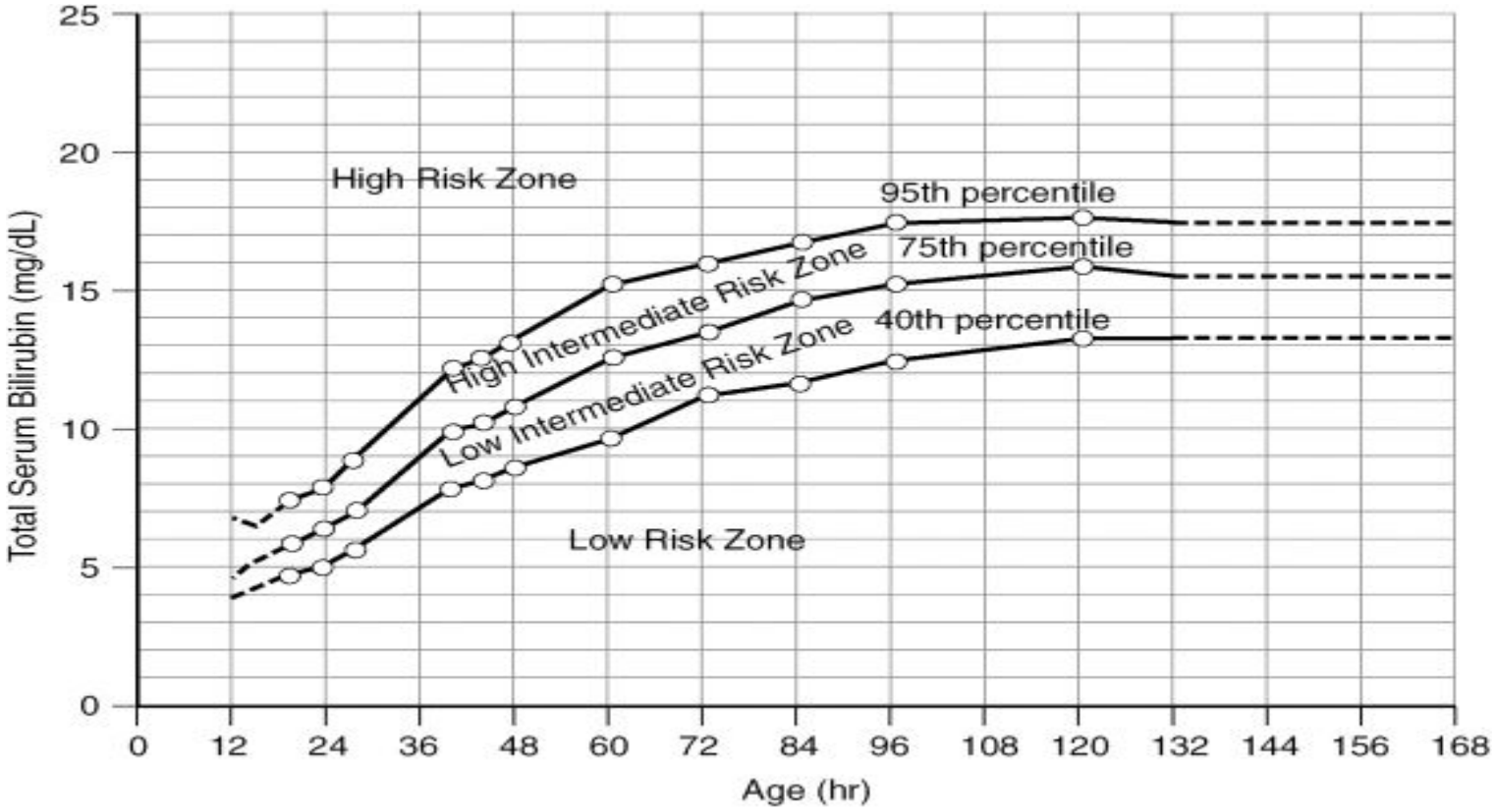
The pathways of bilirubin synthesis, transport, and metabolism. Hgb, hemoglobin; RBCs, red blood cells. *(From Assali NS: Pathophysiology of Gestation. New York, Academic Press, 1972, with permission.)*



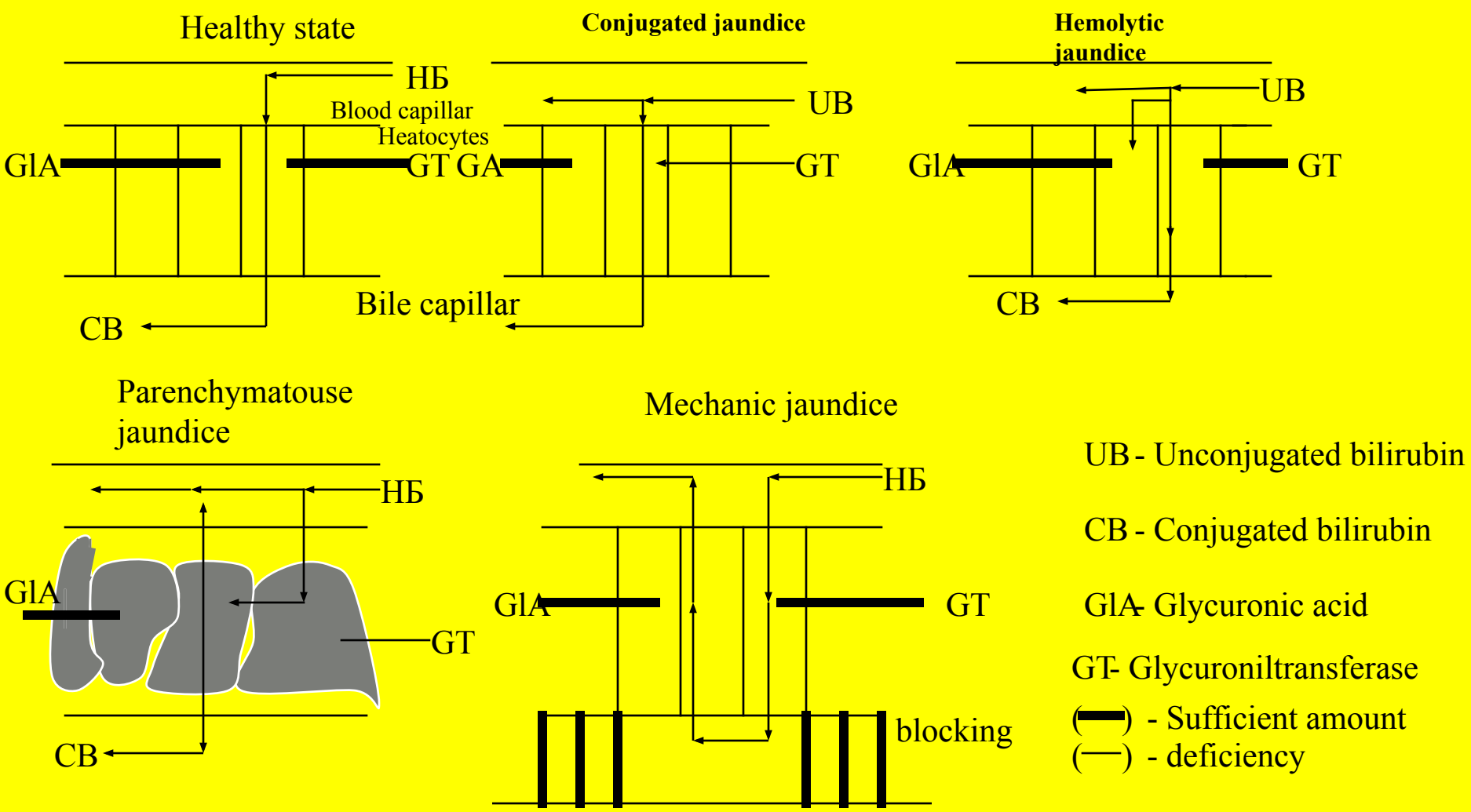
Mean total serum bilirubin (TSB) concentrations in 22 full-term normal white and African-American infants during the first 11 days of life. *Vertical bars* represent standard error of the mean. *(From Gartner LM et al: Development of bilirubin transport and metabolism in the newborn rhesus monkey. J Pediatr 90:513, 1977, with permission.)*



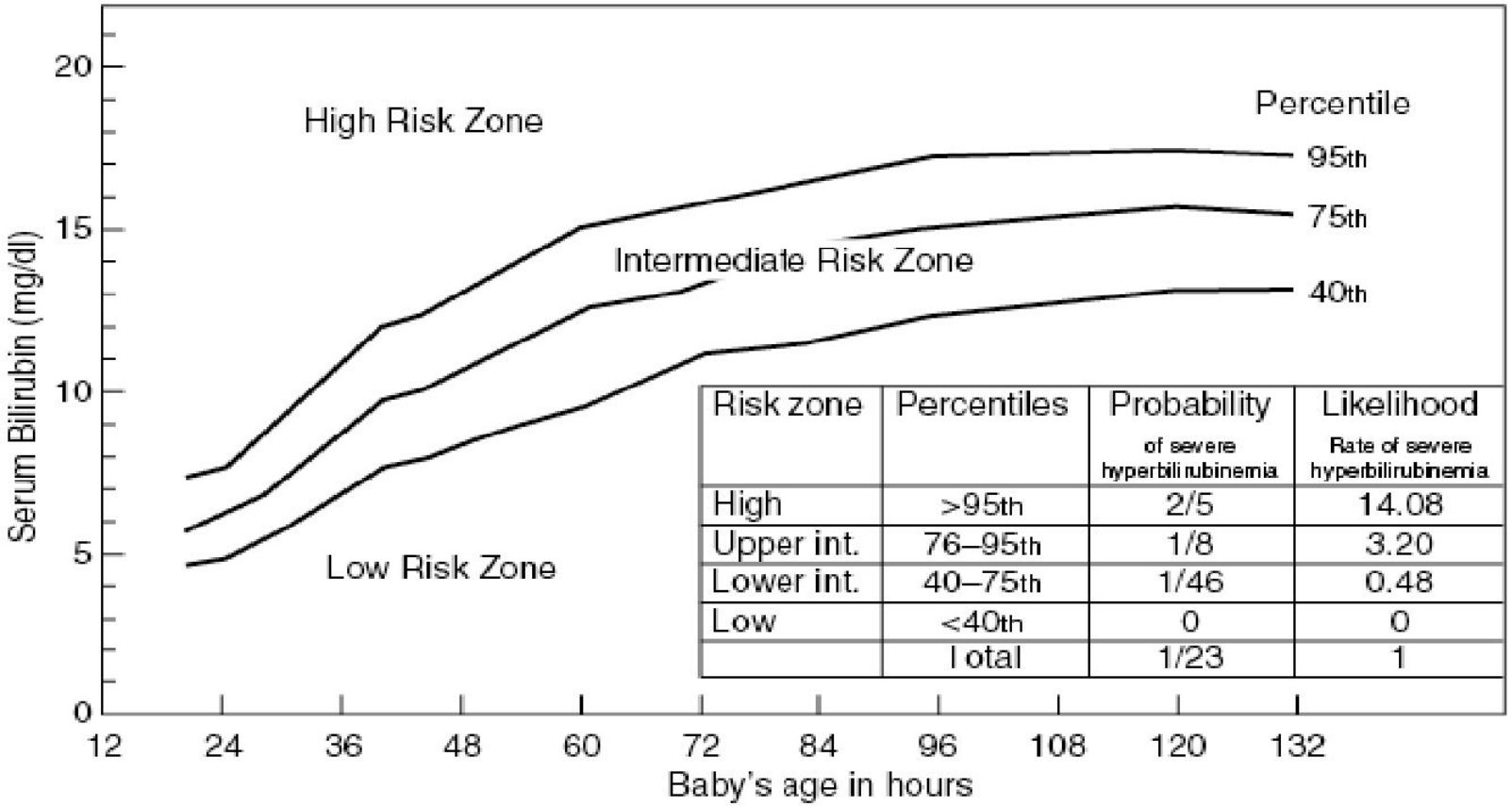
Developmental pattern of hepatic bilirubin uridine diphosphoglucuronate glucuronosyltransferase (UGT) activity in humans. *(From Kawade N, Onishi S: The prenatal and postnatal development of UDP-glucuronyltransferase activity towards bilirubin and the effect of premature birth on this activity in the human liver. Biochem J 196:257, 1981. Reprinted by permission of the Biochemical Society, London.)*



Zones of risk for pathologic hyperbilirubinemia based on hour-specific serum bilirubin levels. *(From Bhutani VK et al: Predictive ability of a predischarge hour-specific serum bilirubin for subsequent significant hyperbilirubinemia in healthy term and near-term newborns. Pediatrics 103:6, 1999.)*



Classification and mechanisms of jaundices development in neonates



Risk zone	Percentiles	Probability of severe hyperbilirubinemia	Likelihood Rate of severe hyperbilirubinemia
High	>95th	2/5	14.08
Upper int.	76–95th	1/8	3.20
Lower int.	40–75th	1/46	0.48
Low	<40th	0	0
	Total	1/23	1

Hour-specific bilirubin nomogram with the predictive ability of the predischarge bilirubin value for subsequent severe hyperbilirubinemia, >95th percentile tract. Reproduced with permission from Bhutani VK, Johnson LH. Jaundice technologies; prediction of hyperbilirubinemia in term and near term newborns. J Perinatol 2001;21:576

Clinical and serologic differences of hemolytic disease among ABO and Rh sensibilisation

1. a - и b –agglutinins normally exists in blood serum of mother and capable to penetrate fetus. Rh antibodies normally are absent both in mother and fetus.

2. Anti-A and Anti-B being full agglutinins as other antibodies could penetrate placenta whereas full Rh antibodies couldn't penetrate it.

3. Fetus tissues in "extractors"(people who reveals A and B substances not only in blood but in humors as well) and in "non-extractors" contains both A and B substances which is usually neutralizes anti-A and anti-B antibodies. Rh –antibodies doesn't neutralizes by the tissue antibodies therefore their infiltration of Rh positive fetus causes hemolysis. This very characteristic differential feature of ABO antibodies leads to hemolytic disease development without previous sesibilisation as mother blood already consists of a and b agglutinins.

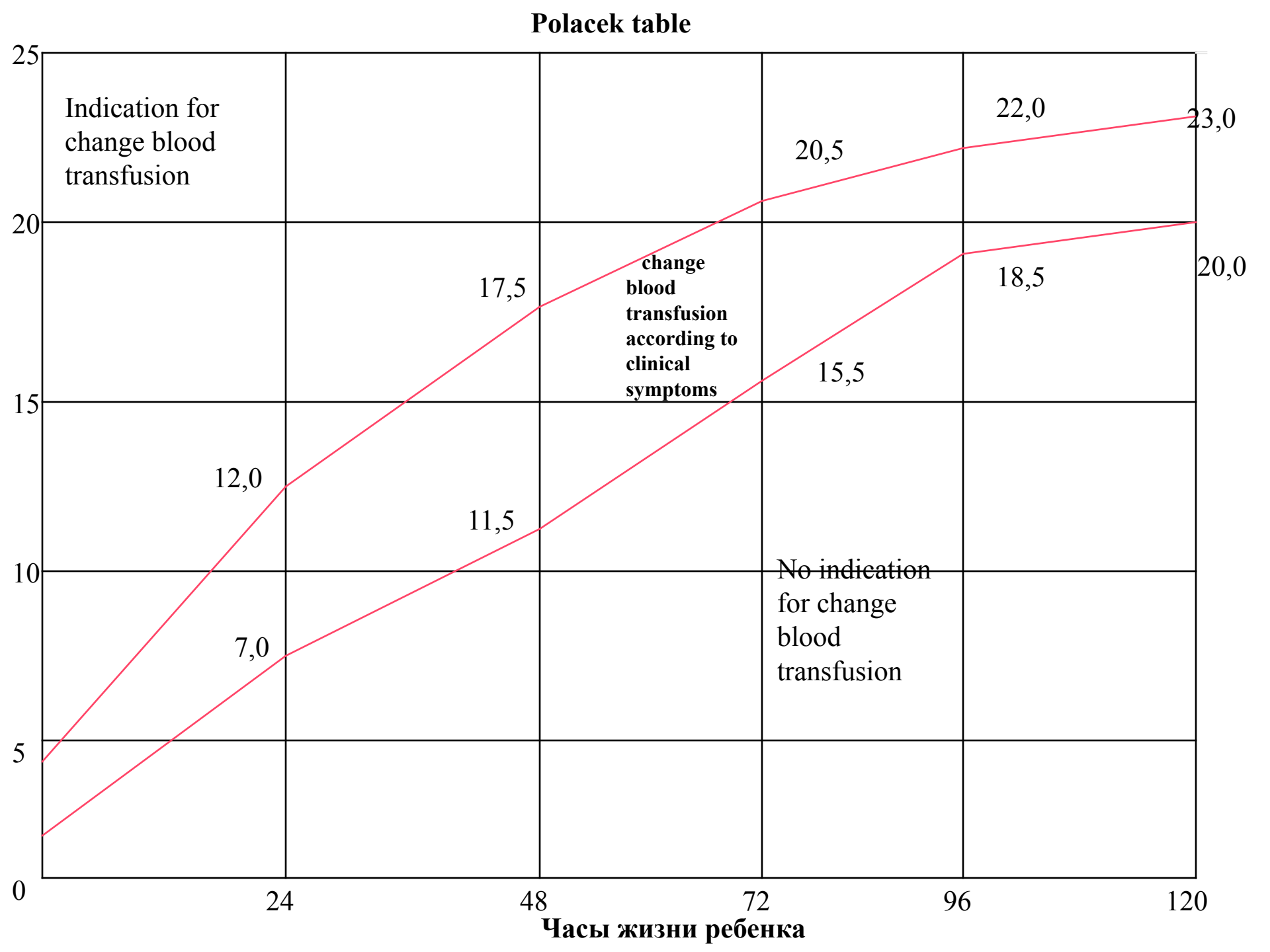
The basic principles of change blood transfusion.

1.The tip of correctly fixed umbilical vein catheter must be placed into vena cava being situated between the diaphragm and left atrium.

2. The length of umbilical vein catheter from it end to label at the level of umbilical ring is equal to the distance from brachium to the belly-button – 5 cm; the procedure initiates with removing of 30 -40 ml of blood(20 ml in preterms).

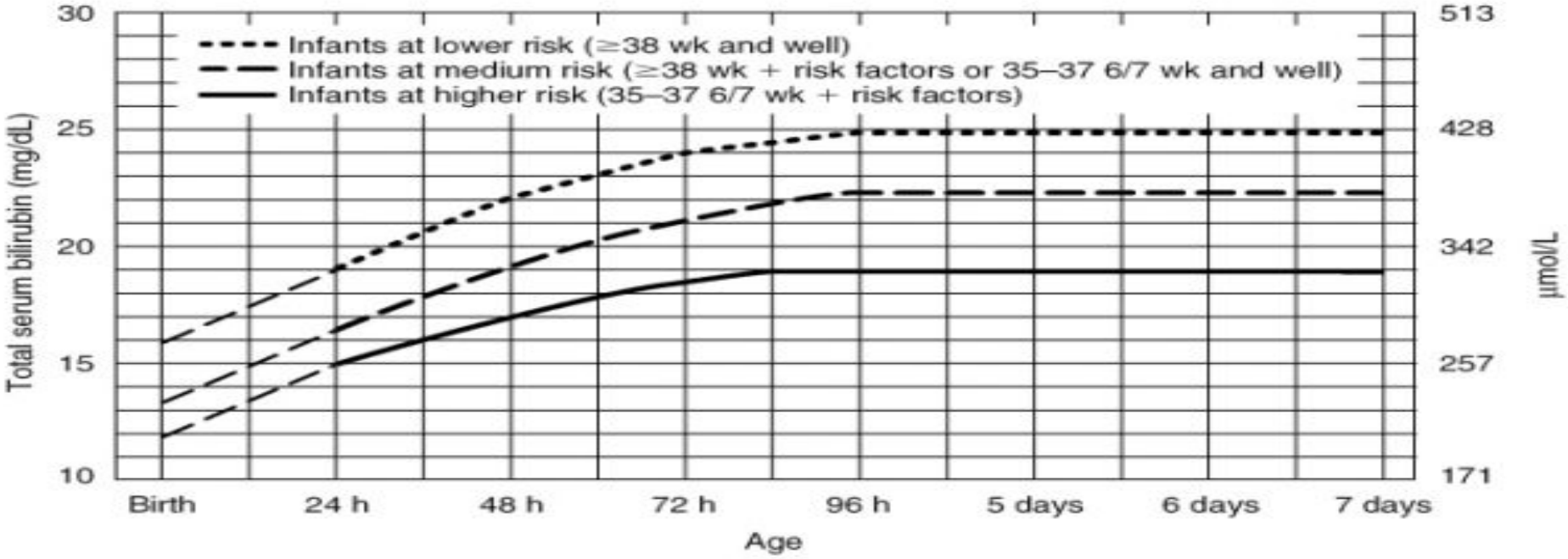
3. The total amount of injected blood must be 50 ml more than removed; operation must carried slowly at 3-4 ml per minute alternating with injecting and rejecting of 20 ml blood (10 ml in preterms) with total duration no less than 2 hour; every 100 ml of entering blood need to administrate 1 ml of 10 % calcium gloconas solution.

4. In the blood serum before change transfusion and just after the bilirubin level must be detected.


Polacek table
25
20
15
10
5
0
Indication for change blood transfusion
22,0
23,0
20,5
17,5
change blood transfusion according to clinical symptoms
18,5
20,0
15,5
12,0
11,5
No indication for change blood transfusion
7,0
24
48
72
96
120
Часы жизни ребенка

Guidelines for Exchange Transfusion in Infants ≥ 35 Weeks

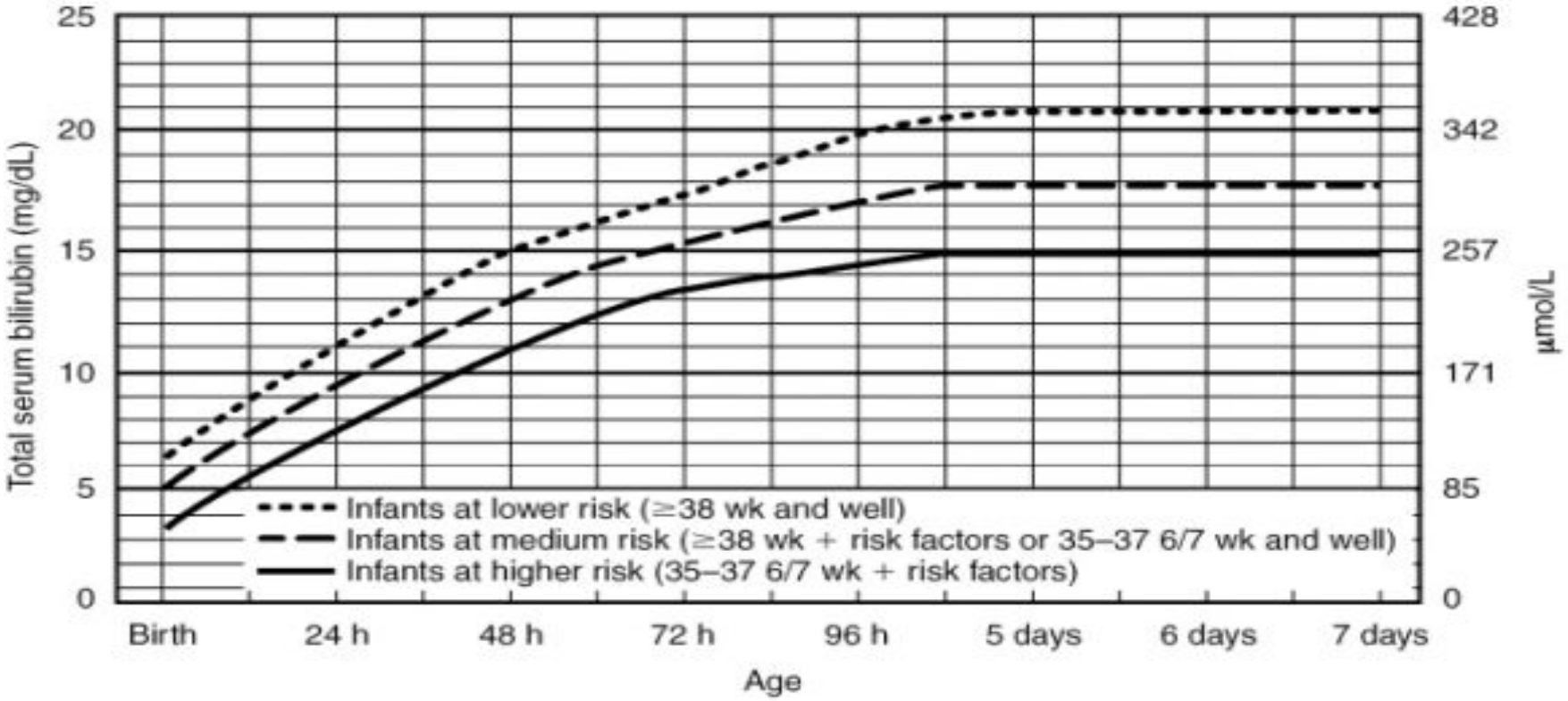
Note: These guidelines are based on limited evidence and the levels shown are approximations. During birth hospitalization, exchange transfusion is recommended if TSB rises to these levels despite intensive phototherapy. For readmitted infants, if TSB is above exchange level, repeat TSB every 2-3 hr and consider exchange if TSB remains above levels indicated after intensive phototherapy for 6 hours.



- 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 25mg/dL, (85µmol/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.

Guidelines for Phototherapy in Hospitalized infants ≥ 35 Weeks

Note: These guidelines are based on limited evidence and the levels shown are approximations. The guidelines refer to the use of intensive phototherapy which should be used when the TSB exceeds the line indicated for each category.



- 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 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 wk 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 (35-50 µmol/L) below those shown but home phototherapy should not be used in any infant with risk factors.

Extrahepatic biliary atresia. Central vein surrounded by hepatocytes. Intracanalicular bile plugs are present. In addition, hepatocytes contain intracytoplasmic bile pigment granules. Paraffin embedding and hematoxylin-eosin staining.