



## Perinatal Manual of Southwestern Ontario

A collaboration between the Regional Perinatal Outreach Program of Southwestern Ontario & the Southwestern Ontario Perinatal Partnership (SWOPP)

## Chapter 22

### NEONATAL HYPERBILIRUBINEMIA

*"Hyperbilirubinemia in apparently healthy term newborn infants continues to hold the potential threat of complications from bilirubin encephalopathy and kernicterus".*

*Canadian Paediatric Society Statement 1999*

*"Approach To The Management Of Hyperbilirubinemia In Term Newborn Infants"*

#### Physiologic Jaundice

1. Common due to neonatal:
  - ↑ RBC volume
  - ↓ RBC lifespan
  - ↑ Enterohepatic recirculation (meconium)
2. Becomes visible at 85-120  $\mu\text{mol/L}$
3. Baby is otherwise well
4. Elevated unconjugated bilirubin level only
5. Appears after 24 hours of life and before 4 days
6. In the term infant, the bilirubin peaks at 4-5 days
7. Lasts up to 1 week in term, 2 weeks in preterm infants

#### Other Causes Of Jaundice

1. Breakdown of RBC's:
  - Blood group (ABO) and Rh incompatibility (Anti-D)
  - Rare group incompatibility (eg: Kell, Duffy, c,e)
  - Polycythemia
  - Venous HCT > 65, HGB > 220 g/L
2. Sequestered blood
  - Bruising
  - Hematoma
3. RBC defects
  - G6PD
  - Spherocytosis

**Disclaimer**

The Regional Perinatal Outreach Program of Southwestern Ontario has used practical experience and relevant legislation to develop this manual chapter. We recommend that this chapter be used as a reference document at other facilities. We accept no responsibility for interpretation of the information or results of decisions made based on the information in the chapter(s).

4. Sepsis

5. ↓ Conjugation of Bilirubin:

- Prematurity
- “Breast milk jaundice”  
(studies have show that infants supplemented with L-aspartic acid, enzyme hydrolyzed casein formulas and whey/casein formulas have been shown to decrease bilirubin levels by a statistically significant amount over solely breast feeding)<sup>1</sup>
- Inherited defects
- Drugs

6. Inability to excrete bile:

- Biliary atresia (mainly conjugated hyperbilirubinemia)

7. ↑ Reabsorption from GI tract:

- Obstruction
- NPO (Delayed feeds)

## **Breast Milk Jaundice**

1. Late/true:

- 0.5-1% of breast-fed babies
- Bilirubin peaks in 2nd-3rd week of life
- Exact cause unknown: Suggestions enzymes in breast milk, free fatty acids
- No reports of encephalopathy
- Baby otherwise well
- Elevated unconjugated bilirubin (**no** elevation of conjugated bilirubin)
- Management: Continue unsupplemented breastfeeding
- May continue for several weeks/months

2. Early:

- Related to infrequency of breastfeeding or ineffective suckling
- Breast milk is a natural laxative which will affect the enterohepatic circulation
- Water supplementation will not flush out bilirubin, but may inhibit lactation
- Management: Feed more frequently at the breast

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1 Gourley et al. A controlled, randomized, double-blind trial of prophylaxis against jaundice among breastfed newborns. *Pediatrics* 2005;116(2):385-391.

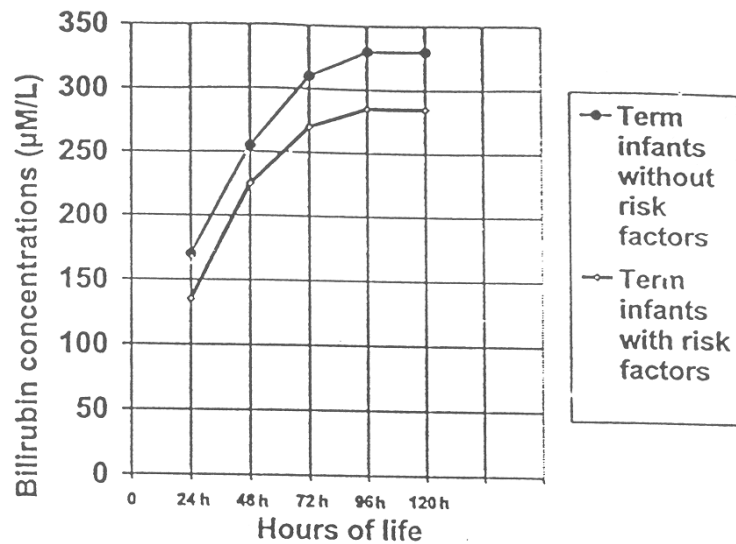
<b>TABLE 1: LABORATORY INVESTIGATIONS FOR HYPERBILIRUBINEMIA IN TERM NEWBORN INFANTS</b>	
<b>Indicated</b>	<b><i>(If bilirubin concentrations reach phototherapy levels)</i></b> Serum total or unconjugated bilirubin concentration Serum direct conjugated bilirubin concentration Blood group with direct antibody test (Coombs' test) Hemoglobin and hematocrit determinations
<b>Optional</b>	<b><i>(In specific clinical circumstances)</i></b> Complete blood count including manual differential white cell count Blood smear for red cell morphology Reticulocyte count Glucose-6-phosphate dehydrogenase screen Serum electrolytes and albumin or protein concentrations

### **Phototherapy**

The infant receiving phototherapy should have as much skin as possible exposed to the lights. More intense phototherapy may be achieved by using multiple sources of phototherapy: double or triple phototherapy is recommended to optimize the skin surface exposed and, therefore, the efficacy of phototherapy.

All jaundiced infants should be adequately hydrated before and during phototherapy. Breastfeeding is not contraindicated in the presence of hyperbilirubinemia and should be continued. More frequent breastfeedings may be beneficial.

For infants with prolonged jaundice (lasting longer than seven days) or with conjugated hyperbilirubinemia (greater than 30  $\mu\text{mol/L}$ ), additional investigation and management may be required, and a consultation with a specialist may be needed.



Guidelines for initiation of phototherapy for hyperbilirubinemia in term infants with and without risk factors.

Some risk factors include gestational age, 37 weeks, birth weight <2500g, hemolysis, jaundice at <24 hours of age, sepsis and need for resuscitation at birth.

Canadian Pediatric Society, March 1999

### **Nursing Care of Infant Receiving Phototherapy**

1. If possible, use a servo-controlled incubator with the skin probe set to 36-36.5°C, or keep the incubator 1°C below the recommended neutral-thermal environment for body weight and postnatal age
2. Monitor the infant (and incubator) temperatures hourly until stable, then every four hours
3. Keep the infant naked
4. Cover the eyes with patches - remove for feedings and to detect irritation/infection
5. Weigh infant daily
6. Increase fluid intake by 25 ml/kg/day for infants on fixed intakes (usually no need to complement breastfed infants)
7. Reposition infant after each feed for maximal exposure
8. Turn off phototherapy lights when drawing blood sample

### **Kernicterus/Bilirubin Encephalopathy**

The timely recognition of risk factors is essential to minimize the danger of kernicterus. The risk factors are as follows:

- Gestational age younger than 37 weeks and birth weight less than 2500 g.
- Hemolysis due to maternal isoimmunization, G6PD deficiency, spherocytosis or other causes
- Jaundice at less than 24 hours of age
- Sepsis
- The need for resuscitation at birth
- Respiratory disease
- Acidosis
- Medications that interfere with bilirubin binding (ie: sulphonamides)

## **Exchange Transfusion**

For healthy term infants without risk factors, exchange transfusion should be considered at serum unconjugated bilirubin concentrations of 400 to 430  $\mu\text{mol/L}$ .

For term infants with risk factors, the level should be 340  $\mu\text{mol/L}$ . For infants who initially present with serum bilirubin concentrations in excess of exchange levels, intensive phototherapy should produce a decline of serum unconjugated bilirubin from 20 to 35  $\mu\text{mol/L}$  within 4 to 6 hours, and levels should continue to fall thereafter and remain below the threshold for exchange transfusion. If the bilirubin concentration does not decrease after adequate rehydration and 4 to 6 hours of intensive phototherapy, exchange transfusions should be considered.

## **Reference**

1. Canadian Paediatric Society Statement (A Joint Statement with the College of Family Physicians of Canada) "Approach to the management of hyperbilirubinemia in term newborn infants". *Paediatric Child Health*, Vol 4, No 2, March 1999. – *currently under revision*