

The following vignette applies to the next 2 items.

A 4-day-old full-term boy is brought to the physician for his first office visit after an uncomplicated vaginal delivery and newborn nursery course. The mother's blood type is A positive, and prenatal laboratory results and ultrasound were normal. Birth weight was 3.4 kg (7 lb 8 oz) and length was 48.5 cm (18 in). He has been exclusively breastfed since birth and nurses for 10 minutes on each breast every 4 hours. The infant passed several dark-brown, sticky meconium stools during the first 2 days of life but has had only smears of dark yellow stool today. He has 3 wet diapers each day. For the past day, his diapers have appeared as shown below.



The neonate's current weight is 3.15 kg (6 lb 15 oz). He has scleral icterus and jaundice of the face, chest, and abdomen. The rest of his physical examination is normal. Laboratory results are as follows:

Total bilirubin 15 mg/dL

Direct bilirubin 0.9 mg/dL

Item 1 of 2

Which of the following is the most likely cause of this infant's hyperbilirubinemia?



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Item 1 of 2

Which of the following is the most likely cause of this infant's hyperbilirubinemia?

- ☐ A. Alloimmune hemolytic disease
- ☐ B. Biliary atresia
- ☐ C. Breast milk jaundice
- ☐ D. Breastfeeding failure jaundice
- ☐ E. Dubin-Johnson syndrome
- ☐ F. Galactosemia

Submit

Item 2 of 2

Which of the following is the best next step in management of this patient?

- ☐ A. Administer Rho(D) immune globulin to the infant's mother
- ☐ B. Breastfeed 15 minutes per side every 2-3 hours
- ☐ C. Continue current feeding regimen, follow-up in 1 week
- ☐ D. Phototherapy and exchange transfusion
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- ☐

A. Alloimmune hemolytic disease [7%]
- ☐

B. Biliary atresia [4%]
- ☐

C. Breast milk jaundice [36%]
- ☒

D. Breastfeeding failure jaundice [45%]
- ☐

E. Dubin-Johnson syndrome [5%]
- ☐

F. Galactosemia [3%]

Proceed to Next Item

Explanation:

User Id:

Breastfeeding failure jaundice vs breast milk jaundice			
Diagnosis	Timing	Pathophysiology	Clinical features
Breastfeeding failure jaundice	First week of life	Lactation failure resulting in: <ul style="list-style-type: none">Decreased bilirubin eliminationIncreased enterohepatic circulation	<ul style="list-style-type: none">Suboptimal breastfeedingSigns of dehydration
Breast milk jaundice	Starts at age 3-5 days; peaks at 2 weeks	High levels of β -glucuronidase in breast milk deconjugate intestinal bilirubin & increase enterohepatic circulation	<ul style="list-style-type: none">Adequate breastfeedingNormal examination

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Breastfeeding failure jaundice is exaggerated unconjugated hyperbilirubinemia in the

Jaundice	at 2 weeks	Intestinal bilirubin & increase enterohepatic circulation	• Normal examination
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Breastfeeding failure jaundice is exaggerated unconjugated hyperbilirubinemia in the **first week of life** that is caused by **lactation failure**. It can be caused by both maternal (eg, inadequate milk supply, cracked/clogged nipples, engorgement, **infrequent feeding**) and infant (eg, **poor latch**, ineffective suck, falling asleep) factors. Normal infants pass dark, sticky meconium during the first 2 days of life, after which they should transition to yellowish or green stool if ingesting adequate milk. Inadequate stooling results in decreased bilirubin elimination and increased enterohepatic circulation of bilirubin.

In addition to jaundice, infants with breastfeeding failure are often dehydrated. During the first week of life, the normal number of wet diapers a day should equal the infant's age in days (eg, a 4-day-old infant should have ≥ 4 wet diapers a day). This infant has lost 7% of his birth weight, has slightly decreased urine output, and has **"brick-red" urate crystals** in his diapers, all of which are signs of mild dehydration. He also has not passed yellow-seedy stools. These clinical findings and the 4-hour feeding intervals make breastfeeding failure jaundice the most likely diagnosis.

(Choice A) Alloimmune hemolytic disease is caused by hemolysis of fetal red blood cells due to ABO or Rh incompatibility. ABO hemolytic disease affects almost exclusively infants with blood types A or B who are born to mothers with type O blood. Routine testing for infant blood type is unnecessary as ABO and Rh incompatibility is unlikely to occur with maternal A+ blood type.

(Choice B) Biliary atresia presents with conjugated hyperbilirubinemia (direct bilirubin $>20\%$ of total bilirubin) in the first 2 months of life. Other findings include clay-colored stools, dark urine, and an enlarged liver, none of which are present in this infant.

(Choice C) Breast milk jaundice can be distinguished from breastfeeding failure jaundice if the infant has no signs of dehydration or feeding problems, making this diagnosis unlikely.

(Choice E) Dubin-Johnson syndrome is a rare autosomal recessive condition characterized by conjugated hyperbilirubinemia, which this infant does not have. Affected individuals are usually asymptomatic except for mild scleral icterus.

(Choice F) Galactosemia is a rare cause of conjugated hyperbilirubinemia due to galactose-1-phosphate uridyl transferase deficiency. In addition to jaundice, neonates develop vomiting and growth failure due to inability to digest galactose in breast milk or cow's milk-based formulas.

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Educational objective:

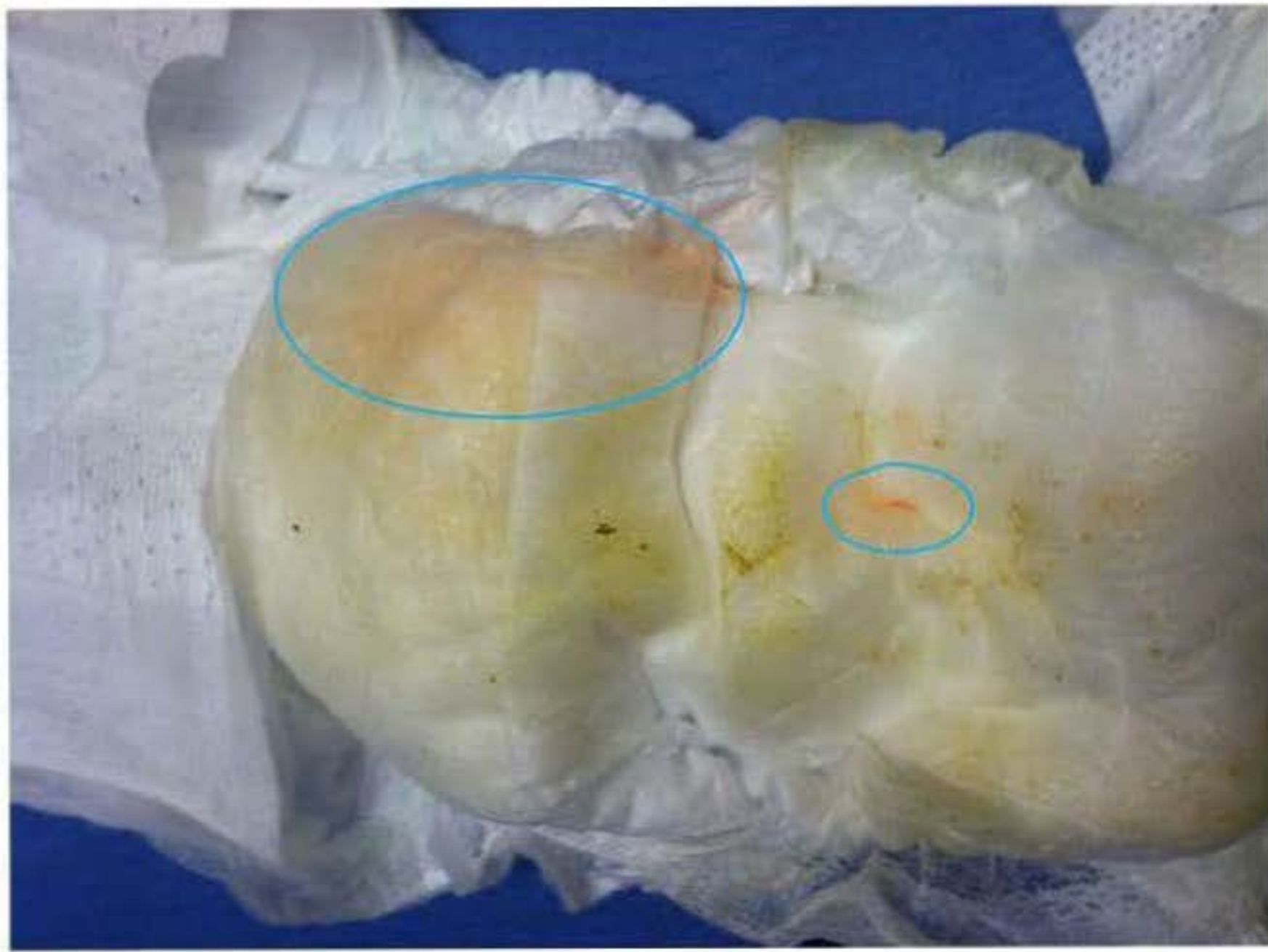
Breastfeeding failure jaundice manifests as unconjugated hyperbilirubinemia and dehydration in the first week of life. Inadequate stooling results in suboptimal bilirubin elimination and increased enterohepatic circulation of bilirubin.

References:

1. [Breastfeeding and jaundice](#)
2. [Neonatal jaundice and human milk.](#)
3. [Hyperbilirubinemia in the newborn infant > or =35 weeks' gestation: an update with clarifications.](#)
4. [Management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation.](#)

Media Exhibit

crystals secondary to dehydration



Item 2 of 2

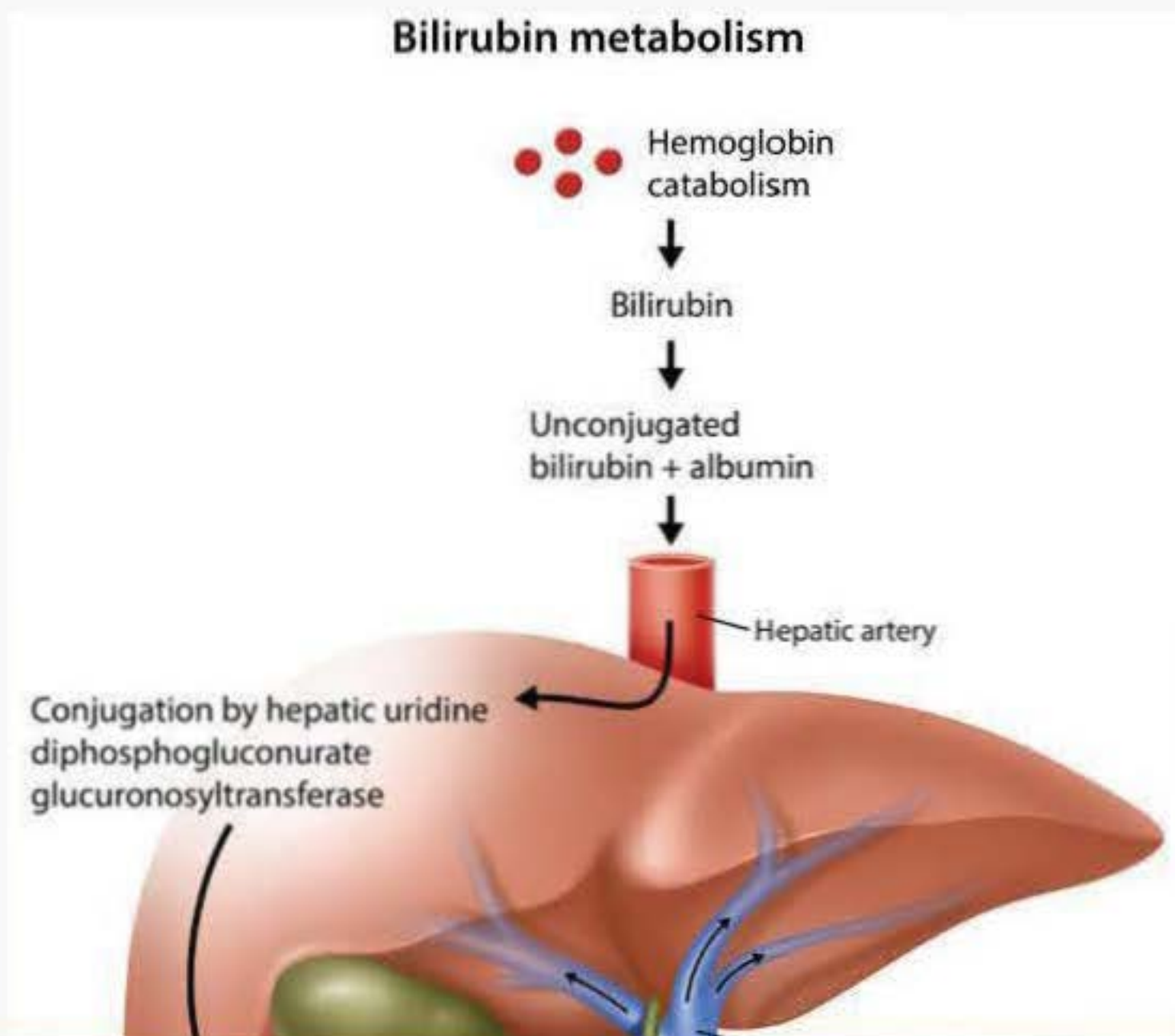
Which of the following is the best next step in management of this patient?

- ☐ A. Administer Rho(D) immune globulin to the infant's mother [1%]
- ☒ B. Breastfeed 15 minutes per side every 2-3 hours [69%]
- ☐ C. Continue current feeding regimen, follow-up in 1 week [12%]
- ☐ D. Phototherapy and exchange transfusion [10%]
- ☐ E. Switch to a cow's milk-based formula [5%]
- ☐ F. Switch to soy formula [3%]

Proceed to Next Item

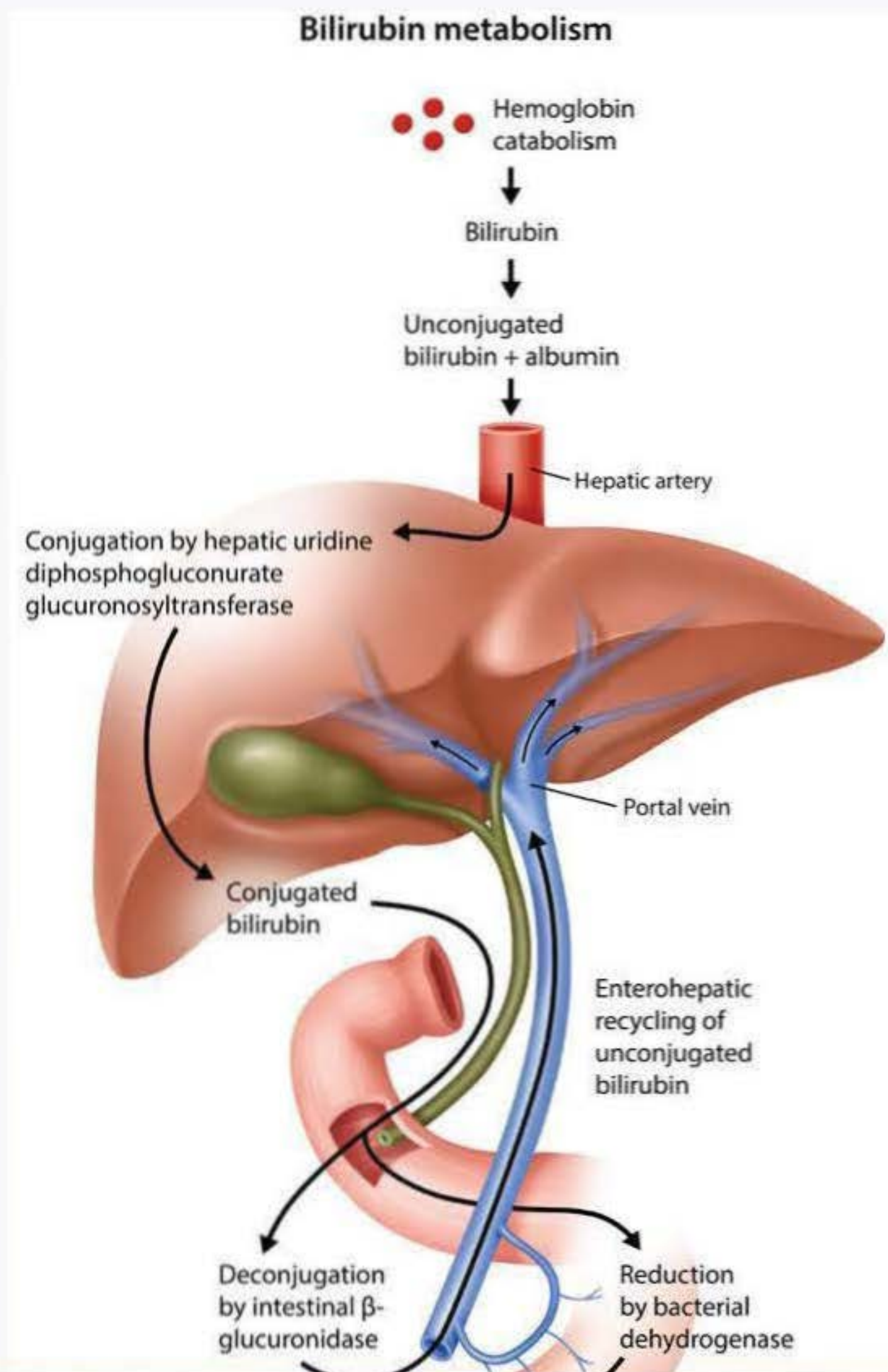
Explanation:

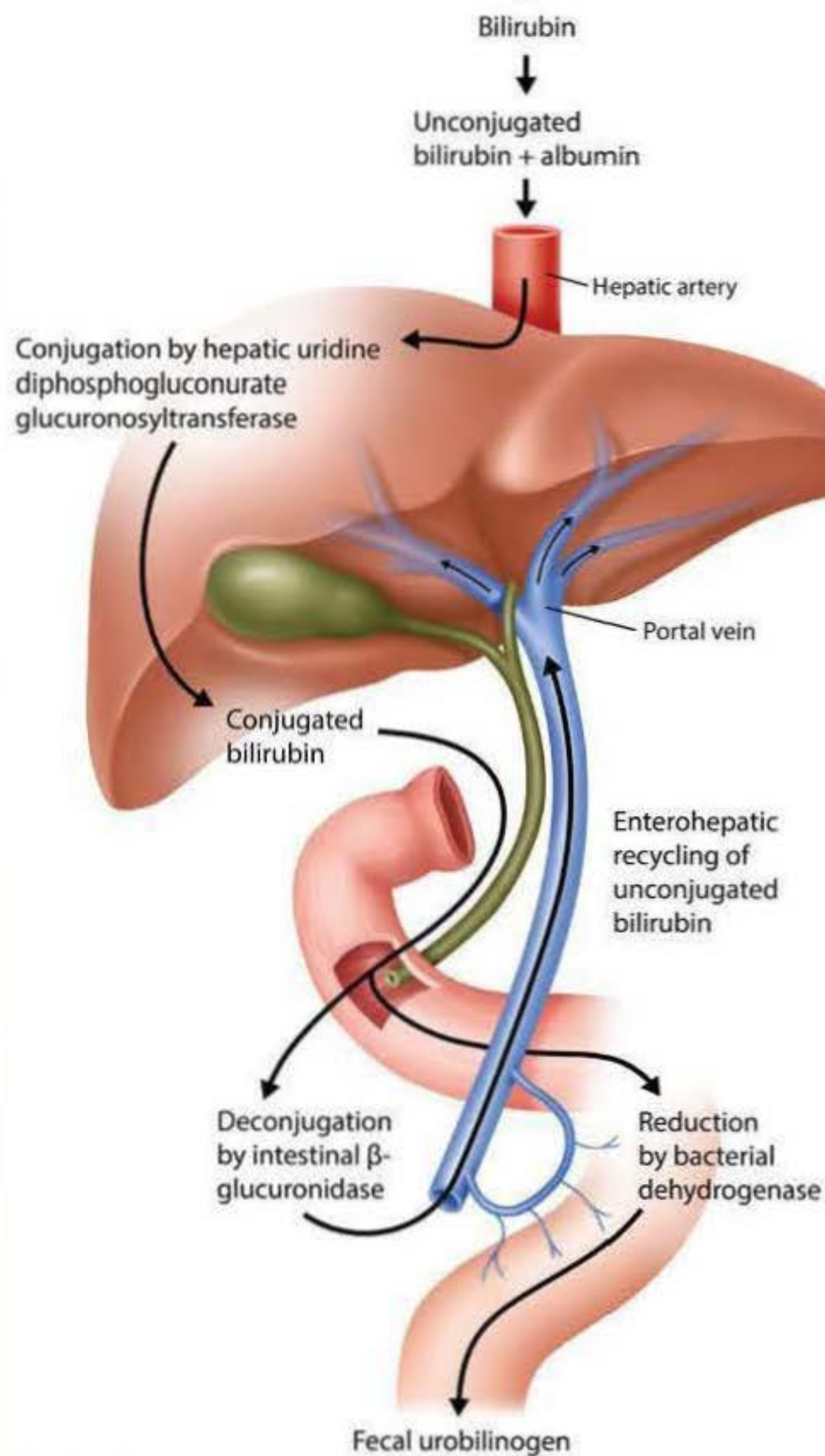
User Id: [REDACTED]



Explanation:

User Id: [redacted]





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All newborns have mild unconjugated hyperbilirubinemia due to high hemoglobin turnover

Fecal urobilinogen

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All newborns have mild unconjugated hyperbilirubinemia due to high hemoglobin turnover and immature hepatic uridine diphosphogluconurate glucuronosyltransferase activity. Bilirubin is excreted primarily through the stool, and inadequate feeding can result in bilirubin accumulation.

The best treatment for breastfeeding failure jaundice in otherwise healthy full-term newborns is to increase the frequency and duration of feeds to stimulate milk production, maintain adequate hydration, and promote bilirubin excretion. Neonates should breastfeed ~8-12 times a day (**every 2-3 hours**) for ≥10-20 minutes per breast during the first month of life. When bilirubin is eliminated as **fecal urobilinogen**, less bilirubin is reabsorbed and recycled in the enterohepatic circulation, thereby decreasing serum bilirubin levels.

This infant should be closely monitored to ensure that he is being fed adequately and that his bilirubin level is decreasing. If the bilirubin continues to rise despite efforts to optimize lactation, formula supplementation may be necessary (**Choice E**). However, discontinuing breastfeeding and switching to formula will further decrease the mother's milk supply and prevent the infant from receiving the benefits of breastfeeding, which include improved infant immunity and mother-infant bonding.

(**Choice A**) All Rh-negative mothers should receive Rho(D) immune globulin during pregnancy to prevent Rh-antibody hemolytic disease of the newborn. This mother is Rh-positive and does not require Rho(D) immune globulin.

(**Choice C**) Because this infant is mildly dehydrated, feeding frequency should be increased and he should be reevaluated within 2 days. If the unconjugated bilirubin levels continue to rise, the infant is at increased risk of kernicterus and devastating neurologic consequences; waiting a week is too long.

(**Choice D**) The threshold for phototherapy in a full-term, healthy 4-day-old infant is a total bilirubin level ≥20 mg/dL based on the American Academy of Pediatrics bilirubin nomogram. Exchange transfusion is reserved for infants with levels ≥25 mg/dL or those with bilirubin-induced neurologic dysfunction.

(**Choice F**) Galactosemia is an absolute contraindication to breast milk or cow's milk-based formula, and soy formula should be fed to these patients. Soy formula is inappropriate for breastfeeding failure jaundice.

Educational objective:

Treatment of breastfeeding failure jaundice consists of optimizing lactation and