Understanding newborn jaundice

DEAR DR. BENFIELD: Can you explain why newborn babies get jaundiced? Can you also explain how fluorescent lights make the jaundice go away? R.P.

DEAR R.P.: The story of newborn jaundice begins with the life cycle of red blood cells (RBCs) in our blood. The bone marrow continuously produces new RBCs to replace the older RBCs as they age and break apart. The average life span of adult RBCs is 120 days. When elderly RBCs approach the 120 day mark, they become increasingly stiff and lose their ability to bend and flow through the spleen. Once trapped in the spleen, elderly RBCs break up into several parts. One of these breakdown products is called bilirubin, a yellowish pigment. The bilirubin attaches to a protein molecule called albumin and is transported to the liver, where it is processed by liver cells and transformed into bile. The bile is stored in the gall bladder until a meal stimulates the flow of bile into our intestinal tract, giving our stools their color.

Normally, then, the level of bilirubin in our blood is low enough that it doesn’t cause the whites of our eyes or our skin to turn yellow, which is what we mean by jaundice.

Now, let’s shift to fetal life. Before birth, fetal RBCs go through a life cycle similar to the one I’ve just described, but with several differences:

- Fetal RBCs have a shorter life span of approximately 80 days.
- When fetal RBCs reach the 80 day mark and break up, much of the bilirubin produced flows across the placenta into mom’s blood stream.
- This fetal bilirubin is then processed by mom’s liver, not by her baby’s liver.

At the moment of birth, however, this must change. Now the baby’s liver is on its own and must process all the bilirubin and turn it into bile. So, temporarily, the full-term newborn’s liver is said to be immature. But it matures rapidly, over the course of several
Understanding newborn jaundice

days to a week. Meanwhile, the bilirubin level in roughly two-thirds of all newborns reaches a high enough level on the second or third day of life to cause “physiologic” or “normal” newborn jaundice. As a baby’s liver matures, the jaundice fades away.

Occasionally, during this maturing phase, a baby’s bilirubin level will rise high enough to cause concern. We don’t want the bilirubin level to get too high and harm the baby’s brain. So we start treatment with phototherapy, which means placing the baby under a bank of special fluorescent lights or placing the baby on a special light blanket. To protect the baby’s eyes, we shield them with eye patches.

While under the lights, a baby receives a continuous dose of photons of energy, which interact with the bilirubin molecules in the skin and break them down into smaller components. These breakdown products are excreted in the stool, lowering the level of jaundice in the baby.

Phototherapy is remarkably safe. And once the baby’s jaundice has faded away, it usually doesn’t return.

Not all cases of newborn jaundice are benign. For example, a blood group incompatibility between mom and baby may produce high levels of jaundice. In turn, the baby may need an exchange transfusion in order to safely lower the bilirubin level and keep it down. Rarely, more than one exchange transfusion is required.

A serious infection may also cause newborn jaundice. And then there are genetic diseases, such as cystic fibrosis, that may present with newborn jaundice. Taking a good family history, thoroughly examining the baby, and ordering additional tests will usually enable the baby’s doctor to come up with the correct diagnosis.

A further thought: Do you know the story of how phototherapy became a treatment for newborn jaundice? Let’s go back to 1956 and the Rochford General Hospital in Essex, England. Sister Ward, the head nurse in the premature baby unit, loved taking the preemies out to the courtyard for sunshine and fresh air. She thought this would do them more good than their stuffy, overheated incubators.
Understanding newborn jaundice

One day, Sister Ward noticed that a jaundiced preemie was slightly yellow all over except for a small area of skin, which was actually a deep orange. A corner of the sheet had covered this area, blocking out the sun. She concluded that the rest of the infant had been “bleached” by the sun.

A short time later, someone accidentally left a tube of baby’s blood exposed to sunlight for several hours. When the bilirubin level was measured in the tube of blood, it was much lower than before. Sister Ward and her doctors put two and two together and realized that visible light could lower serum bilirubin. Thus, the idea of using fluorescent light to treat newborn jaundice was born.