

August 2008

Shining a Light on Infant Jaundice Problem Statement

Professor Arye Rosen - I'd like to introduce you to Dr. Har'el Rosen, who is a neonatologist with Onsite Neonatal Partners. A neonatologist works with sick and premature newborns. Dr. Har'el Rosen would like the help of this research group in developing a new technology for treating a common problem in newborn infants, that is, infant jaundice.

Dr. Har'el Rosen – Let me begin by explaining the problem. When red blood cells break down, the hemoglobin in the cells is converted to a yellow-orange colored substance called bilirubin. The liver then changes the structure of bilirubin to make it more water soluble so body can clear it more readily.

Now, newborns are by nature immature and the liver is not as good at clearing bilirubin as the liver in an older child or an adult might be. So, the bilirubin tends to accumulate in the bloodstream. This is what we mean by jaundice.

Newborn jaundice is quite common- about half of all newborns will get jaundice to some degree and about 10% of these will need medical intervention. In the 1950s, it was noticed that babies who were nearer to the windows in the nursery tended to be less jaundiced than those in the middle of the room. Since then we have learned that bilirubin absorbs blue light. When this happens, the molecule twists and becomes more water soluble, allowing it to be directly excreted

Three different types of lighting systems have been developed to mimic the effects of sunlight. One type uses regular fluorescent or halogen lamps to shine on the newborn. A second system uses a bright halogen bulb with fiber optic cable linking it to a flat panel. The baby lies on the panel, which has embedded optical fibers. The third form of phototherapy uses LEDs designed to operate at the wavelengths where bilirubin's absorption is. One system uses an overhead bank of blue LEDs, but the LEDs are limited in how much energy they put out. So they are no more effective than what's already out there.

Usmah - Is the whole body is exposed?

Dr. Har'el Rosen - As much as possible. The babies are pretty much naked, though they do cover the eyes so they aren't exposed to the bright light. Of course, if the baby is naked, it will be cold. So phototherapy involves a stay in the special care nursery in an incubator.

Nicholas - What's the duration of the therapy?

Dr. Har'el Rosen - Usually, a few days to about a week. Almost always it's resolved one way or another before the baby is about a week old.

So- we would like you to develop a safe and effective method to deliver blue light therapy in a home setting. Of course, whatever you come up with will need to go through the FDA approval process. We are looking for a unit that is effective, portable, and also durable and safe. We'd like to have something to present to the FDA in six months or so.