Neonatal Jaundice and Phototherapy Treatment

**What is Neonatal Jaundice?**

Neonatal Jaundice is a common, temporary and usually harmless condition in newborn infants. It affects both full-term and premature babies, usually appearing 2-4 days after birth. Prompt treatment may prevent significant lasting damage. If left untreated, may result in irreversible brain damage known as Kernicterus.

Jaundice occurs when there is a build-up of a naturally occurring substance in the blood called bilirubin. Bilirubin is an orange/red pigment in the blood. Bilirubin is produced by the normal breakdown of red blood cells. It is normal for everyone to have low levels of bilirubin in their blood. As bilirubin begins to build up, it deposits on the fatty tissue under the skin causing the baby's skin and whites of the baby's eyes to appear yellow.

Most common cause is Physiological Jaundice and occurs in more than 50% of babies because the baby has an immature liver and bilirubin is processed slower.

**Treatment**

High levels of bilirubin can occur in the blood called hyperbilirubinemia. These high levels can be dangerous to a baby. It is important to obtain periodic blood samples to check the bilirubin levels and, if necessary, to treat jaundice to ensure the healthy development of the infant. Feeding is required every 2-3 hours is recommended to reduce the jaundice levels. Phototherapy with or without a blanket/pad is the most common form of treatment for jaundice. This treatment is used for a few days until the liver is mature enough to handle the bilirubin on its own.

**Phototherapy**

Some “normal” jaundice will disappear within a week or two without treatment. Other babies will require treatment because of the severity of the jaundice, the cause of the jaundice, or how old the baby is when jaundice appears.

Phototherapy is the process of using light to eliminate bilirubin in the blood. These light waves are absorbed by the infant’s skin. LED phototherapy units have greater therapeutic effects than conventional fluorescent lamp-based units. Diaper and eye protection must be applied to infant during treatment.
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Key Factors to Implementing Phototherapy

1. Emission of light source – light wavelength-bilirubin absorbs maximally at 460nm
2. Light Intensity – number of photons delivered per area of exposed skin (30uW.-2.nm or greater over a waveband of 460-490m)
3. Body surface area – more the better
4. Decreased in TSB (Total Serum Bilirubin) during first 4-6 hours of exposure

Phototherapy Systems

The Phototherapy Blanket/Pad is an alternative and/or additional treatment for neonatal jaundice. This system uses fiber optics and represents advanced technology in phototherapy treatment. The Blanket/Pad provides the highest level of therapeutic light available to treat the infant. A pad of woven fibers is used to transport light from a light source to baby. Absorption of this light leads to the elimination of bilirubin. Blue LED intensity is the newest technology in phototherapy systems. High irradiance levels are used to maximize the rate of bilirubin breakdown. LED’s produce no heat which is useful for managing newborns temperatures, quiet for developmental care and not to mention, low cost of ownership compared to the fluorescent and halogen phototherapy systems.

Fluorescent tube phototherapy equipment

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<th>Temperature [°C]</th>
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**TSB after therapy: 10.6 mg/dL (TSB reduction rate: 0.076 mg/dL/h)**

- Gestational age: 39 weeks and 4 days, Birth weight: 2,654 g
- Phototherapy was initiated at 47 hours after birth due to a TSB of 12.5 mg/dL (criterion for phototherapy initiation: 12 mg/dL).
- The temperature inside the incubator was set to 32.2°C and then adjusted to 31.3°C after 3 hours.
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**LED phototherapy equipment**

Our new line of Phototherapy devices from ATOM Medical:

BILI-THERAPY Pad Type delivers effective phototherapy for the treatment of indirect hyperbilirubinemia from the back of the newborn. Effective wavelength (450-480nm) from the light source of blue LED will encourage infant's early discharge from the hospital. BILI-THERAPY Pad Type can be used in a bassinet next to the mother's bed and used with the BILI-THERAPY Spot Type to provide double phototherapy treatment without interfering with visualization of the infant.

Post-therapy TSB: 12.4 mg/dL (TSB reduction rate: 0.275 mg/dL/h)

- Gestational age: 39 weeks and 4 days. Birth weight: 3,206 g
- Phototherapy was initiated at 169 hours after birth due to a TSB of 19.0 mg/dL (criterion for phototherapy initiation: 18 mg/dL)
- The temperature inside the incubator was set to 32.1°C.
Neonatal Jaundice and Phototherapy Treatment

BILI-THERAPY Spot Type provides effective blue LED phototherapy treatment and promotes early hospital discharge by reducing the treatment time in providing high irradiation intensity and effective wavelength (450-475nm). The BILI-THERAPY Spot Type can be mounted on the F-Rail without using a stand for space saving around the incubator or warmer. The examination lamp allows the condition of the infant to be monitored and the dimmer function is ideal for developmental care.