

A Non-Invasive Neonatal Jaundice Screening Device Measuring Bilirubin on Eyes

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Abstract : Bilirubin is a yellow substance that is made when the body breaks down old red blood cells. High levels of bilirubin can cause jaundice, a condition that makes the newborn's skin and the white part of the eyes look yellow. Jaundice is a serial-killer in developing countries in Southeast Asia such as Myanmar and most parts of Africa where jaundice screening is largely unavailable. Worldwide, 60% of newborns experience infant jaundice. One in ten will require therapy to prevent serious complications and lifelong neurologic sequelae. Limitations of current solutions: - Blood test: Blood tests are painful may largely unavailable in poor areas of developing countries, and also can be costly and unsafe due to the insufficient investment and lack of access to health care systems. - Transcutaneous jaundice-meter: 1) can only provide reliable results to caucasian newborns, due to skin pigmentations since current technologies measure bilirubin by the color of the skin. Basically, the darker the skin is, the harder to measure, 2) current jaundice meters are not affordable for most underdeveloped areas in Africa like Kenya and Togo, 3) fat tissue under the skin also influences the accuracy, which will give overestimated results, 4) current jaundice meters are not reliable after treatment (phototherapy) because bilirubin levels underneath the skin will be reduced first, while overall levels may be quite high. Thus, there is an urgent need for a low-cost non-invasive device, which can be effective not only for caucasian babies but also Asian and African newborns, to save lives at the most vulnerable time and prevent any complications like brain damage. Instead of measuring bilirubin on skin, we proposed a new method to do the measurement on the sclera, which can avoid the difference of skin pigmentations and ethnicities, due to the necessity for the sclera to be white regardless of racial background. This is a novel approach for measuring bilirubin by an optical method of light reflection off the white part of the eye. Moreover, the device is connected to a smart device, which can provide a user-friendly interface and the ability to record the clinical data continuously A disposable eye cap will be provided avoiding contamination and fixing the distance to the eye.

Keywords : Jaundice, bilirubin, non-invasive, sclera

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