

## Evaluation of the use of non-invasive hemoglobin measurement in early childhood

Arai Y, Shoji H, Awata K, Inage E, Ikuse T, Shimizu T. *Pediatr Res*. 2022 Jul 29. doi: 10.1038/s41390-022-02204-7.

**Background:** Iron deficiency anemia in children affects psychomotor development. We compared the accuracy and trend of a non-invasive transcutaneous spectrophotometric estimation of arterial hemoglobin (Hb) concentration (SpHb) by rainbow pulse CO-oximetry technology to the invasive blood Hb concentration measured by an automated clinical analyzer (Hb-Lab).

**Methods:** We measured the SpHb and Hb-Lab in 109 patients aged 1-5 years. Regression analysis was used to evaluate differences between the two methods. The bias, accuracy, precision, and limits of agreement of SpHb compared with Hb-Lab were calculated using the Bland-Altman method.

**Results:** Of the 109 enrolled subjects, 102 pairs of the SpHb and Hb-Lab datasets were collected. The average value of measured Hb was  $12.9 \pm 1.03$  (standard deviation [SD]) g/dL for Hb-Lab. A significant correlation was observed between SpHb and Hb-Lab measurements ( $\text{SpHb} = 7.002 + 0.4722 \text{ Hb-Lab}$ , correlation coefficient  $r = 0.548$ , 95% confidence interval = 0.329-0.615). Bland-Altman analysis showed good visual agreement, with a mean bias between SpHb and Hb-Lab of  $0.188 \pm 0.919$  g/dL (mean  $\pm$  SD).

**Conclusions:** We concluded that non-invasive Hb measurement is useful for Hb estimation in children and provides new insights as a screening tool for anemia.

**Impact:** Our results indicated a good correlation between non-invasive transcutaneous spectrophotometric estimation of arterial hemoglobin (Hb) concentration using a finger probe sensor by rainbow pulse CO-oximetry technology and invasive blood Hb concentration. Although previous studies have indicated that in patients with a worse condition, the bias between the two methods was large, this study, which was conducted on children with stable disease, showed a relatively small bias. Further studies using this non-invasive device might help to understand the current status of anemia in Japan and promote iron intake and nutritional management in children.