Non-Invasive Measurement of Continuous Hemoglobin Concentration Via Pulse CO-Oximetry.

Macknet MR, Kimball-Jones PL, Applegate RL, Martin RD, Allard MW. *Anesthesiology.* 107; A1545.

Introduction

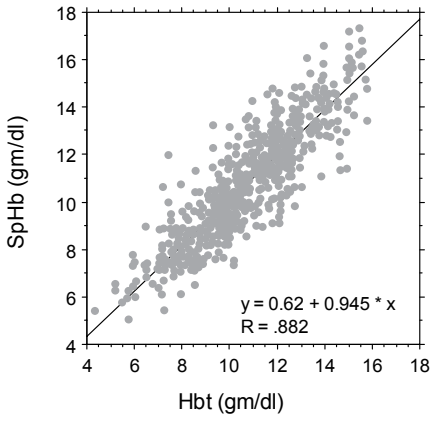
Serial blood draws for the measurement of hemoglobin concentration are standard practice in major surgery, trauma, anemia and dialysis patients but is invasive and time consuming. A device that would allow for continuous real-time, non-invasive monitoring of hemoglobin concentration in these patients and others has the potential to improve clinical care, patient safety and the cost of care. In this study, Macknet and researchers from Loma Linda Medical Center test the accuracy of the prototype Masimo noninvasive total hemoglobin monitor in surgery patients and healthy volunteers compared to invasive CO-Oximetry analysis.

Methods

The accuracy of the prototype Masimo hemoglobin monitor was tested in 30 surgery patients and 18 healthy volunteers. Individuals from both groups were monitored according to ASA standards and fitted with a radial artery cannula and three Masimo prototype total hemoglobin sensors, optically isolated from each other and connected to a data collection system. The healthy volunteers underwent a hemodilution protocol, which consisted of replacing one unit of blood with 30 ml/kg of saline. Data was collected during surgery or during the hemodilution protocol. Readings from the noninvasive hemoglobin sensors (SpHb) were compared to readings from arterial blood gas draws taken at the same time [Hb]. Bias, precision and A_{RMS} were calculated from the 802 data pairs comparing laboratory CO-Oximeter readings to the SpHb readings.

Results

Mean [Hb] +/- SD	10.7 (+/- 2.2)
Range [Hb]	4.4 - 15.8 g/dl
Bias SpHb to [Hb]	0.03
Precision SpHb to [Hb]	1.12
% A_{RMS}	1.12



Authors' Conclusion

"This device is the first device developed that can continuously and noninvasively measure hemoglobin concentration in addition to the other common hemoglobin species and therefore provides a significant expansion to existing physiologic monitoring technology. Rapid measurement of hemoglobin would be extremely useful in many clinical scenarios. This technology in combination with methemoglobin and carboxyhemoglobin measurements should allow for significant advances in patient care."