

New pulse oximeter measures carboxyhemoglobin levels in human volunteers.

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Introduction

For over twenty years, two-wavelength pulse oximetry has not been able to measure dyshemoglobins, such as COHb or MetHb.^{1,2} Masimo Corporation has developed a new eight-wavelength Pulse CO-oximeter, the "Rainbow-SET Rad-57," which is designed to measure COHb% as well as the traditional SpO₂ value. This is the first report of the accuracy of this device in human volunteers.

Methods

Ten healthy volunteers participated, with informed consent and IRB approval. Each subject was monitored with six Rad-57 pulse oximeter sensors, on digits 2, 3, and 4 of each hand. A radial artery cannula was used to sample blood for analysis by laboratory CO-oximetry. Data from all pulse oximeters were recorded and an arterial sample was drawn and analyzed at ten-minute intervals. After obtaining baseline values, subjects breathed 500 ppm carbon monoxide blended with air until reaching a COHb level of approximately 15%. CO was then discontinued and subjects breathed oxygen until their COHb levels decreased to less than 10%.

Results

All subjects met the COHb target of 15%, and none experienced any symptoms. Typical single-subject data comparing the Rad-57 with the CO-oximeters are shown in Figure 1. The pooled data bias (mean error) and precision (standard deviation of error) are 1.22 and 2.19, respectively. The linear regression slope and intercept are 0.781 and 0.703. The standard error of the estimate (SEE) is 1.97.

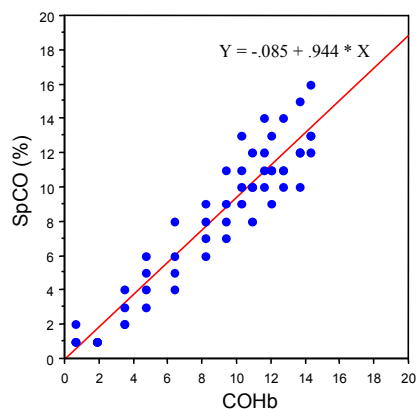


Figure 1
Single subject data for COHb% by
Rad-57 (SpCO) vs. CO-oximeter.

Authors' Discussion

"Until now, no pulse oximeter could measure COHb or accurately estimate SaO₂ in its presence.⁽¹⁾ The new Masimo Rad-57 pulse oximeter performed within its specifications in this volunteer study, measuring COHb% in volunteers with an uncertainty of about 2%. The linear regression slope is slightly less than one, which suggests a calibration adjustment. This new technology represents a major advance in the monitoring of oxygenation. The same principles will allow the measurement of other dyshemoglobins, including methemoglobin."

References

1. Barker SJ, Tremper KK: *Anesthesiology* 66:677-79, 1987.
2. Barker SJ, Tremper KK, Hyatt J: *Anesthesiology* 70:112-17, 1989.