The Measurement of Carboxyhemoglobin and Methemoglobin using a Non-Invasive Pulse CO-Oximeter.

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The Pulse CO-Oximeter (Rad-57 Masimo Corporation, Irvine, CA) allows non-invasive and instantaneous measurement of carboxyhemoglobin (COHb) and methemoglobin (MetHb) percentage level using a finger probe. However, the accuracy and reliability of the Rad-57 against the gold standard of venous or arterial blood samples have not been clearly established. Thus, the objective of this trial is to evaluate the accuracy and precision of the Rad-57 Pulse CO-Oximeter by comparing it with venous sampling on the same subjects.

Nine healthy subjects were subjected to carbon monoxide such that it raised the COHb to 10 to 14% on two different days and pooled together. The COHb and MetHb were measured with a blood gas-analyzer and simultaneously with the Rad-57 as the COHb increased from 1.4 to 14%. Results were compared using linear regression and a Bland and Altman method comparison.

Mean bias and precision for COHb measured with the Rad-57 was-1% and 2.5%, respectively. The mean bias and precision for MetHb measured with the Rad-57 was 0.0% and 0.3%, respectively. The ability to detect a COHb ≥ 10% occurred in 54% of the samples in which COHb was ≥ 10% to 14%. In conclusion, the Rad-57 reads±5% of the true COHb value for 95% of all samples. The Rad-57 seems to be a good substitute as a first screening test of COHb when the Pulse CO-Oximeter reads<15%.