

Measurement of Carboxyhemoglobin and Methemoglobin by Pulse Oximetry: A Human Volunteer Study.

Barker S.J., Curry J., Redford D., Morgan S. *Anesthesiology*. 2006 Nov;105(5):892-7.

Background

A new eight-wavelength pulse oximeter is designed to measure methemoglobin and carboxyhemoglobin, in addition to the usual measurements of hemoglobin oxygen saturation and pulse rate. This study examines this device's ability to measure dyshemoglobins in human volunteers in whom controlled levels of methemoglobin and carboxyhemoglobin are induced.

Methods

Ten volunteers breathed 500 ppm carbon monoxide until their carboxyhemoglobin levels reached 15%, and 10 different volunteers received intravenous sodium nitrite, 300 mg, to induce methemoglobin. All were instrumented with arterial cannulas and six Masimo Rad-57 (Masimo Inc., Irvine, CA) pulse oximeter sensors. Arterial blood was analyzed by three laboratory CO-oximeters, and the resulting carboxyhemoglobin and methemoglobin measurements were compared with the corresponding pulse oximeter readings.

Results

The Rad-57 measured carboxyhemoglobin with an uncertainty of $\pm 2\%$ within the range of 0-15%, and it measured methemoglobin with an uncertainty of 0.5% within the range of 0-12%.

Conclusion

The Masimo Rad-57 is the first commercially available pulse oximeter that can measure methemoglobin and carboxyhemoglobin, and it therefore represents an expansion of our oxygenation monitoring capability.