

Impact of Oxygenation Status on the Noninvasive Measurement of Hemoglobin.

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BACKGROUND: Noninvasive monitoring of hemoglobin (SpHgb) via pulse oximetry has the potential to alert caregivers to blood loss. Previous studies have demonstrated that changes in oxygenation may impact accuracy.

METHODS: Twenty normal volunteers were monitored using SpHgb at sea level, during ascent to 14,000 feet, at 14,000 feet with 100% oxygen delivery, and again at sea level. Each period consisted of 15 minutes of monitoring. SpHgb measurements were compared to a blood sample using Bland Altman analysis. The loss of the SpHgb signal was also recorded.

RESULTS: The mean difference in measured hemoglobin (Hgb) between a venous sample and SpHgb was -2.6 ± 0.96 at 14,000 feet. Ascent to 14,000 feet resulted in a predictable fall in SpO₂ and was associated with loss of the SpHgb signal for half the period of observation (7.4 minutes). In the other three conditions, SpHgb signal was missing 1 to 12.6% of the time. The nadir SpO₂ was not predictive of the loss of SpHgb signal.

DISCUSSION: Changes in oxygenation in normal volunteers are associated with short-term SpHgb signal loss (<10 minutes), but no impact on the measured SpHgb.