Discrepancies between Arterial Oxygen Saturation and Functional Oxygen Saturation Measured with Pulse Oximetry in Very Preterm Infants.

**Background**
Discrepancies between pulse oximetry saturation (SpO₂) and arterial saturation (SaO₂) at low blood oxygenation values have been previously reported with significant variations among instruments and studies. Whether pulse oximeters that attenuate motion artifact are less prone to such discrepancies is not well known. **Objective:** To prospectively assess the agreement of the Masimo V4 pulse oximeter within the critical 85-95% SpO₂ target range.

**Methods**
For all consecutive babies with gestational age <33 weeks, postnatal age <7 days, and an umbilical arterial line, SpO₂ was measured continuously and SaO₂ analyzed on an as-needed basis. Bland-Altman techniques provided estimates of the difference (D = SaO₂ - SpO₂), standard deviation (SD), and 95% limits of agreement (D ± 2*SD).

**Results**
There were 1,032 measurements (114 babies) with SpO₂ between 85 and 95%. The 95% limits of agreement were -2.0 ± 5.8, -2.4 ± 9.2, and -1.9 ± 5.3 in the SpO₂ categories 85-95, 85-89, and 91-95%, respectively. For the SpO₂ categories 85-89% and 91-95%, only 52% (53/101) and 59% (523/886) of SpO₂ values, respectively, corresponded to the analogous SaO₂ categories. In the 85-89% SpO₂ category, SaO₂ was lower than 85% in 39 of the 101 (39%) measurements.

**Conclusion**
SaO₂ was lower on average than SpO₂ with an increased bias at lower saturation. The -2.4 ± 9.2 95% limits of agreement for SaO₂ - SpO₂ in the 85-89% SpO₂ category suggest that SpO₂ and SaO₂ are not interchangeable and intermittent SaO₂ assessments are warranted when the targeted SpO₂ is within this range.