

Comparison of EQUANOX™ 7600 and INVOS® 5100 cerebral oximeters in cardiac surgery patients

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Introduction

It was recently shown in healthy volunteers that EQUANOX technology provides an accurate measure of cerebral tissue oxygen saturation (1) and that the INVOS monitoring yielded an exaggerated fall in cerebral tissue oxygen saturation (cO₂) with an hypoxic challenge compared to jugular bulb venous saturation (2). The present study compared simultaneous measurements from two NIRS cerebral oximeters: INVOS 5100 (Somanetics Corp., Troy, MI) and EQUANOX 7600 (Nonin Medical, Minneapolis, MN) in cardiac surgery patients.

Methods

After approval by the institutional ethical committee and written informed consent, 10 elective on-pump cardiac surgical patients were included. In addition to routine monitoring, INVOS and EQUANOX 8000CA (3 wavelength) adult sensors were randomly placed on the right and left forehead. Absolute and trending NIRS-derived cO₂ values determined by the INVOS and EQUANOX monitors were analysed using linear regression analysis and bias and precision determination.

Results

10 patients underwent uneventful combined coronary artery bypass and valve surgery (7 aortic valve replacement and 3 mitral valve plasty). Equanox system showed greater signal stability than INVOS throughout the surgical periods including periods when no clinical alterations which would be indicative of status changes. Regression analysis for both cerebral monitoring systems is shown in Figure 1 and bias and precision calculation in Figure 2.

Figure 1. EQUANOX compared to INVOS in cardiac surgery patients (n = 10)

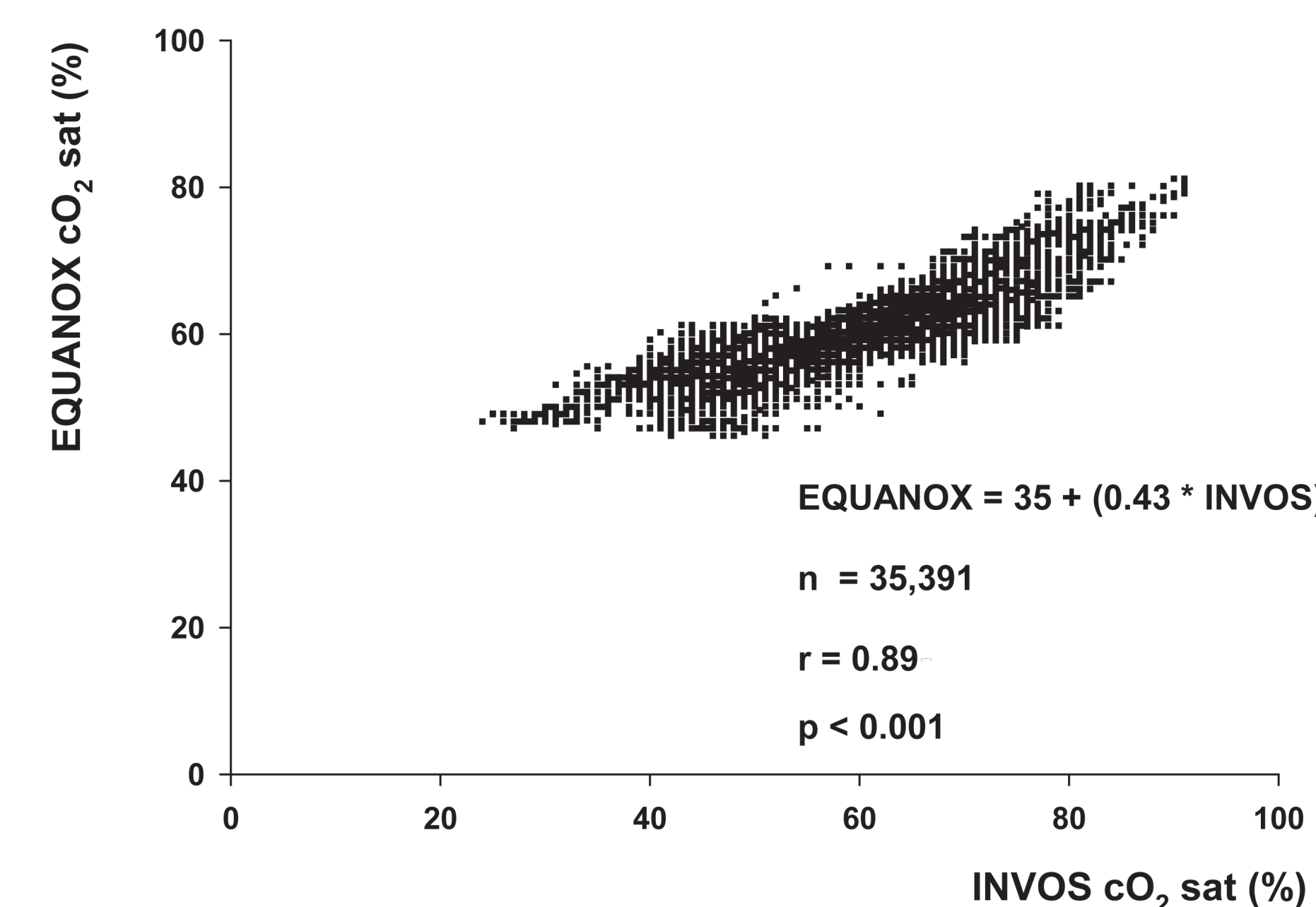
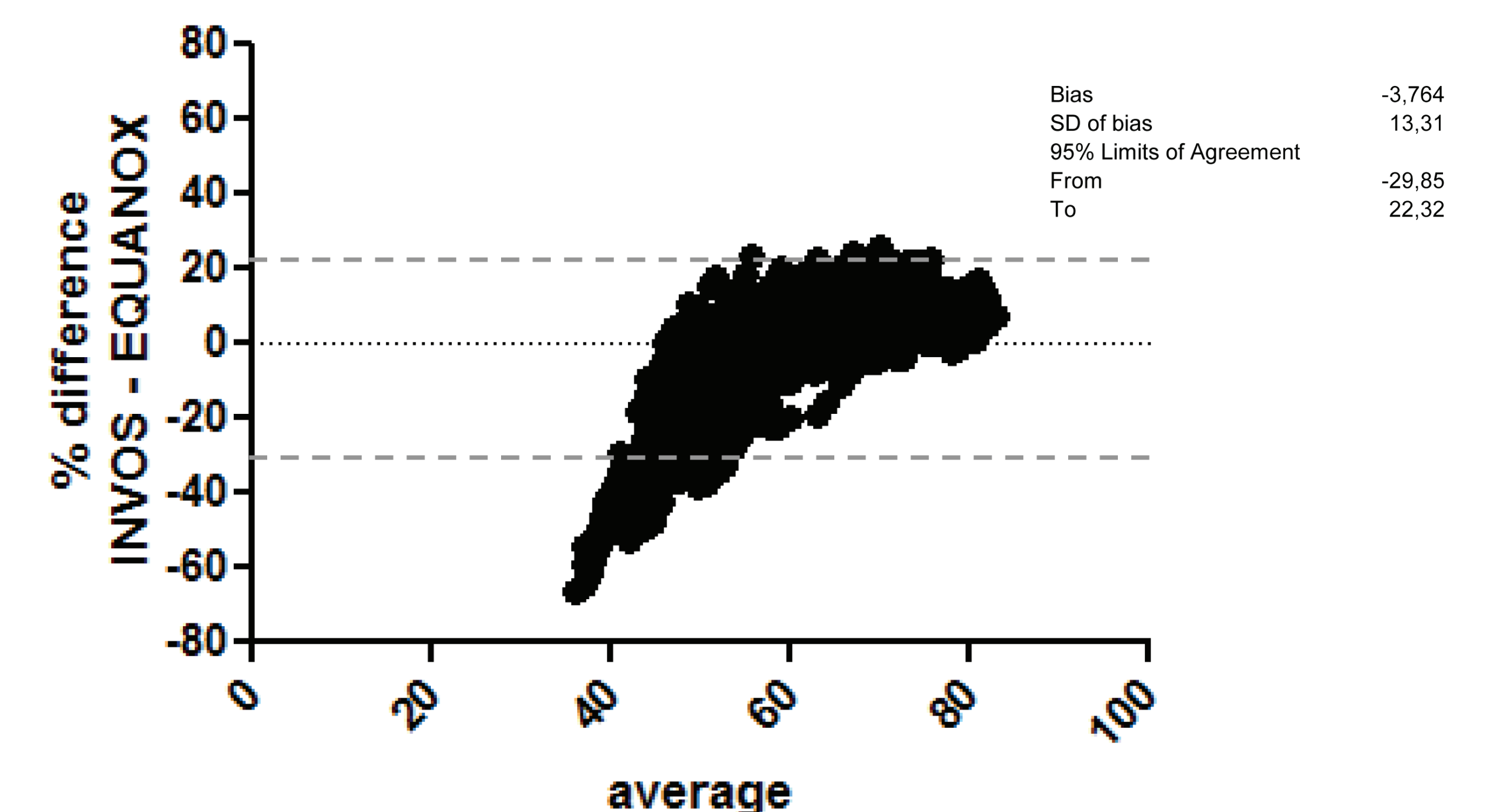


Figure 2. Bland-Altman: % difference vs average



Conclusion

Both systems provide comparable cO₂ data when cerebral oxygen saturation is higher than 50%. Below 50% however, the INVOS monitoring system reports lower oxygen saturations than the EQUANOX system. Corresponding clinical scenarios led us to believe that the INVOS system was over-estimating decreases at low saturations.