

SCA56**Simultaneous Comparison of FORE-SIGHT and INVOS Cerebral Oximeters to Jugular Bulb and Arterial Co-Oximetry Measurements in Healthy Volunteers**

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Introduction: The purpose of this study is to compare simultaneous measurements from two FDA-approved near-infrared spectroscopy (NIRS) cerebral oximeters: FORE-SIGHT® (CAS Medical Systems, Branford CT USA), and INVOS® 5100 (Somanetics Corp., Troy MI USA) against the commonly used gold standard of weighted co-oximetry jugular bulb and arterial oxygen saturation values during episodes of deliberate oxygen desaturation.

Methods: Healthy adult subjects were enrolled in this volunteer study after obtaining written informed consent. A right internal jugular bulb catheter and a left radial arterial line were placed. FORE-SIGHT and INVOS adult sensors were placed on the right & left forehead respectively. A Sequential Gas Delivery system (Respiract, Thornhill Research, Toronto, Canada) was used to deliver gas mixtures following a protocol of step changes of room air, 21%, 8%, 21%, & 50% inspired oxygen at five minute intervals. Oxygen saturation (SpO₂) was maintained >70% when measured at the finger. Blood samples were drawn simultaneously from the jugular bulb (SjbO₂) and radial arterial (SaO₂) catheters and analyzed for oxygen tension using a co-oximeter (GEM 4000, IL, Lexington MA USA). Co-oximeter reference values, CX(F) and CX(I), were calculated based upon previous validation studies of each monitor: CX(F) = 0.3xSaO₂ + 0.7xSjbO₂; CX(I) = 0.25xSaO₂ + 0.75xSjbO₂.

Absolute NIRS-derived cerebral tissue oxygen saturation values determined by the FORE-SIGHT (SctO₂) and INVOS (rSO₂) monitors were modeled as a function of CX(F) and CX(I) using linear regression. Bias and precision (1 standard deviation) were also determined.

Results: Nine subjects (6 male/3 female; 7 Caucasian/2 African American; Age: 21-34 y; weight 56-95 kg) completed the study protocol. A total of 43 samples were analyzed. PaO₂ ranged from 38 - 449 mmHg; PjbO₂ ranged from 25 - 63 mmHg and PaCO₂ ranged from 31 - 53 mmHg. The range of baseline room air values for FORE-SIGHT SctO₂ was 68-76% and for INVOS rSO₂ was 48-87%. The range of baseline room air reference values for CX(F) was 71-80% and for CX(I) was 69-79%. Regression lines for absolute cerebral tissue oxygen saturation values against co-oximeter reference values are shown in Figure 1.

Conclusion: The results demonstrate that the FORE-SIGHT cerebral oximeter monitor has greater precision with respect to measuring absolute cerebral tissue oxygen saturation than the INVOS cerebral oximeter monitor.

