

## 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.

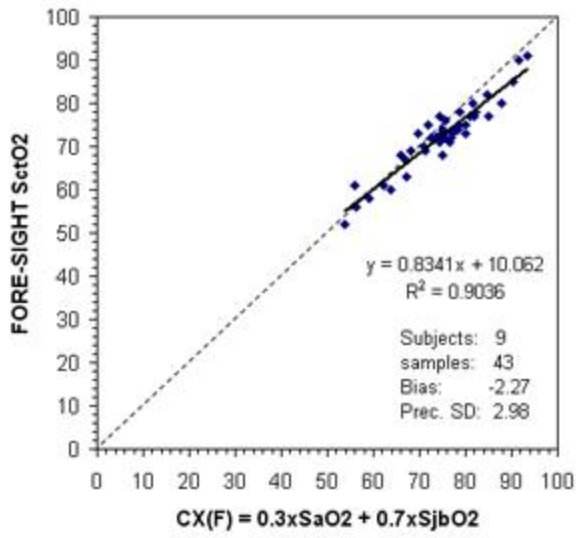
**Methods:** Healthy adult subjects were enrolled in this volunteer study after obtaining written informed consent. A right internal jugular bulb catheter and a left radial arterial line were placed. FORE-SIGHT and INVOS adult sensors were placed on the right & left forehead respectively. A Sequential 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 (SpO<sub>2</sub>) was maintained >70% when measured at the finger. Blood samples were drawn simultaneously from the jugular bulb (Sj<sub>b</sub>O<sub>2</sub>) and radial arterial (SaO<sub>2</sub>) 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:  $CX(F) = 0.3 \times SaO_2 + 0.7 \times Sj_bO_2$ ;  $CX(I) = 0.25 \times SaO_2 + 0.75 \times Sj_bO_2$ .

Absolute NIRS-derived cerebral tissue oxygen saturation values determined by the FORE-SIGHT (SctO<sub>2</sub>) and INVOS (rSO<sub>2</sub>) 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. PaO<sub>2</sub> ranged from 38 - 449 mmHg; Pj<sub>b</sub>O<sub>2</sub> ranged from 25 - 63 mmHg and PaCO<sub>2</sub> ranged from 31 - 53 mmHg. The range of baseline room air values for FORE-SIGHT SctO<sub>2</sub> was 68-76% and for INVOS rSO<sub>2</sub> 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.

Figure 1 FORE-SIGHT absolute comparison



INVOS absolute comparison

