



NONIN EQUANOX 8004CA ADVANCE CEREBRAL OXIMETER SENSOR PROVIDES VALID ASSESSMENT OF TRUE TISSUE OXYGEN SATURATION



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Introduction

Near infra-red spectroscopy (NIRS) regional oximeters estimate cerebral tissue oxygen saturation (rSO_2) and is a composite value based on the relative proportions of arterial and venous blood within brain tissue. Nonin has developed a regional oximeter with dual emitter - detector sensor architecture to eliminate the influence of variations in non-cerebral tissue (eg:scalp). The aim of this study was to calibrate and validate a new four wavelength cerebral oximeter sensor.

Methods

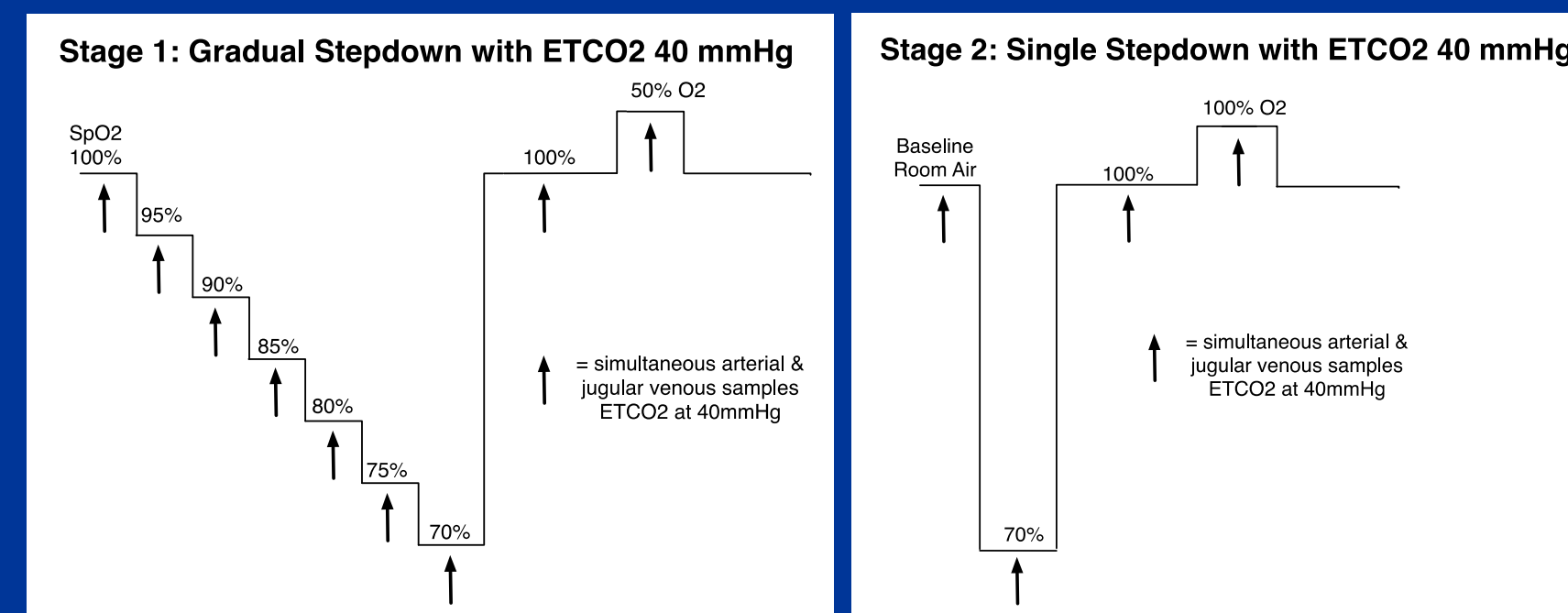
Adult ASA 1 volunteers were enrolled. An internal jugular venous bulb catheter and a radial artery catheter were placed. Cerebral sensors were placed bilaterally on the forehead and a pulse oximeter was placed on the ear.

NIRS-derived rSO_2 and pulse oximeter saturation (SpO_2) were recorded continuously at 1Hz. Hypoxia was induced and managed via a dedicated facemask and breathing apparatus (Respiract, Thornhill Research, Toronto); continuous end-tidal CO_2 and O_2 were monitored.



Subjects underwent two standardized breathe-down protocols in sequence:

- (1) decrease of SpO_2 in approximately 5% increments from 100 to 70%
- (2) decrease of SpO_2 in single step from 100 to 70%.



Each step was maintained for 6 minutes to establish steady-state end-tidal CO_2 and O_2 tensions during which a single jugular bulb blood sample and two arterial blood samples were drawn simultaneously.

Co-oximetry was used to determine the jugular venous saturation ($SjvO_2$) and arterial saturation (SaO_2). The two arterial samples per plateau were averaged to provide one SaO_2 value per plateau.

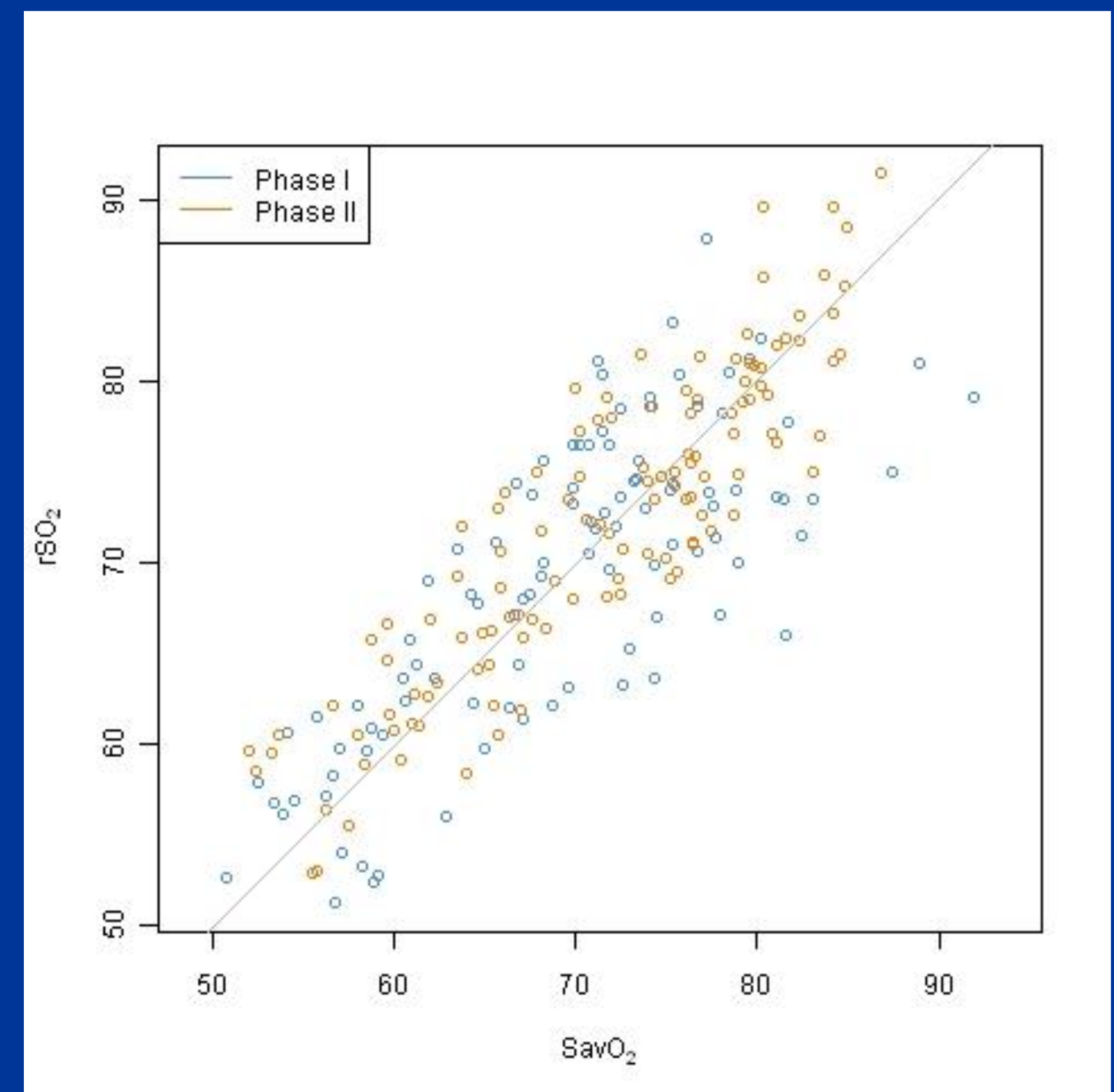
The arteriovenous ($SavO_2$) saturation was then calculated as a 70:30 ratio of $SjvO_2$ to SaO_2 .

$$SavO_2 = [0.70 \times SjvO_2] + [0.30 \times SaO_2]$$

A predetermined ARMS value of 5% was set as the criterion for acceptable accuracy.

Results

24 subjects completed the study (calibration=13; validation=11). Readings were obtained in all subjects and no subjects were excluded from the analysis. Absolute accuracy of rSO_2 compared to calculated $SavO_2$ as measured by ARMS was 4.1%.



Conclusion

This study confirms that Nonin's 4-wavelength cerebral oximeter provides an accurate measure of the calculated cerebral tissue oxygen saturation during deliberate oxygen desaturation in healthy volunteers.

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