



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



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Introduction

Near infra-red spectroscopy (NIRS) regional oximeters estimate cerebral tissue oxygen saturation (rSO₂) 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

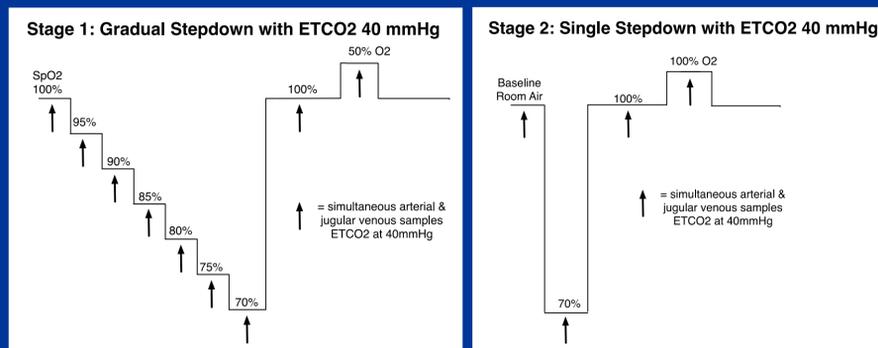
Adult ASA 1 volunteers were enrolled. An internal jugular venous bulb catheter and a radial artery catheter were placed. Cerebral sensors were placed bilaterally on the forehead and a pulse oximeter was placed on the ear.

NIRS-derived rSO₂ and pulse oximeter saturation (SpO₂) were recorded continuously at 1Hz. Hypoxia was induced and managed via a dedicated facemask and breathing apparatus (Respiract, Thornhill Research, Toronto) and monitor continuous end-tidal CO₂ and O₂.



Subjects underwent two standardized breath-down protocols in sequence:

- (1) decrease of SpO₂ in approximately 5% increments from 100 to 70%
- (2) decrease of SpO₂ in single step from 100 to 70%.



Each step was maintained for 6 minutes to establish steady-state end-tidal CO₂ and O₂ 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 (SjvO₂) and arterial saturation (SaO₂). The two arterial samples per plateau were averaged to provide one SaO₂ value per plateau.

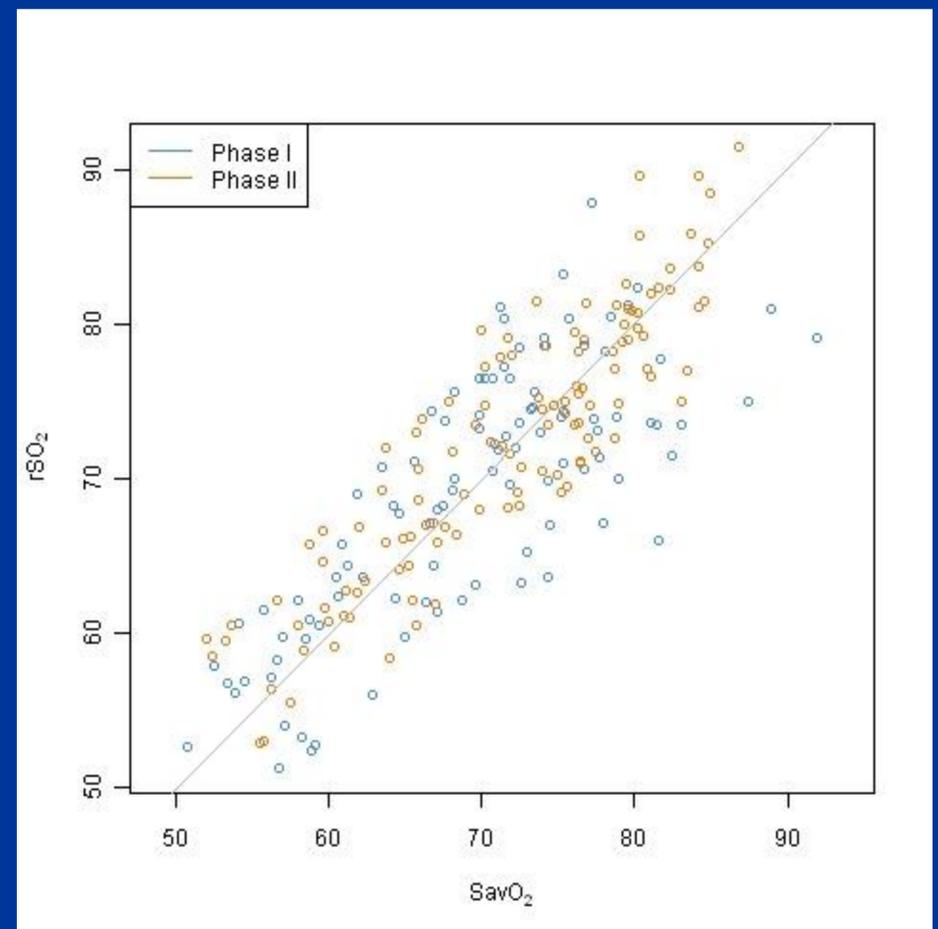
The arteriovenous (SavO₂) saturation was then calculated as a 70:30 ratio of SjvO₂ to SaO₂.

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

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 rSO₂ compared to calculated SavO₂ 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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