



ARTICLE OF THE MONTH

The Effects of Systemic Oxygenation on Cerebral Oxygen Saturation and Its Relationship to Mixed Venous Oxygen Saturation: A Prospective Observational Study Comparison of the INVOS and ForeSight Elite Cerebral Oximeters

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Welcome to the September 2018 SNACC Article of the Month! This month's article about the performance of two cerebral oximeters was chosen and commented on by Veerle De Sloovere. Dr. De Sloovere is an anesthesiologist at the University Hospital in Leuven, Belgium. She has completed fellowships in cardio-thoracic anesthesia, neuroanesthesia and neurointensive care. Her special interests are cerebral autoregulation and perioperative care.

As always, we encourage our readers to give us their feedback on the SNACC [Twitter](#) feed or on [Facebook](#).

~ Nina Schloemerkemper, MD; Oana Maties, MD; Adrian Picurko, MD

Commentary

Veerle De Sloovere, MD

Since the introduction of near infra-red spectroscopy (NIRS), it has been increasingly used in the perioperative setting and in the intensive care unit to monitor brain oxygenation. Presently, five NIRS-based cerebral oximetry devices have received FDA approval for clinical use in patients¹. These commercially available cerebral oximeters all differ in the number of wavelengths of light employed, algorithms, and the principles of operation of NIR spectroscopy used to determine cerebral oxygen saturation.^{2,3}

Few studies⁴⁻⁶ have already highlighted the following issue: "The variability induced by these different algorithms results in differences in cerebral tissue oxygen saturation measured by different NIRS devices, making comparison between them problematic" as mentioned by Ghosh *et al* in *Anesthesia & Analgesia* in 2012.⁷ This raises the question of whether an algorithm used to optimize cerebral oxygenation⁸ mainly developed with one cerebral oximeter is applicable to other cerebral oximeters, or if the cut-off for cerebral desaturation is the same for other cerebral oximeters.

There are limited data addressing the implications of these differences.

In this study, the effects of systemic oxygenation on cerebral oxygen saturation and its relation with mixed venous oxygen saturation were assessed by two different cerebral oximeters on spontaneously ventilating patients who were extubated after cardiac surgery. It was also addressed whether the measurements of both devices can be used interchangeably to detect decreased cerebral oxygen levels.

Schmidt *et al.* found that the two commonly used cerebral oximeters react differently to variations in systemic oxygen delivery and differ in their relationship with mixed venous oxygen saturation, as well as their ability to detect critically reduced mixed venous oxygen.

There are several limitations to this small study that do not allow firm conclusions about this issue, but this paper should make us cautious when transferring results obtained from different cerebral oximeters.

One size does not fit all, both for the patients and for cerebral oximeters.

To be continued by further research ...

References

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