

## **Agreement of somatic and renal near-infrared spectroscopy with reference blood samples during a controlled hypoxia sequence: a healthy volunteer study**

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**Purpose:** O3<sup>®</sup> Regional Oximetry (Masimo Corporation, California, USA) is validated for cerebral oximetry. We aimed to assess agreement of somatic and renal near-infrared spectroscopy with reference blood samples.

**Methods:** O3 sensors were placed bilaterally on the quadriceps and flank of 26 healthy volunteers. A stepped, controlled hypoxia sequence was performed by adding a mixture of nitrogen and room air to the breathing circuit. O3-derived oxygen saturation values were obtained at baseline and at six decremental saturation levels (5% steps). Blood samples (radial artery, iliac vein (somatic reference) and renal vein) were obtained at each step. Reference values were calculated as:  $0.7 \times$  venous saturation +  $0.3 \times$  arterial saturation. The agreement between O3-derived values with blood reference values was assessed by calculating root-mean-square error accuracy and Bland-Altman plots.

**Results:** The root-mean-square error accuracy was 6.0% between quadriceps oxygen saturation and somatic reference values. The mean bias was 0.8%, with limits of agreement from -7.7 to 9.3%. These were 5.1% and 0.6% (-8.3 to 9.5%) for flank oxygen saturation and somatic reference values, respectively, and 7.7% and -4.9% (-15.0 to 5.2%) for flank oxygen saturation and renal reference values. The kidney depth was  $3.1 \pm 0.9$  cm below the skin.

**Conclusion:** O3 regional oximetry can be used on the quadriceps and flank to monitor somatic saturation, yet has a saturation-level dependent bias. O3-derived values obtained at the flank underestimated renal reference values. Additionally, it is unlikely that the flank sensors did directly measure renal tissue.