Oxygen Reserve Index: Validation of a New Variable.

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BACKGROUND: Pulse oximetry-derived oxygen saturation is typically >97% in normoxia and hyperoxia, limiting its clinical use. The new Oxygen Reserve Index (ORi), a relative indicator of the partial pressure of oxygen dissolved in arterial blood (PaO2) in the range of 100–200 mm Hg, may allow additional monitoring of oxygen status.

METHODS: In this prospective validation intervention study, 20 healthy volunteers were breathing standardized oxygen concentrations ranging from mild hypoxia (fraction of inspired oxygen = 0.14) to hyperoxia (fraction of inspired oxygen = 1.0) via a tight-fitting face mask. ORi was measured noninvasively by multiwavelength pulse co-oximetry using 2 finger sensors. These ORi values (unitless scale, 0.00–1.00) were compared with measured PaO2 values. Repeated-measurements correlation analysis was performed to assess the ORi/PaO2 relationship. ORi trending ability was assessed using a 4-quadrant plot. The area under the receiver operating characteristics curve was calculated to assess the prediction of hypoxia (low-ranged PaO2, <100 mm Hg).

RESULTS: Within the ORi-sensitive range, a strong positive correlation was found between ORi and PaO2 for both sensors (R = 0.78 and 0.83; P < .0001). ORi trending of PaO2 was good within this range (concordance rate = 94%). The
prediction of PaO2 <100 mm Hg was also good, with an area under the receiver operating characteristics curve of 0.91 and 99% sensitivity and 82% specificity.

CONCLUSIONS: In this prospective volunteer validation study, a strong and positive correlation between PaO2 and ORi was found, together with a good trending ability. Based on these data, the future use of ORi as a continuous noninvasive monitoring tool for assessing oxygenation status in patients receiving supplemental oxygen might be supported.