

Modern technology–derived normative values for cerebral tissue oxygen saturation in adults.

Eyeington, C. T., Ancona, P., Osawa, E. A., Cutuli, S. L., Eastwood, G. M., & Bellomo, R. *Anaesth Intens Care* 2019.

Abstract

Modern near-infrared spectroscopy technology is increasingly adopted to measure cerebral tissue oxygen saturation. However, the normal range of cerebral tissue oxygen saturation in adults with such technology is unknown. We sought to measure cerebral tissue oxygen saturation in healthy volunteers using the novel O3 Regional Oximetry® device (Masimo Corporation, Irvine, CA, USA) and assess its relationship with key physical and haemodynamic characteristics. For ≥ 5 minutes, we continuously recorded cerebral tissue oxygen saturation, pulse oximetry, cardiac index and mean arterial pressure. We assessed for differences in cerebral tissue oxygen saturation between hemispheres, sex, skin type, comorbidity or smoking status, and for associations between cerebral tissue oxygen saturation and age, height, weight, SpO₂ and haemodynamic parameters. We recorded >32,000 observations in 98 volunteers aged 22 to 60 years, including 41 (42%) males. One-fifth had one or more co morbidities ($n=22$, 22.5%), one-tenth were either current or former-smokers ($n=13$, 13%), and most had a Fitzpatrick skin type of 3 or lower ($n=84$, 86%). The mean combined average cerebral tissue oxygen saturation was 67.6% (95% confidence interval 66.8%–68.6%). We found statistically significant differences in cerebral tissue oxygen saturation according to hemisphere and an association between cerebral tissue oxygen saturation and mean arterial pressure and cardiac index. The combined average cerebral tissue oxygen saturation in 98 healthy volunteers was 67.6% with a narrow confidence interval and no combined average cerebral tissue oxygen saturation was below 56%. We also observed statistically significant yet quantitatively small cerebral tissue oxygen saturation differences between hemispheres, and an association between cerebral tissue oxygen saturation and mean arterial pressure and cardiac index.