The objective of this study was to determine whether changes in carboxyhaemoglobin (COHb) saturation following carbon monoxide (CO) rebreathing can be accurately detected by pulse CO-oximetry in order to determine blood volume.

Noninvasive measurements of carboxyhaemoglobin saturation (SpCO) were continuously monitored by pulse CO-oximetry before, during and following 2 min of CO rebreathing.

Reproducibility and accuracy of noninvasive blood volume measurements were determined in 16 healthy non-smoking individuals (15 males, age: 28 ± 2 years, body mass index: 25.4 ± 0.6 kg m(-2)) through comparison with blood volume measurements calculated from invasive measurements of COHb saturation. The coefficient of variation for noninvasive blood volume measurements performed on separate days was 15.1% which decreases to 9.1% when measurements were performed on the same day. Changes in COHb saturation and SpCO following CO rebreathing were strongly correlated (r = 0.90, p < 0.01), resulting in a significant correlation between invasive and noninvasive blood volume measurements (r = 0.83, p = 0.02).

Changes in SpCO following CO rebreathing can be accurately detected by pulse CO-Oximetry, which could potentially provide a simplified, convenient and reproducible method to rapidly determine blood volume in healthy individuals.