Assumed oxygen consumption frequently results in large errors in the determination of cardiac output.

Abstract:
OBJECTIVE: We sought to investigate the differences in assumed and measured oxygen consumption values for the determination of cardiac output by using the Fick principle in a pediatric population with congenital heart disease. METHODS: The patient population consisted of 143 patients with a mean age of 11.3 years (age range, 2 days to 23.8 years) undergoing cardiac catheterization during general anesthesia and with mechanical ventilation. Oxygen consumption was measured with a standard commercial analyzing system (Deltatrac II; Datex, Engström, Helsinki, Finland). Assumed oxygen consumption values were calculated according to the formulas of Krovetz and Goldbloom and LaFarge and Miettinen. Comparisons between measurements and assumptions were performed by Bland-Altman plots. Two-sided paired t tests were used to assess a difference of the assumed and measured values. RESULTS: The range of measured oxygen consumption values was between 55.2 and 249 mL min⁻¹ m⁻². The Krovetz-Goldbloom formula led to systematically larger values compared with the measured values (P = .0001; mean difference of -53.3 mL min⁻¹ m⁻²; 95% confidence interval, -56.7 to -49.8 mL min⁻¹ m⁻²). The use of the LaFarge-Miettinen formula tends to overestimate oxygen consumption (P = .0037; mean difference of -15.9 mL min⁻¹ m⁻²; 95% confidence interval, -26.5 to -5.4 mL min⁻¹ m⁻²). A similarly poor
agreement was found when analyzing a subgroup of 25 patients with Fontan-type circulation. CONCLUSION: The use of assumed instead of measured oxygen consumption values introduces large errors in the determination of cardiac output.