Online Exhaled Propofol Monitoring in Normal-weight and Obese Surgical Patients

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Background/Introduction: Ion Mobility Spectrometry (IMS) allows for online quantification of exhaled propofol concentrations. We aimed to validate a bedside online IMS device, the Edmon®, for predicting plasma concentrations of propofol in normal-weight and obese patients.

Methods: Patients of body mass index (BMI) >20 kg/m2 scheduled for laparoscopic cholecystectomy or bariatric surgery were recruited. Exhaled propofol concentrations (CA), arterial plasma propofol concentrations (CP) and bispectral index (BIS) values were collected during target-controlled infusion anaesthesia. Generalised estimation equation (GEE) was applied to all samples and stable-phase samples at different delays for best fit between CP and CA. BMI was evaluated as covariate. BIS and exhaled propofol were also assessed with GEE.

Results: 29 patients (BMI 20.3–53.7) were included. A maximal R^2 of 0.6 was found during stable concentrations and with five minutes lag-time of CA to CP; the intercept a=-0.69 (95% CI -1,7;0,3) and slope b=0.87 (95% CI 0.7,1.1). BMI was found to be a non-significant covariate. The median absolute performance error predicting plasma propofol concentrations was 13.4%. There was a maximal negative correlation of R=-0.44 at two minutes delay from BIS to CA.

Conclusions: Online monitoring of exhaled propofol concentrations is clinically feasible. Modest correlation with plasma concentrations makes the clinical usefulness questionable. The best correlations were found with delays between plasma propofol and exhaled propofol of five min.
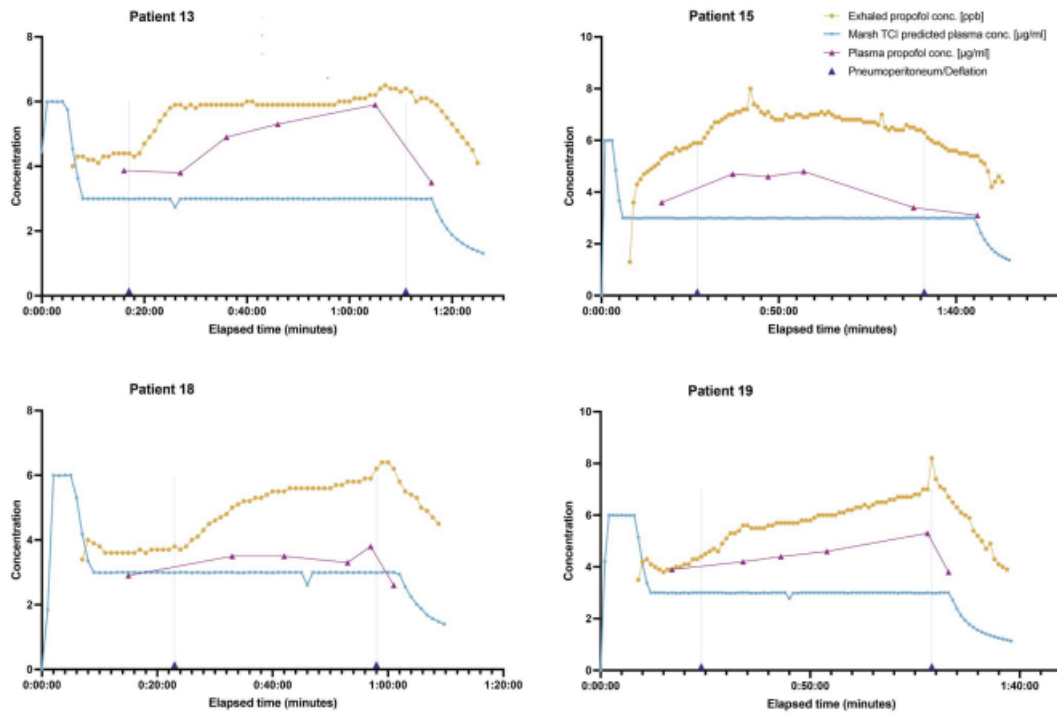
FIGURE 1 Exhaled propofol concentrations, plasma propofol concentrations, Marsh plasma target TCI predicted concentrations and time points of peritoneal inflation and deflation from four study patients
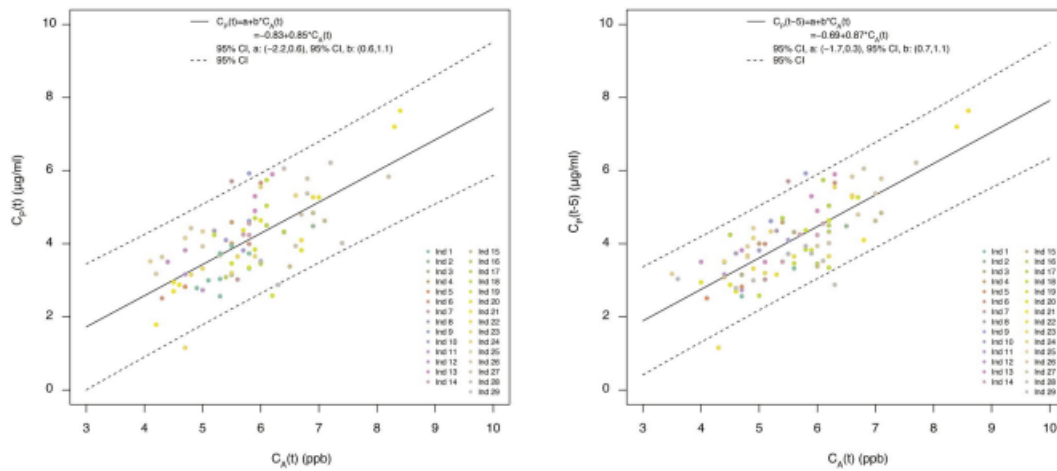

FIGURE 2 (A) Generalized estimating equation (GEE) with propofol concentration in exhaled air (C_A) as dependent variable and propofol concentration in plasma (C_P) as dependent variable. The first two plasma samples from each patient have been omitted. (B) Final GEE model of propofol concentrations in exhaled air and plasma, with first two plasma samples omitted and five minutes delay of (C_A) to (C_P)