The Validation of Application of the Pharmacokinetic Model of Remifentanil Built with Infant Data to Adult

Authors: Shinju Obara, MD; Talmage D. Egan, MD

Introduction: Children usually require more i.v. anesthetics on a per kg basis than adults, which is partly explained by pharmacokinetic (PK) differences. Standing [1] reported a pharmacokinetic (PK) remifentanil (REMI) model in infants whose parameters were corrected with body weight using allometric scaling techniques. The aim of this study was to validate their model using adult data.

Methods: The validation dataset was comprised of 2635 REMI data points from 146 adults, obtained from studies by Minto [2], Egan [3,4], and Kern [5]. The median performance error (MDPE) and the median absolute performance error (MDAPE) were calculated.

Results: MDPE and MDAPE were 0.067 and 0.250, respectively. The model performance was better in subjects with body mass index of 18 to 24 kg/m^2 than in obese subjects.

Discussion: Standing's model predicted adult REMI concentrations moderately well although the model performance was relatively worse in obese adults. REMI is metabolized by non-specific plasma and tissue esterases that are already maturated at birth. The PKs of REMI in adults are considered to be influenced by lean body mass even in obese subjects [3]. Standing's infant PK model may emulate the metabolic ability of lean body where tissue esterases exist, allowing the extrapolation to adults, although the poorer performance in obesity may represent a limitation of allometric scaling techniques.

Conclusion: Standing's infant PK model performed reasonably well in lean adult patients.

References

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