Population Pharmacokinetics of Dexmedetomidine (DEX) During Long-Term Continuous Infusion in Critically Ill Patients

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Abstract

Dexmedetomidine (DEX) is available, administered according to its intended use. In this study, the population pharmacokinetics of DEX during long-term, continuous intravenous infusions was evaluated in critically ill patients. A total of 34 studies evaluating Dexmedetomidine was administered during long-term infusions in critically ill patients. Of these, 18 patients were included in the analysis. Bayesian methods were used to fit the population pharmacokinetic model. The model was found to be adequately fitted to the data. The mean parameter estimates for clearance (Cl) and volume of distribution (Vd) were 39.4 L/hr and 152 L, respectively. The interindividual variability on Cl and Vd were 34% and 9%, respectively. The interpatient variability in drug concentration was 9%. The concentration curves are quite small and apparent only at 4 hours post-end-infusion, indicating slight overestimation of the model.

Conclusions

The model validation results demonstrate adequate model fit for the 1 compartment model fit for a dose of 5573 µg/hr. The model was used to evaluate the effects of covariates on DEX PK. The model parameters were found to be linearly correlated with body weight and creatinine clearance. The model was found to be adequate for the evaluation of DEX PK during long-term infusions.

Keywords: Dexmedetomidine, Continuous Infusion, Critical Care, Pharmacokinetics

Results

The 1 compartment model fit for a dose of 5573 µg/hr was found to be adequately fitted to the data. The mean parameter estimates for clearance (Cl) and volume of distribution (Vd) were 39.4 L/hr and 152 L, respectively. The interindividual variability on Cl and Vd were 34% and 9%, respectively. The interpatient variability in drug concentration was 9%. The concentration curves are quite small and apparent only at 4 hours post-end-infusion, indicating slight overestimation of the model.

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