Development of Practical Models for Prediction of PK/PD Profiles

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The objective of the Modeling and Simulation (M&S) approach is to analyze data with appropriate models and to perform prediction under various conditions. In case of pharmacokinetic / pharmacodynamic (PK/PD) data analysis, the data to be analyzed are often obtained as function of time, and time course profiles of PK/PD index and its predictive distribution should be appropriately simulated. Considering practical cases in stages of drug development or clinical pharmacotherapy, available data may often be limited in terms of quality especially when data are collected retrospectively. Thus, models should sometimes be as simple and practical as possible depending on the available data. We have proposed some practical M&S strategies in non-clinical and clinical drug development processes, which are; 1) a simple method for predicting intravenous plasma time-course profiles of drugs using data from non-clinical PK experiments and information of chemical properties of each drug, 2) population PK and Bayesian prediction for pharmacokinetics in pediatric patients, and 3) the PK/PD model to predict *in vivo* bactericidal (PD) profiles with logistic growth model using data from *in vitro* experiments. We also examined a simple pharmacodynamic model to explain the profiles of neutropenia after a combination therapy of anticancer agents. Results of those approaches will be presented and usefulness of “practical” models will be discussed. **References**; 1) Wajima et al., *J. Pharm. Sci.* **93(7)** 1890-1900 (2004). 2) Shimamura et al., *J. Pharm. Sci.* **96(11)** 3125-3139 (2007). 3) Katsube et al., *J. Pharm. Sci.* (2007) (*in press – available online*).