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Jiaxu Li* (jiaxu.li@louisville.edu), Department of Mathematics, University of Louisville, Louisville, KY 40292, and **Yang Kuang** (kuang@asu.edu), Department of Mathematics and Statistics, Arizona State University, Tempe, AZ 85287-1804. *SYSTEMICALLY MODELING THE DYNAMICS OF PLASMA INSULIN IN SUBCUTANEOUS INJECTION OF INSULIN ANALOGUES FOR TYPE 1 DIABETES.*

Subcutaneous injection of exogenous insulin or insulin analogues needs to be performed one or more times daily for type 1 diabetics. The timing and dosage of insulin administration have been a critical research area since the invention of insulin analogues. Several pharmacokinetical models have been proposed and some are applied clinically in modeling various insulin therapies. However, their plasma insulin concentration must be computed separately from the models' output. Furthermore, minimum analytical study was performed in these existing models. We propose two systemic and simplified ordinary differential equation models to model the subcutaneous injection of rapid-acting insulin analogues and long-acting insulin analogues, respectively. Our models explicitly model the plasma insulin and hence have the advantage of computing the plasma insulin directly. The profiles of plasma insulin concentrations obtained from these two models are in good agreement with the experimental data. We also study the dynamics of insulin analogue, plasma insulin concentrations, and, in particular, the shape of the dynamics of plasma insulin concentrations. (Received August 31, 2008)