



MINIMAL AND MAXIMAL MODELS OF GLUCOSE METABOLISM IN HEALTH AND DIABETES

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Modeling can enhance the quantitative understanding of the pathophysiology of glucose metabolism, in particular obesity and diabetes. I will discuss recent whole-body modeling developments. In the first part I will discuss “minimal” models to understand/measure the glucose-insulin system from a standard (meal, OGTT) or stable isotope labeled oral test. These models allow to quantitate the efficacy of homeostatic control by assessing crucial control parameters, e.g. insulin sensitivity, beta-cell function, hepatic insulin extraction, hepatic glucose production, glucose utilization and rate of appearance of ingested glucose. In addition to “minimal” models also “maximal” models to simulate the glucose-insulin system play a crucial role, e.g. in insilico trials substituting pre-clinical trials or when it is either not possible, appropriate, convenient or desirable to perform experiments in humans. In the second part I will discuss a new generation of “maximal” models of human metabolism in healthy, prediabetes, type 2 and type 1 diabetes. Of note, the type 1 diabetes simulator has been recently accepted by the FDA as an in silico substitute to animal trials for pre-clinical testing of certain insulin treatment strategies in diabetes (artificial pancreas).

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