

Modeling, Estimation and Control

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Mathematical modeling of biomedical processes and systems is one way to understand how these work and function; once a model is designed, the numerical values of its parameters need to be estimated from available observational and experimental data; once a model is identified on data, it is then possible to use it to devise optimal control procedures to intervene on the original biomedical system.

In this talk we describe two related problems relative to the metabolic control of the glucose-insulin system: in the study of these problems some relevant general criteria emerge about what makes a good model and how correct estimation methods make the difference between achieving and not achieving medical goals.

After a short historical review of several kinds of models, future directions of research are then described, where apparently abstract mathematical tools are shown to be relevant and applicable to concrete medical situations. The continuous interplay between mathematical modelling, statistical estimation theory, and optimal control approaches is underscored.