Quantification of the glucose levels of a patient customizing the Dalla-Mann model

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Abstract

Diabetes mellitus (DM) is a group of metabolic diseases in which there is a defect in the action or in the production of insulin increasing the levels of sugar (glucose) in blood over prolonged periods. In order to control the glucose, Diabetics need to predict somehow glucose values having into consideration food intakes, insulin injections, exercise done, etc. To help with this task, some models to measure and predict the levels of glucose in the human body have been presented, most of them are averaged models.

One of the main issues on the identification of models is the high variability of the glucose profiles from one patient to another. Thus, nowadays, the mainstream consists of customizing the treatments to every patient. With this aim, we use the model presented in [1] to be applied to a real patient. This model consists of a glucose subsystem and an insulin subsystem.

Then, we characterize the model for a real patient, finding the parameters that make the model fits the best the glucose patient's data in order to be used in the daily therapy. We can take profit of modern handy devices- Continues Glucose Monitoring Systems (CGMS)- that provides glucose measures (with some errors) every 5 minutes. There are some critical issues to control, for instance, if a patient reach extremely low glucose levels, he/she may die.

References

[1] Chiara Dalla Man, Robert A. Rizza, Claudio Cobelli, Meal Simulation Model of the Glucose-Insulin System, IEEE Transactions on Biomedical Engineering (Volume: 54, Issue: 10, Oct. 2007)