Model based validation of meal inputs in diabetes therapy

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Abstract: Correct insulin dosage is critical to achieve a good glucose control in diabetes type 1 patients. Correct dosage depends on correct information about expected metabolic reaction profiles, on actual blood glucose concentration and on expected insulin and glucose consumption and intake. Since almost all this information is imprecise, therapy is largely based on rules of thumb and on trial and error. One substantial aspect of this uncertainty derives from the fact that actually the glucose release profile in the blood would be important, but instead patients can only roughly estimate carbohydrates content in the food. This affects also the on-line identifiability of response models using standard information as available to normal patients. Against this background, this paper presents a model based approach to validate patient inputs based on some physiological assumptions and on a sequential estimation of models and unknown inputs. As a bycatch, a simple but effective model of the glucose behavior is determined. The method has been developed and tested using clinical data recorded at the Lepeyronie hospital (Montpellier, France).

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