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Personalized Short-term Blood Glucose Prediction in T1DM

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Background
The focus of the European project DIAdvisorTM [3] is the development of a personalized tool providing diabetic patients with reliable and accurate near future blood glucose predictions in order to support the users in the insulin therapy decision-making tasks while letting them maintaining control over their own treatments and management.

Estimate data-driven individual-specific short-term BG predictors given:
- plasma glucose [mg/dL],
- plasma glucose rate of appearance [mg/kg/min] after CHO absorption,
- total plasma insulin [mIU/L] after subcutaneous injection.

Objective

Data
8 T1DM subjects (5 MDI/3 CSII, 5 males/3 females, age = 45.25±13.53 years, disease duration = 22.37±11.81 years, BMI = 23.88±3.25, HbA1c = 8.27±0.90%) underwent a 3-days visit at the CIC in Montpellier, France, within the European research project DIAdvisorTM [3]. Patients were served standardized meals for breakfast, lunch and dinner (carbohydrate content: 42.79±7.70 [g], respectively) and decided insulin needs based on their personal HemoCueTM Glucose Analyzer outcomes. Blood samples were collected by nurses to measure plasma glucose concentrations: every hour during day, every 2 hours during night, 30 min before breakfast, 10, 20, 30, 60, 90, 120, 150, 180, 240, 300 min after breakfast and every 15 minutes after lunch and dinner for 2 hours, for a total of 37 blood samples per day.

Glucose concentration

Results
Cross validation showed prediction error standard deviation 14.19±8.45 [mg/dL], 26.22±15.04 [mg/dL], 31.59±19.41 [mg/dL] and 37.70±22.14 [mg/dL] on 30-, 60-, 90- and 120-minutes-ahead prediction, respectively.

Discussion

The study provided reliable short-term glycemia predictions.

Conclusions

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References

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