INTRODUCTION

The Hungarian Artificial Pancreas Working Group (MAP) has created a robust control algorithm able to extend the individualized control algorithms of the literature. The model of Hovorka (Physiol. measur., 25, 905-920, 2004) was used to create virtual patients. Their parameters were identified using data recorded of 203 weeks of 90 T1DM patients in clinical environment from the MAP’s insulin pump centers (aged 6-52 years).

To increase the border of the usability of the robust control framework which was presented before, a new disturbance model was created. This „worst-case” model contain the disturbances from the meal intake, the muscle work, the inaccuracy from controller designing methos and the model parameters. The results were presented at previous ATTD conferences and international journals.

SIMULATION RESULTS

The general control algorithm can be working on target device. We can improve the efficiency of our systems with the continuous development.

Based on the in-silico tests (using real patients’ data of the MAP centers) we have demonstrated that with correspondingly identified initial conditions the hypoglycemic and hyperglycemic episodes can be seriously reduced.

With new designing methods the developed robust controller can handle various disturbances even in simulated „worst case” situation as well.

EX. 1. 17 years old boy (on pump from two years, having active lifestyle and good compliance).

DISCUSSION AND CONCLUSIONS

The general control algorithm can be working on target device. We can improve the efficiency of our systems with the continuous development.

Based on the in-silico tests (using real patients’ data of the MAP centers) we have demonstrated that with correspondingly identified initial conditions the hypoglycemic and hyperglycemic episodes can be seriously reduced.

With new designing methods the developed robust controller can handle various disturbances even in simulated „worst case” situation as well.

FURTHER STEPS

- Improve and connect the developed systems.
- Developing new telemecine prototype.
- Testing the robust algorithms.

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