INSULIN CLEARANCE DURING HYPER-INSULINEMIA EUGLYCEMIA THERAPY

S. Penning[1], P. Massion[1], C. Pretty[1], T. Desaive[1], J.G. Chase[2]

[1]University of Liege, GIGA-Cardiovascular Sciences, Liege, Belgium
[2]Department of Mechanical Engineering, University of Canterbury, Christchurch, New-Zealand

Introduction

Beneficial effects of high insulin doses on cardiac function are used to treat patients with cardiogenic shock.
Hyper-Insulinemia Euglycemia Therapy (HIET) = insulin infusions (1 U/kg/h) + exogenous glucose (max. 400 g/day).
But…

- Clinical application of HIET is currently empirical.
- The hypoglycemic risk is high.
- Controlling insulin dosing can be very difficult as patient metabolism and insulin sensitivity are variable.

Hence…

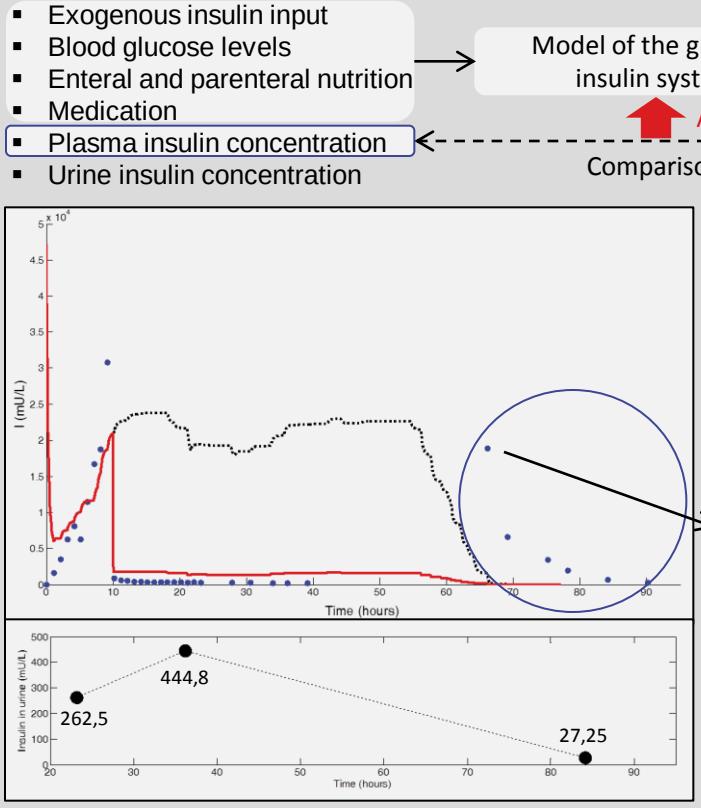
Our work aims to develop a model-based protocol to optimize HIET interventions.

Methods & Results

The model of the glucose-insulin system is adapted for HIET patients, especially the plasma insulin clearance.
Data come from 5 patients treated with HIET in Liege University Hospital (Belgium).

Clinical data:

- Exogenous insulin input
- Blood glucose levels
- Enteral and parenteral nutrition
- Medication
- Plasma insulin concentration
- Urine insulin concentration



	Initial model	Model adaptation
0h-10h	Modeled plasma insulin clearance should be reduced	Saturation of renal clearance
t > 10h	Modeled plasma insulin clearance should be increased significantly	Desaturation of renal clearance + supplemental plasma insulin clearance process
t = 66h	Sudden increase (from 208,7 mU/L to 18 880 mU/L)	

•	Measured plasma insulin concentration	mU/L
– –	Simulated plasma insulin concentration	mU/L
—	Simulated plasma insulin concentration after model adaptation	mU/L
•	Urine insulin concentration	mU/L

Conclusions

- The adapted model better captures HIET patient behavior.
- After 10 hours of HIET, insulin clearance increases largely → normalization of plasma insulin concentration.
- Insulin is eliminated via the urine but possibly also stored.
- HIET becomes ineffective and should be stopped after 10 hours.

Contact :
sophie.penning@ulg.ac.be

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