S 04

ACCURACY ASSESSMENT OF ONLINE GLUCOSE MONITORING BY A SUBCUTANEOUS ENZYMATIC GLUCOSE SENSOR DURING AEROBIC EXERCISE BOUTS IN TYPE 1 DIABETIC PATIENTS TREATED BY CONTINUOUS SUBCUTANEOUS INSULIN INFUSION

RP Radermecker[1,2], C Fayolle[1], JF Brun[3], P Gaba[1], J Bringer[1], E Renard[1]

[1] Endocrinology Department, Lapeyronie Hospital, Montpellier, France
[2] Department of Diabetes, Nutrition and Metabolic disorders, CHU Sart Tilman, University of Liège, Liège, Belgium
[3] CERAMM, Clinical Physiology Department, Lapeyronie Hospital, Montpellier, France

Introduction:
Online continuous glucose monitoring during sport practise would be highly valuable to insulin-treated diabetic patients. We assessed whether this goal could be reached by using a subcutaneous 'needle-type' enzymatic sensor.

Material and methods:
10 patients (5F/5M), aged 51 ± 12, with type 1 diabetes since 24 ± 11 years, treated by continuous subcutaneous insulin infusion (CSII) for more than 1 year (HbA_{1c}: 7.5 ± 0.8 %), performed a 30min-exercise bout at constant, high intensity load (15% above their individual ventilatory threshold), on a cycle ergometer, as a routine clinical care evaluation to state their ability to practise competitive sport. All patients wore a subcutaneous "needle type" enzymatic glucose sensor linked to a portable monitor (Guardian RT®, Medtronic-MiniMed, Northridge, CA, USA) which was settled on the previous eve. Sensor calibration was performed against capillary blood glucose immediately before exercise. Blood glucose values according to the sensor were recorded every 5 minutes from T-10 to T+30, and then every 10 minutes during recovery period from T+ 30 to T+90. These recorded values were compared to blood glucose assays performed on simultaneously collected peripheral venous samples.

Results:
Sensor functioning and tolerance raised no problem but in one sensor whose adequate calibration could not be obtained. An average blood glucose decrease of 113 ± 63 mg/dl occurred during exercise bouts, while sensor glucose decreased by 88 ± 49 mg/dl. 146 paired glucose values could be analyzed. The correlation factor between sensor and blood glucose values was 0.957 with an intercept of 0.275. Mean difference between paired values according to Bland-Altman analysis was 22 mg/dl. Clarke error grid showed 88% of paired points in A and B zones, while 4, 8 and 0% of paired points were in C, D and E zones, respectively. All paired points in C zone could be attributed to the single sensor whose calibration failed.

Conclusions:
Blood glucose decrease during intensive exercise bouts performed by CSII-treated diabetic patients can be estimated with acceptable clinical accuracy by online monitoring using a subcutaneous sensor. Whether sensor accuracy can maintain has to be assessed by trials including a prolonged effort, while reliability of hypo-alarms, non assessable in the present trial, will also require further studies.

Artificial Insulin Delivery

Pancreas and Islet Transplantation

Study Group of the European Association for the Study of Diabetes

27th Workshop of the AIDPIT Study Group

2nd European Diabetes Technology and Transplantation Meeting (EuDDT)

Innsbruck-Igls / Austria
January 27-29, 2008

Abstracts