

Continuous Glucose Monitoring during Exercise in Patients with Type 1 Diabetes on Continuous Subcutaneous Insulin Infusion

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Abstract

Aim:

Exercise is associated with an increased risk of hypoglycemic or hyperglycemic events. The aim of this study was to assess glucose changes during and after physical exercise in patients with type 1 diabetes managed by continuous subcutaneous insulin infusion before and after a 14-day moderate or intense exercise program.

Methods:

Sixteen male patients [hemoglobin A1c $7.3 \pm 0.8\%$ (mean \pm standard deviation), age 39 ± 11 years, body mass index 26.0 ± 2.7 kg/m²] were enrolled in this single-center, randomized, open-label study. They underwent exercise challenges before and after a 14-day moderate (group A, $n = 8$) and intense (group B) exercise program. Changes in glucose levels were monitored continuously by means of a microdialysis technique.

Results:

Patients in group A trained less intensively than the patients in group B. The treadmill exercise led to a comparable level of challenge in both patient groups. Neither heart rate nor energy consumption differed within the groups or between the groups. Patients in both groups had a comparable basal insulin infusion rate. Prandial insulin doses were higher pretraining than posttraining in both groups. Identical amounts of additional carbohydrates were consumed by the patients in both groups during the 21 h after the exercise challenge. Glucose profiles recorded showed a wide variability. No differences in the glucose profiles with respect to the training intensity could be observed within and between the groups. Patients in group A tended to spend a shorter period of time in hypoglycemia after the exercise challenge posttraining compared to pretraining, but not the patients in group B. The number of hypoglycemic episodes was not different between the groups.

Conclusions:

The patients with type 1 diabetes exhibit the expected wide variability in glucose profiles before, during, and after physical exercise. Use of continuous glucose monitoring allows handling of this situation without running into the risk of acute metabolic deteriorations.

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Abbreviations: (AE) adverse event, (AUC) area under the curve, (BG) blood glucose, (BMI) body mass index, (CGM) continuous glucose monitoring, (CHO) carbohydrate, (CSII) continuous subcutaneous insulin infusion, (CV) coefficients of variation, (HbA1c) hemoglobin A1c, (SCGM) subcutaneous glucose monitoring system, (SD) standard deviation, (SMBG) self-monitoring of blood glucose

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