

Impact of Islet Transplantation on Glycemic Control as Evidenced by a Continuous Glucose Monitoring System

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Abstract

Background:

This study evaluated the effects of islet allotransplantation (ITx) on metabolic control utilizing a continuous glucose monitoring system (CGMS) and assessed its effectiveness as an indicator and predictor of graft dysfunction (GD).

Methods:

Glycemic control was assessed in 25 patients with type 1 diabetes mellitus (T1DM); 12 ITx recipients and 13 controls. Mean interstitial glucose, standard deviation (SD), glucose variability, and percentage of time in hyperglycemia (%GT >140 mg/dl), hypoglycemia (%GT <54 mg/dl), and normoglycemia (%GT 54–140 mg/dl) were measured in 72-hour time periods from CGMS recordings in the control group at baseline and in the ITx group at 3, 6, 9, 12, 15, and 18 months after ITx completion and were analyzed as predictors and indicators of GD. Hemoglobin A1c (HbA1c), 90-minute glucose after a mixed meal tolerance test, fasting C-peptide/glucose ratio, and insulin requirements were followed.

Results:

Compared to the control group, the percentage of time in hypoglycemia was significantly lower in the ITx group at all time points; time in normoglycemia was increased at all times except at 15 months; and time in hyperglycemia was significantly lower at 6, 9, 12, and 18 months. Mean glucose and glucose variability were significantly lower in the ITx group at all times except at 3 and 15 months, whereas HbA1c and 90-minute glucose were significantly lower in the ITx group at all time points. Mean glucose, SD, glucose variability, and %GT >140 mg/dl were significant as indicators but not as predictors of GD.

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Abbreviations: (CGMS) continuous glucose monitoring system, (CPGR) C-peptide to glucose ratio, (GD) graft dysfunction, (%GT) percentage of time glucose levels were above, between, or below a certain level, (ITx) islet allotransplantation, (HbA1c) hemoglobin A1c, (SD) standard deviation, (T1DM) type 1 diabetes mellitus

Keywords: continuous glucose monitoring system, diabetes, graft dysfunction, islets, islet transplantation, metabolism

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Abstract cont.

Conclusions:

The CGMS demonstrated the benefits of ITx in T1DM, with improvements in glycemic control apparent up to 18 months after transplant. CGMS measures were found to be indicators of GD.

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