

Randomized Forced Titration to Different Doses of Technosphere[®] Insulin Demonstrates Reduction in Postprandial Glucose Excursions and Hemoglobin A1c in Patients with Type 2 Diabetes

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Abstract

Background:

Individuals with type 2 diabetes mellitus have impairments in early insulin release, resulting in increased postprandial glucose excursions and suboptimal glycemic control. Studies with Technosphere[®] Insulin (TI) indicate that it has rapid systemic absorption and a short duration of glucose-lowering activity, making it well suited for controlling postprandial glucose levels.

Methods:

The goal of this phase 2b, prospective, multicenter, double-blind, placebo-controlled study was to characterize the dose response of four different doses (equivalent to 3.6, 7.3, 10.9, and 14.6 U subcutaneous regular human insulin) of prandial TI or Technosphere powder alone administered before each of three meals daily, in combination with insulin glargine over an 11-week treatment period, in patients with type 2 diabetes and suboptimal glycemic control.

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Abbreviations: (AE) adverse event, (ATS) American Thoracic Society, (AUC_{glucose}) area under the glucose curve, (BG) blood glucose, (C_{max}) maximum plasma concentration, (DL_{CO}) lung diffusion capacity, (FBG) fasting blood glucose, (FEV₁) forced expiratory volume in 1 second, (FVC) forced vital capacity, (HbA1c) hemoglobin A1c, (HRCT) high-resolution computerized axial tomography, (MRI) magnetic resonance imaging, (PPG) postprandial glucose, (TI) Technosphere[®] Insulin

Keywords: diabetes, HbA1c, inhaled insulin, postprandial glucose, Technosphere Insulin

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Abstract cont.

Results:

The study enrolled 227 patients. In all dose groups, TI demonstrated statistically significant dose-dependent reductions in hemoglobin A1c (HbA1c) versus baseline (-0.4, -0.5, -0.5, and -0.6 for 3.6, 7.3, 10.9, and 14.6 U equivalents, respectively; $p < 0.05$ in all groups), as well as versus placebo or Technosphere powder alone (-0.40, -0.67, -0.70, and -0.78 for 3.6, 7.3, 10.9, and 14.6 U equivalents, respectively; $p < 0.04$ in all groups). It reduced the postprandial maximum glucose concentration within each treatment group (statistically significant in all but the TI 3.6 U-equivalent group) and reduced the postprandial area under the glucose curve (statistically significant for the TI 10.9 and 14.6 U-equivalent groups) versus placebo. There were no cases of severe hypoglycemia, while mild/moderate hypoglycemia was observed most frequently in the highest dosage groups, as expected. Rates of cough were low and comparable among all groups. No clinically relevant changes in pulmonary function tests, body weight, or high-resolution computerized axial tomography and magnetic resonance imaging were observed.

Conclusions:

This study demonstrated that, over 11 weeks, TI plus basal insulin glargine is well tolerated and results in dose-dependent reductions in postprandial glucose and HbA1c levels.

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