

Pancreatic Polypeptide Administration Enhances Insulin Sensitivity and Reduces the Insulin Requirement of Patients on Insulin Pump Therapy

Atoosa Rabiee, M.D.,^{1,2} Panagis Galiatsatos, M.D.,¹ Rocio Salas-Carrillo, M.D.,¹ Michael J. Thompson, M.D.,³ Dana K. Andersen, M.D.,¹ and Dariush Elahi, Ph.D.^{1,2}

Abstract

Introduction:

The effects of pancreatic polypeptide (PP) infusion were examined in patients on insulin pump therapy to determine whether PP administration can reduce insulin requirements in patients with type 1 diabetes mellitus (T1DM) or type 3c diabetes mellitus (T3cDM; pancreatogenic).

Methods:

Ten subjects with long-standing T1DM ($n = 7$) or T3cDM ($n = 3$) on insulin pump treatment received a 72 h subcutaneous infusion of 2 pmol/kg/min bovine PP or saline by portable infusion pump in a single-blinded, randomized, crossover design.

Results:

Pancreatic polypeptide infusion raised plasma PP levels to 450–700 pmol/liter. Daily insulin infusion requirements (I) fell from 48 ± 6.9 to 40 ± 7.5 U on day 2 ($p < .05$) and from 46 ± 7.7 to 37 ± 6.6 U on day 3 ($p < .05$) of PP infusion compared with saline. Corrected for average blood glucose concentration (G), I/G fell in 10/10 subjects during the second 24 h period and in 7/10 subjects during the third 24 h period; sensitivity to insulin, calculated as $1/(I/G)$, increased $45\% \pm 12\%$ on day 2 ($p < .01$) and $34\% \pm 14\%$ on day 3 ($p < .05$) of PP infusion. Pancreatic polypeptide responses to a test meal were compared with the change in insulin infusion requirements in 5 subjects; the reduction in insulin requirements seen during PP infusion correlated with the degree of baseline PP deficiency ($p < .002$).

Conclusions:

A concurrent subcutaneous infusion of PP enhances insulin sensitivity and reduces insulin requirements in patients with long-standing T1DM and T3cDM on insulin pump therapy. The benefit of PP infusion correlated with the degree of PP deficiency.

J Diabetes Sci Technol 2011;5(6):1521-1528

Author Affiliations: ¹Department of Surgery, Johns Hopkins Bayview Medical Center, Baltimore, Maryland; ²Department of Medicine, Johns Hopkins Bayview Medical Center, Baltimore, Maryland; and ³Department of Medicine, University of Massachusetts Medical School, Worcester, Massachusetts

Abbreviations: (bPP) bovine pancreatic polypeptide, (CP) chronic pancreatitis, (IR) insulin receptor, (OGTT) oral glucose tolerance test, (PP) pancreatic polypeptide, (SE) standard error of the mean, (STM) standardized test meal, (T1DM) type 1 diabetes mellitus, (T3cDM) type 3c diabetes mellitus

Keywords: hepatic insulin sensitivity, insulin, insulin pump treatment, pancreatic polypeptide, type 1 diabetes, type 3c diabetes

Corresponding Author: Dana K. Andersen, M.D., Department of Surgery, Johns Hopkins Bayview Medical Center, 4940 Eastern Ave., Baltimore, MD 21224; email address danakandersen@yahoo.com