# Predicting Insulin Independence, Protecting Islet Cells After TPIAT

At Cincinnati Children's, physicians are searching for new ways to predict which patients will be insulin-independent a year after total pancreatectomy and islet auto-transplantation (TPIAT). What they discover could help set family expectations prior to TPIAT and motivate patients and caregivers to continue following treatment recommendations in the months after surgery.

The primary indication for TPIAT is to alleviate the pain associated with chronic pancreatitis. The islet cells are transplanted into the liver to offset the risk of brittle diabetes. More than 50 patients have undergone TPIAT at Cincinnati Children's since the hospital's Pancreas Care Center began offering it in 2015.

At one year post-surgery, about 40% of children and adolescents in the U.S. who undergo TPIAT are insulin-independent, 30% are partially dependent on exogenous insulin, and 30% have full insulin requirements, similar to patients with type 1 diabetes. Protecting the transplanted islet cells is critically important in achieving insulin independence, says Deborah Elder, MD, director of endocrinology at the Pancreas Care Center. Elder and her team prioritize tight glycemic control in the first three months following TPIAT.

"Transplanted islet cells are fragile, and undergo cell death in a hyperglycemic environment," Elder explains. "To offset this threat, our target blood glucose range after surgery is 80 to 120 mg/dL. While patients are in the intensive care unit and receiving insulin through an intravenous line, we utilize an insulin titration protocol and initiate continuous glucose monitoring (CGM). When the patient transitions to the endocrine floor, we use insulin pump therapy with CGM."

Unique to the Pancreas Care Center at Cincinnati Children's, patients post-TPIAT are discharged from the hospital using insulin infusion pump therapy and CGM.

Research points to several factors that can help predict whether a patient achieves insulin independence after TPIAT. Positive predictors include a high number of islets transplanted per body weight and a patient age of 12 or younger. A negative predictor is a pre-TPIAT need for exogenous insulin.

Discovering additional markers could help paint a fuller picture for providers and families, Elder says. One novel approach may involve using results from mixed-meal tolerance tests, which patients have before TPIAT and at several scheduled times after TPIAT. Elder believes that results, such as C peptide peak secretion, could be predictive. "If a patient's profile begins to normalize, we can confirm to families that their efforts to maintain tight blood glucose control are paying off," Elder explains.

Results from genetic sequencing can help families weigh decisions about TPIAT as well. A pancreas gene panel developed at Cincinnati Children's covers 10 mutations associated with hereditary forms of pancreatitis, including the top three: CFTR, PRSS1 and SPINK1. "If a child has a genetic predisposition to chronic pancreatitis and is experiencing chronic pain, families may opt for earlier surgery if they know there's a good chance for favorable outcomes related to pain relief and insulin independence," Elder says. "The more information and insight we can provide families, the more prepared they will be to make decisions and be fully engaged in their child's care."