

Pancreas and Beta Cell Biology

The Pancreatic Duct Gland Compartment in Non-Diabetic and Type 1 Diabetic Subjects

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Purpose: Pancreatic duct glands (PDGs) are coiled blind ending glandular structures that arise from pancreatic ducts and express stem cell markers such as HES-1. The PDG compartment has recently been appreciated as an adult stem cell niche in pancreas that undergoes proliferation and expansion in response to acute exocrine pancreatic injury. As yet there is no data as to whether the PDG compartment gives rise to pancreatic beta cells. We posed the following questions. First, does the PDG compartment contain beta cells in humans with type 1 diabetes (T1DM)? Second, is there an increase in proliferation of the PDG compartment in T1DM?

Methods: Pancreas sections were made available from the nPOD consortium from the head, body and tail of pancreas and stained with Alcian Blue to identify PDGs, insulin immunohistochemistry to identify beta cells and Ki67 for replication.

Summary of Results: Beta cells were identified in PDGs in T1DM and non diabetic controls implying that PDGs may be a stem cell niche for beta cell formation in adult humans. However the number of beta cells in PDGs is decreased by approximately 50% in T1DM implying decreased cell formation and/or increased beta cell destruction. To approach this we quantified PDG cell replication which is increased ~4 fold in T1DM.

Conclusions: Taken together these preliminary findings imply that the PDG compartment may be a stem cell niche for beta cell formation in adult humans with attempted increased beta cell regeneration overcome by ongoing beta cell destruction. Cell lineage studies of the PDG compartment are required to establish that this compartment is a potential beta cell source and by what means cell fate is regulated from this stem cell niche.