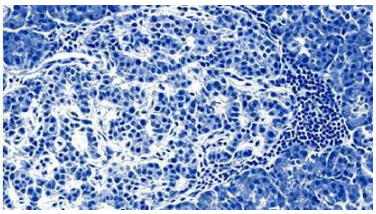
nPOD
Network for Pancreatic Organ Donors with Diabetes



Cellular Characterization of the Pancreas in Individuals with or at Increased-Risk for Type 1 Diabetes

AUTHORS

Xiaohan Tang[1,2], Irina Kusmatseva[1], Shweta Kulkarni[1], Amanda Posgai[1], Desmond A. Schatz[3], Michael J. Haller[3], Martha Campbell-Thompson[1], Clive H. Wasserfall[1], John Kaddis[4,5], Mark A. Atkinson[1,3].

[1] Department of Pathology, Immunology and Laboratory Medicine, Diabetes Institute, University of Florida, Gainesville, FL, USA

[2] Department of Metabolism and Endocrinology, The Second Xiangya Hospital, Central South University, Changsha, Hunan, China

[3] Department of Pediatrics, College of Medicine, University of Florida, Gainesville, FL, USA

[4] Department of Diabetes and Cancer Discovery Science, Diabetes and Metabolism Research Institute, City of Hope/Beckman Research Institute, Duarte, CA, USA

[5] Department of Diabetes Immunology, Diabetes and Metabolism Research Institute, City of Hope/Beckman Research Institute, Duarte, CA, USA

PURPOSE

Once thought a disease primarily affecting β-cells, emerging evidence suggests that type 1 diabetes (T1D) also includes distinct alterations in both endocrine and exocrine pancreatic compartments. However, a quantitative histological description of pancreatic acinar, ductal, and other non-endocrine/non-exocrine tissues is lacking.

METHODS

We utilized HALO image analysis software to analyze scanned whole human pancreas cross-sections from nPOD donor cohort, stained for insulin and glucagon by IHC as well as H&E, from the PH, PB, and PT regions. We characterized pancreatic exocrine and endocrine tissue compositions by quantifying the proportion of endocrine, acinar, and ductal/other (non-endocrine, non-exocrine) areas as well as acinar and endocrine cell density, and size in subjects with or at-risk for type 1 diabetes as well as controls without diabetes.

SUMMARY OF RESULTS

The area of ductal/other tissues was greater in those with T1D lacking residual insulin containing islets (T1D ICI-) compared to non-diabetic autoantibody negative (ND AAb-) and non-diabetic autoantibody positive (ND AAb+) groups. Inversely, acinar area was lower in T1D ICI- donors vs. either ND group. However, despite having a similar proportion of acinar area to both ND groups, the cells were smaller and tissue denser in T1D individuals with residual insulin containing islets (T1D ICI+) compared to ND AAb- donors. Endocrine area was smaller, but density greater, in T1D donors compared to either ND group. Interestingly, endocrine cells were smaller in all T1D vs. ND AAb- donors, but also in T1D ICI+ vs. ND

AAb+ individuals. The main pancreatic duct was thicker and occupied area smaller in the tail vs. body region, regardless of disease status.

CONCLUSIONS

Further research is needed to address the role of whole-organ defects in T1D, but these data provide important insights into anatomical differences observed within the pancreas and highlights that alterations within the exocrine tissue may play a part in disease pathogenesis.