

INTRODUCTION

Diabetes Mellitus (DM) is a chronic and debilitating metabolic disease that affects hundreds of thousands of dogs worldwide. Canine DM is characterized by pancreatic β -cell leading to insulin deficiency and persistent hyperglycemia. DM and exocrine pancreatic inflammation (pancreatitis) are closely associated, and spillover inflammation from pancreatitis to neighboring endocrine tissue and collateral pancreatic endocrine tissue injury has been proposed as a potential etiology for canine DM.

HYPOTHESIS

Direct collateral damage from pancreatitis in dogs results in proportional destruction of pancreatic α and β cells.

METHODS



Primary Antibodies:

- Polyclonal Guinea Pig anti-insulin (DAKO)
- Rabbit anti-glucagon (Cell Signaling Technology Glucagon Antibody #2760)
- Mouse anti-CD45 (Peter Moore Lab, UC Davis) **Secondary Antibodies:**
- Alexa Fluor 488 AffiniPure Donkey Anti-Guinea Pig IgG
- Alexa Fluor 647 AffiniPure Donkey Anti-Rabbit IgG
- Cy3 AffiniPure Donkey Anti-Mouse IgG

The Role of Exocrine Pancreatic Inflammation in the Pathogenesis of Canine Diabetes Mellitus

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were selected categorized into four groups (nuclear



Following staining, whole tissue sections were imaged at 20x using an image capture and stitching technique. Whole tissue sections comprised of hundreds to thousands of stitched tile images. 15-20 high resolution stacked images were then captured of individual islets at 63x. Images were analyzed to determine islet density per tissue section area, α : β cell ratio per islet, and number of leukocytes within and surrounding individual islets.



While image analysis is ongoing, early results show a difference in the number, size, and composition of islets between DM and healthy controls. Healthy pancreas samples have hundreds of islets with large islet size (>20 cells). By comparison, DM only samples have few islets but plenty of individual endocrine cells present. DM only samples have very few insulin+ cells and varying levels of glucagon+ cells. No CD45 has been noted in or around selected islets thus far.





DAPI GLU INS CD45

Figure 2. Pancreatic islet immunofluorescence at 63x in healthy (A,B) and diabetic (C,D) dogs. DM dogs have fewer and smaller islets, as well as a higher α : β cell ratio per islet.



- noted in DM only samples so far
- DM only samples
- individual islets

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DAPI GLU INS CD45

CONCLUSIONS

Marked islet hypoplasia with beta cell preferential loss

• No CD45 detected in analyzed islet images of healthy and

Confocal immunofluorescence protocol optimized for efficient, high quality images of whole tissue sections and

Preliminary result acquisition and analysis in progress

• Students Training in Advanced Research (STAR) Program: • Center for Companion Animal Health (CCAH), UC Davis