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Quantifying Islet Area in a Type 1 Diabetes Susceptible Rodent Model

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Quantifying islet area in a Type 1 Diabetes susceptible rodent model

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Project Description

Type 1 diabetes(T1D) diagnosis is projected to increase between 2-5% in youth annually. Treatment and loss of productivity due to diabetes and its complications cost millions of dollars annually. T1D is an autoimmune disorder with identified genetic components, but no apparent triggers. Our lab uses a rodent model of T1D with a viral trigger. This model is susceptible to T1D in during the window of 21-55 days of life by two weeks of alternate day injection with a viral mimic. To identify biochemical changes that can be translated to early-onset, we have stimulated a group of IWR1 rats with poly IC for six days and 7 hours and measured changes occurring in the pancreas in response to the viral mimic. All of these measures have been qualitative and need the support of quantitative measures. The objective of this project is to measure islet area and to measure insulin staining intensity from immunohistochemically stained pancreas sections to quantitatively assess the changes occurring in the pancreata of the rats during disease induction.

Student Duties, Contributions, and Outcomes

Student's duties: The student will be responsible for organizing a set of micrograph images for analysis. Using Image J software, the student will be responsible for calculating the total pancreas area and staining intensity. The student will be responsible for organizing the data received from the software into a spreadsheet and using GraphPad prism to run descriptive statistics on the tabular data. The student will also use GraphPad prism to create graphs. The student will create a standard operating procedure and methods section to compliment the data. The student will also be responsible for reading relevant literature and presenting one Journal Club for the lab group during the summer.

Tangible contributions: The data from this project will help to support a manuscript in preparation. The preliminary data suggests that this data will experimentally validate a qualitative assessment of the data. The student will also be encouraged to submit an abstract to the Experimental Biology meeting.

Specific Outcomes: The student will learn the pathological analysis of immunohistochemistry stained samples. The student will learn how to organize data and run simple descriptive statistics. The student will also learn how to prepare a methods section, abstract, poster, and journal club presentations.

Student Selection Criteria

The student must be a rising sophomore, junior, or senior who has taken BY119. Students who have taken CH121, BY 215, BY 300, BY 313, or PY300 will receive special consideration. A student from any academic discipline will be considered as long as they meet the minimum requirements.

Faculty/Research Staff Mentorship

The student will primarily be mentored by me and a Ph.D. student in my lab, Madushika Wimalarathne. The student will be trained on the software by me and will be assisted in developing the methods, standard operating procedures, and graphs by Mrs. Wimalarathne. In the early weeks of the project the student and I will work together daily, but as the summer progresses, these weeks will shift to weekly progress meetings.