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Characterizing Production Changes in INS-1 Exosomes from after Exposure to an Immune-Stimulating Trigger

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Characterizing production changes in INS-1 exosomes from after exposure to an immune-stimulating trigger.

**A proposal for the Research and Creative Experience for Undergraduates Program
Summer 2018**

Faculty Mentor: Sharifa T. Love-Rutledge, Ph.D. Department of Chemistry, MSB 229 Phone (256) 824-6112 sharifa.love-rutledge@uah.edu First time RCEU mentor

Project Summary: Type 1 Diabetes (T1D) is an autoimmune disease characterized by immune cell-mediated destruction of pancreatic β cells, the cells responsible for insulin production and regulation of blood glucose levels. A mixture of genetic predisposition, environmental factors (e.g., toxicants or viruses) and unpredictable triggers cause T1D. The signals that initiate autoimmune destruction of the β cell are unclear and how environmental factors such as viral infection specifically trigger β cell autoimmunity is lacking, but might involve biochemical changes or signals like exosomes that might provide a pathway that can be targeted for pharmacological interventions to prevent progression of the disease.

We believe that exosomes have the potential to be utilized as biomarkers of disease status. A change in exosome quantity, as well as the direct effect of these exosomes on beta cells, is not well characterized. The goals of this study are to quantify the number of exosomes produced in response to immune response triggers relative to non-stimulated cells and to analyze the inflammatory gene-based responses of non-stimulated INS-1 cells to exosomes produced by stimulated INS-1 cells.

Student Prerequisites: Students should have taken at least BYS 119 & 120, and CH 121 & 123. Would prefer a student with at least a 3.0 GPA.

Student Duties:

- The student will learn to culture rat insulinomas, which will involve learning to use sterile technique.
- Student will learn to do real-time quantitative polymerase chain reaction.
- Student will learn to use a NanoSight for exosome quantification.
- Student will learn differential centrifugation.

Mentor Supervision and Interaction

Student duties will be monitored by Dr. Love-Rutledge and graduate student. Analysis of data, preparation of poster, manuscript, and any oral presentations will be supervised by Dr. Love-Rutledge. Student will participate in group meetings and will be expected to present at least one peer-reviewed article in a journal club style presentation prepared with the assistance of Dr. Love-Rutledge. The student has access to the supervisor as needed.