Effects of Suborbital Space on Immune Cell Regulation
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ABSTRACT
This project is designed to provide natural supplement (plants and probiotics metabolites extraction) testing in suborbital space to show the effects at a molecular level in peripheral blood mononuclear cells (PBMCs) also known as immune cells. Our methods are to design a sounding payload by utilizing 3-D printing to construct a cryovial integration system to hold our biologicals samples. The payload will then be launched into space for a 5-6 minute period. From this we will analyze biological samples using a flow cytometer to determine if PBMC activation. Mass spectrophotometry will be used to determine metabolomics profile of PBMCs. Miniseq Sequencer will be used to determine the levels of gene expression. From this we hope to gain InSite on the effects of suborbital space on PBMCs incubated with and without plant or probiotic extracts.

INTRODUCTION
In our research we want to study the effects of suborbital space on immune cell system dysregulation. The immune system has an essential role in protecting humans and animals from infection. Microgravity, an important characteristic in space that differs from that found on earth, is directly involved in the immune dysfunction found in astronauts. Microgravity has an extensive impact on immune cells, including affecting cellular development, cell survival, the cytoskeleton, and intracellular signal transduction pathways. However, there are observable differences in how various immune cell types respond to microgravity. The function of natural killer cells is unaffected under microgravity conditions, while those of T cells and macrophages are much more susceptible to microgravity.

OBJECTIVE
- The objective of this experiment is to test suborbital effects on immune cells incubated with and without plant or probiotic extracts.

METHODS

Step 1
Design Payload
3-D print payload design

Step 2
Assemble biological samples and payload
Place payload on Orion rocket to test suborbital effects.

Step 3
Flow Cytometer
Identification of Immune cell activation

Liquid Chromatography Mass Spectrometry
Metabolomics Identification

MiniSeq
Changes in gene expression

DESIGN

Conclusion
- By designing the cryovial integration system we hope that this will help in our goal to test suborbital effects on biological samples.
- If biological samples are retrievable after launch. We hope to test our samples (step 3) to be able to gain InSite on the effects of suborbital space on PBMC when incubated with and without extracts.

REFERENCES

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