Presentation Outline

• Section 1: Mission Overview
• Section 2: Full Mission Simulation Results
• Section 3: Project Management Update
1.0 Mission Overview

Dashari Miller
Mission Overview

• **Mission statement**
  - The purpose of participating in RockSat-C is to answer our question of suborbital micro gravity effects on immune cell regulation.
  - This project is in conjunction with our existing NASA project investigating natural countermeasures to Astronaut’s immune system dysregulation that is of current interest to NASA.
  - The mission is to provide natural supplements (plants and probiotics metabolites extraction) testing in suborbital space to show the effects at a molecular level of gene expression change in activated immune cells.

• **Project requirements**
  - Building a sounding payload-electronic system Integrate the biological experiment-human immune cells subject to microgravity in space and on the ground and spin in a clinostat for 6 minutes
ConOps

• We have had to move to plan B and incorporate a simpler design, to be able to obtain useful results from the flight.
• Within the 6 minute flight, the samples will not be going through any time changes and we are just testing whether there are any changes between samples when subject to true microgravity effects.
• The heritage system from rockon 2018 using the g-switch and will be incorporated but not associated with sample collection.
Changes since STR

• Change to design, we are on Plan B, generating a simpler design to be able to obtain useful results from flight
• Change in team leadership and members
• No new subsystems have been integrated
Integrated Subsystems

Cryovial Integration System

Shield

Temperature sensor

Pressure sensor

Humidity sensor

Geiger counter

1 and 2 Axis Accelerometers

3 Axis Gyroscope
2.0 Full Mission Simulation Results

Dashari Miller, Zsabre Wright, Rodaind Yeremuh
Full Mission Simulation Test

• Samples were set up and left to incubate at room temperature (RT) or in CO2 incubator with hole and without hole to determine the viability of cells after 2-3 days.

• If you notice the color change (indicator of pH), in figure 1, tubes 1-3 were placed CO2 incubator, tube 4 was incubated at RT with hole (simulate air contact) in cryovial, tube 5-7 we left a RT with no air accessibility.

• Figure 2, further shows the pH change for tubes 4-7.

• Tube 4 left at RT and hole present is an indicator that any presence of air will cause an increase in pH change and lead to increased cell death. Which is not what we want and will lead to un-reproducible results. These results are similar to the flight in 2017 (figure 3), we want to avoid retrieving the same results.

• Thus, leading to a rapid design change.
Full Mission Simulation Results

• Changes from 2019 design

• Issues with design
  • Biological Samples, will be dead or increased pH change after two days of sitting in the presence of air, not being able to collect valuable results

• Plan B is to generate simpler design to test samples without the use of the syringe system

• Students will continue to work on this design in hopes of having it fully worked out by next year, if we are accepted in the program

Figure 4. Previous design from ISTR/CDR
Current Design

• Design Changes

Figure 5. New Design

Figure 6 & 7. Secondary Container for Cryovials (Stackable Element)

Figure 8. 3-D print design

RockSat-C 2019
Full Mission Simulation Results

• What action items do you have left between now and the LRR?
  • Vibration Testing
  • Integration into canister
3.0 Project Management Update

Dashari Miller
### Action Item Summary

- **Show a detailed schedule here for when the action items for each subsystem will be designed, tested, and completed**

<table>
<thead>
<tr>
<th>Date</th>
<th>Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 22 - 26, 2019</td>
<td>Testing samples simulation at RT</td>
</tr>
<tr>
<td>April 26 – May 3, 2019</td>
<td>Reassembling of team and simpler design</td>
</tr>
<tr>
<td>May 3 – May 24, 2019</td>
<td>Redesign of payload. Full run through of the check in procedures, vibration testing, integration. Progress Update?</td>
</tr>
<tr>
<td>May 24 – June 11, 2019</td>
<td>Preliminary Check In Procedure Document Due, Launch Readiness Review Document Due</td>
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<tr>
<td>June 12-20, 2019</td>
<td>Wallops Flight Facility</td>
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## User Guide Compliance

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Status/Reason (if needed)</th>
</tr>
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<tbody>
<tr>
<td>Center of gravity in 1&quot; mid-can?</td>
<td>In progress of checking center of gravity</td>
</tr>
<tr>
<td>Contained in can</td>
<td></td>
</tr>
<tr>
<td>Connected to can by 4/5 bulkheads on top and bottom only</td>
<td></td>
</tr>
<tr>
<td>Mass at 20±0.2lbs</td>
<td></td>
</tr>
<tr>
<td>Shared canister clearance</td>
<td>Using full canister</td>
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<tr>
<td>No voltage on the can</td>
<td>In progress of checking plates</td>
</tr>
<tr>
<td>Activation wires at least 4 ft</td>
<td></td>
</tr>
<tr>
<td>Activation wire at least 24 gauge and Teflon coated</td>
<td>24 gauge</td>
</tr>
<tr>
<td>Early Activation: current &lt; 1 A</td>
<td>In progress of checking</td>
</tr>
<tr>
<td>T-0 Activation: current &lt; .1 A</td>
<td>Using G-Switch</td>
</tr>
<tr>
<td>Battery Type</td>
<td>Lithium Polymer (will not charge at Wallops)</td>
</tr>
</tbody>
</table>
Biggest Worries

• N/A
Conclusions

• No concerns or issues at this time, but the next meeting in one week, we should have had everything integrated and tested.
• Closing remarks
• Discuss Presentation to RockOn! 2019
• Discuss Final Report
• Discuss extra launch attendees