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# Rodent Research on the International Space Station A Look Forward

A. B. Kapusta, M. Smithwick, and C. L. Wigley



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**Cecilia Wigley**  
**NASA Ames Research Center**  
**Rodent Research Mission integration**  
**and Operations Lead**



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## Agenda

- Rodent Research-1 update
- Upcoming Rodent Research flights
- New Capabilities



# Rodent Research-1

- Launched on SpX-4 early in the morning of Sunday Sept 21, 2014 after a 24 hour scrub due to Florida weather!
- 2 day transit to the International Space Station with docking on Tuesday, Sept 23
- Animals were transferred from the Transporter to the two Rodent Research Habitats on Thursday, Sept 25
- All 20 animals were healthy and very active
- Twice daily video health checks performed and all animals continued to appear healthy and active through out the mission



# Rodent Research-1

- CASIS dissections/tissue transfer activities were completed on Oct 12 – 14
  - 21 days after launch
  - 10 hindlimbs fixed in formalin and transferred to Ethanol after 24 hours
  - Liver quick frozen from 5 animals
  - Spleen from 5 animals fixed in RNALater stored at 4°C then transferred to -80°C
  - All 10 carcasses were frozen at -80°C
- All samples were returned on SpX-4 which undocked on Oct 21
- NASA dissections were completed on Oct 24
  - 30 days after transfer to the Habitat
  - Liver and spleen from 2 animals
  - 8 intact carcasses frozen for body weight analysis
  - Samples will be returned on SpX-5 in January 2015

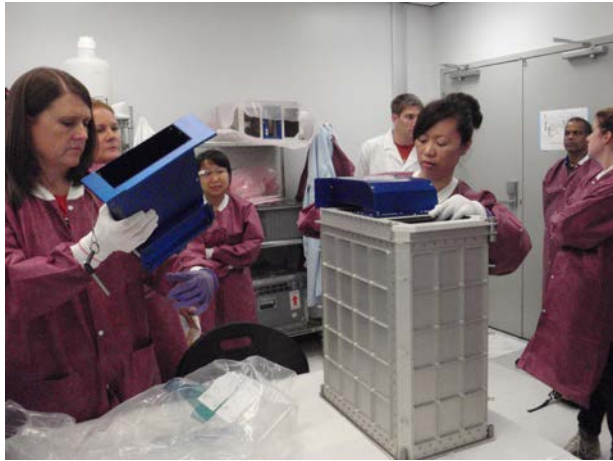


# Rodent Research-1

- Mission Integration and Operations (MI&O) Team supported all on orbit operations from the Ames Research Center (ARC) International Space Station Science Operations Center (ISOC)
  - Privatized voice loops and video of activities
  - Realtime feedback to/from crew with ARC MI&O team
  - CASIS representative in ISOC to support CASIS operations



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11/4/13



# Rodent Research-1 Summary

- Successfully launched and delivered 20 healthy animals to the ISS
- Successfully maintained 10 animals in a Habitat for 30 days
  - Video health checks for 30 days indicated all animals appeared healthy and active
  - Final results pending analysis of samples after return on SpX-5
- Successfully completed on-orbit dissections
  - Simple – hindlimb
  - Complex – Liver and spleen
- Successfully conducted Tissue preservation – Rapid freeze (liver), Formalin (hindlimb), RNALater (spleen)
  - No major operational issues identified
  - Pending analysis of samples after return on SpX-4 and SpX-5 to determine scientific viability of the tissues



# Rodent Research-1 Summary

- Collected timeline data on all operations to be used to develop timelines for future operations
  - Stowage gather activities take more time than originally planned
    - Transfer day had over 80 line items of stowage the crew needed to gather to complete the activities
  - Hardware configuration activities take more time than estimated
  - Training for the animal activities was “spot on”
  - Learning curve was incredible
    - Crew got faster between animals and from Day 1 to Day 2



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# Rodent Research-1 Summary





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# Overview of Upcoming Rodent Research on ISS

- NASA's Rodent Research program traffic model is 2 flights per year on even numbered SpaceX flights
  - Flights will support up to 40 mice for up to 90 days
  - Resources will be shared between NASA sponsored investigators and investigators from the Center for the Advancement of Science in Space (CASIS)



# Overview of Upcoming Rodent Research on ISS

- Rodent Research-2 will be the first NASA rodent mission on the ISS with a focus on science
  - Manifested for launch on SpX-6 (NET February 4, 2015)
  - 40 mice for up to 60 days
    - 20 mice assigned to support two NASA science investigations selected through the 2012 NASA Research Announcement (NRA), Research Opportunities in Space Biology
      - Investigations on antibody responses and affects on the blood brain barrier
      - Biospecimen sharing
        - » Genelab
        - » Additional Biospecimen Sharing investigators to be selected
    - 20 mice assigned to CASIS



# Overview of Upcoming Rodent Research on ISS

- Rodent Research-3
  - Manifested for launch on SpX-8 (NET September 2 , 2015)
  - 40 mice for up to 42 days
    - 20 mice assigned to support one NASA science investigations selected through the 2012 NASA Research Announcement (NRA), Research Opportunities in Space Biology
      - Investigations on antibody responses and affects on the blood brain barrier
      - Biospecimen Sharing
        - » Genelab
        - » Additional Biospecimen Sharing investigators to be selected
    - 20 mice assigned to CASIS
      - Requesting SCID mice



# Overview of Upcoming Rodent Research on ISS

- Rodent Research-4
  - Manifested for launch on SpX-10 (NET February 9, 2016)
  - 40 mice
    - 20 mice assigned to support one NASA science investigations selected through the 2012 NASA Research Announcement (NRA), Research Opportunities in Space Biology
      - Investigations on antibody responses and affects on the blood brain barrier
      - Additional Biospecimen Sharing investigators to be selected
    - 20 mice assigned to CASIS
      - Requesting male mice



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# New Capabilities Developed to support Rodent Research

- Bone Densitometry
- Cardiac Puncture and blood collection
  - Centrifugation for blood separation
- Soft tissue fixation and fluid transfer
- RFID chip reader
- On-orbit water refill



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# New Capabilities Under Development to support Rodent Research

- Anesthesia Recovery system
- Grip strength measurement
- Second glovebox to support Life Sciences Research





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# Operational Updates for Rodent Research

- Foodbar changeout approximately every 14 days
- Water refill approximately every 30 days
- Habitat now certified for up to 90 days