# RODENT HABITAT ON ISS: SPACEFLIGHT EFFECTS ON MOUSE BEHAVIOR

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The NASA Decadal Survey (2011), *Recapturing a Future for Space Exploration: Life and Physical Sciences Research for a New Era*, emphasized the importance of expanding NASA life sciences research to long duration, rodent experiments on the International Space Station (ISS). To accomplish this objective, flight hardware, operations, and science capabilities supporting mouse studies in space were developed at NASA Ames Research Center. The first flight experiment carrying mice, Rodent Research Hardware and Operations Validation (Rodent Research-1), was launched on Sept 21, 2014 in an unmanned Dragon Capsule, SpaceX4, exposing the mice to a total of 37 days in space. Ground control groups were maintained in environmental chambers at Kennedy Space Center. Mouse health and behavior were monitored for the duration of the experiment via video streaming. Here we present behavioral analysis of two groups of five C57BL/6 female adult mice viewed via fixed camera views compared with identically housed Ground Controls. Flight and Ground Control mice exhibited the same range of behaviors, including eating, drinking, exploratory behavior, self- and allogrooming, and social interactions at similar or greater levels of occurrence. Mice propelled themselves freely and actively throughout the Habitat using their forelimbs to push off or by floating from one cage area to another, and they quickly learned to anchor themselves using tails and/or paws. Overall activity was greater in Flt as compared to GC mice, with spontaneous ambulatory behavior including the development of organized 'circling' or 'race-tracking' behavior that emerged within the first few days of flight and encompassed the primary dark cycle activity for the remainder of the experiment. We quantified the bout frequency, duration and rate of circling with respect to characteristic behaviors observed in the varying stages of the progressive development of circling: flipping utilizing two sides of the habitat, circling, multi-lap circling and group-circling. Once begun, mice did not regress to flipping behavior or other previous behavioral milestones for the remainder of flight. An overall upward trend in circling frequency, rate, duration, participation, and organization was observed over the course of the 37-day spaceflight experiment. In this presentation, we will summarize qualitative observations and quantitative comparisons of mice in microgravity and 1g conditions. Behavioral analyses provide important insights into the overall health and adaptation of mice to the space environment, and identify unique behaviors and social interactions to guide future habitat development and research on rodents in space.

**REFERENCE**

[1] NRC Decadal Survey on Biological and Physical Sciences in Space, (2011) http://sites.nationalacademies.org/SSB/CompletedProjects/SSB_067720

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