

EFFECTS OF ONE YEAR OF SPACEFLIGHT ON NEUROCOGNITIVE FUNCTION

R. D. Seidler¹, A. P. Mulavara², V. Koppelmans¹, I. S. Kofman², K. Cassady¹, P. Yuan¹, Y. E. De Dios², N. Gadd², R. F. Riascos³, S. J. Wood⁴, J. J. Bloomberg⁵

¹University of Michigan, 401 Washtenaw Avenue, Ann Arbor MI 48109-2214,
rseidler@umich.edu

²KBRWyle, Houston, TX

³UT Neuroradiology

⁴Azusa Pacific University, Azusa CA

⁵NASA Johnson Space Center

ABSTRACT

It is known that spaceflight adversely affects human sensorimotor function. With interests in longer duration deep space missions it is important to understand microgravity dose-response relationships. NASA's One Year Mission project allows for comparison of the effects of one year in space with those seen in more typical six month missions to the International Space Station. In the Neuromapping project we are performing structural and functional magnetic resonance brain imaging to identify the relationships between changes in neurocognitive function and neural structural alterations following a six month International Space Station mission. Our central hypothesis is that measures of brain structure, function, and network integrity will change from pre to post spaceflight. Moreover, we predict that these changes will correlate with indices of cognitive, sensory, and motor function in a neuroanatomically selective fashion. Our interdisciplinary approach utilizes cutting edge neuroimaging techniques and a broad ranging battery of sensory, motor, and cognitive assessments that are conducted pre flight, during flight, and post flight to investigate potential neuroplastic and maladaptive brain changes in crewmembers following long-duration spaceflight. With the one year mission we had one crewmember participate in all of the same measures pre-, per- and postflight as in our ongoing study. During this presentation we will provide an overview of the magnitude of changes observed with our brain and behavioral assessments for the one year crewmember in comparison to participants that have completed our six month study to date.

This work is supported by the National Space Biomedical Research Institute through NASA NCC 9-58 and by NASA grant # NNX11AR02G.