

National Aeronautics and
Space Administration



2018 NASA Human Research Program Investigators' Workshop

HRP RESEARCH: THE GATEWAY TO

MARS

Galveston Island Convention Center
5600 Seawall Blvd. Galveston, TX 77554

January 22 - 25, 2018

NASA Human Research Program Investigators' Workshop
HRP Research: The Gateway to



January 22-25, 2018
Galveston Island Convention Center
Galveston, TX

In conjunction with the
The 29th Annual Space Radiation Investigators' Workshop

And the
2018 HRP Annual Banquet
January 24, 2018

Sponsored by:
NASA Human Research Program

Steering Committee

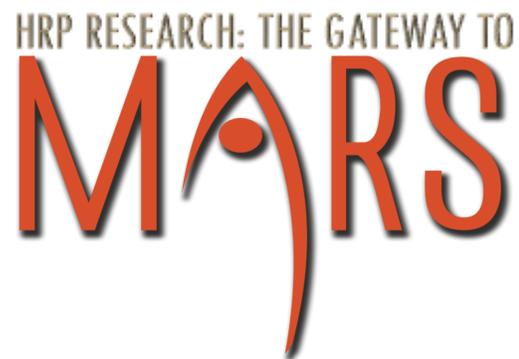
Erik Antonsen, M.D., Ph.D.
Maneesh Arya, Ph.D.
Yael Barr, M.D.
Michael Canga
John Charles, Ph.D.
Barbara Corbin
Dorit Donoviel, Ph.D.
Jennifer Fogarty, Ph.D.

Janice Huff, Ph.D.
Kris Lehnhardt, M.D.
Peter Norsk, M.D.
William Paloski, Ph.D.
Steven Platts, Ph.D.
Lisa Simonsen, Ph.D.
Leticia Vega, Ph.D.
Virginia Wotring, Ph.D.

HRP IWS OVERVIEW

Welcome to the 2018 NASA Human Research Program Investigators' Workshop! (HRP IWS)

The HRP IWS is the annual meeting for NASA-funded investigators. The meeting will be held Monday, January 22 through Thursday, January 25, 2018, at the Galveston Island Convention Center (GICC) in Galveston, TX. The workshop's goal is to provide an informal, collegial atmosphere for cross-disciplinary interaction. The theme of the this year's workshop is ***HRP Research: The Gateway to Mars.***



Over the next few days, you will hear research findings in various scientific sessions featuring presentations by principal investigators organized and scheduled according to NASA Human Research Program elements:

- Exploration Medical Capability (ExMC)
- Human Factors and Behavioral Performance (HFBP)
- Human Health Countermeasures (HHC)
- International Space Station Medical Projects (ISSMP)
- Space Radiation (SR)

REGISTRATION/ BADGING/ CHECK-IN: There is no cost to register for the HRP IWS, but there are optional activities that may require payment. Please be advised that all meals and incidentals should be paid by the attendee. Be sure to wear your name badge while visiting the island. There are several retailers and restaurants that will offer discounts to HRP IWS attendees by simply presenting your badge! A complete list of locations providing discounts is provided in a program insert.

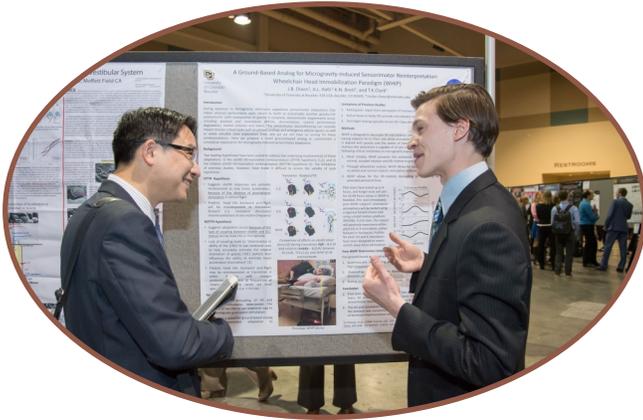
COFFEE: Complimentary coffee and tea service will be provided daily during breaks throughout the conference. Please see the program agenda beginning on page 4 to note all break times.

SPACE RADIATION IWS: The 29th Annual NASA Space Radiation Investigators' Workshop will be held in conjunction with the HRP IWS. The purpose of this workshop is to provide an opportunity for active researchers in the NASA Space Radiation Program to share the results of their work, interact with scientists in other discipline areas within the Human Research Program, and explore new directions for research that may benefit the NASA program. Please see the program agenda for Space Radiation– specific sessions.

CONFERENCE APP: Stay connected with up-to-the-minute information regarding the IWS by downloading the free conference app. You will be able to create your own schedule, take notes, and connect with fellow attendees all at your fingertips. Download to your Android or iDevice <https://crowd.cc/s/1b4NC>

POSTER SESSIONS: Poster presenters should plan to install their posters on Sunday, Jan. 21 from 4pm to 7pm or on Monday, Jan. 22 from 8am to 2pm, prior to Poster Session A. Please note poster session start times in the program agenda.

#HASHTAG: Stay connected to the conference and engaged in the conversation by using #HRPIWS18 on social media!



3 DYNAMIC POSTER SESSIONS

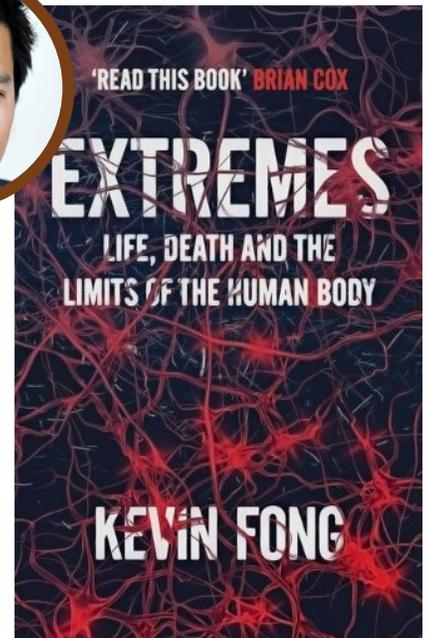
The 2018 IWS has extended its poster session to a third day! Held concurrently with the HRP Grad Student and Postdoc Poster Competition, Poster Sessions A, B & C provide more opportunities to learn about current HRP research, more opportunities to network, and more opportunities to hear from young investigators.

Join us Monday-Wednesday in Exhibit Hall A after the afternoon sessions. Cash bar available.

2018 HRP BANQUET ft. DR. KEVIN FONG

This year's IWS banquet featured speaker is no stranger to the NASA JSC community. Long before becoming a best-selling author and founding the Center for Altitude, Space and Extreme Environment Medicine at University College London (UCL), Dr. Kevin Fong worked with NASA's Human Adaptation and Countermeasures Office at Johnson Space Center.

Now, Dr. Fong is Consultant Anaesthetist at UCL Hospitals, and is Anaesthetic Lead for both the Patient Emergency Response Team and Major Incident Planning. Drawing on his own experiences in trauma surgery as an anaesthetist and intensive care expert, 'Extremes' is Kevin Fong's account of the way cutting-edge medicine is pushing the envelope of human survival. This is certainly an event that you don't want to miss!



INNOVATION CHALLENGE

Innovation often starts with connecting the dots. To become "connectable", it is essential that we share our challenges. HRP has partnered with *Innovenate, LLC* to support us in creating a culture where we talk about our challenges with the aim to find better solutions faster. We therefore encourage you to think about some tough challenges in your research. You are asked to share these challenges in your presentation or poster. This might lead to new connections and collaborations with (cross-discipline) colleagues and lead to the solutions we need to accomplish our mission. Join us in the Innovation Pavilion (Grand Ballroom A) all week to start the discussion!

CONVENTION CENTER MAP

Galveston Island Convention Center Level 1

-  **Poster Sessions/ Exhibits**
-  **Plenary Sessions/ Banquet**
-  **Registration/ check-in**
-  **Discipline-specific Sessions**

Galveston Island Convention Center Level 2

-  **Innovation Pavilion**
-  **Discipline-specific Sessions**
-  **Breaks and Lunch Service**

Wi-Fi Access:

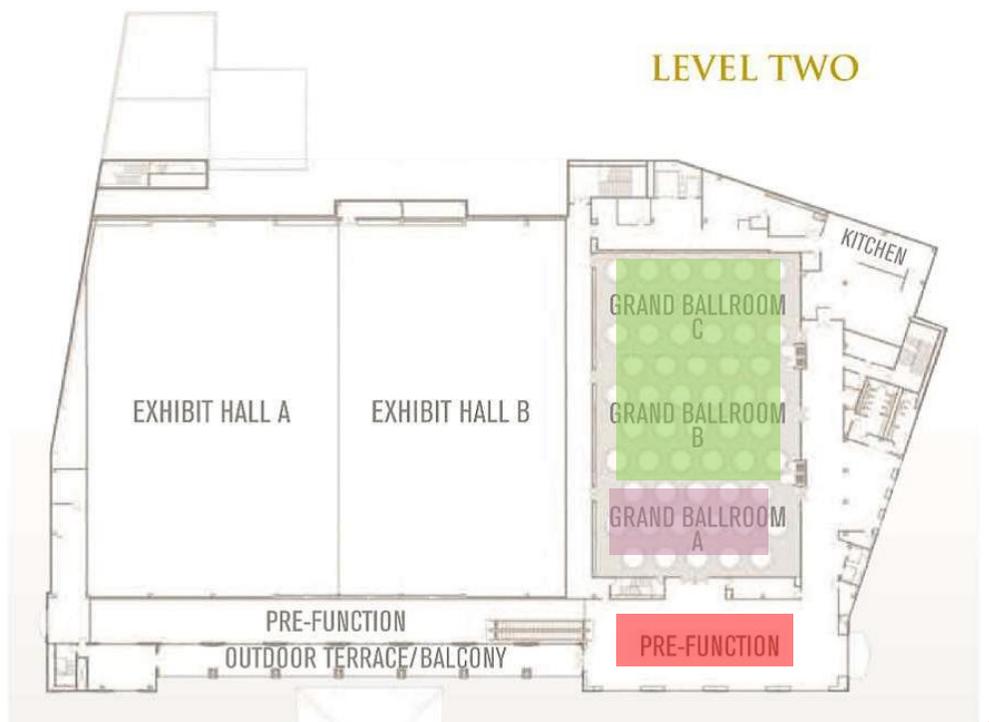
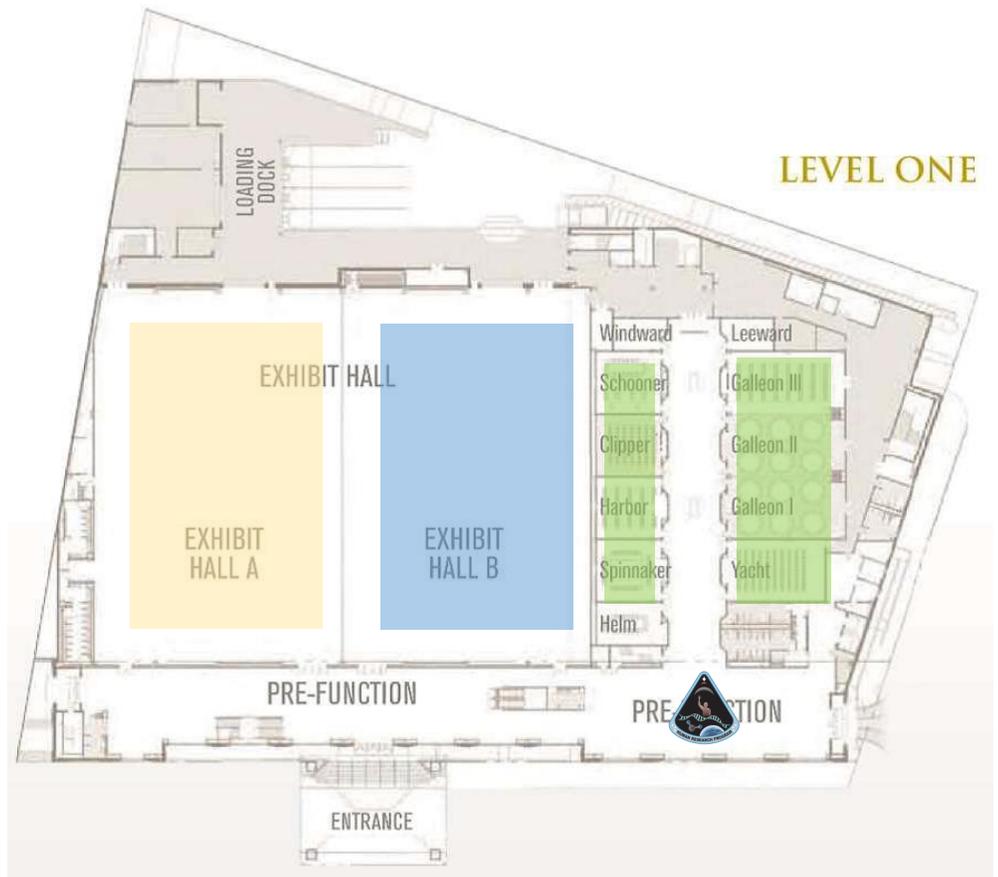
Network for Laptops:
NASAlaptops

Password:
NASAHRP1

Network for Mobile devices, i.e. smartphones, tablets:

NASAmobile

Password:
NASAHRP2



NASA Human Research Program Investigators' Workshop
HRP Research: The Gateway to



In conjunction with
Space Radiation Investigators' Workshop

Monday, January 22

7:00 a.m. Pre-function (1st floor)
8:00 a.m. Exhibit Hall B
 8:05 a.m.

 8:50 a.m.
 9:50 a.m.
 10:05 a.m.
 10:35 a.m.

 11:20 a.m.

12:00 p.m.
 Yacht
 Clipper
 Harbor
 1:00 p.m. Galleon Ballroom

 Grand Ballroom B
 Grand Ballroom C
 2:30 p.m. Grand Foyer (2nd floor)
 3:00 p.m. Galleon Ballroom

 Grand Ballroom B

 Grand Ballroom C
 4:30 p.m. Exhibit Hall A
 6:00 p.m.

General Session (8:00 a.m. – 12:00 p.m.)

General Registration/Check-in
Welcome – J Charles
Plenary: Things That Keep Me Awake At Night: From the Chief Risk Owner's Perspective – J Polk
Plenary: Interagency Plenary - Partner Agencies
BREAK
Plenary: IRB - Changing Times – C Lloyd
Plenary: Our Space, Our Health: A New Way Forward – D Donoviel and V Wotring
Plenary: Aspirin as a Cancer Preventive Agent - Existing Evidence and Remaining Questions – E Hawk
LUNCH
 International Space Station Medical Projects (ISSMP)
 Crew Health
 NASA Innovative Advanced Concepts
 Effects of Spaceflight, Isolation, and Confinement on Neurocognitive Performance
 Exploration Exercise
 Radiation Carcinogenesis and Countermeasures I
BREAK
 Cognition and Behavior in Space: Methods of Monitoring, Measuring and Norms to Detect Behavioral Health Risks
 Long Duration Food System Development, Nutritional Stability, Acceptability, and Crew Nutritional Status
 Radiation Carcinogenesis and Countermeasures II
 Poster Session A; Cash Bar Reception
Adjourn

Tuesday, January 23

7:00 a.m. Pre-function (1st floor)
8:00 a.m. Exhibit Hall B

General Registration/Check-in
Plenary: Fostering Integrity in Research – R Nerem

8:45 a.m.		Plenary: NASA Space Biology - Enabling Human Space Exploration – D Tomko and K Sato
9:30 a.m.		Plenary: Extending Human Exploration Into Deep Space: NASA's Exploration Architecture – J Connolly
10:15 a.m.	Grand Foyer (2 nd floor)	BREAK
10:30 a.m.	Galleon Ballroom	Training Recommendations for Performance & Health in Exploration Missions
	Grand Ballroom B	Making Gains in the Flight Exercise System
	Grand Ballroom C	GCR Simulator & NSRL User Group
12:00 p.m.	Grand Foyer (2 nd floor)	Obtain LUNCH
12:45 p.m.	Exhibit Hall B	Lunch Plenary: Personalized Medicine and Omics – G Ginsburg
1:45 p.m.	Galleon Ballroom	Developing Habitability Standards for Exploration Missions
	Grand Ballroom B	Osteoporosis/Fracture Risks: A Final Research Status?
	Grand Ballroom C	Radiation and Combined Spaceflight Stressors on Cardiovascular Disease I
3:15 p.m.	Grand Foyer (2 nd floor)	BREAK
3:30 p.m.	Galleon Ballroom	Biomarkers: Towards Individualizing Countermeasures for Behavioral Health and Performance
	Grand Ballroom B	Sensorimotor Flight & Ground Studies
	Grand Ballroom C	Radiation and Combined Spaceflight Stressors on Cardiovascular Disease II
	Yacht	ExMC Element Team Meeting (closed)
5:00 p.m.	Exhibit Hall A	Poster Session B; Cash Bar Reception
6:30 p.m.		Adjourn

Wednesday, January 24

7:00 a.m.	Pre-function (1 st floor)	General Registration/Check-in
8:00 a.m.	Galleon Ballroom	Operational Performance Measures: Research Results and Technology Demonstration
	Grand Ballroom B	Spaceflight Associated Neuro-Ocular Syndrome (SANS/VIIP) - Flight Findings
	Grand Ballroom C	Twins I
9:30 a.m.		BREAK
10:00 a.m.	Galleon Ballroom	Crew Autonomy Support: Countermeasures and Tools
	Grand Ballroom B	Spaceflight Associated Neuro-Ocular Syndrome (SANS/VIIP) - Ground Studies and Countermeasure Testing
	Grand Ballroom C	Twins II
11:30 a.m.	Grand Foyer (2 nd floor)	Obtain LUNCH
12:00 p.m.	Grand Ballroom A	Lunch Plenary: Innovation Challenge – H Mooiweer
1:00 p.m.	Galleon Ballroom	Crew Composition, Teamwork and Mission Duration: Tracking Performance
	Grand Ballroom B	ExMC Element Overview & Goals

2:30 p.m.	Grand Foyer (2 nd floor)	BREAK
3:00 p.m.	Exhibit Hall A	Poster Session C; Cash Bar Reception
4:30 p.m.	Grand Foyer (2 nd floor)	BREAK
5:00 p.m.	Pre-function (1st floor)	Cash Bar Happy Hour
6:45 p.m.	Exhibit Hall B	2018 HRP Annual Banquet
		<i>Keynote: Extremes: The Fastest Century – Kevin Fong;</i> <i>Author of Extremes: Life, Death and the Limits of the Human Body</i>
9:00 p.m.		Adjourn

Thursday, January 25

7:00 a.m.	Pre-function (1 st floor)	General Registration/Check-in
8:00 a.m.	Galleon Ballroom	Operational Performance Measurement & Mitigation
	Grand Ballroom B	ExMC Collaboration
	Grand Ballroom C	Space Radiation Effects on Cognition and Performance I
9:30 a.m.	Grand Foyer (2 nd floor)	BREAK
9:45 a.m.	Galleon Ballroom	Spaceflight Injury Biodynamics
	Grand Ballroom B	ExMC Technology Development I
	Grand Ballroom C	Space Radiation Effects on Cognition and Performance II
11:15 a.m.	Grand Foyer (2 nd floor)	Obtain LUNCH
12:00 p.m.	Exhibit Hall B	<i>Lunch Plenary: NSBRI's 20-Year Cooperative Agreement with NASA – J Sutton</i>
1:00 p.m.	Galleon Ballroom	How We Do Business
	Grand Ballroom B	ExMC Technology Development II
	Grand Ballroom C	Space Radiation: Enabling NASA Exploration Missions – A Panel Discussion
2:30 p.m.	Grand Foyer (2 nd floor)	BREAK
3:00 p.m.	Exhibit Hall B	<i>Plenary: Astronaut Perspective – P Whitson</i>
4:00 p.m.		<i>HRP Awards and HRP Poster Competition Awards – W Paloski</i>
4:15 p.m.		<i>Closing Comments – J Charles</i>
4:30 p.m.		Adjourn

AGENDA AT A
GLANCE
DAY 1

MONDAY, JANUARY 22, 2018

	Plenary (Exhibit Hall B)	Poster (Exhibit Hall A)	Galleon Ballroom	Innovation Pavilion (Grand Ballroom A)	Grand Ballroom B	Grand Ballroom C	Yacht
8:00 AM	Plenary Sessions						
9:50 AM	Break						
10:05 AM	Plenary Sessions						
12:00 PM	Lunch						ISSMP
1:00 PM			Neurocognitive Performance		Exploration Exercise	Cancer & Counter- measures I	
2:30 PM	Break						
3:00 PM			Cognition & Behavior		Long Duration Food System	Cancer & Counter- measures II	
4:30 PM		Poster Session A					
6:00 PM	Adjourn						

FEATURED PLENARY SPEAKERS



Chuck Lloyd

Chair, NASA Institutional Review Board; Associate Director, Strategic Communications, NASA HRP
NASA JSC



Virginia Wotring

Deputy Director and Chief Scientist
Translational Research Institute for Space Health



Ernest Hawk

Vice President and Division Head; Cancer Prevention and Population Sciences
The University of Texas MD Anderson Cancer Center

JD Polk
Chief Health and Medical Officer
NASA Headquarters



Dorit Donoviel

Director
Translational Research Institute for Space Health



Monday, January 22, 2018

Crew Health

12:00 PM

Clipper

Chair: Roni Cromwell

- 12:00 PM Cromwell R. Rhodes B. Cromwell R. Van Baalen M.
[Health Surveillance of Active and Former Astronauts \[#18025\]](#)
This session will discuss NASA Crew Health & Safety's surveillance of astronaut health, data analytic capabilities, and new legislation effecting health care of former astronauts.
- 1:00 PM Break [#18026]

Monday, January 22, 2018

International Space Station Medical Projects (ISSMP)

12:00 PM

Yacht

Chair: Steve Platts

- 12:00 PM Platts S. Pietrzyk B. Primeaux L. Wood S. Vessey B.
[TEN LIFE HACKS TO GET YOUR RESEARCH ACCOMPLISHED IN SPACEFLIGHT AND ANALOGS \[#18083\]](#)
The ISSMP team will discuss best-practice approaches for successfully preparing and conducting studies in both the flight and analog environments.
- 1:00 PM Break [#18084]

Monday, January 22, 2018

NASA Innovative Advanced Concepts

12:00 PM

Harbor

Chair: Ron Turner

- 12:00 PM Turner R. Derleth J. Reilly K.
[NASA INNOVATIVE ADVANCED CONCEPTS \[#18097\]](#)
The NASA Innovative Advanced Concepts (NIAC) Program nurtures visionary ideas that could transform future NASA missions with the creation of breakthroughs while engaging America's innovators and entrepreneurs as partners in the journey.
- 1:00 PM Break [#18098]

Monday, January 22, 2018

Effects of Spaceflight, Isolation, and Confinement on Neurocognitive Performance

1:00 PM

Galleon Ballroom

Chairs: Jason Schneiderman and Maya Greene

- 1:00 PM Klein T. Rossiter A. Weber J. Foitschik T. Crucian B. Schneider S. Abeln V.
[ISOLATION, SLEEP, COGNITION AND NEUROPHYSIOLOGICAL RESPONSES – AN INVESTIGATION IN THE HUMAN EXPLORATION RESEARCH ANALOG \(HERA\) \[#18033\]](#)
The maintenance of sleep quality during 30 days of isolation might have positively affected the central nervous system, as brain cortical activation and neurotropic factors were not impaired during isolation and also positively affected mood and cognition.
- 1:18 PM Stahn A. Werner A. Brauns K. Basner M. Dinges D. Gunga H. Kuehn S.
[VULNERABILITY OF THE HIPPOCAMPUS AND AMYGDALA DURING ISOLATION AND CONFINEMENT – THE HERA C3 CAMPAIGN \[#18034\]](#)
30 days of Isolation and confinement lead to significant changes in the plasticity of the hippocampal head and amygdala.
- 1:36 PM Stahn A. Brauns K. Werner A. Basner M. Dinges D. Kuehn S. Gunga H.
[ACUTE AND CHRONIC BDNF RESPONSES DURING 60 DAYS OF BED REST – EXERCISE AS A COUNTERMEASURE? \[#18035\]](#)
Long-duration bed rest lead to clear changes in neurotrophic factors, irrespective of an exercise countermeasure. BDNF was associated with variations in mood. These data confirm the role of BDNF to better understand the biological basis of neurobehavioral effects during spaceflight.
- 1:54 PM Roalf D. Prabhakaran K. Basner M. Dinges D. Stahn A. Nasrini J. McGuire S. Hermosillo E. Ecker A. Johannes B. Gerlach D. Gunga H. Melzer T. Taylor B. Elliott M. Bilker W. Gur R.
[NEUROSTRUCTURAL, COGNITIVE, AND PHYSIOLOGIC CHANGES DURING A 1-YEAR ANTARCTIC WINTER-OVER MISSION \[#18036\]](#)
We performed structural MRI scans on 4 traveling human phantoms and 25 crew members at the Antarctic Concordia Station who were scanned pre-, immediately post-, and 6-months post-mission. Results indicate that some crewmembers showed measurable changes in local brain structures.
- 2:12 PM Seidler R. Mulavara A. Koppelmans V. Cassidy K. Yuan P. Hupfeld K. Kofman I. DeDios Y. Riascos R. Bloomberg J.
[SPACEFLIGHT EFFECTS ON NEUROCOGNITIVE PERFORMANCE: EXTENT, LONGEVITY AND NEURAL BASES \[#18037\]](#)
We are conducting experiments in which 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.
- 2:30 PM Break [#18038]

Monday, January 22, 2018

Exploration Exercise

1:00 PM

Grand Ballroom B

Chair: Meghan Downs

1:00 PM Introduction to Exploration Exercise Hardware [#18065]

1:20 PM Perera J. Hanson A.
[OnePortal Crew Countermeasure Systems \(Exercise\) Design and Utilization Plans](#)
[#18066]

Overview and plans for the One Portal CMS software which was developed in support of crew exercise systems on the ISS and future exploration missions. The One Portal CMS is a custom device-agnostic software capable of easily integrating with exercise systems including COTS sensors integration.

1:40 PM Newby N. Kalogera K. Humphreys B. Fincke R. Maynard C. Donnan S. Downs M.
[MED-2 ISS FLIGHT STUDY](#) [#18067]

Overview of the MED-2 ISS In-flight study design and preliminary observational results from subjects completed to date.

2:00 PM Funk J. Perusek G. Bleisath S. Funk N. Anderson E. Kutnick G. Motil C. Vachon D. Funk G. Bruinsma D.
[ATLAS \(ADVANCED TWIN LIFTING AND AEROBIC SYSTEM\) DEVELOPMENT OVERVIEW](#) [#18068]

The ATLAS (Advanced Twin Lifting and Aerobic System) is a versatile, servo-motor based system which aims to solve the exercise needs for long duration space travel while substantially reducing the volume, mass and power requirements when compared to existing ISS systems.

2:20 PM Discussion [#18069]

2:30 PM Break [#18070]

Monday, January 22, 2018

Radiation Carcinogenesis and Countermeasures I

1:00 PM

Grand Ballroom C

Chairs: Al Fornace and Michael Weil

- 1:00 PM Fornace A. Fornace A. Datta K. Shay J. Meltzer P. Brenner D.
[ASSESSING RISK, DEVELOPING RISK PREDICTION MODELS, AND TESTING RISK MITIGATION STRATEGIES FOR SPACE RADIATION-INDUCED GASTROINTESTINAL CARCINOGENESIS \[#18409\]](#)
An overview of the GI-NSCOR will be presented; the focus is on risk of gastrointestinal cancer by space radiation
- 1:30 PM Shuryak I. Brenner D.
[MODELING LOW-DOSE RBE AND DOSE RATE EFFECTS FOR HZE CARCINOGENESIS USING TARGETED AND NON-TARGETED EFFECTS \[#18410\]](#)
Our results suggest that the carcinogenic effectiveness of HZE ions at space-relevant dose rates and at the high dose rates used in terrestrial experiments may be similar.
- 1:50 PM Cornforth M. Kittler R. Loucas B. Ray A. Robinson E. Bedford J. Spellman P. Anur P. Peto M. Gray J. Williams E. Bailey S.
[Molecular characterization of transmissible chromosome aberrations produced by ions of intermediate and high atomic number \[#18411\]](#)
Next generation sequencing approaches are used to characterize, at the DNA level, the breakpoints of chromosome translocations and inversions produced by ionizing radiations.
- 2:10 PM Shay J.
[MOUSE MODELS OF CANCER RISK AND PREVENTION FROM GCR SIMULATIONS \[#18412\]](#)
Biological countermeasures reduce cancer risks in mouse models exposed to galactic space radiation simulations
- 2:30 PM Break [#18413]

Monday, January 22, 2018

Cognition and Behavior in Space: Methods of Monitoring, Measuring and Norms to Detect Behavioral Health Risks

3:00 PM

Galleon Ballroom

Chairs: Thomas Williams and James Garrett

- 3:00 PM Dinges D. Basner M. Strangman G. Stuster J. Roma P. Mollicone D. Gur R. Stahn A. Dennis L. Ecker A. Nasrini J. Mott C. Williams T.
[STANDARDIZED BEHAVIORAL MEASURES FOR DETECTING BEHAVIORAL HEALTH RISKS DURING EXPLORATION \(BEHAVIORAL CORE MEASURES\) \[#18007\]](#)
This project is developing and evaluating feasibility and acceptability of a standardized suite of behavioral health core measurement tools for evaluation of astronauts within the constraints of prolonged spaceflight.
- 3:20 PM Williams T. Landon L. Schneiderman J. Seaton K. Vessey W. Tisson J. Stanley R. Kusmiesz C. Arias D. Stranges S. Dunn J.
[WINSCAT VS COGNITION BATTERY: INITIAL FINDINGS OF A STUDY TO VALIDATE AND ASSESS DIFFERENCES ACROSS TWO SPACEFLIGHT COGNITIVE ASSESSMENT TOOLS \[#18008\]](#)
We present initial results comparing the WinSCAT and Cognition Battery.
- 3:40 PM Basner M. Dinges D. Nasrini J. Hermosillo E. Ecker A. Port A. Moore T. Gur R.
[COGNITION BATTERY RESEARCH STUDIES: INCREASING COGNITION ADMINISTRATION ORDER FLEXIBILITY AND LONGITUDINAL VALIDATION STUDY IN HIGH-PERFORMING SUBJECTS \[#18009\]](#)
Practice and stimulus set difficulty effects were established in the Order Study. Effects of long (6-18 months) test-retest intervals were investigated in Longitudinal Validation Study for both Cognition and WinSCAT.
- 4:00 PM Nasrini J. Dinges D. Hermosillo E. Stahn A. Ecker A. Mollicone D. Mott C. Moore T. Gur R. Basner M.
[UPDATES TO THE COGNITION BATTERY: USING NORMATIVE PERFORMANCE DATA TO IMPROVE STIMULUS SELECTION AND FEEDBACK DISPLAY \[#18010\]](#)
We utilized a large database of prior administrations of the Cognition battery (N=588 subjects, M=3,697 administrations per task) to inform stimulus selection on the Emotion Recognition Task, and improve subject feedback display, in a recently delivered update to the Cognition software.
- 4:20 PM Discussion [#18011]
- 4:30 PM Break [#18012]

Monday, January 22, 2018

Long Duration Food System Development, Nutritional Stability, Acceptability, and Crew
Nutritional Status

3:00 PM

Grand Ballroom B

Chair: Grace Douglas

- 3:00 PM Sirmons T. Barrett A. Douglas G. Richardson M. Schneiderman J. Slack K. Whitmire A. Williams T. Young M.
[Meal Replacement Mass Reduction and Integration Acceptability Study \[#18085\]](#)
The purpose of this task was to develop a variety of nutritionally balanced, high quality, breakfast replacement bars and determine their effects on crewmember mood and health during the HERA C3 mission.
- 3:18 PM Whitmire A. Sirmons T. Young M. Schneiderman J. Slack K. Williams T. Douglas G.
[Psychological Aspects of Food Bar/Mass Reduction 2 Meal Replacement Study \[#18086\]](#)
This presentation will focus on psychological outcomes from the Meal Replacement Food Bars study in HERA C3 (and serves as a complementary presentation to Dr. Takiyah Sirmons).
- 3:36 PM Barrett A. Froio-Blumsack D. Richardson M.
[STABILIZED FOODS FOR USE IN EXTENDED SPACEFLIGHT: PRESERVATION OF SHELF-LIFE, NUTRIENT CONTENT AND ACCEPTABILITY \[#18087\]](#)
This study includes a coordinated effort to develop high quality food in which vitamins are preserved throughout a 5-year storage period, and develop packaging materials that likewise preserve vitamins throughout storage and are compatible with novel food sterilization methods.
- 3:54 PM Goulette T. Dixon W. Xiao H. Peleg M.
[MODELING DEGRADATION KINETICS OF VITAMINS B1 AND C IN SPACEFLIGHT FOODS \[#18088\]](#)
Spaceflight food vitamins were monitored for their degradation rates in relation to storage temperature and preservation methods, in order to elucidate kinetic parameters that can be used to construct a predictive model for vitamin degradation at any reasonable time and temperature.
- 4:12 PM Smith S. Heer M. Zwart S.
[BIOCHEMICAL PROFILE: PROVIDING INSIGHT INTO VITAMIN STATUS ON ISS MISSIONS \[#18089\]](#)
The Biochemical Profile project (and its predecessor the Nutrition SMO) allows insight into many aspects of human adaptation to spaceflight, including vitamin status, with biological sample collections before, during, and after flight.
- 4:30 PM Break [#18090]

Monday, January 22, 2018

Radiation Carcinogenesis and Countermeasures II

3:00 PM

Grand Ballroom C

Chairs: Al Fornace and Michael Weil

- 3:00 PM Weil M. Ullrich R. Ding L. Emmett M. Yu Y. Bacher J. Halberg R. Raber J. Edmondson E. Ray F. Thamm D. Liber H. Borak T. Story M.
[NASA SPECIALIZED CENTER OF RESEARCH ON CARCINOGENESIS \[#18414\]](#)
The NASA Specialized Center of Research on Carcinogenesis will identify biomarkers of HZE ion-induced carcinogenesis, examine the mechanisms underlying the increased malignancy of HZE ion-induced tumors, and measure space-relevant dose rate effects on cancer incidence.
- 3:30 PM Barnette B. Strain S. Lichti C. Yongjia Y. Ullrich R. Emmett M.
[AN INTEGRATED OMICS APPROACH TO DEFINE THE MOLECULAR MECHANISMS OF HEPATOCELLULAR CARCINOMA \(HCC\) INDUCED BY LOW DOSE, HIGH-ENERGY, HIGH CHARGE IONS \(HZE\) \[#18415\]](#)
Our study utilizes an integrated omics approach comprised of lipidomics, RNA sequencing, and proteomics to determine the pathways that are involved in formation and progression of hepatocellular carcinoma (HCC) induced by low dose, high-energy, high charge ion (HZE) irradiation.
- 3:50 PM Costes S.
[VARIABILITY IN GALACTIC COSMIC RADIATION- INDUCED DNA DAMAGE RESPONSE IN INBRED MICE IS MODULATED BY GENETICS \[#18416\]](#)
Overall, this work suggests that repair kinetics of primary skin fibroblasts is a good surrogate marker for in-vivo radiation sensitivities in other tissues and that this response is modulated by genetics.
- 4:10 PM Burma S. Todorova P. Fletcher E. Mukherjee B. Guida P. Story M. McKinnon P.
[MECHANISTIC ANALYSIS OF PARTICLE RADIATION-INDUCED CARCINOGENESIS USING VALIDATED MOUSE GLIOMA MODELS \[#18417\]](#)
Using mouse models of radiation-induced glioblastoma (GBM), we show that heavy ions are very carcinogenic compared to low-LET radiation, and that GBMs resulting from heavy ion exposure recapitulate human grade IV disease with a prominent cancer stem cell phenotype driven by Met amplification
- 4:30 PM Break [#18418]

Monday, January 22, 2018

Poster Session A: Advanced Food Technology and Nutrition

4:30 PM

Exhibit Hall A

Cooper M. Sirmons T. Froio-Blumsack D. Mohr L. Young M. Douglas G.
[EXTENSION OF SPACE FOOD SHELF LIFE THROUGH HURDLE APPROACH](#)
[\[#18117\]](#)

Various combinations of improvements in the formulation, processing, packaging, and storage conditions of 16 space foods are being studied to establish the conditions to achieve a 5-year shelf life of a processed space food system for long duration missions.

Douglas G. Zwart S. Young M. Kloeris V. Crucian B. Smith S. Lorenzi H.
[THE INTEGRATED IMPACT OF DIET ON HUMAN IMMUNE RESPONSE. THE GUT MICROBIOTA. AND NUTRITIONAL STATUS DURING ADAPTATION TO A SPACEFLIGHT ANALOG](#)
[\[#18118\]](#)

Beneficial associations between human immunological profiles, the gut microbiome, and nutritional status in relation to enhancements in the spaceflight diet will aid in the design and development of more-efficient targeted dietary interventions for exploration missions.

Massa G. Wheeler R. Romeyn M. Hummerick M. Spencer L. Morrow R. Mitchell C. Burgner S. Whitmire S. Young M. Douglas G.
[PREPARATION FOR PICK-AND-EAT FOOD PRODUCTION ON THE INTERNATIONAL SPACE STATION: FLIGHT DEFINITION FOR THE VEG-04 AND VEG-05 MISSIONS](#)
[\[#18119\]](#)

Ground preparation to support ISS experimentation with leafy green and dwarf tomato crops and examine spaceflight impacts on crops, humans, and food safety, is underway.

Cooper M. Paradis R. Zwart S. Smith S. Kloeris V. Douglas G.
[ASSESSMENT OF THE UTILIZATION OF FOOD VARIETY ON THE INTERNATIONAL SPACE STATION](#)
[\[#18120\]](#)

Current food variety utilization aboard the ISS has not been optimized for crew preference, and such changes will be required to ensure maximum food consumption on long duration missions.

Schreurs A. Steczina S. Tahimic C. M'Saad O. Pendelton M. Alwood J. Globus R.
[CANDIDATE NUTRITIONAL COUNTERMEASURE TO MITIGATE ADVERSE EFFECTS OF SPACEFLIGHT IN MICE](#)
[\[#18121\]](#)

The spaceflight environment poses multiple challenges, including microgravity and ionizing radiation, and we tested a diet as countermeasure to prevent bone loss and other adverse effects on tissues.

Hava H. Bailey S.
[IN-FLIGHT FRUIT AND EDIBLE ALGAE PRODUCTION THROUGH A NOVEL HYBRID BIO-WICK AND PHOTOBIOREACTION SYSTEM](#)
[\[#18122\]](#)

Integrating a hybrid bio-wick/photobioreactor will increase sustainability, supportability, and self-sufficiency of long duration missions by: leveraging bioregenerative consumable production to minimize logistic support, reduced resupply & maximize in-situ resource utilization.

Monday, January 22, 2018

Poster Session A: Artificial and Partial Gravity

4:30 PM

Exhibit Hall A

DiZio P. Lackner J.

[DUAL ADAPTATION OF FREE REACHING MOVEMENTS AND OBJECT TRANSPORT TO CORIOLIS FORCE PERTURBATIONS IN A ROTATING ARTIFICIAL GRAVITY ENVIRONMENT \[#18123\]](#)

We assessed adaptation of a manual object transport task to Coriolis force perturbations in a 10 RPM rotating artificial gravity environment, and we found that adaptations for the arm and the grasped object are rapidly and simultaneously acquired and can be recruited in a task-specific manner.

Mortreux M. Ko F. Bouxsein M. Rutkove S.

[A NEW PARTIAL GRAVITY ANALOG MODEL IN RATS TO INVESTIGATE MUSCULOSKELETAL ALTERATIONS DURING SPACEFLIGHT \[#18124\]](#)

Our new quadrupedal unloading model in rats allows us to efficiently assess the longitudinal alterations of the musculoskeletal system in several hypogravity environments.

Bretl K. Sherman S. Mitchell T. Dixon J. Clark T.

[Personalized and Non-Personalized Protocols for Human Adaptation to the Coriolis Cross-Coupled Illusion for Artificial Gravity \[#18125\]](#)

This investigation compares the effectiveness of a non-personalized training protocol with that of a personalized protocol for acclimation to the "Coriolis" cross-coupled illusion experienced during high spin rates associated with short-radius centrifugation.

Donovan F. Gresser A.

[A REVIEW AND COMPARISON OF MOUSE AND RAT RESPONSES TO MICRO GRAVITY, HYPER GRAVITY AND SIMULATED MODELS OF PARTIAL GRAVITY \[#18126\]](#)

We reviewed the reported changes in the physiology and behavior of the mouse and rat when exposed to microgravity, simulated partial gravity and hyper gravity, and use this data to evaluate the species specific advantages and caveats for use in spaceflight research.

Syedmadani K. Gruber J. Clark T.

[LINEAR SLED-HYBRID ARTIFICIAL GRAVITY AS A COMPREHENSIVE COUNTERMEASURE FOR ASTRONAUT PHYSIOLOGICAL DECONDITIONING \[#18127\]](#)

This is a feasibility study for a Linear Sled Hybrid is an artificial gravity system to assist with physiological deconditioning of astronauts for long-duration missions due to microgravity.

Fuller C. Hoban-Higgins T. Robinson E. Alberts J.

[ADAPTATION OF RATS TO A SMALL DIAMETER CENTRIFUGE \[#18128\]](#)

A study examining the adaptation of male and female rats to chronic acceleration (2G) on a small diameter (34 inch) centrifuge.

Monday, January 22, 2018

Poster Session A: Bone, Muscle, Connective Tissue and Cell Biology

4:30 PM

Exhibit Hall A

Meehan R. Knight MD PhD V. Scheuring DO R. Hoffman MS E. Berliner DO J. Regan MD PhD E. Crooks PhD MS J. Morse DO L. Hill, DO J. Pacheco MD MS K.
[SYNOVIAL FLUID CYTOKINES AS A BIOMARKER OF CARTILAGE DEGRADATION DUE TO ARTHRITIS, AND UNLOADING ASSOCIATED WITH SPINAL CORD INJURY AND MICROGRAVITY. . \[#18129\]](#)

Synovial fluid cytokine results will be presented from patients with Rheumatoid Arthritis and Osteoarthritis so the results can be compared to normal subjects (ongoing) and from future cartilage unloading models due to spinal cord injured patients and Astronauts pre and post flight.

Mann V. Sundaresan A. Okoro E. Grimm D. Corydon T. Sahana J. Riwaldt S. Slumstrup L.

[TISSUE AND MOLECULAR IMPACT OF MODELED MICRO GRAVITY ON BONE REMODELING AND ANALYSIS OF TISSUE ENGINEERING ON BONE TISSUE. \[#18130\]](#)

Generation of 3D tissue model constructs using hFOB cells exposed to microgravity analog, random positioning machine.

Willey J. Kwok A. Moore J. Mao X. Collins B.

[KNEE AND HIP JOINT DEGRADATION FROM REDUCED WEIGHT-BEARING AND/OR LOW-DOSE RADIATION \[#18131\]](#)

Reduced weight bearing with or without exposure to low-doses of spaceflight relevant radiation causes an arthritic response and cartilage degradation in the knee and hip joint of rodents.

Allaway H. Bokhari R. Seidel D. Wahl K. Turner N. Ford J. Gaddy D. Suva L. Bloomfield S.

[POTENTIAL MITIGATION OF ACUTE GALACTIC COSMIC RADIATION-INDUCED BONE LOSS BY A DIET HIGH IN OMEGA-3 FATTY ACIDS \[#18132\]](#)

This bio-specimen sharing project will leverage the impact of a NASA funded project performed at the NSRL to explore how dietary intake of omega-3 fatty acids may mitigate radiation induced bone loss.

Tahimic C. Torres S. Adams J. Schreurs A. Alwood J. Shirazi-Fard Y. Globus R.

[TIME-DEPENDENT EFFECTS OF LONG DURATION SIMULATED WEIGHTLESSNESS IN THE RAT SKELETON \[#18133\]](#)

This study aims to determine the effects of long duration simulated weightlessness on skeletal structure and underlying molecular mechanisms.

Bailey J. Chang D. Healey R. Sayson J. Khieu K. Parazynski S. Minkoff L. Coughlin D. Scheuring R. Lotz J. Hargens A.

[Risk of Intervertebral Disc Damage after Prolonged Space Flight \[#18134\]](#)

Our results illuminating anatomical and biomechanical changes to the cervical and lumbar spines following spaceflight may aid the development of countermeasures to reduce spinal pain and decrease the incidence of post-flight intervertebral disc herniation.

Metzger C. Anderson A. Igbini N. Bloomfield S.

[RECOVERY OF HINDLIMB BONE MASS FOLLOWING 90 DAYS OF HINDLIMB UNLOADING \[#18135\]](#)

Young male rats recover from long-term hindlimb unloading after long-term, but not short-term return to weightbearing activity.

Lenfest S. Metzger C. Brezicha J. Elizondo J. Kosniewski J. Looper A. Bloomfield S. Hogan H.

[VOLUNTARY JUMPING EXERCISE IN RATS PRIOR TO UNLOADING PREVENTS UNLOADING-RELATED BONE LOSS \[#18136\]](#)

Rats performed 28 days of voluntary jumping exercise prior to 28 days of simulated microgravity via hindlimb unloading, resulting in significant prevention of bone loss.

Tahimic C. Schreurs A. Steczina S. Alwood J. Shirazi-Fard Y. Globus R.

[DOSE-RESPONSE ANALYSIS OF A DIETARY COUNTERMEASURE FOR RADIATION -INDUCED BONE LOSS \[#18137\]](#)

We report a dosing study in a rodent model for ionizing radiation exposure (2 Gy total body irradiation) where we tested various concentrations (0, 5, 10 and 20% w/w) of Dried Plum for their ability to prevent radiation-induced bone loss.

De Witt J. Buxton R. Williams M. Hanson A. Peters B. Scott-Pandorf M. Sibonga J. Ploutz-Snyder L.

[RELATIONSHIPS BETWEEN IN-FLIGHT LOAD AND MUSCULOSKELETAL HEALTH OUTCOMES \[#18138\]](#)

A retrospective analysis of the relationship between bone and muscle strength changes during long duration space flight and in-flight exercise performance.

Khieu K. Bailey J. Horne D. Liebenberg E. Hargens A. Macias B. Lotz J.

[SPINAL STRUCTURE AND FUNCTION AFTER 90 DAYS SIMULATED SPACE FLIGHT \[#18139\]](#)

90 days of hindlimb suspension, as a model for microgravity in rodents, may not properly unload caudal (tail) intervertebral discs to show the effects of space flight on spinal structure and function.

Wu H. Shanmugarajan S. Zhang Y. Moreno-Villanueva M. Clanton R. Rohde L. Ramesh G. Sibonga J.

[COMBINED EFFECTS OF SIMULATED MICROGRAVITY AND RADIATION EXPOSURE ON OSTEOCLAST CELL FUSION \[#18140\]](#)

Osteoclast cell differentiation was investigated in RAW 264.7 monocyte/macrophage cells cultured in rotation wall vessels while exposed to radiation.

Allaway H. Pierson R. Hogan H. Bloomfield S.

[WILL USE OF LONG-ACTING, REVERSIBLE CONTRACEPTIVES MITIGATE BONE LOSS IN FEMALE RATS DURING SIMULATED EXPLORATION CLASS MISSIONS \[#18141\]](#)

Hormonal contraceptive methods are routinely used by premenopausal female astronauts to suppress ovarian function and menstrual cycling during training and spaceflight missions [1, 2].

Monday, January 22, 2018

Poster Session A: Cancer and Cross Risk Countermeasures

4:30 PM

Exhibit Hall A

Boothman D. Chaudhary J. Patidar P. Xiao L. deng M. Motea E. Zhang C.
[KUB5-HERA \(K-H\) LOSS CAUSES BRCAness TUMOR FORMATION \[#18142\]](#)
We discovered that loss of RPRD1B (Kub5-Hera) led to increased carcinogenesis alone and heightened levels after IR in a BRCAness manner,

Fox D. Bretscher H.
[MINING BIOLOGY'S EXTREMES FOR NEW SPACE RADIATION RESISTANCE STRATEGIES \[#18143\]](#)
We are using both candidate and un-biased approaches to mine some of nature's extreme examples of radiation tolerance.

Pluth J. To J. Sridharan D. Enerio S.
[RADIATION-REGIMEN AND GENETIC IMPACT ON IMMUNE RESPONSE AND MAMMARY GLAND DEVELOPMENT \[#18144\]](#)
Study investigating fractionated vs acute X-ray exposure effects on mammary gland development.

Bacher J. Halberg R. Van Doorn R. Gjyzeli G. Udho E. Koth R. Weil M.
[MECHANISMS UNDERLYING INCREASED HEPATOCELLULAR CARCINOMA MALIGNANCY FROM SPACE RADIATION \[#18145\]](#)
A unique mouse model containing a HCC specific reporter system will be used to compare the characteristics of spontaneous, gamma-ray and HZE ion-induced metastatic liver cancer and to determine the mechanisms responsible for the increased pulmonary metastases in HZE ion-induced HCC.

SUMAN S. KUMAR S. MOON B. FORNACE A. DATTA K.
[HEAVY ION RADIATION-INDUCED INTESTINAL AND COLONIC TUMORIGENESIS IN APC1638N/+ MICE IS INDEPENDENT OF DOSE RATE \[#18146\]](#)
HZE-induced GI-tumorigenesis is independent of dose-rate

Luitel K.
[PROTON RADIATION-INDUCED PROGRESSION OF LUNG CANCER \[#18147\]](#)
Proton irradiation can cause an increase in progression of premalignant lesions.

Kim S. Krishna L. Jerry S.
[BIOLOGICAL EFFECTS OF GCR SIMULATION ON COLON AND LUNG CANCER SUSCEPTIBLE MOUSE MODEL \[#18148\]](#)
GCR simulation induces inflammation, oxidative stress and cancer initiation in colon and lung mouse models.

Castle K. Lee C. Sachdeva M. Moding E. Williams N. Ma Y. Luo L. Kirsch D.
[DEFINING THE ROLE OF MIR-182 IN RADIATION-INDUCED LYMPHOMAGENESIS AND LUNG TUMORIGENESIS \[#18149\]](#)
Utilizing gain of function and loss of function approaches, we are investigating whether miR-182 functions following radiation to regulate lymphoma or lung tumor development by altering Fbxw7 levels.

Ding L. Edmondson E. Yu Y. Ullrich R. Weil M. Story M.

[GENOMIC ANALYSIS OF RADIATION-INDUCED HEPATOCELLULAR CARCINOMA IN C3H MOUSE \[#18150\]](#)

We studied molecular mechanisms of high-LET, low-LET radiation-induced, and spontaneous hepatocellular carcinomas using omics approaches.

Datta K. Suman S. Moon B. Fornace A. Datta K.

[ENERGETIC HEAVY ION SPACE RADIATION-INDUCED LONG-TERM DOWNREGULATION OF AUTOPHAGY AND UPREGULATION OF PROLIFERATIVE PATHWAYS IN NORMAL MOUSE INTESTINAL EPITHELIUM\[#18151\]](#)

Space radiation and autophagy

Wahl K. Seidel D. Ford J. Carroll R. Chapkin R. Turner N.

[ADULT COLON STEM CELL RESPONSE TO RADIATION SOURCE AND DIETARY INTERVENTION \[#18152\]](#)

Low dose HZE radiation exposure induces ion, dose, and time dependent changes in a Lgr5-EGFP colonic stem cell mouse model.

Porada C. Almeida-Porada G. Walker S. Langefeld C. Pardee T. Kuhlman B. Coleman M. Zenhausern F. Wilson P.

[NOVEL MICROFLUIDIC BIOMARKER DETECTION PLATFORMS TO MONITOR IN VIVO EFFECTS OF SPE AND GCR RADIATION, USING MICE WITH HUMAN HEMATOPOIETIC SYSTEMS \[#18153\]](#)

In the present project, we are using mice with human hematopoietic systems and a novel human gut-on-a-chip model system to understand the risks space radiation poses to the human hematopoietic and GI systems, identify biomarkers of damage, and develop an effective countermeasure.

Carnell L. Rios C. Prasanna P. Homer M. Meeks H. Hoots K.

[INTERAGENCY EXAMINATION OF ASPIRIN AS A MEDICAL COUNTERMEASURE FOR RADIATION-INDUCED HEALTH EFFECTS \[#18154\]](#)

Through a joint partnership, multiple agencies are undertaking a comprehensive set of investigations to examine the efficacy of aspirin as a prophylactic or mitigator to reduce the risk of cancer, cardiovascular, microvascular and CNS events following exposure to radiation.

Xia J. Sawakuchi G. Miller K. Rosenberg S.

[Discovery of human radiation-protection genes and pathways \[#18155\]](#)

Discovery of human radiation-protection genes and pathways

Monday, January 22, 2018

Poster Session A: Cardiovascular

4:30 PM

Exhibit Hall A

Granberry R. Eschen K. Abel J. Holschuh B.

[ACTIVE KNIT FABRICS FOR ORTHOSTATIC INTOLERANCE GARMENTS \[#18156\]](#)

This research provides a technical comparison of a novel, active knit orthostatic intolerance garment (OIG) concept with existing OIG technologies, specifically pneumatic compression garments (e.g. NASA's antigravity suit) and undersized compression garments (e.g. Russia's Kentavr).

Frederick N. Frederick N. Mitchell R. Holzman E. Zawieja D. Delp M. Bagher P.

[SPACEFLIGHT INDUCES SUBTLE CHANGES IN MOUSE CORONARY ARTERY FUNCTION \[#18157\]](#)

These preliminary data represent the first examination of coronary artery function following spaceflight and suggest that coronary artery function is altered subtly following spaceflight in lower Earth orbit.

Greaves D. Hughson R.

[24-HR AMBULATORY CENTRAL ARTERIAL BLOOD PRESSURE AND ARTERIAL STIFFNESS MONITORING IN CREWMEMBERS \[#18158\]](#)

In the Vascular Echo study, we measured central arterial stiffness once per hour from 08:00 to 22:00 then at 02:00 and 03:00 in crewmembers using the IEM Mobil-O-Graph device.

Tahimic C. Terada M. Steczina S. Schreurs A. Shirazi-Fard Y. Cimini M. Goukassian D. Globus R.

[EFFECTS OF SIMULATED WEIGHTLESSNESS ON THE RAT HEART \[#18159\]](#)

Our study aims to determine cardiac changes on the molecular and tissue levels in response to spaceflight.

Monday, January 22, 2018

Poster Session A: Extravehicular Activity

4:30 PM

Exhibit Hall A

Boppana A. Anderson A.

[Pressure Sensor Network to Quantify Spacesuit Contact Pressure \[#18160\]](#)

This work encompasses the development of a pressure sensor network to measure the magnitude and distribution of contact pressure between the spacesuit and its wearer.

Shen Y. Anderson A.

[CHARACTERIZATION OF SPACESUIT WEARER JOINT KINEMATICS USING INERTIAL MEASUREMENT UNIT ARRAYS \[#18161\]](#)

This work presents the approach and current progress in the development of an inertial joint angle measurement subsystem for studying spacesuit wearer joint kinematics, leveraging inertial sensor arrays for drift reduction.

Norcross J. Jarvis S. Bekdash O. Cupples J. Abercromby A.

[EVA HUMAN HEALTH AND PERFORMANCE BENCHMARKING MICROGRAVITY PROTOCOL \[#18162\]](#)

The primary objective of this study is to develop a standard set of tasks and metrics to provide valid and reliable characterization of human health and performance metrics under simulated EVA conditions.

Monday, January 22, 2018

Poster Session A: Immunology, Virology and Microbiology

4:30 PM

Exhibit Hall A

Jaing C. Smith D. Mehta S. Pierson D. Karouia F. Venkateswaran K.

[MICROBIAL TRACKING-2: OBSERVING POTENTIAL PATHOGENIC BACTERIA, FUNGI, AND VIRUSES IN THE INTERNATIONAL SPACE STATION. \[#18163\]](#)

Microbial Tracking-2 provides an opportunity to assess threatening microbial populations and predict health risks for long-term space exploration.

Spielmann G. Campbell J. Crucian B. Laughlin M. Simpson R.

[THE IMPACT OF LONG DURATION SPACEFLIGHT ON THE FUNCTION OF B-CELLS AND BIOMARKERS OF INFLAMMATION \[#18164\]](#)

This study aimed at retrospectively analyzing plasma and saliva samples of Astronauts who spent 6 months in the ISS for changes in polyclonal Free Light Chains, indicative of chronic inflammation and overall B-cell function.

Lorenzi H. Voorhies A. Mehta S. Crucian B. Torralba M. Moncera K. Feiveson A. Zurek - Varela E. Pierson D. Ott M.

[STUDY OF THE IMPACT OF LONG-TERM SPACE TRAVEL ON THE ASTRONAUTS' MICROBIOME \[#18165\]](#)

Here we present preliminary results about the MICROBIOME project.

Sawtell N. Doll J. Williams M. Thompson R.

[ACUTE AND LONG TERM OUTCOMES OF SIMULATED DEEP SPACE RADIATION EXPOSURE ON LATENT VIRAL CNS INFECTION AND CNS PATHOLOGY \[#18166\]](#)

This abstract overviews the outcomes of our project evaluating the risk of combined simulated galactic cosmic radiation (sGCR) exposure and the presence of latent HSV in the nervous system, including additional risk of moderate immunosuppression.

Agha N. Baker F. Kunz H. Spielmann G. Mylabthula P. Rooney B. Crucian B. Mehta S. Laughlin M. Simpson R.

[THE IMPACT OF A 6-MONTH MISSION TO THE INTERNATIONAL SPACE STATION \(ISS\) ON SALIVARY ANTIMICROBIAL PROTEINS \[#18167\]](#)

We found that salivary lactoferrin and lysozyme concentration increases during long duration space flight, which may be due to sustained elevations in sympathetic nervous system activity.

Rooney B. Mehta S. Pierson D. Crucian B. Tandon R. Simpson R.

[SIMULATED MICROGRAVITY IMPEDES CMV VIRAL EXPANSION IN INFECTED KASUMI-3 MYELOID PROGENITOR CELLS \[#18168\]](#)

Cytomegalovirus does not expand in simulated microgravity as compared to canonical 2D flask Culture over 12 days in culture.

Okoro E. Sundaresan A. Mann V. Ellis I. Denkins P. Williams W. Marriott C.

[IMMUNE MODULATION IN NORMAL HUMAN PERIPHERAL BLOOD MONONUCLEAR CELLS \(PBMCs\) \(LYMPHOCYTES\) IN RESPONSE TO BENZOFURAN-2-CARBOXYLIC ACID DERIVATIVE KMEG DURING SPACEFLIGHT \[#18169\]](#)

Impacts of benzofuran-2- carboxylic acid and its derivatives on global gene expression under spaceflight conditions

Moreno-Villanueva M. Krieger S. Feiveson A. Kovach A. Wu H.
[MICROGRAVITY-ASSOCIATED IMPAIRED DNA DAMAGE RESPONSE AND RADIATION-INDUCED DNA STRAND BREAKS ARE PREVENTED BY PREVIOUS TREATMENT WITH ISOPROTERENOL IN HUMAN PRIMARY IMMUNE CELLS](#)
[#\[18170\]](#)

Simulated Microgravity-associated dysregulation of gene expression, accumulation of DNA strand breaks and higher radiosensitivity could be prevented by previous treatment with isoproterenol.

Crucian B.
[MONITORING THE CELLULAR IMMUNITY BY IN VITRO DELAYED TYPE HYPERSENSITIVITY ASSAY ON THE ISS \(MOCISS\)](#) [#\[18171\]](#)

This investigation will assess the functionality of peripheral blood immune cells from astronauts during spaceflight.

Crucian B.
[FUNCTIONAL IMMUNE ALTERATIONS, LATENT HERPESVIRUS REACTIVATION, PHYSIOLOGICAL STRESS AND CLINICAL INCIDENCE ONBOARD THE INTERNATIONAL SPACE STATION \(FUNCTIONAL IMMUNE\)](#) [#\[18172\]](#)

This study consists of previously validated assays which characterize in-flight immune dysregulation and includes dendritic and natural killer cell function, transcriptomics and proteomics, and determination of DNA damage and breaks.

Makedonas G.
[ASSESSMENT OF NORMOXIC COASTAL ANTARCTIC WINTEROVER AS AN ANALOG FOR SPACEFLIGHT IMMUNE DYSREGULATION \(CHOICE-COASTAL\)](#)
[#\[18173\]](#)

This study evaluates the similarity of immune alterations in the coastal Antarctic analog, Neumayer Station, to those found in ISS astronauts.

David L. Stewart Johnson S.
[PERSONALIZING PREBIOTIC THERAPIES FOR ASTRONAUTS' GUT MICROBIOTA](#)
[#\[18174\]](#)

This project will establish a platform for individualizing prebiotic treatments that could be used to enhance gut bacterial metabolism in astronauts.

Monday, January 22, 2018

Poster Session A: Omics

4:30 PM

Exhibit Hall A

Morton S. Crucian B. Hagan S. Satyamitra M. Daily A.

[PILOT STUDY ON THE INVESTIGATION OF TEAR FLUID BIOMARKERS AS AN INDICATOR OF OCULAR, NEUROLOGICAL, AND IMMUNOLOGICAL HEALTH IN ASTRONAUTS \[#18175\]](#)

The purpose of this pilot study is to investigate the collection, preparation, and analysis of tear biomarkers as a means of assessing ocular, neurological, and immunological health.

Venkateswaran K. Landry K. Malli Mohan G. Mason C. Regberg A. Singh N. Smith D. Urbaniak C. Weislogel M. Sinclair D. Wong S. Zhang Y.

[OMICS IN SPACE \(OIS\): TECHNOLOGY DEVELOPMENT FOR OMICS INSTRUMENTATIONS AND BIOMOLECULE MEASUREMENTS \[#18176\]](#)

The omics in space project will develop instrumentations for extracting nucleic acids and sequencing methodologies for inflight detection and measurement of several biomolecules related to physiological and immunological effects related to spaceflight.

Ade C. Caldwell J. Bembem D.

[OMICS AND BIOCHEMICAL MARKERS OF CARDIOVASCULAR HEALTH: RELATIONSHIP WITH BEDREST AND STANDARD PHYSIOLOGICAL MEASURES \[#18177\]](#)

Determine if tissue-specific cardiovascular-health and bone-health related c-miRNA are altered following 30 days HDBR and how they relate to changes in cardiac function and bone mineral density.

Goukassian D. Kishore R. Hakobyan A. Vangala M. Khachatryan A. Nersisyan L. Mills P. Zuriaga-Herrero M. Walsh K. Arakelyan A. Snathanam S. Rajan S. Muniswamy M.

[Effect of Space Flight on Astronauts Plasma-Derived Exosomal miRNA and Mitochondrial Damage: Implications for Biomarker Development \[#18178\]](#)

Modifications in exosomal cargo and cytochrome c oxidase subunit I (Cox I) and Cox III in astronauts blood can be used as pre-clinical prognostic bio-markers and for health and disease

Chiu C. Wallace S. John K. Stahl S. Rubins K. McInyre A. Dworkin J. Lupisella M. Smith D. Botkin D. Stephenson T. Juul S. Turner D. Izquierdo F. Federman S. Stryke D. Somasekar S. Alexander N. Yu G. Mason C. Burton A.

[NANOPORE DNA SEQUENCING FOR MICROBIAL IDENTIFICATION AND GENOME ASSEMBLY ON THE INTERNATIONAL SPACE STATION \[#18179\]](#)

We deployed a pocket-sized, portable DNA sequencer (the MinION instrument by Oxford Nanopore Technologies) on the International Space Station (ISS) and compared its in-flight performance against the MinION, Illumina MiSeq, and PacBio RS II sequencing platforms run in parallel in terrestrial laboratories.

Monday, January 22, 2018

Poster Session A: Performance, Muscle and Exercise Systems

4:30 PM

Exhibit Hall A

Ryder J. Crowell B.

[*Sweat rates during continuous and interval aerobic exercise: implications for nasa multipurpose crew vehicle \(mpcv\) missions*](#) [#18180]

Sweat responses to continuous and interval exercise.

Schneider S.

[*FROM ANTARCTICA TO ALZHEIMERS – EXERCISE HELPS TO PREVENT COGNITIVE DECLINE*](#) [#18181]

Several studies from our lab demonstrate the importance of regular physical activity for brain health, mood and life-quality for those living in space as well as elderly people and demonstrate that findings of space life science research are beneficial for the general population.

Hill E. Housh T.

[*ECCENTRIC BLOOD FLOW RESTRICTION TRAINING ELICITS MUSCLE ADAPTATION AND ATTENUATES EXERCISE-INDUCED MUSCLE DAMAGE*](#) [#18182]

The effects of low intensity eccentric exercise with blood flow restriction induces favorable adaptations in skeletal muscle without the development of muscle damage.

Chien J. Parks M. Siu K.

[*Criterion validation of a mobile motion capture system in space for analysis of joint angles*](#) [#18183]

Using novel motion capture system, MO2CA, could accurately measure the joint angles in comparison with golden standard camera motion capture system.

Laughlin M. Reed J. Layne C. Kozlovskaya I. Koryak Y. Albracht K. Staeudle B. Rittweger J.

[*SARCOLAB-3: MYOTENDINOUS AND NEUROMUSCULAR ADAPTATION TO LONG-TERM SPACEFLIGHT*](#) [#18184]

SarcoLab-3 will perform a battery of in vivo and in vitro investigations into the causes of muscle weakness from the molecular to whole body level.

Buxton R. Kalogera K. Hanson A.

[*CHANGES IN EXERCISE DATA MANAGEMENT*](#) [#18185]

Proper data management is crucial to the success of an organization.

Perez F. Navarro Tichell P. Diaz Artilles A.

[*CARDIOPULMONARY RESPONSES TO EXERCISE IN ALTERED-GRAVITY ENVIRONMENTS*](#) [#18186]

We are conducting a human experiment to investigate acute cardiopulmonary responses to partial G with and without ergometer exercise using our newly developed tilting platform capable of simulating several gravitational environments in the head-to-toe direction (Gz) by tilting the bed.

Ade C. Sutterfield S. Alexander A. Caldwell J. Didier K. Hammer S. Barstow T.
[IDENTIFICATION OF AEROBIC FITNESS STANDARDS FOR EXPLORATION MISSION TASKS \[#18187\]](#)

The primary aim of this project was to determine aerobic fitness variables that can individually or in aggregate (a) map to the level of success for a given mission critical tasks, (b) help to predict successful completion of those tasks, and (c) provide an aerobic fitness standard.

Ryder J. Fullmer P. Crowell B. Buxton R. Goetchius E. Hwang E. DeWitt J. English K. Ploutz-Snyder L.

[IDENTIFICATION OF MUSCLE FITNESS STANDARDS FOR EXPLORATION MISSION TASKS \[#18188\]](#)

This investigation characterizes the relationship between muscle strength and physical mission task performance.

Crowell B. Newby N. Hwang E. Ploutz-Snyder L.

[FAP Equipment abstract \[#18189\]](#)

Description of unique equipment used in NASA funded bed rest studies.

Newby N. Downs M. Caldwell E. Kreutzberg G. Trinh T. Fincke R. Kalogera K. Funk N. Perusek G. Ayton B. Ayton C. Loerch L. Oddsson L.

[Novel Musculoskeletal Loading System \(MLS\) for Small Exercise Devices \[#18190\]](#)

This project developed and tested a 'smart' exercise bar, a small exercise loading attachment device, and a sensorimotor feedback device for use during resistive exercise.

Gruber J. Seyedmadani K. Reed B. Gruber J.

[NOVEL COMPREHENSIVE MUSCULOSKELETAL LOADING ADAPTOR FOR COMPACT EXERCISE DEVICES \[#18191\]](#)

Our proposal is to develop a low-mass, low-maintenance, and joinable accessory for comprehensive exercise accessory (JACE) that can attach to the ROCKY device to enable two-point shoulder loading without converting to a double-cable system for less complexity more compact design.

Monday, January 22, 2018

Poster Session A: Radiation Risk Modeling and Physics

4:30 PM

Exhibit Hall A

Schimmerling W.

[THE HEALTH RISKS OF EXTRATERRESTRIAL ENVIRONMENTS \(THREE\) \[#18192\]](#)

The presentation will describe the contents and use of THREE, an encyclopedic website whose goal is to present a discussion of the space radiation environment and its health risks to humans.

Chisholm J. Ford J.

[MODELING PLANETARY ENVIRONMENTS WITH GEANT4-PLANETOCOSMICS \[#18193\]](#)

Using a radiation monte carlo transport code to determine radiation dosage to inhabitants of structures made various materials if they were situated at various points on the surface of Mars.

Ray F. Garcia E. Fallgren C. Liber H. Weil M.

[RETROSPECTIVE BIODOSIMETRY STUDY OF HEAVY ION IRRADIATED MICE USING DIRECTIONAL GENOMIC HYBRIDIZATION \[#18194\]](#)

Chromatid paints were developed for mouse chromosome 1-4 which were applied to mouse metaphases derived from mice irradiated with 0, 0.2, and 0.4 Gy of 300 MeV/n 28Si and were scored for chromosome inversions, translocations and sister chromatid exchanges (SCE).

Plante I. Ponomarev A. Blattnig S.

[RECENT DEVELOPMENTS IN THE CODE RITRACKS \(RELATIVISTIC ION TRACKS\) \[#18195\]](#)

This work summarizes the latest developments introduced in the code RITRACKS.

Gaza R. Hussein H. Patel C. Shelfer T. Murrow D. Waterman G. Milstein O. Berger T. Ackerlein J. Marsalek K. Gaza R. Leitgab M. Lee K. Semones E.

[THE MATROSHKA ASTRO RAD RADIATION EXPERIMENT \(MARE\): INTERNATIONAL SCIENCE PAYLOAD ABOARD ORION EM-1 \[#18196\]](#)

Development and integration status of the Matroshka AstroRad Radiation Experiment (MARE) international ionizing radiation science payload baselined for Orion's Exploration Mission 1 (EM-1) flight into cislunar space.

Loucas B. Cornforth M.

[THE PRODUCTION OF CHROMOSOMAL EXCHANGES BY HZE IONS OF DIFFERENT ENERGIES BUT THE SAME LET \[#18197\]](#)

Track interaction events produce a slight curvature in the chromosome exchange breakpoint dose response.

Ponomarev A. Plante I. Blattnig S.

[CALCULATIONS OF CHROMOSOME ABERRATIONS AND THEIR SIZE DISTRIBUTIONS USING A COMPUTATIONAL MODEL OF THE CELL NUCLEUS WITH IMPINGING STOCHASTIC AND AMORPHOUS TRACKS FROM SINGLE IONS CORRESPONDING TO THE SPACE ENVIRONMENT \[#18198\]](#)

Human chromosomal aberrations from space particles

Costes S.

[DNA REPAIR DOMAIN MODELING CAN PREDICT CELL DEATH AND MUTATION FREQUENCY FOR WIDE RANGE SPECTRUM OF RADIATION \[#18199\]](#)

A computer model is introduced to predict cell death and DNA mutation for any HZE particles, given their atomic number and energy, by simply calibrating the model against experimental data in cells exposed to X-ray.

Chancellor J.

[EMULATION OF THE SPACE RADIATION ENVIRONMENT FOR MORE ACCURATE GROUND-BASED RADIATION OUTCOME \[#18200\]](#)

We will demonstrate that the LET spectrum of the GCR environment can be generated by carefully perturbing the intrinsic properties of hydrogen-rich crystalline materials in order to instigate specific nuclear spallation processes when placed in a mono-energetic accelerated heavy-ion beam

Monday, January 22, 2018

Poster Session A: Sensorimotor

4:30 PM

Exhibit Hall A

Chien J. Wang Z. Siu K.

[Can plantar vibration help astronauts adapt new environment? \[#18201\]](#)

The supra-threshold vibration perturbed the strategy of obstacle negotiation and forced healthy young adults to behave like older adults or fallers when stepping over multiple obstacles.

Boyle R.

[NEUROVESTIBULAR RESPONSES TO ALTERED GRAVITY IN VERTEBRATES \[#18202\]](#)

Despite the permanence of gravity in evolution the animal senses the non-1G environment and adaptive mechanisms are initiated - in the short term compensation is likely confined to sensory receptors and for longer exposures structural modifications of the otolith mass may result.

Dixon J. Clark T.

[PRELIMINARY VALIDATION OF THE WHEELCHAIR HEAD IMMOBILIZATION PARADIGM AS AN ANALOG FOR POST-FLIGHT SENSORIMOTOR IMPAIRMENT \[#18203\]](#)

We present a test bed for validation of a ground-based analog for post-spaceflight sensorimotor impairment which would provide an invaluable platform for effectively designing countermeasures for astronauts returning to a gravity environment after spaceflight.

Waddington G. Marchant A. Ball N. Witchalls J. Mulavara A. Bloomberg J.

[RELATIONSHIP BETWEEN LOWER LIMB MUSCULAR ACTIVATION AND SOMATOSENSORY PERFORMANCE IN FULL WEIGHT-BEARING, A NON-WEIGHT BEARING OR "BED-REST" POSTURE, AND VISUOMOTOR TASKS. \[#18204\]](#)

This paper describes a new human lower limb somatosensory function test that is sensitive to acute changes in somatosensation ability when non-weightbearing allowing development of novel approaches to assessing microgravity countermeasure effectiveness.

Burles F. Bloomberg J. Iaria G.

[WAYFINDING: THE BEHAVIOURAL AND NEUROLOGICAL EFFECTS OF SPACEFLIGHT ON ASTRONAUTS' SPATIAL ORIENTATION SKILLS. \[#18205\]](#)

This study is investigating how a typical stay aboard the ISS affects astronauts' spatial orientation skills and the neurological changes associated with it.

Rosenberg M. Reschke M. Kofman I. Fisher E. Gadd N. Lee S. Laurie S. Stenger M. Bloomberg J. Mulavara A. Kozlovskaya I.

[FIELD TEST: RESULTS OF QUIET STANCE FOLLOWING LONG DURATION SPACEFLIGHT \[#18206\]](#)

Preliminary results of a quiet stance as part of Field Test, testing crewmembers three times within the first 24 hours of landing.

Rosenberg M. Kreutzberg G. Noyes M. Reschke M.

[*A HYBRID REALITY SENSORIMOTOR ANALOG IN SIMULATED MICROGRAVITY TO SIMULATE DISORIENTATION FOLLOWING LONG-DURATION SPACEFLIGHT*](#) **[#18207]**

We employed virtual reality on simulated planetary surfaces with body weight unloading with a novel disorientation paradigm to simulate postflight balance challenges.

Fisher E. Reschke M. Koffman I. Rosenberg M. Gadd N. Kreutzberg G. Ribeiro C. Lee S. Bloomberg J. Tomilovskaya E. Kozlovskaya I.

[*Dysmetria: The Effect of Space Flight on Hand Movements After Long Duration Flight*](#) **[#18208]**

This simple functional test provides an immediate evaluation of dysmetria and possible cerebellar dysfunction as well as a method to determine the progress of recovery.

Hupfeld K. Koppelmans V. Kofman I. De Dios Y. Riascos R. Bloomberg J. Mulavara A. Seidler R.

[*NEURAL BASES OF VESTIBULAR CHANGES WITH SPACEFLIGHT*](#) **[#18209]**

Using functional neuroimaging at several time points before and after six months of spaceflight, we investigate whether microgravity exposure and subsequent readaptation to Earth's gravity influences the neural correlates of vestibular processing.

Campbell D. Clement G. Reschke M. Bloomberg J.

[*EVALUATING OTOLITH FUNCTION DURING SPACEFLIGHT USING VESTIBULAR EVOKED MYOGENIC POTENTIALS \(VEMP\)*](#) **[#18210]**

Ocular and cervical VEMP threshold responses are hypothesized to change due to the offloading of the otolith organs in microgravity, and thus far normative baseline data has been collected on a healthy population using air-conducted sound, bone-conducted vibration, and head tapping stimuli.

Clément G. Campbell D. Reschke M.

[*EVALUATING THE SUBJECTIVE STRAIGHT AHEAD BEFORE AND AFTER SPACEFLIGHT*](#) **[#18211]**

Normative control subject data and preliminary ISS crewmember data support the hypothesis that the subjective straight ahead, an internal perception of body orientation, is affected by prolonged exposure of the otolith organs to microgravity.

Vimal V. Lackner J. DiZio P.

[*PREDICTING INDIVIDUAL DIFFERENCES IN LEARNING MANUAL CONTROL OF ATTITUDE STABILITY IN A SPACE FLIGHT ANALOG ENVIRONMENT*](#) **[#18212]**

Long duration spaceflights, such as to Mars, will cause many sensorimotor related difficulties that could jeopardize the mission. For example, travelling to Mars would involve multiple gravitational transitions.

Monday, January 22, 2018

Poster Session A: Spaceflight Associated Neuro-Ocular Syndrome (SANS/VIIP)

4:30 PM

Exhibit Hall A

Williams M. Bershad E. Levine B. Clark J. Malm J. Eklund A. Zanello S. Hu X. Laurie S. Stenger M. Scott J. Bergsneider M.

[ZERO G AND ICP: INVASIVE AND NONINVASIVE ICP MONITORING AND VIIP BIOMARKER IDENTIFICATION \[#18226\]](#)

We present the protocol for pre- / post-flight lumbar puncture, noninvasive ICP, and biomarker analysis for astronauts on the ISS

Bershad E. Venkatasubba Rao C. Cohen H. Lazaridis C. Clark J. Sangi-Haghpeykar H. Suarez J. Strangman G. Marshall-Goebel K. Kramer L. Hasan K. Stern C. Rittweger J.

[SPACE-CENT: STUDYING THE PHYSIOLOGICAL AND ANATOMICAL CEREBRAL EFFECTS OF CENTRIFUGATION AND HEAD DOWN TILT \[#18227\]](#)

This study will evaluate the cerebral and ocular effects of an artificial gravity countermeasure in the setting of 60 days of 6 degree head down tilt.

Kramer L. Hirzallah M. Hasan K. Younes K. Macias B. Stenger M. Menon U. Narayana P.

[QUANTITATIVE MAGNETIC RESONANCE OF CEREBRAL BLOOD FLOW HEMODYNAMICS IN ACUTE HEAD DOWN TILT \[#18228\]](#)

Isolated jugular distention induced by acute 15 degree head down tilt had no significant effect on cerebral blood flow.

Smith S. Zwart S. Chang A. Gregory J. Chen J. Leavitt J. Zeisel S. Gibson C. Mader T.
[ASTRONAUT OPHTHALMIC ISSUES AND ONE-CARBON METABOLISM: EXPANDED POLYMORPHISM EVALUATION AND EVALUATION IN A POTENTIAL ANALOG POPULATION \[#18229\]](#)

We have documented a genetic predisposition for some astronauts to develop ophthalmic findings during and after flight. We report here progress on two follow-up studies: and expanded genetic profile, and an analog population study of women with polycystic ovary syndrome (PCOS).

Mao X. Nishiyama N. Pecaut M.

[ACUTE EFFECT OF SPACEFLIGHT ON INTRAOCULAR PRESSURE \[#18230\]](#)

space flight conditions, especially gravitational changes, may induce acute and short-term response in intraocular pressure

Wang L. Hai P.

[LABEL-FREE PHOTOACOUSTIC LYMPHATIC FLOWGRAPHY IN SIMULATED MICROGRAVITY \[#18231\]](#)

We propose to develop a label-free photoacoustic lymphatic flowgraphy system to image lymphatic flows and to study their alterations in simulated microgravity.

Zanello S. Theriot C. Taibbi G. Vizzeri G. Parsons-Wingert P. Cheves-Barrios P.

[HINDLIMB SUSPENSION IN RODENTS ELICITS GENE EXPRESSION CHANGES IN THE RETINA \[#18232\]](#)

Zanello S. Bershad E. Calvillo E. Enderle D. Valentino M. Yu S. Skog J.
[SANS/VIIP BIOMARKER IDENTIFICATION: RNA-SEQ TECHNOLOGY AND EXPRESSION ANALYSIS ON GROUND BIOFLUID SAMPLES \[#18233\]](#)

This work discusses pre-analytical workflow considerations for implementing RNAseq technology in a NASA human flight study.

Main B.

[DEVELOPMENT OF A SELF-IMAGING, WIDE ANGLE, HIGH RESOLUTION RETINAL IMAGING SYSTEM FOR HUMAN SPACEFLIGHT APPLICATIONS \[#18234\]](#)

We will develop a compact, desk mounted (slightly larger than an augmented reality headset) self-imaging, non-mydratic, 45+ degree wide-angle, high resolution retinal imaging device; the first of its kind available today.

Porter A. Myers J. Munster D. Nelson E. Lewandowski B.

[Implementation of Model-Based Design of Experiments: Application of COmputational Modeling to Support HRP Studies \[#18235\]](#)

This study illustrates the potential gains obtained by leveraging computational modeling to improve experimental efficiency in NASA research and countermeasures studies through implementation of Model-Based Design of Experiments (MBDOE).

Sevick-Muraca E. Kwon S. Janssen C.

[DEVELOPING TECHNIQUES OF NEAR-INFRARED FLUORESCENCE IMAGING OF CSF OUTFLOW INTO THE LYMPHATICS THROUGH INTRATHECAL INJECTION OF ICG \[#18236\]](#)

Using near-infrared fluorescence imaging techniques in swine, we were able to show fluid transit from the spinal cord, into the subarachnoid space and outflow into the draining cervical lymph nodes -- a fluid flow which we will explore whether impairment occurs under microgravity conditions.

Huang A. Huang A. Balasubramanian S. Stenger M. Lee S. Laurie S. Liu J. Cole C. Foulk J. Feiveson A. Ebert D. Sargsyan A. Hargens A. Sada S. Macias B.

[ASSESSMENT OF INTRAOCULAR PRESSURE AND CHOROIDAL THICKNESS DURING HEAD-DOWN TILT WITH VENOCONSTRICTIVE THIGH CUFFS \[#18237\]](#)

Bilateral venoconstrictive thigh cuffs reversed ocular changes during acute head-down tilt and might serve as a countermeasure when applied during spaceflight.

Batliwala S. Brunstetter T. Tarver B. Clemett S. Nelman-Gonzalez M. Wells J. Mason S. Sams C.

[RE-EVALUATION OF IIH AS THE IDEAL TERRESTRIAL ANALOG FOR SANS: IS THERE A BETTER MODEL TO CONSIDER? \[#18238\]](#)

There are several findings and differences between IIH & SANS that mandate a closer look at the validity of IIH as a terrestrial SANS analog.

Ghosh P. Cullen A. Park H. Goldsmith J. Maraj J. Evanson K. Zawieja D. Behnke B. Delp M.

[JUGULAR VEINS DEMONSTRATE ENHANCED CONSTRICTION FOLLOWING SPACEFLIGHT IN MICE \[#18239\]](#)

Spaceflight enhances the constrictor responsiveness of jugular veins across a range of intravascular pressures in mice, and such an adaptation could serve to promote venous congestion in the head and contribute to possible elevations in intracranial pressure.

Petersen L. Ashari N. Levine B. Hargens A.

[MOBILE NEGATIVE PRESSURE SUIT AS AN INTEGRATED COUNTERMEASURE \[#18240\]](#)

Prototype of mobile, wearable countermeasure suit comprised of lower body negative pressure trousers and vest to simulate effects of gravity (fluid shift and mechanical load) to be worn for 8-10 hours a day during spaceflight

Mason S. Brunstetter T. Young M. Van Baalen M. Tarver W. Derrick R. Wells J. Dey B. Todd K. Smith B. Patel N.

[OPERATIONAL TRANSITION FROM THE FIRST-GENERATION HEIDELBERG SPECTRALIS OPTICAL COHERENCE TOMOGRAPHY \[OCT \("OCT1"\)\] TO THE SECOND-GENERATION HEIDELBERG SPECTRALIS OCT \("OCT2"\)](#) [#18241]

The potential impacts of transitioning to the first generation Heidelberg Spectralis OCT ("OCT1") to the second generation OCT ("OCT2") were evaluated for impacts to on orbit operations and longitudinal data for occupational monitoring.

Mason S. Patel N. Young M. Van Baalen M. Tarver W. Otto C. Samuels B. Koslovsky M. Schaefer C. Taiym W. Wear M. Gibson C. Tafreshi A.

[INTEGRATION OF OPTICAL COHERENCE TOMOGRAPHY SCAN PATTERNS TO AUGMENT THE CLINICAL DATA SUITE](#) [#18242]

Reanalysis of clinical OCT data will be presented.

Asemani D. Brown T. Roberts D.

[ANALYSIS OF STRUCTURAL CHANGES IN BRAIN MRI SCANS OF ASTRONAUTS AFTER SHORT- AND LONG-DURATION SPACE MISSIONS](#) [#18243]

Using the pre-flight and post-flight brain MRI scans of US Space Shuttle and ISS astronauts, we estimated both the linear and nonlinear brain changes in long-duration and short-duration astronauts.

Anderson A. Butterfield J. Subramanian P. Clark T.

[ARTIFICIAL GRAVITY AS A COUNTERMEASURE FOR SPACEFLIGHT ASSOCIATED NEURO-OCULAR SYNDROME](#) [#18244]

We discuss our experiment to investigate the effect of artificial gravity (AG) on the eye and cardiovascular system to evaluate AG as a countermeasure to spaceflight associated neuro-ocular syndrome.

Lee S. Martin D. Scott J. Laurie S. Macias B. Arbeille P. Plutz-Snyder L. Stenger M.

[WHAT LEVEL OF GRAVITY IS REQUIRED TO PREVENT SPACEFLIGHT-ASSOCIATED NEURO-OCULAR SYNDROME \(SANS\)?](#) [#18245]

The primary objective of this study is to characterize cardiovascular, cerebrovascular, and ocular changes across a range of gravity levels to identify a threshold of gravitational load that can serve as a countermeasure to SANS during future spaceflight missions.

Macias B. Stenger M. Balasubramanian S. Huang A. Cole C. Foulk J. Kesari S. Liu J. Ebert D. Lee S. Laurie S. Sargsyan A. Feiveson A. Hargens A.

[Validation of a Cephalad Fluid Shift Countermeasure](#) [#18246]

This project sought to determine whether thigh cuffs could decrease intracranial pressure (ICP), choroid engorgement, and intraocular pressure (IOP) when applied during an acute 15° head-down tilt (HDT) microgravity analog.

Gasheva O. Zawieja S. Castorena-Gonzalez J. Wang W. Narayanan A. Zhang X. Cromer W. Bagher P. Delp M. Gashev A. Zawieja D.

[EFFECTS OF SPACEFLIGHT ON CERVICAL LYMPHATIC FUNCTION IN MICE](#) [#18247]

Flight animal data indicate that there may be adaptations during spaceflight of cervical lymphatic function to the loss of the gravitational force vector that normally help drive lymph flow.

Narayanan S. Zhang X. Delp M. Zawieja D.

[SPACEFLIGHT-INDUCED ADAPTATIONS OF THE MENINGEAL VASCULATURE IN MICE](#) [#18248]

Characterization of the meningeal cerebral vasculature of mice flown aboard the International Space Station for 30 days.

Ebert D. Kemp D. Melgoza R. Caldwell T. Danielson R. Hargens A. Stenger M.
[OTOACOUSTIC EMISSIONS AS AN INDICATOR OF FLUID SHIFT-RELATED PRESSURE CHANGES IN SPACEFLIGHT \[#18249\]](#)

Our findings contribute to addressing two questions for NASA: 1) Can the OAE technique contribute usefully to the preflight prediction of individual sensitivity to SANS? 2) Do OAE-derived indications of pressure change during spaceflight provide insights into SANS development?

Martin B. Rohr J. Sass A. Sater S. Macias B. Oshinski J. Ethier C. Stenger M.
[MRI-BASED QUANTIFICATION OF OPTIC NERVE TORTUOSITY AND SUBARACHNOID SPACE 3D GEOMETRY: RELIABILITY ASSESSMENT \[#18250\]](#)

We developed manual and automated methods to quantify optic nerve tortuosity and 3D optic nerve and nerve sheath geometry.

Masterova K. Cowan D. Anderson A. Fellows A. Buckey J.
[DETECTION OF SPACEFLIGHT ASSOCIATED VISUAL CHANGES USING PORTABLE AUTOREFRACTORS \[#18251\]](#)

This study evaluated two portable self-administrated autorefractors (the EyeNetra and SVOne Pro) for repeatability, accuracy, and potential for use on the ISS as a way of obtaining in-flight data to estimate the time-course of the changes in axial length and visual acuity that occur in flight.

Riascos R. Behzad B. Rabiei P. Hasan K. Kamali A. Kramer L.
[COMPARISON OF THE SIZES OF THE TRANSVERSE AND SUPERIOR SAGITTAL VENOUS SINUSES PRE- AND POST-FLIGHT IN ASTRONAUTS \[#18252\]](#)

Our study demonstrates post flight decrease in the size of transverse and superior sagittal sinuses in astronauts.

Riascos R. Hakimelahi R. Zaza R. Rabiei P. Kamali A. Hasan K. Kramer L.
[COMPARISON OF THE PITUITARY GLAND VOLUME PRE- AND POST-FLIGHT IN ASTRONAUTS \[#18253\]](#)

Our study demonstrates a decrease in pituitary gland volume in astronauts after space flight.

Riascos R. Hakimelahi R. Zaza R. Rabiei P. Kamali A. Hasan K. Kramer L.
[COMPARISON OF THE USE OF VOLUMETRY VS LINEAR HEIGHT MEASUREMENTS TO DETECT CHANGES IN THE PITUITARY GLAND USING 3D-T1W NON-CONTRAST MRI \[#18254\]](#)

Our study demonstrates that there is no correlation between midsagittal height and volume of the pituitary gland in the astronauts, suggesting that reliance on midsagittal height alone for assessment of pituitary gland function may be misguided.

Riascos R. Hasan K. Kamali A. Irungu B. Behzad B. Hakimelahi R. Sargsyan A. Rabiei P. Kramer L.
[ASSOCIATION OF DIFFUSION TENSOR IMAGING PARAMETERS OF OPTIC TRACTS AND CEREBRAL WHITE MATTER TRACTS WITH VISUAL IMPAIRMENT AND STRUCTURAL CHANGES OF THE EYES AND OPTIC NERVES IN LONG-DURATION MICROGRAVITY EXPOSURE \[#18255\]](#)

Our study demonstrate increase in ventricular cerebrospinal fluid volume in the post-flight scans with increased mean diffusivity in the occipital cortex on the right side, mostly seen in the fusiform gyrus.

Marshall-Goebel K. Bershad E. Zhang Q.
[ASSESSMENT OF ARTIFICIAL GRAVITY AS A COUNTERMEASURE TO CEPHALAD FLUID SHIFTING \[#18256\]](#)

Spaceflight Associated Neuro-ocular Syndrome (SANS) affects approximately half of astronauts during long duration missions on-board the ISS.



Scott J. Martin D. Goetchius E. Cox R. Matz T. Ritter M. Dewitt J. Ploutz-Snyder R.
Stenger M. Haykowsky M. Ploutz-Snyder L.

[INFLUENCE OF EXERCISE MODALITY ON CEREBRAL-OCULAR HEMODYNAMICS
AND PRESSURES](#) [#18257](#)

Moderate and high intensity aerobic or resistance exercise has clearly identified benefits for cardiac, muscle, and bone health.

AGENDA AT A
GLANCE
DAY 2

TUESDAY, JANUARY 23, 2018

	Plenary (Exhibit Hall B)	Poster (Exhibit Hall A)	Galleon Ballroom	Innovation Pavilion (Grand Ballroom A)	Grand Ballroom B	Grand Ballroom C	Yacht
8:00 AM	Plenary Sessions						
10:15	Break						
10:30 AM			Training Recom- mendations		Flight Exercise System	GCR Sim & NSRL User Group	
12:00	Obtain Lunch						
12:45	Lunch Talk						
1:45 PM			Habitability Standards		Osteo & Fracture Risks	Radiation & CV Disease I	
3:30 PM			Biomarkers		Sensorimotor - Flight & Ground	Radiation & CV Disease II	ExMC Element Team Meeting (closed)
5:00 PM		Poster Session B					
6:30 PM	Adjourn						

FEATURED PLENARY SPEAKERS



Robert Nerem
Professor Emeritus,
Bioengineering
Georgia Institute of
Technology



David Tomko
Space Biology Program
Scientist
NASA Headquarters



Kevin Sato
Project Scientist
NASA Ames Research
Center



John Connolly
Lead, Human Mars Study
Team
NASA JSC



Geoffrey Ginsburg
Director, Duke Center for Ap-
plied Genomic and Precision
Medicine; Director, Duke MEDx
Duke University

Tuesday, January 23, 2018

GCR Simulator and NSRL User Group

10:30 AM

Grand Ballroom C

Chairs: Lisa Simonsen and Greg Nelson

- 10:30 AM Guida P. Rusek A.
[NSRL USER GROUP: BIOLOGY AND OPERATIONS \[#18071\]](#)
This will be the annual forum for the NSRL User Group Meeting, where updates to the NSRL facility are presented and the user community gets the opportunity to raise issues and give feedback.
- 11:00 AM Blakely E. Chang P. Hada M. Mao J. Baake J. Grover A. Rusek A. La Tessa C. Snyder D. Bjornstad K. Rosen C. Rhone J. Beitman A. Saganti P. Sachs R.
[SIMULATING GCR-INDUCED TUMOR RISK & CHROMOSOME ABERRATION CORRELATES \[#18072\]](#)
In vivo and in vitro particle experiments guide theoretical modeling to extend single-ion beam dose effect responses of murine tumor induction, and murine and human chromosome aberration studies to mixed ion fields simulating GCR.
- 11:15 AM Hada M. Rhone J. Beitman A. Saganti P. Plante I. Ponomarev A. Slaba T. Patel Z.
[COMPUTATIONAL MODEL PREDICTION AND BIOLOGICAL VALIDATION USING SIMPLIFIED MIXED FIELD EXPOSURES FOR THE DEVELOPMENT OF A GCR REFERENCE FIELD \[#18073\]](#)
We designed simplified mixed field beam with combination of 4 beams. Frequency of chromosome aberration (CA) was studied with acute and chronic dose rate with single and mixed field beams. A comparison between computational modeling simulation of CA and experimental results will be shown.
- 11:30 AM Kronenberg A. Gauny S. Grossi G. Grygoryev D. Yamazaki J. Torres E. Turker M. Raber J.
[GCR SIMULATION STUDIES WITH HUMAN AND MOUSE MODELS \[#18074\]](#)
This project is designed to help NASA develop and test a GCR simulator for space radiation health studies, assess the health risks of multi-beam exposures on human and murine models, and determine how best to take data from single ion studies to predict cancer risks from GCR exposures.
- 11:45 AM Weil M. Ray F. Krumland N. Borak T.
[STATUS OF THE NEUTRON RADIATION FACILITY AT COLORADO STATE UNIVERSITY \[#18075\]](#)
A facility in which large numbers of rodents can be exposed to chronic, low dose rate neutron irradiation for time spans up to and exceeding one year is in operation.
- 11:55 AM Discussion [#18076]
- 12:00 PM Break [#18077]

Tuesday, January 23, 2018

Making Gains in the Flight Exercise System

10:30 AM

Grand Ballroom B

Chair: Andrea Hanson

- 10:30 AM Ploutz-Snyder L. DeWitt J. Scott J. English K. Buxton R. Goetchius E. Ryder J. Guilliams M. Ploutz-Snyder R. Downs M.
[OPTIMIZATION OF IN-FLIGHT EXERCISE COUNTERMEASURES - SPRINT \[#18091\]](#)
SPRINT and CON subjects showed generally similar muscle outcomes with SPRINT showing some modest improvements over CON including faster recovery on select variables and a more consistent training response on most variables.
- 10:48 AM Hwang E. English K. Ryder J. Kelly C. Walker T.
[HEART RATE RESPONSES TO UNAIDED ORION SIDE AND TOP HATCH EGRESS IN THE GULF OF MEXICO \[#18092\]](#)
Physiologic and performance data was collected on subjects performing egress from an Orion-like capsule while in the Gulf of Mexico. Results may impact procedures, crew rescue equipment requirements, recommended readiness standards, and updated exercise countermeasures requirements.
- 11:06 AM Goetchius E. English K. Downs M. Crowell J. Young M. Ploutz-Snyder L.
[TIME COURSE OF CHANGES IN VO₂PK DURING 70-DAY BED REST \[#18093\]](#)
Characterization of VO₂pk before, during, and after 70-d BR with an integrated aerobic and resistance exercise countermeasure and with sedentary control.
- 11:24 AM Cross E. Perera J. Hanson A. English K. Vu L. Amonette W.
[NEXTGEN ONE PORTAL USABILITY EVALUATION \[#18094\]](#)
The newly developed NextGen One Portal graphical user interface (GUI) was shown to have having greater efficiency, learnability, memorability, and overall user experience than the current Advanced Resistive Exercise Device (ARED) GUI used by astronauts on the International Space Station.
- 11:42 AM Vu L. Amonette W. Barrera J. Kim H. Benson E. Perera J. Rajulu S. Hanson A.
[VIRTUAL EXERCISE TRAINING SOFTWARE SYSTEM \[#18095\]](#)
The purpose of this study was to develop and evaluate a virtual exercise training software system (VETSS) capable of providing real-time instruction and exercise feedback during exploration missions.
- 12:00 PM Break [#18096]

Tuesday, January 23, 2018

Training Recommendations for Performance and Health in Exploration Missions

10:30 AM

Galleon Ballroom

Chairs: Donna Dempsey and Brian Gore

- 10:30 AM Billman D. Catrambone R. Feldman J. Sliwinska K. Leventhal J. Schreckenghost D.
[Training for Generalizable Skills & Knowledge: Integrating Principles and Procedures](#)
[\[#18457\]](#)
To support future NASA missions, we compared knowledge and generalization following training emphasizing generation of relations, particularly between procedures and a device model, to knowledge and generalization following training in a control condition emphasizing efficiency.
- 10:50 AM Robinson S. O'Meara S.
[METHODOLOGY FOR PROCEDURAL DEVIATION ANALYSIS DURING ASTRONAUT TASK EXECUTION](#)
[\[#18458\]](#)
We report on the development and validation of quantitative crew-performance metrics for task-execution accuracy, in the context of just-in-time training of long-duration astronauts.
- 11:10 AM Robinson S. O'Meara S. Karasinski J. Lorenzen C. Rocha R. Stevens C.
[LONG-DURATION SPACEFLIGHT CREW TRAINING – CUSTOMIZED JUST-IN-TIME TRAINING FOR IN-FLIGHT COMPLEX SYSTEM REPAIR](#)
[\[#18459\]](#)
Techniques for customization of on-board just-in-time training for long-duration astronauts are investigated.
- 11:30 AM Rose R. Zbozinek T. Smith S. Williams T. Schneiderman J. Arias D. Ahlstrom B. Oftedal A. Craske M.
[AUTONOMOUS MULTIMEDIA STRESS MANAGEMENT AND RESILIENCE TRAINING FOR FLIGHT CONTROLLERS](#)
[\[#18460\]](#)
We report on a randomized effectiveness trial of SMART-OP with flight controllers at NASA-JSC (N=33?). We will present preliminary outcome stress and resilience data (self-report, behavioral, and biomarker) and address benefits and challenges of conducting research remotely at JSC.
- 11:50 AM Discussion [\[#18461\]](#)
- 12:00 PM Break [\[#18462\]](#)

Tuesday, January 23, 2018

Developing Habitability Standards for Exploration Missions

1:45 PM

Galleon Ballroom

Chairs: Sherry Thaxton and Alexandra Whitmire

- 1:45 PM Fanchiang C. Klaus D. Zavala M.
[DEVELOPMENT OF A CREW PERFORMANCE ASSESSMENT FRAMEWORK FOR SPACECRAFT DESIGN \[#18027\]](#)
This work presents progress towards the development of a novel framework for integrating space human factors knowledge into a comprehensive and quantitative model for predicting impacts on crew performance due to spacecraft design.
- 2:05 PM Greene M. Thaxton S. Whitmire A. Schuh S. Archer R. Vasser K.
[ISS HABITABILITY DATA COLLECTION AND FINDINGS \[#18028\]](#)
This abstract describes the work completed on the ISS Habitability study.
- 2:25 PM Barger L. Sullivan J. Flynn-Evans E. Basner M. Dinges D. Seaton K. Abercromby A. Limardo J. Wessel J. Wang W. Czeisler C.
[USING THE NASA FLIGHT SLEEP DATABASE TO EVALUATE THE ASSOCIATION OF SLEEP TO SPACEFLIGHT ENVIRONMENT AND PERFORMANCE \[#18029\]](#)
Over the course of a decade, we objectively assessed, via wrist actigraphy and daily logs, sleep-wake timing of 64 astronauts on 80 Space Shuttle missions, encompassing 26 Space Transportation System flights, and 21 astronauts on the ISS.
- 2:45 PM Brainard G. Hanifin J. Warfield B. Jasser S. Kemp J. Disoke F. Ayers M. Glodjo T. Panepinto L. Vadalía S. Kanumilli S. Nelson N. Hasher D. Balaicuis J. Byrne B. Pineda M. Gerner E. Clark T. Maida J. Johnston S. Moomaw R. Barger L. Czeisler C. St. Hilaire M. Rahman S. Lockley S.
[TESTING SOLID STATE LIGHTING COUNTERMEASURES TO IMPROVE CIRCADIAN ADAPTATION, SLEEP, AND PERFORMANCE DURING HIGH FIDELITY ANALOG AND FLIGHT STUDIES FOR THE INTERNATIONAL SPACE STATION \[#18030\]](#)
Three ground analog studies and one ISS in-flight study are determining if solid-state lighting can be used to support astronaut vision and serve as an in-flight countermeasure for circadian misalignment, sleep disruption and performance deficits on the ISS.
- 3:05 PM Discussion [#18031]
- 3:15 PM Break [#18032]

Tuesday, January 23, 2018

Osteoporosis/Fracture Risks: A Final Research Status?

1:45 PM

Grand Ballroom B

Chairs: Jean Sibonga and Scott M. Smith

- 1:45 PM Sibonga J. Matsumoto T. LeBlanc A. Spector E. Jones J. Shapiro J. Lang T. Shackelford L. Smith S. Evans H. Keyak J. Okada A. Yasui T. Kohri K. Oshima H.
[AN ORAL BISPHOSPHONATE COUNTERMEASURE FOR SPACE FLIGHT-INDUCED BONE LOSS: STATUS OF SMO 021 \[#18111\]](#)
The data show that a drug of the bisphosphonate class, in combination with resistive exercise on the ARED, enhances the preservation of hip bone mass and strength during spaceflight that is corroborated by its suppressive effect on biomarkers of bone breakdown.
- 2:03 PM Sibonga J. Spector E. Yardley G. Lang T.
[FEASIBILITY STUDY: QCT MODALITY FOR RISK SURVEILLANCE OF BONE - EFFECTS OF IN-FLIGHT COUNTERMEASURES ON SUB-REGIONS OF THE HIP BONE. \[#18112\]](#)
This pilot study demonstrates the utility of QCT hip scans (as an adjunct to DXA monitoring) to assess recovery of spaceflight-induced bone loss in sub-regions of the hip .
- 2:21 PM Smith S. Heer M. Shackelford L. Zwart S.
[BIOCHEMICAL PROFILE: PROVIDING INSIGHT INTO BONE BIOCHEMISTRY ON ISS MISSIONS \[#18113\]](#)
We will present an update to the bone biochemistry and associated data collected as part of the Biochem Profile project.
- 2:39 PM Zwart S. Rice B. Dlouhy H. Shackelford L. Heer M. Koslovsky M. Smith S.
[DIETARY ACID LOAD AND BONE TURNOVER DURING LONG-DURATION SPACEFLIGHT AND BED REST \[#18114\]](#)
Long-term lowering of dietary acid load by increasing vegetable and fruit intake may protect against changes in loss of bone mineral content during spaceflight, particularly if resistive exercise is not being performed, but further investigation is warranted.
- 2:57 PM Gordon G. Romaniello S. Skulan J. Smith S. Zwart S. Zheng W. Letcher A. Anbar A.
[NATURAL CALCIUM ISOTOPES PROVIDE RAPID AND PRECISE MONITORING OF BONE MINERAL BALANCE CHANGES IN MICROGRAVITY \[#18115\]](#)
Naturally occurring calcium isotopes provides a quantitative dynamic monitor of bone mineral balance in individual astronauts, and demonstrates that some bone loss interventions are more effective than others.
- 3:15 PM Break [#18116]

Tuesday, January 23, 2018

Radiation and Combined Spaceflight Stressors on Cardiovascular Disease I

1:45 PM

Grand Ballroom C

Chairs: Zarana Patel and Stuart Lee

- 1:45 PM Yusuf S.
[A CLINICAL PERSPECTIVE ON RADIATION-INDUCED CARDIOVASCULAR DISEASE](#)
[\[#18396\]](#)
A CLINICAL PERSPECTIVE ON RADIATION-INDUCED CARDIOVASCULAR DISEASE
- 2:10 PM Charvat J. Lee S. Wear M. Lee L. Stenger M. Van Baalen M.
[CARDIOVASCULAR DISEASE OUTCOMES AMONG THE NASA ASTRONAUT](#)
[CORPS](#) [\[#18397\]](#)
The study provides data on cardiovascular disease outcomes among NASA astronauts.
- 2:30 PM Patel Z. Elgart S. Little M. Chappell L. Milder C. Shavers M. Huff J.
[RADIATION EXPOSURE AND MORTALITY FROM CARDIOVASCULAR DISEASE](#)
[AND CANCER IN EARLY NASA ASTRONAUTS: SPACE FOR EXPLORATION](#)
[\[#18398\]](#)
This work demonstrates no excess cardiovascular disease or cancer mortality in an early NASA astronaut cohort and no associations between radiation exposure and disease mortality were observed.
- 2:50 PM Lee S. Ribeiro C. Martin D. Smith S. Zwart S. Laurie S. Macias B. Stenger M.
[DEFINING THE RELATIONSHIP BETWEEN BIOMARKERS OF OXIDATIVE AND](#)
[INFLAMMATORY STRESS AND THE RISK FOR ATHEROSCLEROSIS IN](#)
[ASTRONAUTS DURING AND AFTER LONG-DURATION SPACEFLIGHT](#) [\[#18399\]](#)
This investigation will determine if biomarkers of oxidative and inflammatory stress are elevated during and after long-duration spaceflight and to determine if a relation exists between levels of biomarkers and indices of atherosclerotic risk measured in the carotid and brachial arteries
- 3:10 PM Discussion [\[#18400\]](#)
- 3:15 PM Break [\[#18401\]](#)

Tuesday, January 23, 2018

Biomarkers: Towards Individualizing Countermeasures for Behavioral Health and Performance

3:30 PM

Galleon Ballroom

Chairs: Erin Flynn-Evans and Alexandra Whitmire

- 3:30 PM Dinges D. Basner M. Goel N. Rao H. Hermosillo E. Dennis L. Carlin P. Trentalange M. Lin L. Mignot E.
[MARKERS OF SUSCEPTIBILITY TO NEUROBEHAVIORAL DECREMENTS IN SPACE FLIGHT \[#18001\]](#)
Metabolic markers and gene candidates related to sleep time, circadian rhythmicity, and cognitive processing appeared to contribute to phenotypic neurobehavioral vulnerability to sleep loss.
- 3:50 PM Lockley S. St. Hilaire M. Rahman S. Kristal B. Sullivan J. Quackenbush J. Duffy J. Barger L. Czeisler C.
[DEVELOPMENT AND TESTING OF BIOMARKERS TO DETERMINE INDIVIDUAL ASTRONAUTS' VULNERABILITIES TO BEHAVIORAL HEALTH DISRUPTIONS \[#18002\]](#)
The aim of this study is to identify candidate biomarkers that predict neurocognitive and psychological responses to sleep deprivation and circadian misalignment.
- 4:10 PM Goel N. Dennis L. Ecker A.
[BIOMARKERS AS PREDICTORS OF RESILIENCY AND SUSCEPTIBILITY TO STRESS IN SPACE FLIGHT \[#18003\]](#)
The aim of this project is to validate biomarkers as predictors of susceptibility or resiliency to the neurobehavioral effects of stress and sleep loss for use in space flight in short-duration and long-duration analogs.
- 4:30 PM Alfano C. Bower J. Simpson R. Connaboy C. Laughlin M.
[Psychological Risk and Overlap with Physical Health in the human exploration research analog \(hera\) \[#18004\]](#)
Findings regarding the prevalence of psychological symptoms, their overlap with various physical symptoms, and associations with baseline measures of distress tolerance, anxiety sensitivity, and emotion regulation will be presented from the 2016 HERA campaign.
- 4:50 PM Discussion [#18005]
- 5:00 PM Break [#18006]

Tuesday, January 23, 2018

ExMC Element Team Meeting (CLOSED)

3:30 PM

Yacht

Chair: Baraquiel Reyna

3:30 PM Discussion [#18051]

5:00 PM Break [#18052]

Tuesday, January 23, 2018

Radiation and Combined Spaceflight Stressors on Cardiovascular Disease II

3:30 PM

Grand Ballroom C

Chairs: John Baker and Dawn Bowles

- 3:30 PM Atkinson M.
[RADIATION INDUCES CHANGES IN BOTH EXOSOMAL CARGO AND FUNCTION: CAN THESE BE USED TO PREDICT AND MANAGE TISSUE DAMAGE? \[#18402\]](#)
Could engineered exosomes be used as an adjuvant therapy to protect against damage from deep space radiation?
- 3:50 PM Boerma M. Cao M. Sridharan V. Singh P. Pathak R. Seawright J. Landes R. Byrum S. Tackett A. Jones T. Mao X. Stanbouly S. Sun R. Secomb T. Cheema A. Weil M. Chicco A. Nelson G.
[EFFECTS OF CHRONIC AND SINGLE-DOSE CHARGED PARTICLE EXPOSURE ON CARDIAC FUNCTION AND STRUCTURE IN MULTIPLE ANIMAL MODELS \(CSRR\) \[#18403\]](#)
This presentation provides an overview of the main results obtained in studies focused on degenerative cardiac and vascular effects of charged particle irradiation in the Center for Space Radiation Research.
- 4:10 PM Baker J. Lenarczyk M. Little M. Hopewell J. Kronenberg A.
[DETERMINATION OF RISK FOR AND OCCURRENCE OF HEART DISEASE FROM SPACE RADIATION \[#18404\]](#)
We are determining the increased risk for developing degenerative cardiac disease as a result of exposure to representative components of space radiation.
- 4:25 PM Bishawi M. Brown Z. Roan J. Bishawi M. Lee F. Abraham D. Isaac D. Mao L. Slaba T. Kidane Y. Thompson J. Moseley M. Truskey G. Dewhirst M. Bowles D.
[PROTEOMIC SIGNATURES OF SPACE RADIATION INDUCED CARDIOVASCULAR DEGENERATION \[#18405\]](#)
The objective of this study is to acquire a mechanistic understanding of how the space radiation environment alters cellular and molecular processes that contribute to the development of cardiovascular dysfunction at the organ and organismal level.
- 4:40 PM Kabarowski J. Walters K. Gupta K. Barnes S. Wilson L. Crossman D. Crowley M. Chang P.
[Lipidomic and Genomic alterations in aortae of mice associated with adhesive effects of Space-relevant Doses of Heavy-ion Radiation and potential consequences for Radiation-induced Atherosclerosis. \[#18406\]](#)
Lipidomics and genomics were performed on aortae from mice exposed to space-relevant doses of heavy ions (56Fe), revealing potential mechanisms for cardiovascular risk related to increased adhesion and endothelial perturbation.
- 4:55 PM Discussion [#18407]
- 5:00 PM Break [#18408]

Tuesday, January 23, 2018

Sensorimotor Flight and Ground Studies

3:30 PM

Grand Ballroom B

Chairs: Jacob Bloomberg and Mark Shelhamer

- 3:30 PM Mulavara A. Peters B. De Dios Y. Gadd N. Caldwell E. Batson C. Goel R. Oddsson L. Kreutzberg G. Zanello S. Clark T. Waddington G. Oman C. Cohen H. Wood S. Seidler R. Reschke M. Bloomberg J.
[BEHAVIORAL, BRAIN IMAGING AND GENOMIC MEASURES TO PREDICT FUNCTIONAL OUTCOMES POST - BED REST AND SPACEFLIGHT \[#18419\]](#)
The ability to predict the manner and degree to which individual astronauts are affected by exposure to long-duration spaceflight will improve the effectiveness of countermeasure training programs designed to enhance sensorimotor adaptability.
- 3:48 PM Seidler R. Mulavara A. Koppelmans V. Cassady K. Yuan P. Hupfeld K. Kofman I. DeDios Y. Riascos R. Bloomberg J.
[SPACEFLIGHT EFFECTS ON NEUROCOGNITIVE PERFORMANCE: EXTENT, LONGEVITY AND NEURAL BASES \[#18420\]](#)
We are conducting experiments in which 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.
- 4:06 PM Reschke M. Kozlovskaya I. Kofman I. Tomilovskaya E. Rosenberg M. Bloomberg J. Stenger M. Laurie S. Lee S. Rukavishnikov I. Fomina E. Wood S. Mulavara A. Feiveson A. Fisher E. Kitty V. Lysol N. Clement G.
[APPLYING RESULTS OF THE FIELD TEST TO RISKS ASSOCIATED WITH UNASSISTED EMERGENCY EGRESS \[#18421\]](#)
Results of the Field Test as relates to Orion egress safety.
- 4:24 PM Holden K. Greene M. Cross II E. Sandor A.
[EFFECTS OF LONG-DURATION MICROGRAVITY ON FINE MOTOR SKILLS \[#18422\]](#)
A flight study on the ISS is in progress to determine the effects of long-duration microgravity and gravitational transitions on fine motor performance. ISS 1-year and 6-month crew subjects completed 4 different iPad-based tasks to measure fine motor performance.
- 4:42 PM Moore S. Dilda V. Morris T. Yungher D. MacDougall H. Wood S.
[EFFECTS OF LONG-DURATION SPACEFLIGHT ON POST-LANDING OPERATOR PROFICIENCY \[#18423\]](#)
This study quantified deficits in post-landing cognitive/sensorimotor function and the resultant deficits in operator proficiency following 6-month ISS missions.
- 5:00 PM Break [#18424]

Tuesday, January 23, 2018

Poster Session B: Acute and Hematopoietic Responses from Exposure to Space Radiation

5:00 PM

Exhibit Hall A

Welford S.

[MLH1 DEFICIENCY SENSITIZES HEMATOPOIETIC STEM CELLS TO MALIGNANT TRANSFORMATION AFTER EXPOSURE TO HIGH AND LOW LET IONIZING RADIATION: A NEW RISK FOR ASTRONAUTS \[#18258\]](#)

Mismatch repair fidelity decreases with age due to loss of MLH1 expression in people, and thus sensitizes healthy astronauts to radiation-induced hematopoietic malignancies.

Moroni M. Kenchegowda D. Legesse B. Hritzo B. Olsen C. Aghdam S. Kaur A. Culp W. Derrien-Colemyn A. Severson G.

[SELECTIVE INSULIN-LIKE GROWTH FACTOR RESISTANCE IS ASSOCIATED WITH HEART HEMORRHAGES AND POOR PROGNOSIS IN A NOVEL PRE-CLINICAL MODEL OF THE HEMATOPOIETIC ACUTE RADIATION SYNDROME \[#18259\]](#)

Selective IGF-1 resistance is a novel mechanisms of radiation injury, associated with a vicious cycle amplifying ROS-induced damage, inflammation and endothelial dysfunction. Selective inhibition of IGF-1 cardioprotective function may contribute to hemostatic disorders development.

Patel R. Gerson S. Welford S.

[MLH1 DEFICIENCY INCREASES THE RISK OF HEMATOPOIETIC MALIGNANCIES POST LOW- AND HIGH-LET RADIATION EXPOSURE \[#18260\]](#)

Our data showed that MMR defects in HSCs leads to sensitization to radiation induced hematopoietic malignancy, and that radiation quality effects exacerbate the sensitivity.

Nelson G. Jones T. Campbell-Beacher M. Stanbouly S. Nishiyama N. Rodriguez D. Orloff L. Sun S. Sridharan V. Boerma M. Hauer-Jensen M.

[CARDIAC AND VASCULAR EFFECTS OF SPACE RADIATION - CSRR ACUTE RISK STUDIES \[#18261\]](#)

Rodent and cell models were used to characterize acute and degenerative effects of proton and heavy ion irradiation and simulated microgravity related to cardiovascular function using retina, heart, skin, blood and endothelial cells from mice and humans.

Porada C. Almeida-Porada G. Brudvik E. Kuhlman B. George S. Wilson P.

[THE DELETERIOUS EFFECTS OF SIMULATED MICROGRAVITY ON HUMAN HSC DNA DAMAGE REPAIR & DIFFERENTIATION INTO FUNCTIONAL IMMUNE CELLS \[#18262\]](#)

In the present study we show that conditions of microgravity negatively affect the ability of human HSC to repair DNA damage and to differentiate into functional immune cells.

Jejelowo O. Gridley D. Wu H. Pourmand N.

[BIOLOGICAL RESPONSE IN TERMS OF DIFFERENTIAL GENE EXPRESSIONS TO ACUTE DOSE PROTON IRRADIATED TISSUES \[#18263\]](#)

BIOLOGICAL RESPONSE IN TERMS OF DIFFERENTIAL GENE EXPRESSIONS TO ACUTE DOSE PROTON IRRADIATED TISSUES

Tuesday, January 23, 2018

Poster Session B: Cardiovascular and Degenerative Risks from Radiation Exposure

5:00 PM

Exhibit Hall A

Bishawi M. Feger B. Kidane Y. Thompson J. Dubois L. Young K. Carnell L. Blattnig S. Bursac N. Dewhirst M. Moseley M. Bowles D.

[**PROFILING THE PROTEOMIC RESPONSES OF CARDIOMYOCYTES TO LOW DOSE GAMMA RADIATION** \[#18264\]](#)

The purpose of this study was to evaluate the biological effects of low-dose radiation on isolated cardiomyocytes in order to help determine potential targets for countermeasure development and determine the nature of the risk.

Patnaik S. Davis C. Guerrero M. Thirugnanasambandam M. Lau A. Finol E.

[**BIOMECHANICAL CHANGES IN RODENT ABDOMINAL AORTA DUE TO HIGH ENERGY PARTICLE RADIATION** \[#18265\]](#)

Particle radiation induces changes in the vascular extracellular matrix and this phenomenon is evident from the observed variances in tissue biomechanical behavior.

Azzam E. Guo J. Hu T. Moore L. Chidambaram S. Khurana A. Colangelo N. de Toledo S.

[**SHORT- AND LONG-TERM MODULATION OF HEMATOPOIETIC CELLS' ABUNDANCE IN MICE EXPOSED TO SPACE RADIATION** \[#18266\]](#)

The objective of this study is to determine temporal changes in the relative abundance of circulating immune cells, and of their precursors in bone marrow, in mice exposed to space radiation.

Azzam E. Yurkow E. Adler D. Colangelo N. Domogauer J. Moore L. Guo J. Chidambaram S. Sabbah N. de Toledo S. Howell R.

[**LONG-TERM EFFECT OF HEAVY ION RADIATIONS ON RADIOSENSITOMETRIC CHARACTERISTICS OF MURINE BONE** \[#18267\]](#)

The objective of this study is to evaluate, in mice, the effects of space radiation on bone dynamics using computed tomography (CT) scanning.

Wu H. Zhang Y. Hamilton S. Gridley D. Sodipe A. Jejelowo O. Ramesh G. Moreno-Villanueva M. Wu H.

[**Apoptosis and Expression of Apoptosis-related Genes in Mouse Intestinal Tissue after Whole-body Proton Exposure** \[#18268\]](#)

Apoptosis and expressions of apoptosis-related genes were investigated in small intestines of BALB/c mice after exposure to 250 MeV protons.

Kaytor M. Harvey A. Hagan S. Alvarez M. Cary L. Cengel K.

[**BIO 300 MITIGATES BIOLOGICAL DAMAGE FROM NON-GAMMA IONIZING RADIATIONS** \[#18269\]](#)

We explored the potential utility of a radioprotective therapy, BIO 300, against various non-gamma radiation sources.

Brown Z. Bishawi M. Feger B. Carnell L. Blattnig S. Bowles D.

[**A SYSTEMATIC LITERATURE REVIEW OF RADIATION-INDUCED CARDIOVASCULAR DISEASE** \[#18270\]](#)

In order to identify and locate the deficits in current understanding of radiation-induced CVD, a systematic review of the literature was performed.

Mishra B. Luderer U.

[SPACE RADIATION DAMAGES UTERINE CELL ARCHITECTURE IN MICE \[#18271\]](#)

Exposure to charged iron particle radiation induced DNA-double strand breaks, damages the uterine luminal and glandular epithelial cells, which are essential for the establishment of pregnancy.

grabham p. Wu Y. Sharma p. koh s.

[COMBINED EFFECT OF SPACE RADIATION AND SIMULATED MICROGRAVITY ON HUMAN BLOOD MICRO-VESSEL MODELS: SYNERGISTIC AND ADDITIVE EFFECTS \[#18272\]](#)

A very low dose of mixed charged particles inhibits angiogenesis synergistically and is additive to the effects of simulated microgravity

Steller J. Raben D. Ronca A. Jennings R. Powell T. Jansson T.

[EFFECT OF RADIATION ON DEVELOPMENT IN SPACE: CONSIDERATIONS FOR MARS AND LUNAR COLONIZATION \[#18273\]](#)

We explore the NASA radiation models for Mars and Lunar missions, evaluate reproductive outcomes in the setting of radiation, and outline our proposal evaluating the reproductive outcomes in mice after emulating the chronic low-dose pan-gestation exposure of cosmic radiation.

Tuesday, January 23, 2018

Poster Session B: Human Factors and Behavioral Performance

5:00 PM

Exhibit Hall A

Schmer-Galunder S. Keller P. Ladwig J.

[TEAM DYNAMIC ASSESSMENT DURING VR GAMEPLAY AT HI-SEAS ANALOG STUDY \[#18274\]](#)

We used a VR-based strategic puzzle game to study team behavior, team coordination and communication in a realistic, playful setting over 8 months (at the HI-SEAS facilities) to automatically detect indicators of changes to team cohesion.

Barshi I. Dempsey D.

[THE EFFECTS OF LONG-DURATION SPACEFLIGHT ON TRAINING RETENTION AND TRANSFER \[#18275\]](#)

THE EFFECTS OF LONG-DURATION SPACEFLIGHT ON TRAINING RETENTION AND TRANSFER

Dempsey D. Barshi I.

[ISS TRAINING BEST PRACTICES AND LESSONS LEARNED \[#18276\]](#)

This ongoing study seeks to document current training practices and lessons learned in ISS training to provide input to the design of future crew training for Deep Space missions.

Bryan C.

[EXPECTATIONS TRAINING CONSIDERATIONS FOR CREW MEMBERS PREPARING FOR LONG-DURATION EXPLORATION MISSIONS \[#18277\]](#)

Although NASA's existing training methods build realistic expectations and dispel inaccurate or unhelpful expectations, modifications and adaptations to these training methods are needed to better prepare crew members for the unique characteristics of exploration missions.

Burkhart K. Allaire B. Bouxsein M.

[NEGATIVE EFFECTS OF SPACEFLIGHT ON LUMBAR PARASPINAL MUSCLE MORPHOLOGY \[#18278\]](#)

Size and density of trunk musculature declined significantly during spaceflight and showed variable recovery upon return to Earth.

Bannova O. D. Camba J.

[IMMERSIVE TECHNOLOGIES IN THE DESIGNED ENVIRONMENT AND THEIR ROLE AS PSYCHOLOGICAL COUNTERMEASURES IN SPACE MISSIONS \[#18279\]](#)

Implementation of immersive visualization technologies in the designed environment that helps crew adaptation to confined conditions of in-transit and on-surface habitats as well as mitigate the negative impact of sensory deprivation and isolation during long-duration space missions.

Rose R. Wu P. Zbozinek T. Foale C. Oftedal A. Yang A. Craske M.

[ASYNCHRONOUS BEHAVIORAL HEALTH TREATMENT TECHNIQUES FOR LONG-DURATION MISSIONS \[#18280\]](#)

We report on our randomized control trial examining the effectiveness of asynchronous behavioral health techniques with medical personnel. We present preliminary data on baseline and mid-treatment measures and qualitative outcome from our sample of (N = 60).

Stuster J. Adolf J. Byrne V. Greene M.

[GENERALIZABLE SKILLS AND KNOWLEDGE FOR EXPLORATION MISSIONS](#)
[#\[18281\]](#)

This study identifies the work that will be performed during the first human expedition to Mars and the abilities, skills, and knowledge that will be required of crew members.

Kazi S. Khaleghzadegan S. Chime N. Dinh J. Oswald F. Salas E. Rosen M.

[A REVIEW ON THE USE OF PHYSIOLOGICAL MEASUREMENT IN TEAM SETTINGS](#)
[#\[18282\]](#)

A systematic review on the state of team science in the use of physiological sensors revealed that detection of synchrony between team members depends on the type of physiological system, the type of data aggregation method, and the type of task used.

Wu P. O'Neill P.

[AUGMENTED REALTY FOR ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM \(ECLSS\)](#)
[#\[18283\]](#)

This paper discusses key challenges of using Augmented Reality (AR) in operational settings that must be overcome in order to realize its potential to deliver just in time information to improve efficiency and reduce error.

Morrison M.

[THE ASTRONAUT PSYCHOLOGY DASHBOARD: TRACKING AND IMPROVING TEAM EFFECTIVENESS ON LONG-DURATION MISSIONS](#)
[#\[18284\]](#)

This poster presents designs for an Astronaut Psychology Dashboard --- a software application that proposes to make it easy for space crews monitor and improve team functioning, physical health, and personal well-being on long-duration space missions.

Dishop C. Olenick J. Santoro Webb J. Kozlowski S. Chang C. Perry S.

[ALGORITHM VALIDATION IN THE APPLICATION OF SENSOR DATA TO TEAM PROCESSES](#)
[#\[18285\]](#)

In this study we validate a new algorithm developed to process data incoming from wearable sensor technology used by NASA teams.

Rosen M. Kazi S. Khaleghzadegan S. Dinh J. Paoletti J. Oswald F. Salas E.

[Unobtrusive Measures of Team Communication: State of the Science and the Road](#)
[#\[18286\]](#)

We review the multi-disciplinary literature on unobtrusive team communication measurement and present a compendium of metrics and validity evidence for use in assessing LDSE competencies.

Tannenbaum S. Maynard T. Mathieu J. Bedwell W.

[CHALLENGES, TEAM ADAPTATION, AND RESILIENCE IN EXTREME ENVIRONMENTS](#)
[#\[18287\]](#)

Studying how teams respond and adapt to challenges in ICE environments.

Seidler R. Mulavara A. Bloomberg J.

[DOES INTERMITTENT OR CONTINUOUS ARTIFICIAL GRAVITY COUNTERACT LONG DURATION BED REST INDUCED NEUROCOGNITIVE DECLINES?](#)
[#\[18288\]](#)

We will investigate whether intermittent or continuous delivery of 30 minutes centrifugation serves as an effective countermeasure for head down bed rest induced neurocognitive changes.

Lee J. Mulavara A. Bloomberg J. Kuehn S. Stahn A. Seidler R.
[BED REST COMBINED WITH 0.5% CO2 AS A SPACEFLIGHT ANALOG TO STUDY NEUROCOGNITIVE CHANGES: EXTENT, LONGEVITY, AND NEURAL BASES](#) [#18289]

Our overarching goal is to quantify neurocognitive changes and associated neural structural and functional alterations occurring as a result of a 30 days head down tilt bed rest plus 0.5% CO2 environment, serving as a spaceflight analog exposure.

Lockley S. Rahman S. St. Hilaire M. Clark T. Hanifin J. Barger L. Czeisler C. Brainard G.
[LIGHTING PROTOCOLS FOR EXPLORATION – HERA CAMPAIGN](#) [#18290]
This study will evaluate the use of a Dynamic Lighting Schedule in the Human Exploration Research Analog to examine the feasibility and efficacy of the solid state lighting assembly and to provide the tests necessary to finalize operational procedures for testing of this system aboard the ISS.

Carter D. Shuffler M. Schechter A. DeChurch L. Contractor N. Burke S. Zaccaro S. Landon L. Trainer H. Pendergraft J.
[PROJECT FUSION: FACILITATING UNIFIED SYSTEMS OF INTERDEPENDENT ORGANIZATIONAL NETWORKS](#) [#18291]

This poster will summarize the goals and strategies for Project FUSION - an upcoming project which will delve into the drivers coordination within and between teams in Spaceflight Multiteam Systems.

Ryan K. Danielson R.
[A RETROSPECTIVE ANALYSIS OF ON-ORBIT HEARING ASSESSMENTS AND MISSION-RELATED AUDIOMETRY](#) [#18292]
The purpose of this retrospective study is to perform the analysis of OSHA and audiometric data acquired from ISS crewmembers and identify the incidence of off-nominal hearing threshold shifts from their pre-flight hearing status.

Lewis R.
[ARCHITECTURAL FACILITATION OF SALUTOGENESIS IN LIGHT OF THE SUBLIME](#) [#18293]

Spacecraft architectural design methods and measures may influence positive and productive behavioral and salutogenic effects and responses to transitions and ever-changing perspectives to Earth and planetary objects stimulated by the extraordinary, sublime space experience.

Connaboy C. Johnson C. LaGoy A. Pepping G. Simpson R. Deng Z. Ma L. Bower J. Alfano C.
[INTER-SESSION RELIABILITY OF A NOVEL PERCEPTION-ACTION COUPLING TASK](#) [#18294]

Determination of a novel action boundary assessment tool for assessing behavioral risk

Newton D. LePine J. Wellman N.
[EFFECTIVENESS IN MULTIFACETED WORK: ENGAGEMENT AS A MIXED BLESSING IN TRANSITIONS TO DIFFERENT TASKS](#) [#18295]

The positive and negative mechanisms associated with task transitions, and the impact on subsequent motivation and effectiveness.

Feigh K. Ma M. Ijtsma M. Pritchett A.
[OBJECTIVE FUNCTION ALLOCATION FOR HUMAN-ROBOTIC INTERACTION](#) [#18296]

We propose an objective function allocation method called Work Models that Compute (WMC), which employs fast-time computational simulation to analyze agents working together to achieve a common goal.

Duda K. Steiner T. Endsley T. West J. Chamitoff G.

[WEARABLE KINEMATIC SYSTEMS FOR QUANTIFYING 3-D SPACE UTILIZATION IN THE MICROGRAVITY ENVIRONMENT \[#18297\]](#)

Research and development of a vision+inertial wearable navigation system for tracking astronaut movement within the ISS for net habitable volume usage estimation.

Matsangas P. Shattuck N.

[SLEEP PATTERNS, AND MOOD STATES OF CREWMEMBERS IN 8-MONTH MISSION V OF THE HAWAII SPACE EXPLORATION ANALOG AND SIMULATION \(HI-SEAS\): PRELIMINARY RESULTS \[#18298\]](#)

Crewmembers who scored higher in neuroticism, lower in extraversion, and lower in agreeableness had worse sleep quality, elevated daytime sleepiness, more severe insomnia symptoms, and worse mood (in the form of increased variability of scores, or of scores deteriorating during the mission)

Kozlowski S. Biswas S. Chang C.

[TEAM COHESION BADGE: DEVELOPMENT OF GALVANIC SKIN RESISTANCE MODALITY \[#18299\]](#)

Research and technology development to integrate a galvanic skin resistance (GSR) sensor to a sensor technology platform (i.e., badge) designed to support effective team interactions, collaboration, and cohesion.

Fischer U. Mosier K. Tofighi D.

[A RESEARCH APPROACH TO UNDERSTANDING KEY COMPONENTS OF SUCCESSFUL AUTONOMOUS SPACE MISSIONS \[#18300\]](#)

We describe research to examine and model the relationship between crew autonomy and team effectiveness both of the crew and of the multi-team system of crew and mission control.

Olenick J. Webb J. Dishop C. Binsted K. Chang C. Kozlowski S.

[TEAM DYNAMICS AND GRANGER CAUSALITY IN A LONG DURATION FLIGHT ANALOG \[#18301\]](#)

This study extends existing knowledge of team dynamics by utilizing stronger analytic methods than typically utilized in teams research to show that team processes and outcomes on one day have a causal relationship with team processes the following day according Granger causal logic.

Beutter B. Karasinski J. Adelstein B.

[UTILITY OF THE ROBOTICS ON-BOARD TRAINER FOR REDUCING HUMAN FACTORS AND BEHAVIORAL PERFORMANCE RISKS \[#18302\]](#)

This work examines the utility of NASA's Robotics On-Board Trainer to make progress on the HRP Human Factors Risks and to develop new sensitive performance metrics to measure diverse aspects of astronaut performance.

Iwig C. Stone E. Salas E.

[ITERATIVE DESIGN OF A WEB-BASED MEASUREMENT TOOLKIT FOR ADVISING THE ASSESSMENT OF HUMAN-AUTOMATION SYSTEM SAFETY AND PERFORMANCE \[#18303\]](#)

This abstract presents an overview of the iterative design process engaged in for development and testing of a web-based measurement toolkit for advising the assessment of human-automation system safety and performance.

Stahn A. Brauns K. Werner A. Wolbers T. Riemer M. Craig M. Dinges D. Basner M. Gunga H. Simone K.

[HIPPOCAMPAL CHANGES AND SPATIAL COGNITION ASSOCIATED WITH 60 DAYS OF BED REST WITH AND WITHOUT EXERCISE AS A COUNTERMEASURE \[#18304\]](#)

Long-term bed rest has a negative effect on the hippocampus and associated structures. These data could explain various social and neurobehavioral changes observed in spaceflight and the need to develop target-specific countermeasure for maintaining neurobehavioral performance.

Chen M. Arellano J. Morency R. Hsiang S. Lim C. Ramirez C. Myers J. Goodenow D. Thaxton S.

[SPACECRAFT OPTIMIZATION LAYOUT AND VOLUME \(SOLV\): DEVELOPMENT OF A MODEL TO ASSESS HABITABLE VOLUME \[#18305\]](#)

The Spacecraft Optimization Layout and Volume (SOLV) is a NASA Research Announcement (NRA) funded project that aims to develop a constraint-driven, optimization-based computational model that can be used during the early design phases to estimate spacecraft/habitat volume and layout.

Marquez J. Chang M. Beard T. Kim Y. Karasinski J.

[HUMAN-AUTOMATION ALLOCATIONS FOR CURRENT ROBOTIC SPACE OPERATIONS \[#18306\]](#)

Human-automation allocations are described for current robotic space operations, specifically heavy lift robotic arms and rovers.

Stahn A. Dinges D. Nasrini J. Hermosillo E. Ecker A. Werner A. Brauns K. Gunga H. Moore T. Kuehn S. Gur R. Basner M.

[HYBRID TRAINING - A SENSORY STIMULATION COUNTERMEASURE FOR LONG DURATION SPACE EXPLORATION MISSIONS \[#18307\]](#)

Sensory deprivation and monotony during isolation and confinement are critical risks for developing neurobehavioral disorders. Hybrid Training is as a sensory stimulation augmentation countermeasure to mitigate these risks and is currently testen during two winter-overs in Antarctica.

Wenzel E. Godfroy-Cooper M.

[ADVANCED MULTIMODAL SOLUTIONS FOR INFORMATION PRESENTATION \[#18308\]](#)

The scope of the current work is an analysis of potential multimodal display technologies for long duration missions and, in particular, will focus on their potential role in EVA activities.

Wenzel E. Adelstein B.

[JUST-IN-TIME TRAINING FOR TELEOPERATIONS \[#18309\]](#)

The overall goal of this area of work is to develop prototype Just-in-Time Training (JITT) protocols for visuomotor teleoperation tasks and determine their relative strengths and weaknesses.

Roma P. Schneiderman J. Landon L. Whitmire A. Baskin P. Arias D.

[OVERVIEW OF THE NASA BEHAVIORAL HEALTH & PERFORMANCE LABORATORY \[#18310\]](#)

Overview of the Behavioral Health & Performance (BHP) Laboratory at NASA Johnson Space Center

Niler A. DeChurch L. Mesmer-Magnus J. Contractor N.

[WORKING IN AND OUT OF TEAMS THROUGH SPACE AND TIME \[#18311\]](#)

Which kinds of tasks are easier and harder to switch between? We explore perceptions of solo, crew, and crew-MCC tasks in HERA and find that more interdependent (i.e., crew or crew-MCC) tasks are “stickier” than solo tasks.

Bell S. Vinokhodova A. Gushin V. Contractor N. DeChurch L. Outland N. Vazquez M. Burns T.

[TOWARD A PROCESS MODEL OF INTERPERSONAL RELATIONSHIP FORMATION IN ICE \[#18312\]](#)

We present qualitative and quantitative analyses of HERA data in which we examine key events that shape interpersonal relationships over time.

Gokhman I. Plummer G. DeChurch L. Vazquez M. Bell S. Contractor N.

[DEVELOPMENT AND VALIDATION OF AN INFORMATION SHARING ASSESSMENT TOOL FOR SPACE CREWS \[#18313\]](#)

We report data from HERA crews and a baseline general population sample related to the validation of an information sharing assessment tool.

Roma P. Schneiderman J. Landon L. Whitmire A.

[OVERVIEW OF NASA BEHAVIORAL HEALTH & PERFORMANCE STANDARD MEASURES \[#18314\]](#)

Overview of NASA Behavioral Health & Performance (BHP) Standard Measures

Perlman G. Shteynberg Y. Ruggero C. Foti D. Kotov R.

[Personality and Biological Predictors of Resiliency to Chronic Stress Among High-Achieving Adults \[#18315\]](#)

Prediction of behavioral health outcomes using personality and neurophysiology.

Lee J.K., Koppelmans V., Riascos R.F, Pasternak O, Mulavara A.P., Bloomberg J.J., Seidler R.D.

[EVALUATION OF BRAIN WHITE MATTER MICROSTRUCTURE IN NASA \[#18316\]](#)

Recent reports of elevated brain white matter hyperintensity (WMH) counts and volume in post flight astronaut MRIs warrant further examination of the impact of spaceflight.

Strangman G. Ikkovic V. Zhang Q.

[QUANTIFYING AND PREDICTING OPERATIONALLY-RELEVANT PERFORMANCE IN A LONG-DURATION SPACEFLIGHT ANALOG \[#18317\]](#)

We are utilizing the Robotics On-Board Trainer for Research (ROBoT-r) system along with simultaneous multi-modal physiological recordings (NINscan-SE) to assess and predict operationally-relevant performance changes associated with 45-day isolation in HERA.

Shuffler M. Savage N. Verhoeven D. Flynn M. Burke S. Kramer W.

[SOCIAL SKILLS IN SPACEFLIGHT: THE ROLE OF SOCIAL INTELLIGENCE IN ENHANCING TEAMWORK QUALITY & TEAM EFFECTIVENESS \[#18318\]](#)

As long duration spaceflight requires crews to maintain effective interpersonal relationships, we explored the role of social intelligence as an influencing factor regarding interpersonal emergent states and teamwork quality in varying levels of autonomy and physical distribution.

Young K. Kim H. Rajulu S.

[QUANTIFICATION OF IN-FLIGHT PHYSICAL CHANGES: ANTHROPOMETRY AND NEUTRAL BODY POSTURE \[#18319\]](#)

Preliminary findings of an ISS study to assess the anthropometric changes to body shape and size due to microgravity for 9 long duration subjects.

Anderson A. Klaus D.

[INTERACTIVE SPACE VEHICLE DESIGN TOOL WITH VIRTUAL REALITY \[#18320\]](#)

We describe our work to evaluate the spectrum of visual design tools that facilitates rapid and flexible design of space vehicles and habitats.

Vos G. Fink P. Morency R. Ngo P. Simon C. Williams R. Pérez L.

[*A TOOL FOR THE AUTOMATED COLLECTION OF SPACE UTILIZATION DATA: THREE DIMENSIONAL SPACE UTILIZATION MONITOR \[#18321\]*](#)

The objective of this project is to develop an automated three-dimensional space utilization data collection system which delivers data useful in the analysis of vehicle habitability pertaining to crew activities on the ISS as well as potential long duration space missions.

Connaboy C. LaGoy A. Sinnott A. Pepping G. Simpson R. Deng Z. Ma L. Bower J. Alfano C.

[*SLEEP DEPRIVATION COMPROMISES ACTION BOUNDARY AND AFFORDANCE BASED JUDGMENTS \[#18322\]*](#)

Sleep deprivation effects action boundary perception accuracy

Ronca A. Moyer E. Talyanski Y. Solomides P. Choi S. Gong C. Globus R.

[*MOUSE BEHAVIOR ON ISS: EMERGENCE OF A DISTINCTIVE ORGANIZED GROUP CIRCLING BEHAVIOR UNIQUE TO SPACEFLIGHT \[#18323\]*](#)

Behavioral analysis of mice flown on ISS in the NASA Rodent Habitat provides clear evidence for the emergence of a distinctive, organized group behavior unique to the weightless space environment

Flynn-Evans E. Martinez S. Gregory K. Murphy C. Young M. Barger L. Sullivan J.
[*EVALUATION OF MODEL PREDICTIONS OF PERFORMANCE AMONG FLIGHT MISSION CONTROLLERS AND INDIVIDUALS WORKING MARS TIME \[#18324\]*](#)

We compared four bio-mathematical models of performance to actual performance measures in two operational studies and found that the models show promise for evaluating schedules at the group level, but not at the individual level.

Adelstein B. Karasinski J. Ellis S.

[*TELEOPERATION TARGETING MOVEMENTS AS A FUNCTION OF CONTROL-DISPLAY MISALIGNMENT, TIME DELAY, AND REQUIRED PRECISION \[#18325\]*](#)

Movement data from a targeting experiment corroborate the three-way interaction predicted by a new computational model relating task performance to three fundamental teleoperation difficulty factors: control-display alignment, delay, and task precision.

Newby N. Somers J. Putnam J. Wells J. Siders B.

[*SOYUZ LANDING RISK CHARACTERIZATION \[#18326\]*](#)

This study examines the injuries associated with Soyuz landings.

Dinges D. Basner M. Bilker W. Gur R. Hensch T. Nindl B. Roma P. Stahn A.

[*NSCOR FOR EVALUATING RISK FACTORS AND BIOMARKERS FOR ADAPTATION FOR RESILIENCE TO SPACEFLIGHT: EMOTIONAL VALENCE AND SOCIAL PROCESSES IN ICC/ICE ENVIRONMENTS \[#18327\]*](#)

This NASA Center of Scientific Excellence (NSCOR) is evaluating risk factors and biomarkers for adaptation and resilience to spaceflight in relation to emotional valence and social processes, using three different ICC/ICE environments.

Plummer G. DeChurch L. Contractor N. Johnson J. Mesmer-Magnus J.

[*MEASURING SHARED MENTAL MODELS OVER TIME \[#18328\]*](#)

How do crew shared mental models change over time during long duration missions? We tracked the similarity of crew mental models daily over the course of 30 and 45 day missions in the Human Exploration Research Analog (HERA).

Pinedo C. Dixon J. Davis E. Zuzula E. Clark T.

[*A NUMERICAL ALGORITHM TO ESTIMATE AN ACHIEVABILITY LIMIT FOR CREWED PLANETARY LANDING*](#) [#18329]

We have developed a novel algorithm that predicts the achievable limit for a planetary lander vehicle given the fuel remaining, vehicle dynamics, and a model for pilot

Outland N. Brown S. Colaneri T. Vasquez M. Weiss J. Wocjik H. Bell S.

[*THE RELATIONSHIP BETWEEN TEAM COMPOSITION AND TEAM EFFECTIVENESS MODERATED BY LDSE-RELEVANT CONTEXT FEATURES*](#) [#18330]

Some team composition and outcome relationships vary as a function of the outcome and context. We meta-analyze 258 studies detailing how team composition relates to outcomes important in space flight under conditions seen in current space flight.

Johnson J. Zurek M. Contractor N. DeChurch L.

[*TEAM DYNAMICS IN SPACEFLIGHT ANALOGS: SHARED MENTAL MODELS, INFORMAL SOCIAL ROLES, AND TEAM VIABILITY AND CONFLICT IN THE HUMAN EXPLORATION RESEARCH ANALOG \(HERA\)*](#) [#18331]

How do shared mental models (SMMs) impact team dynamics during a long-duration mission? We examine the relationship among SMMs and team members' informal social roles, isomorphism between formal and informal role properties, as well as team dynamics within NASA's HERA.

Burke S. Perez A. Carusone N. Paoletti J. Salas E.

[*LEVERAGING ARCHIVAL DATA TO UNDERSTAND THE IMPACT OF CULTURAL DIVERSITY ON TEAMS IN LONG DURATION SPACE EXPLORATION*](#) [#18332]

Describes the progress on a project which has recently moved out the definitional phase and whose goal is to map the critical issues surrounding cultural diversity in LDSE and based on this build a cultural training tool.

Christian K. Petitti C. Ortega-Schwartz K. Macias B. Lee S. Stenger M. Lovering A. Laurie S.

[*VAPER: ASSESSMENT OF SLEEP AND CIRCADIAN RHYTHM DURING HYPERCAPNIC 6° HEAD-DOWN TILT BED REST*](#) [#18333]

The effect of 30 days of 6-degree head-down tilt bed rest and 0.5% carbon dioxide on sleep and circadian rhythm.

Gottlieb J. Ladwig J. Hamell J. Dehaven M. Wu P.

[*ANSIBLE: A NETWORK FOR SOCIAL INTERACTIONS FOR BILATERAL LIFE ENHANCEMENT*](#) [#18334]

The objective of ANSIBLE is to devise a low cost, easy to use scalable system for delivering psychological assessment and wellness promoting strategies within a virtual environment.

Twyman M. Lungeanu A. DeChurch L. Contractor N.

[*THE EMERGENCE AND DEVELOPMENT OF CREW SHARED MENTAL MODELS: AN AGENT-BASED MODEL*](#) [#18335]

How can crew shared mental models be maintained during long distance space exploration missions? We present a computational model and virtual experiments examining individual, contextual, task, and social factors.

Tanaka K. Witz C. Niler A. DeChurch L. Contractor N.

[*SOCIAL NETWORK ACUITY AMONG SPACE CREWS AND MISSION CONTROL CENTERS*](#) [#18336]

How do space crews and mission controllers build an understanding of communication networks? Results from the Human Research Exploration Analog finds two biases: failing to see links that exist, and perceiving links that do not exist based on emergent and formal groups.

Mupparaju S. Anderson A. Cowan D. Lam Q. Gifford S. Love R. Florum-Smith A. Fellows A. Buckley J.

[COMPUTER-BASED MENTAL HEALTH RESOURCES IN ISOLATED CONFINED ENVIRONMENTS: COMPARISON BETWEEN CANADA FORCES STATION ALERT AND HI-SEAS IV\[#18337\]](#)

Computer-based psychological support and virtual reality were evaluated at two isolated and confined environments (Canadian Forces Station Alert and the HISEAS Mars Simulation Habitat)

Gokhman I. Larson L. DeChurch L. Bell S.

[TRACKING CREW PERFORMANCE ON MULTIPLE DIMENSIONS OVER TIME \[#18338\]](#)

How does team performance vary over the course of a long-duration mission? We examine trends in team performance on creative thinking, ethical decision making, and problem solving tasks over the course of 30 and 45-day missions in HERA.

DeChurch L. Park P. Lungeanu A. Twyman M. Contractor N.

[CREST: CREW RECOMMENDER FOR EFFECTIVELY SWITCHING TASKS \[#18339\]](#)

Why are some tasks too engaging to stop (“sticky”) or more enticing to start (“attractive”) than others during a space mission? We present a computational model examining task, team, technology, and social network factors that explain what make some tasks “sticky” or “attractive”

Contractor N. DeChurch L. Antone W. Twyman M. Gibson Z. Sawant A. Gado H. Bell S.

[TEAMSTAR: TOOL FOR EVALUATING AND MITIGATING SPACE TEAM RISK \[#18340\]](#)

Introducing TEAMSTAR - a dashboard leveraging three computational models of crew relations and performance, to assist with the management of team risk prior to and after launch.

Burns T. Antone W. Weiss J. Larson L. Bell S. DeChurch L.

[IDENTITY IN ISOLATION: HOW TEAMS BOND OR BREAK \[#18341\]](#)

What causes space teams to bond or break? We examine the influences of psychological collectivism and emotion regulation on crew member’s identification with the entire HERA crew over the course of 30 and 45-day missions in HERA.

Connaboy C. Sinnott A. LaGoy A. Pepping G. Simpson R. Deng Z. Ma L. Bower J. Alfano C.

[APERTURE RATIO INFLUENCES ACTION BOUNDARY PERCEPTION ACCURACY PERFORMANCE \[#18342\]](#)

A novel iPad software application was successful in determining action boundary accuracy perception at and around behavioral thresholds.

Doyle T. Musson D. Robertson J. Dias R. Gupta A. Yule S.

[DISTRIBUTED TELEMEDICINE SIMULATION PLATFORM FOR TEAM MEDICAL EVENT MANAGEMENT DURING SPACE EXPLORATION \[#18343\]](#)

This paper presents the design of platform that supports space craft simulation, distributed telemedicine, and high-fidelity medical simulation for team medical event management is required to address team medical event management during space exploration.

Flynn-Evans E. Gregory K. Kirkley C. Martinez S. Hillenius S. Marquez J.

[EVALUATION OF THE VALIDITY, ACCEPTABILITY AND USABILITY OF BIO-MATHEMATICAL MODELS TO PREDICT FATIGUE IN AN OPERATIONAL ENVIRONMENT \[#18344\]](#)

We are evaluating the validity, acceptability and usability of bio-mathematical models to predict fatigue in the Human Research Exploration Analog.

Hava H. Kaufman A. Correll N.

[*NATURE PROVIDES THE GATEWAY TO BLISS IN DEEP SPACE EXPLORATION HABITATS*](#) [#18345]

Nature improves habitability, affect and diet by integrating Bioregenerative Life Support Systems (BLISS) into exploration class habitats.

Antone W. Lungeanu A. Gibson Z. DeChurch L. Bell S. Contractor N.

[*TEAM DYNAMICS: USING SIMULATION AS A TOOL TO DEVELOP THEORY*](#) [#18346]

Team compositions shapes team processes and outcomes. We demonstrate an approach for designing a theory driven simulation model for team composition effects, validating it with data, and using it to guide future research directions or support applied decision making.

Binsted K. Basner M. Bedwell W. Caldwell B. Hunter J. Kozlowski S. Roma P. Schmer-Galunder S.

[*HI-SEAS: OVERVIEW OF RESULTS FROM THE FOUR, EIGHT AND TWELVE MONTH MISSIONS*](#) [#18347]

This presentation will provide an overview of HI-SEAS mission conditions and protocols, set the context for these results, and discuss 'big picture' lessons learned.

Beard B. Holden K.

[*THE FINE MOTOR SKILLS AND COGNITION TEST BATTERIES: NORMATIVE DATA AND INTERDEPENDENCIES*](#) [#18348]

This project will collect normative data on the Cognition and Fine Motor Skills Test Batteries in a certified pilot population and determine to what degree motor responses contribute to the cognitive scores.

Harrington M.

[*IMPROVING PSYCH PHYSICAL WELL-BEING AND PERFORMANCE IN ISOLATED, CONFINED, AND EXTREME ENVIRONMENTS WITH HEAD MOUNTED VIRTUAL REALITY PHOTOREALISTIC SIMULATIONS OF EARTH BASED NATURAL ENVIRONMENTS*](#) [#18349]

Physical and psychological indicators will be measured over a several month study with UCF undergraduate volunteers in a pilot study, to determine how a realistic, natural, expansive Earth environment impacts feelings and health.

Vera A.

[*TRANSITIONING TO HUMAN-AUTOMATION TEAMING FOR SPACEFLIGHT*](#) [#18350]

Fundamental changes in spaceflight operations from the current heavy dependence on ground mission support will be required for long-duration, deep-space exploration missions.



Synergy Grant

About

These small, short duration grants are designed to enable collaboration with an existing or previously funded TRI for Space Health project. Synergy grants are intended to permit sharing of resources and personnel across funded projects and allow researchers and NASA to get the most value from each project. This mechanism will supply modest funding to explore new collaborative ideas.

Projects may -

- Enable sharing of unused samples, particularly those from space flight or space flight analogs
- Add an additional specific aim onto an existing project
- Provide seed funding for a new approach or area of research that could tie into an existing project

Funding

Budget is ≤\$25k/year. Term is 6-12 months. In special, well-justified circumstances, the institute will consider a proposal with a higher budget and longer project duration.

Proposals may be submitted anytime and are reviewed at the end of each quarter (Mar 31, Jun 30, Sep 30, Dec 31).

Details

- TRI does not fund incremental advances to existing approaches or methods
- Applicants must be employed by U.S.-based institutions and companies
- Must include collaboration with a TRI for Space Health investigator
- Institutions must be registered in database (www.sam.gov) prior to receipt of funds

Apply

Want to apply? Email your proposal with the following information to [Dr. Emmanuel Urquieta](#). The proposal should include:

Page 1:

Key project information (title, start/end dates, Principal Investigator, Co-investigators, total budget, institutions or companies)

Brief description of the project plan, including specific aims, background and preliminary data

Page 2:

Efficiencies enabled by this proposal.

Relation of the project to NASA Risk(s) (see <https://humanresearchroadmap.nasa.gov/risks/>)

Description of the project deliverables, along with timeline

Brief biographies of the team members, unless they are already funded by Space Health

Budget justification

Page 3:

Budget form

Have a question? Please email [Dr. Emmanuel Urquieta](#).

TRI for Space Health has a single overarching mission: *Lead a national effort in translating cutting-edge emerging terrestrial research into applied space flight human risk mitigation strategies for exploration missions.* Simply put, we seek and fund emerging scientific and biomedical advances, radically disruptive technologies, and new engineering capabilities and facilities that bridge earth and space health.

Funded by NASA through a cooperative agreement, TRI for Space Health engages and enables new health technologies to predict, protect and preserve astronaut health during deep space exploration missions. We seek high risk, high reward, high quality and efficient solutions that can be adapted (or translated) for use in space. We serve as a bridge between industry, government and academia. We engage with progressive space life scientists and organizations and provide mentorship and expertise that cannot be found elsewhere.

The Translational Research Institute (TRI) for Space Health is a Baylor College of Medicine led consortium with the California Institute of Technology (Caltech) and the Massachusetts Institute of Technology (MIT).

WEDNESDAY, JANUARY 24, 2018

	Plenary (Exhibit Hall B)	Poster (Exhibit Hall A)	Galleon Ballroom	Innovation Pavilion (Grand Ballroom A)	Grand Ballroom B	Grand Ballroom C	Yacht
8:00 AM			Operational Performance Results		SANS/VIIP-Flight	Twins I	
9:30	Break						
10:00 AM			Crew Autonomy Support		SANS/VIIP-Ground	Twins II	
11:30 AM	Obtain Lunch						
12:00 PM				Lunch Talk: Innovation Challenge			
1:00 PM			Tracking Team		ExMC Overview &		
2:30 PM	Break						
3:00 PM		Poster Session C					
4:30 PM	Break						
5:00 PM	Cash Bar in Foyer						
6:45 PM	Banquet						
9:00 PM	Adjourn						

FEATURED PLENARY SPEAKERS



Henk Mooiweer

Innovation Consultant
Innovate, Inc.



Kevin Fong

Consultant Anaesthetist
University College London Hospitals

Wednesday, January 24, 2018

Operational Performance Measures: Research Results and Technology Demonstration

8:00 AM

Galleon Ballroom

Chairs: Gordon Vos and Brent Beutter

- 8:00 AM Kaushik L. Sangwan A. Hansen J. Yu C. Joglekar A.
[HUMAN BEHAVIOR AND PERFORMANCE ANALYSIS BASED ON SPOKEN LANGUAGE TECHNOLOGY ALGORITHMS \[#18105\]](#)
Speech signal has a diverse range of information which reflects individual behavior and group dynamics. Information like “who spoke when?” (Speaker Identification and Diarization technology), “what was said?” (Automatic Speech Recognition) and “how was it said?” (Speech under Stress)
- 8:18 AM Kaushik L. Sangwan A. Hansen J.
[APOLLO ARCHIVE EXPLORER: AN ONLINE TOOL TO EXPLORE AND STUDY SPACE MISSIONS \[#18106\]](#)
Apollo Archive Explorer (AAE), provides simple interface access to complex Behaviour and Performance metric information. We have designed a system where the user has the ability to choose the level, depth and kind of information they wish to analyze (audio-visual, scientific data analysis).
- 8:36 AM Palmon N. Bracken B. Strangman G. Farry M.
[COGNITIVE ASSESSMENT AND PREDICTION TO PROMOTE INDIVIDUALIZED CAPABILITY AUGMENTATION AND REDUCE DECREMENT \(CAPT PICARD\) \[#18107\]](#)
An unobtrusive system to measure, assess, and predict Astronaut workload and warn Astronauts or Mission Control when steps should be taken to augment cognitive readiness.
- 8:54 AM Zhang Q. Zhang N. Marshall-Goebel K. Ivkovic V. Strangman G.
[WEARABLE MULTIMODALITY MONITORING FOR ASTRONAUTS' HEALTH AND PERFORMANCE DURING SPACEFLIGHT \[#18108\]](#)
Enhanced capabilities including electrodermal activity (EDA), continuous cuffless blood pressure (BP) and cerebrospinal fluid (CSF) monitoring are being developed for NINscan to address the needs and mitigate the risks during long term space flights and missions to the Mars.
- 9:12 AM Ivkovic V. Dinges D. Strangman G.
[BEHAVIORAL CORE MEASURES: ROBoT-R \[#18109\]](#)
We are adapting and validating the Robotics On-Board Trainer (ROBoT) system for Canadarm2 operation to be used as an operationally-relevant performance assessment tool as part of the Behavioral Core Measures project.
- 9:30 AM Break [#18110]

Wednesday, January 24, 2018

Spaceflight Associated Neuro-Ocular Syndrome (SANS/VIIP) - Flight Findings

8:00 AM

Grand Ballroom B

Chairs: Michael Stenger and William Tarver

- 8:00 AM Tarver W. Brunstetter T. Van Baalen M. Mason s. Taiym W.
[SPACEFLIGHT ASSOCIATED NEURO-OCULAR SYNDROME \(SANS\) CLINICAL UPDATE \[#18439\]](#)
SANS related clinical findings in first time (rookie) astronauts will be presented and discussed. OCT specific data will be presented highlighting the differences between optic disc edema induced by Idiopathic Intracranial Hypertension and optic disc edema induced by SANS.
- 8:18 AM Macias B. Otto C. Ploutz-Snyder R. Sargsyan A. Alexander D. Kramer L. Riascos-Castaneda R. Samuels B. Gibson C. Patel N. Lee S. Laurie S. Stenger M.
[Prospective Observational Study of Ocular Health in ISS Crews – The Ocular Health Study \[#18440\]](#)
The purpose of this study is to characterize and quantify the ocular, neurological, and cardiovascular variables associated with the development of SANS before, during, and after long-duration ISS missions.
- 8:36 AM Stenger M. Hargens A. Dulchavsky S. Arbeille P. Danielson R. Dunn J. Ebert D. Garcia K. Johnston S. Laurie S. Lee S. Liu J. Macias B. Martin D. Minkoff L. Ploutz-Syner R. Ribeiro C. Sargsyan A. Smith S.
[FLUID SHIFTS \[#18441\]](#)
The purpose of this study is to characterize the fluid distribution and compartmentalization associated with long-duration spaceflight and to determine if a relation exists between these fluid distribution measures and the ocular structural and functional changes characteristic of SANS.
- 8:54 AM Roberts D. Brown T. Asemani D.
[VOLUMETRIC ANALYSIS OF THE PRE- AND POST-FLIGHT BRAIN MRI SCANS OF SHORT- AND LONG-DURATION ASTRONAUTS \[#18442\]](#)
We reviewed the pre-flight and post-flight brain MRI scans of US Space Shuttle and ISS astronauts to: (1) assess the impact of long-duration spaceflight on the human brain and cerebrospinal fluid (CSF) spaces and (2) provide insight into the etiology of VIIP syndrome.
- 9:12 AM Parsons-Wingter P. Murray M. Vizzeri G. Taibbi G. Mason S. Young M. Zanello S.
[DIFFERENCES IN PRE AND POST VASCULAR PATTERNING WITHIN RETINAS OF ISS CREW MEMBERS AND HEAD-DOWN TILT SUBJECTS BY VESGEN ANALYSIS \[#18443\]](#)
Space-filling vascular capacity decreased in the majority of retinas in Astronauts pre and post flight to the ISS but increased in HDT Subjects after 70-Day Bed Rest by the fractal dimension and other vascular parameters generated by NASA's VESGEN software.
- 9:30 AM Break [#18444]

Wednesday, January 24, 2018

Twins I

8:00 AM

Grand Ballroom C

Chair: John Charles

- 8:00 AM Bailey S. McKenna M. Taylor L. George K.
[ASSESSING TELOMERE LENGTH AND TELOMERASE ACTIVITY IN TWIN AND UNRELATED ASTRONAUTS \[#18463\]](#)
Telomere length dynamics (changes over time) represents a robust integrative biomarker of health risk for astronauts, as it reflects the combined exposures and experiences encountered during spaceflight.
- 8:18 AM Feinberg A. Rizzardi L. Feinberg J. Tryggvadottir R. Callahan C. Jenkinson G.
[COMPREHENSIVE ANALYSIS OF DIFFERENTIAL EPIGENETIC EFFECTS OF SPACE TRAVEL ON MONOZYGOTIC TWINS \[#18464\]](#)
Epigenetic characterization of monozygotic twins during long-term space travel.
- 8:36 AM Mason C.
[THE EPIGENETIC AND TRANSCRIPTIONAL DYNAMICS OF LONG-TERM HUMAN SPACE TRAVEL \[#18465\]](#)
Identical twin astronauts were monitored before, during, and after a one-year mission. RNA-seq for 19-timepoints' peripheral blood mononuclear cells and immune cells (CD4, CD8, CD19, LD) was performed, with 300 genes and mtRNA fractions in cell-free RNA (cfRNA) with significant change.
- 8:54 AM Smith S. Heer M. Zwart S.
[BIOCHEMICAL PROFILE: HOMOZYGOUS TWINS AND A 1-YEAR ISS MISSION \[#18466\]](#)
We will report here data from the Biochemical Profile project of the larger Twins Study.
- 9:12 AM Mignot E.
[IMMUNOME AFTER VACCINATION IN NASA TWINS \[#18467\]](#)
The aim of this study was to compare the effect of flu immunization using a 2015-2016 trivalent flu-vaccination on T cell receptor (TCR) repertoire.
- 9:30 AM Break [#18468]

Wednesday, January 24, 2018

Crew Autonomy Support: Countermeasures and Tools

10:00 AM

Galleon Ballroom

Chairs: Ernest Vince Cross and Alonso Vera

- 10:00 AM McLaughlin A. Byrne V. Sprufera J. Pryor M. Hicks W.
[CREATING A TAXONOMY OF VARIABLES AFFECTING COGNITIVE AIDS VIA AN INVESTIGATION OF HYBRID AIDS \[#18013\]](#)
Cognitive resource conflict is an important consideration in the design of cognitive aids.
- 10:20 AM Holden K. Schreckenghost D. Greene M. Hamblin C. Lancaster J. Morin L.
[ELECTRONIC PROCEDURES FOR CREWED MISSIONS BEYOND LOW EARTH ORBIT \(LEO\) \[#18014\]](#)
Two studies are performed to investigate electronic procedures design impacts to situation awareness and other human performance variables, focusing on: 1) the impact of level of automation, and 2) the impact of display/procedure integration.
- 10:40 AM Liu A. Galvan-Garza R. Yang Y. Oman C.
[DESIGN AND AUTOMATION OF ELECTRONIC CHECKLISTS FOR ROBOTIC OPERATIONS \[#18015\]](#)
We have developed a prototype electronic procedure system to study how automated step execution could be implemented to enhance situation awareness (SA), operator workload, and task execution in the context of robotic arm operation.
- 11:00 AM Hillenius S. Marquez J.
[EVALUATION OF CREW-CENTRIC ONBOARD MISSION OPERATIONS PLANNING AND EXECUTION TOOL \[#18016\]](#)
Results from the final year of onboard planning crew autonomy self-scheduling research.
- 11:20 AM Discussion [#18017]
- 11:30 AM Break [#18018]

Wednesday, January 24, 2018

Spaceflight Associated Neuro-Ocular Syndrome (SANS/VIIP) - Ground Studies and Countermeasure Testing

10:00 AM

Grand Ballroom B

Chairs: Michael Stenger and Steven Laurie

- 10:00 AM Ebert D. Macias B. Sargsyan A. Garcia K. Kemp D. Hargens A. Johnston S. Stenger M.
[IMPEDANCE THRESHOLD DEVICE AS A SPACEFLIGHT-ASSOCIATED NEURO-OCULAR SYNDROME COUNTERMEASURE \[#18445\]](#)
This investigation evaluated the impedance threshold device (ITD) as a SANS countermeasure.
- 10:18 AM Marshall-Goebel K. Ikvovic V. Baggish A. Cohen A. Nahed B. Rosenthal E. Zhang Q. Dentinger A. Bershad E. Strangman G.
[MECHANICAL COUNTERMEASURES TO CEPHALAD FLUID SHIFTS \[#18446\]](#)
This study examined the effect of two potential commercial countermeasures for SANS—KAATSU thigh cuffs and the LymphaPress Optimal edema management system—to mitigate ocular and cerebral effects of cephalad fluid shifts during head-down tilt.
- 10:36 AM Fuller C. Gompf H. Hoban-Higgins T. Robinson E.
[HEAD-DOWN TILT AS A MODEL FOR INTRACRANIAL AND INTRAOCULAR PRESSURES, AND RETINAL CHANGES DURING SPACEFLIGHT \[#18447\]](#)
Using a translational animal model, this program is investigating the role of chronic cephalic fluid movement on the generation of the VIIP syndrome in astronauts.
- 10:54 AM Ethier C. Myers J. Nelson E. Martin B. Oshinski J. Samuels B. Feola A.
[EFFECTS OF CSF PRESSURE ON THE EYE: A COMPUTATIONAL-EXPERIMENTAL COMPARISON \[#18448\]](#)
We compare experiments and simulations of the effects of elevated CSF pressure on the posterior eye
- 11:12 AM Laurie S. Basner M. Christian K. Lathan C. Lovering A. Lee S. Martin D. Stenger M.
[VaPER: BED REST IN A 0.5% CO2 ENVIRONMENT \[#18449\]](#)
Twelve subjects will complete 30 days of six-degree head-down tilt in a 0.5% CO2 environment.
- 11:30 AM Break [#18450]

Wednesday, January 24, 2018

Twins II

10:00 AM

Grand Ballroom C

Chair: John Charles

- 10:00 AM Green S. Jiang P. Keshavarzian A. Vitaterna M. Turek F.
[METAGENOMIC SEQUENCING OF THE GUT MICROBIOTA OF TWIN ASTRONAUTS ON ISS AND ON EARTH \[#18469\]](#)
This study examined the effects of the space environment on the gut microbiota of Scott Kelly while he was on board the ISS for a one-year mission, as well as his identical twin brother and former astronaut Mark Kelly, while he remained on the ground.
- 10:18 AM Rana B. Lee S. Stenger M. Macias B. Siamwala J. Schilling J. Hook V. Ebert D. Patel H. Smith S. Afkarian M. Vaisar T. Hoofnagle A. Ziegler M. Hargens A. Sharma K.
[PROTEOMIC AND METABOLOMIC ASSESSMENT OF FLUID SHIFTS IN TWIN ASTRONAUTS \[#18470\]](#)
We quantified proteins and metabolites related to the development of SANS to delineate the changes of molecular signatures in blood and urine throughout the course of a one-year ISS mission in a pair of identical twin astronauts.
- 10:36 AM Lee S. Rana B. Stenger M. Sears D. Smith S. Zwart S. Macias B. Hargens A. Sharma K. De Vivo I.
[Metabolomic and Genomic Markers of Atherosclerosis AS RELATED to Oxidative Stress, Inflammation, and Vascular Function in Twin Astronauts \[#18471\]](#)
The space-flown twin will have biomarkers of oxidative stress and inflammatory damage, altered arterial structure and function, dysregulation of genes associated with oxidative stress and inflammation, and a metabolic profile shift associated with elevated atherosclerosis risk factors.
- 10:54 AM Basner M. Dinges D. Nasrini J. Hermosillo E. Ecker A. Mollicone D. Moore T. Gur R.
[COGNITIVE PERFORMANCE CHANGES IN THE TWINS STUDY \[#18472\]](#)
Both twins performed the Cognition test battery, a brief neuropsychological test battery specifically designed for astronauts, before, during, and after the one year ISS mission. Results related to mission phases and time in mission will be reported at the meeting.
- 11:12 AM Mishra T. Piening B. Contrepolis K. Ahadi S. Lee B. Chen S. Salins D. Lin L. Garrett-Bakelman F. Mignot E. Mason C. Snyder M.
[LONGITUDINAL INTEGRATED MULTI-OMICS ANALYSIS OF THE BIOMOLECULAR EFFECTS OF SPACE TRAVEL \[#18473\]](#)
Longitudinal, integrative analysis of metabolomics and proteomics data from Twins Study
- 11:30 AM Break [#18474]

Wednesday, January 24, 2018

Crew Composition, Teamwork and Mission Duration: Tracking Performance

1:00 PM

Galleon Ballroom

Chairs: Peter Roma and Lauren Landon

- 1:00 PM Burke S. Shuffler M. Hernandez C. Savage N. Wiese C. Howell R. Verhoeven D.
[LESSONS LEARNED ABOUT TEAM LEADERSHIP & FOLLOWERSHIP WITHIN ISOLATED, CONFINED ENVIRONMENTS \[#18019\]](#)
We describe the findings and lessons learned within a NASA-funded project which used a multi-faceted approach to examine team leadership within isolated, confined environments, such as long duration spaceflight.
- 1:20 PM Kozlowski S. Chang C. Biswas S.
[MEASURING, MONITORING, AND REGULATING TEAMWORK FOR LONG DURATION MISSIONS \[#18020\]](#)
Research to (1) benchmark team cohesion and psychosocial functioning in a range of analog environments (Antarctic summer and winter-over teams, NASA mission simulations [HERA, HI-SEAS]) and (2) develop an unobtrusive cohesion monitoring and regulation technology to support crew cohesion.
- 1:40 PM Burke S. Howell R. Driskell T. Marlow S. Driskell J. Salas E.
[EXAMINING THE LINK BETWEEN PERSONALITY AND TEAM ROLE PROFILES IN ISOLATED, CONFINED ENVIRONMENTS \[#18021\]](#)
Describes work conducted within an analog environment (HERA) to better understand the enactment of team roles with a focus on the relationship between personality and team role enactment.
- 2:00 PM Vazquez M. Outland N. Vinokhodova A. Gushin V. Bell S. DeChurch L. Contractor N.
[EXAMINING INTERPERSONAL COMPATIBILITY USING CONFIGURATIONS OF CONDITIONS FOR TIE FORMATION ACROSS TWO SAMPLES \[#18022\]](#)
We examine the extent to which conditions (e.g., demographic similarity, perceptions of others) are conducive to network tie formation (i.e., social- and task-oriented ties) between crew members over time, with a special interest in metrics from the PSPA such as psychological distance.
- 2:20 PM Discussion [#18023]
- 2:30 PM Break [#18024]

Wednesday, January 24, 2018

ExMC Element Overview and Goals

1:00 PM

Grand Ballroom B

Chairs: Erik Antonsen and Kris Lehnhardt

- 1:00 PM Antonsen E.
[EXMC ELEMENT SCIENCE APPROACH \[#18045\]](#)
The ExMC Element science approach will be discussed
- 1:18 PM McGuire K. Mindock J.
[EXPLORATION MEDICAL CAPABILITY SYSTEM ENGINEERING OVERVIEW \[#18046\]](#)
This talk will discuss how Exploration Medical Capability is using Model-Based System Engineering to define operational needs, decompose requirements and architecture, and identify medical capabilities needed to support human exploration.
- 1:36 PM cerro j. rubin d. mindock j. middour c. mcguire k. hanson a. reilly j. burba t. urbina m.
[EXPLORATION MEDICAL SYSTEM TECHNICAL ARCHITECTURE OVERVIEW \[#18047\]](#)
this paper defines the SysML architecture used to manage a model based approach to understanding exploration medical capabilities within the area of crew health and performance.
- 1:54 PM Hailey M. Antonsen E. Blue R. Reyes D. Mulcahy R. Kerstman E. Bayuse T.
[DEFINING MEDICAL CAPABILITIES FOR EXPLORATION MISSIONS \[#18048\]](#)
The approach for identifying and defining medical capabilities for exploration missions will be discussed, as well as how these outputs impact the systems engineering effort.
- 2:12 PM Mindock J. Myers J. Latorella K. Cerro J. Hanson A. Hailey M. Middour C.
[EXPLORATION MEDICAL SYSTEM TRADE STUDY TOOLS OVERVIEW \[#18049\]](#)
ExMC is creating an ecosystem of tools to enable well-informed medical system trade studies.
- 2:30 PM Break [#18050]

Wednesday, January 24, 2018

Poster Session C: Space Radiation Effects on Cognition and Performance

3:00 PM

Exhibit Hall A

Eisch A. Whoolery C. Reynolds R. Lucero M. Ito N. Eacret D. Redfield R. Richardson D. Torres V. Poinssatte K. Palchik G. Mukherjee S. Rivera P. Birnbaum S. Chen B. Heintz N. Schmidt E. Stowe A. Yun S.

[Space radiation-induced enhancement in pattern separation in aversive and appetitive testing platforms in mature mice is linked to changes in dentate gyrus mitochondrial respiration \[#18213\]](#)

Space radiation-induced enhancement in pattern separation in aversive and appetitive testing platforms in mature mice is linked to changes in dentate gyrus mitochondrial respiration.

BRITTEN R. WHITEHURST J. DUNCAN V. MACADAT E. ARRIYAM F. TONDIN A.

[Unconstrained cognitive flexibility \(creative problem solving\) in male Wistar rats is impaired after exposure to <10 cGy GCR. \[#18214\]](#)

Exposure to 1 cGy of 600 MeV/n 28Si ions resulted in impairment of both constrained and unconstrained cognitive flexibility, preliminary data suggests that 400 MeV/n 4He ions are less harmful to unconstrained cognitive flexibility.

Raber J. Patel E. Torres E. Fallgren C. Barnette B. Weil M. Emmett M.

[EFFECTS OF 28SI ION IRRADIATION ON BEHAVIORAL AND COGNITIVE PERFORMANCE OF BALB/C AND C3H MICE FOLLOWING EXPOSURE \[#18215\]](#)

BALB/c and C3H mice and their F2 hybrid progeny were irradiated with 28Si ions (350 MeV/n, 0.2 Gy), behaviorally tested, the hypothalamus and amygdala dissected, and currently these tissues are being analyzed using a lipidomics analysis.

Raber J. Rossi S. Stewart B. Riparip L. Jopson T. Turker M. Impey S.

[COGNITIVE INJURY, NETWORK STABILITY, AND EPIGENETIC CHANGE FOLLOWING EXPOSURE TO HIGH AND LOW LET IRRADIATION \[#18216\]](#)

Comparing hippocampal DNA methylation following proton, 56Fe ion, and 28Si ion irradiation revealed a general synaptic signature with genes associated with profound phenotypes, confirming the potential to identify genes and pathways involved in the CNS radiation response.

Hinshaw R. Sowa M. Lemere C.

[INTEGRATING PARTICLE MICROBEAM TECHNOLOGY AND HUMAN NEURAL CULTURES: A NASA SPACE TECHNOLOGY RESEARCH FELLOWSHIP \[#18217\]](#)

This abstract describes a newly funded NASA Space Technology Research Fellowship (NSTRF) project that aims to develop a system utilizing particle microbeam technology and human neural cell culture to serve as a ground-based analog to space radiation exposure.

Vlkolinský R. Rudbeck E. Britten R. Nelson G.

[Electrophysiological effects of low dose silicon nuclei on long-term depression in rat medial prefrontal cortex and the hippocampus. \[#18218\]](#)

Low dose silicon radiation impacts long-term depression in the rat medial prefrontal cortex and alters frequency and kinetics of glutamate-mediated miniature excitatory postsynaptic currents in L2-3 neurons.

O'Banion M. Deane R. Belcher E. Hinkle J. Dionisio-Santos D. Williams J. Olschowka J.
[IMPACT OF SPACE-RADIATION INDUCED ALTERATIONS ON TOXIC PROTEIN ACCUMULATION ASSOCIATED WITH NEURODEGENERATIVE DISEASE \[#18219\]](#)

Space radiation decreases brain clearance of amyloid beta, suggesting a mechanism for its effect on Alzheimer's pathology in mouse models of the disease.

Chang P. Shaler T. Lin H. Bakke J. Grover A. Chen S.
[PARTICLE BEAM QUALITY IMPACTS POST-TRANSLATIONAL MODIFICATION IN NEURONAL CELLS \[#18220\]](#)

Radiation quality plays a role in targeted protein degradation in neuronal cells.

Mange A. Mange A. Guida P. Hienz R. Davis C.
[SLEEP FRAGMENTATION IMPAIRS RPVT PERFORMANCE IN IRRADIATED RATS \[#18221\]](#)

The present study examines the degree to which sleep fragmentation following radiation exposure exacerbates radiation-induced performance deficits on the rodent psychomotor vigilance test (rPVT) in rats.

Kiffer F. Alexander T. Anderson J. Groves T. Wang J. Sridharan V. Boerma M. Allen A.
[LATE EFFECTS OF 16O IRRADIATION ON SOCIAL AND COGNITIVE BEHAVIOR IN FEMALE MICE \[#18222\]](#)

¹⁶O (600MeV/n) irradiation compromises social and cognitive behaviors in female mice 9 months following exposures.

Parihar V. Syage A. Allen B. Flores L. Angulo M. Acharya M. Baulch J. Limoli C.
[IMPAIRED COGNITIVE FLEXIBILITY FOLLOWING PROTON IRRADIATION \[#18223\]](#)
PERSISTENT IMPAIRMENT IN FEAR EXTINCTION FOLLOWING PROTON IRRADIATION

Liu B. Liu G. Lorello P. Caldarone B. Lemere C.
[LONG-TERM SEX-SPECIFIC NEUROBEHAVIOURAL EFFECTS OF PROTON RADIATION ON WT AND AD MICE \[#18224\]](#)

proton IRR resulted in a variety of genotype- and sex-specific radiation effects in locomotion, motor coordination, anxiety, and cognition.

Wyrobek A. Rabin B. Britten R. Bhatnagar S. Peterson L. Straume T. Witkowska H.
[Molecular characterization of choroid plexus and hippocampal damage and degenerative CNS risks from space radiation. \[#18225\]](#)

This research project is designed to provide NASA with a mechanistic understanding of individual variation in the risks for impaired neurocognitive performance and late-onset neurological disease after exposure to low-dose space radiation.

Wednesday, January 24, 2018

Poster Session C: Computational Modeling

3:00 PM

Exhibit Hall A

Schepelmann A. Pennline J. Werner C. Gilkey K. Lewandowski B.

[OVERVIEW AND EVALUATION OF A COMPUTATIONAL BONE PHYSIOLOGY MODELING TOOLCHAIN AND ITS APPLICATION TO TESTING OF EXERCISE COUNTERMEASURES \[#18351\]](#)

We present a toolchain to create customized predictions of bone state in microgravity and evaluate it using data from a 70-day bedrest study. The toolchain quantitatively predicts bone mineral density of subjects who did not exercise and qualitatively predicts mitigating effects of exercise.

Thompson W. Huffman R. Gallo C. DeWitt J. Humphreys B. Godfrey A. Frenkel D. Lewandowski B.

[Estimation of kinetics from EXERCISE device load information and kinematics \[#18352\]](#)

We present our findings from an investigation of the feasibility of estimating localized kinetics when the overall exercise system does not include measured ground reaction forces and uses motion capture techniques based on a reduced marker set and/or a reduced number of cameras.

Gallo C. Thompson W. Lewandowski B. Godfrey A. DeWitt J.

[INFLUENCE OF LOAD PROFILE ON BIOMECHANICS OF THE SQUAT AND DEADLIFT \[#18353\]](#)

Effect of the free weight and flywheel exercise device profiles on the human body.

Nelson E. Myers J. Lewandowski B.

[EFFECT OF BLOOD PRESSURE ON INTRAOCULAR PRESSURE DURING HEAD-DOWN TILT \[#18354\]](#)

In this numerical analysis, we simulate IOP during a 15° Head-Down Tilt test for three virtual individuals with varying blood pressure (high (160/90), normal (120/80), and low (96/60)) in order to discern whether or not blood pressure (BP) can affect acute response to gravitational changes.

Mujat M. Zhao Y. Iftimia N. Ferguson R.

[OPTICAL SYSTEM FOR MONITORING NET OCULAR BLOOD FLOW – EXPERIMENTAL RESULTS \[#18355\]](#)

Optical Coherence Tomography and Laser Doppler Flowmetry are used to provide structural (thickness maps and volume) and hemodynamic (net blood flow) characterization of retina and choroid to monitor functional and structural changes of the eye encountered in space exploration missions.

Diaz Artilles A. Alonso Blanco D.

[UNDERSTANDING GRAVITATIONAL EFFECTS ON THE CARDIOVASCULAR SYSTEM USING A LUMPED PARAMETER MODEL – SENSITIVITY ANALYSIS \[#18356\]](#)

We are using a computational approach to investigate human cardiovascular responses to gravitational stress. Specifically, we are performing a comprehensive LHS/PRCC sensitivity analysis on a lumped-parameter cardiovascular model in different gravitational environments.

Lewandowski B. Myers J. Sibonga J.

[COMPARISON OF APPLIED LOADS TO BONE STRENGTH TO ASSESS FRACTURE RISK \[#18357\]](#)

The comparison between hip bone applied loads and bone strength for risk assessment is described

Lewandowski B. Nelson E. Myers J. Gilkey K.

[CROSS-CUTTING COMPUTATIONAL MODELING PROJECT: INTEGRATIVE MODELING APPROACH \[#18358\]](#)

The goals, approach and content of the new HRP cross-cutting computational modeling project will be described.

Lostroscio K. Humphreys B. Lewandowski B. Downs M. Newby N. Quioco L.

[KINEMATIC INFORMATION FROM MED-2 PARABOLIC FLIGHT CAMPAIGN \[#18359\]](#)

Beginning with a process developed in the HRP Computational Modeling Project to extract and track markers in global coordinates from multi-camera video, and joint center information from a Kinect, human musculoskeletal kinematics were obtained for the MED-2 parabolic flight test.

Humphreys B. Godfrey A. Lostroscio K. Schepelmann A. Lewandowski B.

[PERFORMANCE QUANTIFICATION OF A MOTION CAPTURE SYSTEM DEVELOPED FOR SPACEFLIGHT ENVIRONMENTS \[#18360\]](#)

To support measuring kinematics on spaceflight vehicles and in analog environments, a flexible motion capture system was developed; performance of that system is presented.

Phillips S. Anderson A. Chepko A. Archambault-Leger V. Masterova K. Fellows A. Cowan D. Buckley J.

[UNIQUE NUMERICAL MODEL INCORPORATING TISSUE WEIGHT AND TISSUE COMPRESSIVE FORCES FOR MODELING MICROGRAVITY EFFECTS \[#18361\]](#)

We have developed a unique numerical model that incorporates the effects of tissue compressive forces.

Wednesday, January 24, 2018

Poster Session C: ExMC

3:00 PM

Exhibit Hall A

ARBEILLE P. CHAPUT D. DEPRIESTER A. BELBIS O. MAILLET A. BENARROCHE P. BARDE S.

[REMOTE ECHOGRAPHY ONBOARD THE ISS FULLY CONTROLLED FROM THE GROUND CNES SPACE CENTER. APPLICATION IN ISOLATED MEDICAL CENTRE ON EARTH \(200 patients\). \[#18362\]](#)

Remote echography onboard ISS

Mela C. Thompson W. Liu Y.

[MULTIMODAL IMAGING PLATFORM FOR MEDICAL DIAGNOSTICS AND INTERVENTIONS IN SPACE \[#18363\]](#)

Addressing the concerns of medical diagnosis and interventions during long-duration space travel, we present a light weight, compact, hands-free and user-friendly multimodal imaging system.

Henry R. Strumwasser A. Polk T. Tobin J. Locke J. Pantalos G.

[LESSONS ON DIAGNOSIS AND TREATMENT OF ACUTE ABDOMINAL EMERGENCIES FROM GLOBAL SURGERY APPLIED TO HEALTHCARE DELIVERY IN EXPLORATION SPACE MISSIONS \[#18364\]](#)

Abstract for poster submission comparing the diagnosis and treatment of acute surgical abdominal pathology in earthbound austere conditions with those that may possibly occur in a space exploration mission, and discusses the potential advances in technology to alleviate this problem.

Myers J. Garcia Y. Arellano J. Boley L. Goodenow D. Kerstman E. Koslovsky M. Reyes D. Saile L. Taiym W.

[COMPARISON OF THE INTEGRATED MEDICAL MODEL PREDICTIONS TO REAL WORLD ISS AND STS OBSERVATIONS \[#18365\]](#)

To determine the credibility of IMM output the IMM project team completed two validation studies that compare IMM output to observed medical events from a selection of Shuttle Transportation System (STS) and International Space Station (ISS) missions.

Lafond D. Grenier J. Archambault P. Weiss M. Tremblay S.

[POLICY CAPTURING TO DERIVE CLINICAL DECISION RULES FOR SPACE MEDICINE DECISION SUPPORT \[#18366\]](#)

We present a policy capturing method and experimental results for capturing psychologically plausible and understandable expert decision rules, with applications in space medicine decision support.

Robinson J. Myers J. Goodenow D. McIntyre L. Bhattacharyya K. Bellisario B. Leinweber L. Gilkey K.

[INTRODUCTION to MEDICAL EXTENSIBLE DYNAMIC PROBABILISTIC RISK ASSESSMENT TOOL \(MEDPRAT\) \[#18367\]](#)

MEDPRAT is designed to be extended with additional human health research information, medical equipment, space and terrestrial standards and practices to assess space flight medical risk in a manner consistent with other risk measures used in spacecraft and mission design.

Pantalos G. Higginson T. Barrow B. Heidel J. Riggs A. Mallonee C. Pereira D. Harrison S. Snider J. Deshpande R. Roussel T. Sutton E. Sharp K. Dhamotharan V. Burgess J. Antaki J.

[*SUBORBITAL FLIGHT EVALUATION OF AN AQUEOUS IMMERSION SURGICAL SYSTEM FOR REDUCED GRAVITY* \[#18368\]](#)

We continue the development and testing of an Aqueous Immersion Surgical System (AISS) which is a clear enclosure (dome) to permit minimally invasive and open surgical procedures within a localized aqueous environment in reduced gravity.

Pantalos G. Sutton E. Sharp K. Miller K. Grant G. Broderick T. Wu J. Badger J. Doerr H.
[*CREATING SURGICAL CAPABILITIES FOR EXPLORATION SPACE FLIGHT* \[#18369\]](#)

Surgical capabilities for an exploration space mission includes skills competency for a non-surgeon CMO, determining optimal supply logistics, robotic assistance for medical/surgical procedures, and effective anesthesia and post-operative pain management protocols.

Wu J. Sutton J.

[*MASS AND VOLUME ANALYSIS OF 3D PRINTING ISS MEDICAL KIT CONTENTS* \[#18370\]](#)

This study analyzes the possible mass and volume savings of 3D printing contents of the ISS Medical Kits based on today's demonstrated capabilities of 3D printing.

Simon J. Wang Y. Cunitz B. Sapozhnikov O. Thiel J. Starr F. Bailey M.

[*THE EFFECT OF ELEVATED CARBON DIOXIDE ON KIDNEY STONE DETECTION WITH THE ULTRASOUND TWINKLING ARTIFACT* \[#18371\]](#)

The color Doppler ultrasound twinkling artifact on kidney stones is reduced by elevated carbon dioxide at levels relevant to those found on space vehicles, which may influence kidney stone diagnoses with twinkling in space.

Qin Y. Jiao J. Gelato M. Li X. Lin W.

[*BONE QUALITY ASSESSMENT AT MULTIPLE SKELETAL SITES USING SCANNING CONFOCAL ACOUSTIC NAVIGATION* \[#18372\]](#)

A strong correlation between QUS and DXA at both wrist and calcaneus were observed in normal subjects, but not in the aging subject. This suggest it is essential to assess multiple skeletal sites using QUS, particularly in the progressive osteoporosis or bone loss condition.

Hellmer R. Eaton M. Khatri U. Turpin J. Mirgorodsky Y.

[*Development of Multi-Purpose X-ray Source and System for Exploration Medical Condition Imaging* \[#18373\]](#)

A multi-purpose x-ray source is being developed for ultra-compact 2D and tomographic imaging systems for human exploratory medical conditions.

Arquilla K. Anderson A.

[*DEVELOPMENT AND ANALYSIS OF WIRED TEXTILE PROTOTYPES FOR USE IN WEARABLE SENSOR SYSTEMS* \[#18374\]](#)

In this research effort, we focus on improving the interface between sensors and humans by selecting, prototyping, and evaluating wearable sensor design concepts with a focus on the accommodation of a wide range of wearable sensor system configurations.

Myers J. Goodenow D. Gokoglu S. Kassemi M.

[SENSITIVITY ANALYSIS OF THE CHANGE OF RENAL STONE OCCURRENCE RATES IN ASTRONAUTS USING URINE CHEMISTRIES \[#18375\]](#)

Utilizing 1517 astronaut urine chemistries to inform the renal stone occurrence rate forecasting model, we performed a sensitivity analysis on urine chemistry components for their influence on predictions of renal stone size and rate of renal stone occurrence.

Barua S. Kim H. Griko Y.

[POLYRAD-PROLONGING SHELF LIFE OF SPACE MEDICATIONS \[#18376\]](#)

The objective of this project is to design a radiation resistant drug delivery system (Polyrad) using free radical scavenging molecules and biocompatible polymers for prolonged pharmaceutical shelf life in a space flight environment.



Wednesday, January 24, 2018

Poster Session C: Informal Help Desk

3:00 PM

Exhibit Hall A

3:00 PM Technology Transfer [#18377]

Wednesday, January 24, 2018

Poster Session C: Mixed Topics

3:00 PM

Exhibit Hall A

Wood A. French A. Gage A. Lopez D. Chakravarty K. Bardina J. McDermott W. Stewart H.

[NASA AMES LIFE SCIENCES DATA ARCHIVE INSTITUTIONAL SCIENTIFIC COLLECTION \(ISC\) \[#18378\]](#)

This poster presents information about space flown biological samples that are currently available from NASA's Institutional Scientific Collection.

Lagarde T.

[REGENERATIVE ECLSS SYSTEM BASED ON ACCELERATED PLANT GROWTH AND PROCESSING OF ORGANIC WASTE \[#18379\]](#)

The optimization of plant growth with rotating drums combined with a processing of organic waste by worms to simplify a closed-loop system

De Leon P.

[DEVELOPING A FULLY FUNCTIONAL PLANETARY ANALOG STATION IN NORTH DAKOTA \[#18380\]](#)

The Department of Space Studies at the University of North Dakota have paired up with NASA and the Experimental Program to Stimulate Competitive Research (EPSCoR) to design and build a multipurpose planetary research facility.

Thompson W. Parsons Y.

[PROCESS FOR THE RECRUITMENT AND MEDICAL CLEARANCE OF TEST SUBJECTS \[#18381\]](#)

Developing countermeasures for the effects of space flight often requires investigators to rely on human subjects to support data collection; therefore, (TSS) has the primary responsibility to provide medically qualified test subjects for participation in ground based studies.

Koslovsky M. Arellano J. Schaefer C. Feiveson A. Young M. Lee S.

[A NETWORK-BASED ALGORITHM FOR CLUSTERING MULTIVARIATE LONGITUDINAL DATA \[#18382\]](#)

We develop, validate, and apply a network-based clustering algorithm to generate hypotheses regarding physiological changes associated with spaceflight exposure using data collected in NASA research and operational studies, as well as in astronaut clinical care visits.

Orlando T. Jones B. Paty C. Reynolds J. First P. Robinson S. La Saponara V. Beltran E.

[RADIATION EFFECTS ON VOLATILES AND EXPLORATION OF ASTEROIDS AND LUNAR SURFACES \[#18383\]](#)

We examine solar wind production of volatile resources and develop methods and novel materials to mitigate radiation effects on human exploration of asteroids and lunar surfaces.

Homola P. Miszczyk J.

[COSMIC-RAY EXTREMELY DISTRIBUTED OBSERVATORY: A SYNERGY FROM A GLOBAL APPROACH TO SPACE RADIATION \[#18384\]](#)

The space radiation reaching Earth and its surroundings is not only a threat during an interplanetary journey, it can also bring us an unprecedentedly powerful insight into the deepest secrets of the Universe if only the available, or expected, cosmic signal is processed in a global way.

Cromer W. Narayanan A. Zawieja D.

[SPACE FLIGHT INDUCED CHANGES IN THE STRUCTURE OF THE MOUSE GUT \[#18385\]](#)

We are presenting morphological measurements of changes that occur in the small and large intestines of mice flown on the international space station, including changes in water content, fecal content, and lymphoid tissue size changes.

Beltran E. Britt D.

[ADDRESSING EXPLORATION AND ISRU SAFETY CHALLENGES \[#18386\]](#)

Planetary materials, that have substantial potential for in situ resource utilization (ISRU), and that can be a key resource for future exploration architectures can also pose a serious threat to crew safety.

Zhang Y. Richards S. Richards J. Neelam S. Plante I. Hada M. Levine H.

[RESPONSE OF ARABIDOPSIS THALIANA SEEDS TO SIMULATED GALACTIC COSMIC RAYS \[#18387\]](#)

Exposure to simulated GCRs significantly altered the morphology and viability of the seedlings grown from imbibed seeds in a dose- and ion quality-dependent manner as well as transcriptomic profiles in seedlings.

Choi S. Shirazi-Fard Y. Stube K. Harris C. Beegle J. Fisher R. Wigley C. Martin K. Nevis R. Globus R.

[DEVELOPMENT OF NEW CAPABILITIES FOR RODENT RESEARCH FOR LONG-DURATION MISSIONS ON THE INTERNATIONAL SPACE STATION \[#18388\]](#)

NASA ARC has been developing new capabilities to support long duration rodent missions on the ISS to enable scientists to study the effects of space flight on animal physiology that, as identified by the HRP, could play a role in the health of astronauts in space.

Joglekar A. Yu C. Kaushik L. Sangwan A. Hansen J.

[FEARLESS STEPS CORPUS: A REVIEW OF THE AUDIO CORPUS FOR APOLLO-11 SPACE MISSION AND ASSOCIATED CHALLENGE TASKS \[#18389\]](#)

This abstract looks at the efforts involved in creating the Fearless Steps Corpus and Challenge Tasks and its potential impact for the Speech and Language Community

Janis B. Kopechek J. Priddy M. DeFilippis A. Ayyoubi T. Menze M.

[DRY-PRESERVATION OF RED BLOOD CELLS FOR STORAGE AT AMBIENT TEMPERATURES \[#18390\]](#)

Red blood cells, loaded with trehalose using sonoporation, were dried and stored at ambient temperature, then recovered upon re-hydration.

Whitlow H. deVera A. Deoli N. Dias J. Gossen L. Rogers D. Schneider-Broussard R. Smith K.

[Studying the effect of interplanetary charged particle radiation environment on tissues using a small ion accelerator facility. \[#18391\]](#)

A facility for charged particle irradiation of cell and tissue samples with charged particles under BSL-2 conditions is described.

Ikeda H. Souda H. Puspitasari A. Held K. Hidema J. Hada M. Saganti P. Yoshida Y.
Kanai T. Takahashi A.

[DEVELOPMENT OF 3D CLINOSTAT SYNCHRONIZED IRRADIATION SYSTEMS FOR SIMULATING SPACE CONDITIONS \[#18392\]](#)

Our 3D clinostat synchronized irradiation systems were developed by applying technology from heavy-ion radiotherapy such as respiratory gating systems, and by regulating with the high-speed shutter for synchronized X-irradiation to analyze combined effect of radiation and simulated μ G.

Tomko D. Sato K.

[NASA SPACE BIOLOGY - ENABLING HUMAN SPACE EXPLORATION \[#18393\]](#)

This presentation will review the components and strategy of Space Biology perspective for understanding life in space and how its research translates to addressing knowledge gaps and mitigating risks for human exploration in low Earth orbit and beyond.

Martin S. Nordeen C.

[ENGINEERING TORPOR: A CASE FOR THE NATURAL HIBERNATOR IN DUELING APPROACHES TO METABOLIC SUPPRESSION IN PURSUIT OF HUMAN SPACE EXPLORATION \[#18395\]](#)

Learning to engineer torpor based on natural hibernation is our best chance to achieve safe, effective human torpor for long-duration space flight.

Wednesday, January 24, 2018

Poster Session C: Information Help Desk - Mixed Topics

3:00 PM

Exhibit Hall A

3:00 PM

Young M. Matthew K. Schaefer C. Feiveson A.
[INFORMAL STATISTICS HELP DESK \[#18394\]](#)
Meet with statisticians to get your questions answered.

AGENDA AT A
GLANCE
DAY 4

THURSDAY, JANUARY 25, 2018

	Plenary (Exhibit Hall B)	Poster (Exhibit Hall A)	Galleon Ballroom	Innovation Pavilion (Grand Ballroom A)	Grand Ballroom B	Grand Ballroom C	Yacht
8:00 AM			Operational Performance Measurement &		ExMC Collaboration	SR Cognition & Performance I	
9:30 AM	Break						
9:45 AM			Injury Biodynamics		ExMC Tech Development I	SR Cognition & Performance II	
11:15 AM	Obtain Lunch						
12:00 PM	Lunch Talk						
1:00 PM			How We Do Business		ExMC Tech Development II	SR Panel Discussion	
2:30 PM	Break						
3:00 PM	Astronaut						
4:00 PM	Poster Awards & Closing Remarks						

FEATURED PLENARY SPEAKERS



Jeffrey Sutton

President, Chief Executive Officer
and Institute Director
National Space Biomedical Research
Institute (NSBRI)



Peggy Whitson

Astronaut
NASA JSC

Thursday, January 25, 2018

ExMC Collaboration

8:00 AM

Grand Ballroom B

Chairs: Stephanie Flint and Melinda Hailey

- 8:00 AM Walton M. Antonsen E.
[BRIDGING THE ENGINEERING AND MEDICINE GAP \[#18039\]](#)
Clear communication between the disparate entities of engineers and human system experts in life sciences is critical for exploration mission success from the perspective of both risk analysis and data handling.
- 8:18 AM Reyes D. Suresh R. Pavela J. Urbina M. Mindock J. Antonsen E.
[MEDICAL SIMULATION SCENARIOS FOR EXPLORATION MEDICINE \[#18040\]](#)
The utility of using medical scenarios to provide insight to engineering teams designing medical systems for use in space exploration will be discussed.
- 8:36 AM Blue R. Chancellor J. Suresh R. Carnell L. Reyes D. Nowadly C. Antonsen E.
[CHALLENGES IN CLINICAL MANAGEMENT OF RADIATION-INDUCED ILLNESSES IN EXPLORATION SPACEFLIGHT \[#18041\]](#)
The challenges of effectively managing the potential manifestations of radiation-induced illnesses in exploration spaceflight will be discussed.
- 8:54 AM Daniels V. Bayuse T. Mulcahy R. Mcguire K. Antonsen E.
[THE PATHWAY TO A SAFE AND EFFECTIVE SPACEFLIGHT MEDICATION FORMULARY: EXPERT REVIEW PANEL RECOMMENDATIONS \[#18042\]](#)
The abstract summarizes the recommendations made by an Expert Review Panel assembled by the Exploration Medical Capability (ExMC) Element, to evaluate the ExMC Pharmacy Project Research Plan (RP), and provide suggested input for improving the subsequent RP revision.
- 9:12 AM Nelson E. Abbott-Hearn A. Valentine R. Godfrey A. Li Y. Calaway K. Zoldak J. Hussey S.
[DEVELOPMENT OF A PORTABLE BLOOD ANALYSIS KIT FOR LONG-DURATION SPACEFLIGHT \[#18043\]](#)
We are designing a technology demonstration on the International Space Station to demonstrate on-orbit lab analysis in ptest reparation for deep space missions.
- 9:30 AM Break [#18044]

Thursday, January 25, 2018

Operational Performance Measurement and Mitigation

8:00 AM

Galleon Ballroom

Chairs: Jason Schneiderman and Kritina Holden

- 8:00 AM Duda K. Stankovic A. York S. West J.
[REAL-TIME ESTIMATION OF THE EFFECTS OF A SIMULATED LONG-DURATION EXPLORATION MISSION ON FLIGHT PERFORMANCE, WORKLOAD, AND SITUATION AWARENESS \[#18099\]](#)
Quantification of flight performance, workload, and situation awareness using operationally-relevant simulated tasks during HERA Campaign 4 Missions.
- 8:20 AM Flynn-Evans E. Wong L. Pradhan S. Chachad R. Beutter E.
[CHARACTERIZING PERFORMANCE ON THE ROBOTIC ON-BOARD TRAINER \(ROBoT\) DURING SLEEP DEPRIVATION \[#18100\]](#)
We will present findings demonstrating how ROBoT metrics change over 24 hours of sleep loss.
- 8:40 AM Dunn J. Orr M. Binsted K.
[COMPARISON AND FUSION OF MULTIPLE DATA SOURCES FROM LONG-DURATION SPACEFLIGHT ANALOG MISSIONS FOR INTEGRATED HEALTH AND STRESS MONITORING \[#18101\]](#)
By comparing biomarker results with wearable device data and self-reporting, this work embraces the challenge and the opportunity to detect signals from multiple data sources that may facilitate early recognition, intervention, and subsequent recovery from adverse health states.
- 9:00 AM Schreckenghost D. Billman D. Klerman E.
[QUANTIFYING AND DEVELOPING COUNTERMEASURES FOR THE EFFECT OF FATIGUE-RELATED STRESSORS ON AUTOMATION USE AND TRUST DURING ROBOTIC SUPERVISORY CONTROL \[#18102\]](#)
Results are summarized from an experiment in the second project year that evaluates the effects of sleep deprivation on human performance when supervising robotic tasks, including the use of automation countermeasures.
- 9:20 AM Discussion [#18103]
- 9:30 AM Break [#18104]

Thursday, January 25, 2018

Space Radiation Effects on Cognition and Performance I

8:00 AM

Grand Ballroom C

Chairs: Greg Nelson and Janice Huff

- 8:00 AM Chung C.
[MIND OVER MATTERS: ADDRESSING COGNITIVE FAILURE FOLLOWING RADIOTHERAPY \[#18425\]](#)
As patients live longer following more effective cancer therapy, they are faced with longer term toxicities of treatment. Following brain radiotherapy, cognitive loss is a major toxicity that can impact functional capacity, quality of life, and even survival.
- 8:20 AM Limoli C. Parihar V. Baulch J. Acharya M. Vlkolinsky R. Nelson G. Britten R. Soltesz I.
[NEUROCOGNITIVE COMPLICATIONS ASSOCIATED WITH EXPOSURE TO COSMIC RADIATION \[#18426\]](#)
Exposure to various types of cosmic radiation elicits an array of changes that ultimately compromise neurotransmission and cognition
- 8:40 AM Lemere C. Liu B. Liu G. Lorello P. Caldarone B.
[LONG-TERM CNS EFFECTS OF PROTON IRRADIATION IN MALE AND FEMALE WILDTYPE AND ALZHEIMER'S-LIKE MICE: A COMPARISON WITH OUR PREVIOUS 56FE IRRADIATION STUDY \[#18427\]](#)
In comparing our recent proton irradiation study with our previous 56Fe irradiation study in male and female WT and APP/PS1dE9 mice, we found major differences in mouse behavior and cerebral amyloidosis in response to a single exposure of protons versus 56-iron irradiation.
- 9:00 AM Rabin B. Carrihill-Knoll K. O'conor S. Miller M. Shukitt-Hale B.
[EFFECTS OF EXPOSURE TO HZE PARTICLES ON THE COGNITIVE PERFORMANCE OF OVARIECTOMIZED AND INTACT FEMALE RATS \[#18428\]](#)
The results of these experiments suggest that the effects of exposure to HZE particles on cognitive performance of female subjects are more variable than they are for males
- 9:15 AM Nelson G.
[HRP TRANSLATIONAL ANIMAL MODEL WORKSHOP OUTBRIEF \[#18429\]](#)
The HRP's Space Radiation, Human Factors and Behavioral Performance Elements sponsored a workshop held June 13-14, 2017 at the South Shore Harbour Resort & Conference Center in League City, TX.
- 9:30 AM Break [#18430]

Thursday, January 25, 2018

ExMC Technology Development I

9:45 AM

Grand Ballroom B

Chairs: Sam Hussey and William Thompson

- 9:45 AM Myers J. Garcia Y. Arellano J. Boley L. Goodenow D. Kerstman E. Koslovsky M. Reyes D. Saile L. Taiym W.
[COMPARISON OF THE INTEGRATED MEDICAL MODEL PREDICTIONS TO REAL WORLD ISS AND STS OBSERVATIONS \[#18053\]](#)
To determine the credibility of IMM output the IMM project team completed two validation studies that compare IMM output to observed medical events from a selection of Shuttle Transportation System (STS) and International Space Station (ISS) missions.
- 10:03 AM Bailey M. Simon J. Hall M. Dunmire B. Cunitz B. Wang Y. Maxwell A. Kreider W. Harper J. Sorensen M. Wessells H. Janssen K. Dai J. Ghanem M. Bruce M. Sapozhnikov O.
[RENAL ON FLEXIBLE ULTRASOUND - IMAGING TECHNOLOGIES \[#18054\]](#)
Our project addresses the medical condition Nephrolithiasis (kidney stones), specifically ExMC Gap 4.13: Limited capability to diagnose and treat a renal stone by developing ultrasound to image, fragment, and reposition kidney stones.
- 10:21 AM Martin D. Wang L. Lee S. Ribeiro C. Ritter M. Feiveson A. Ferguson C. Laurie S. Stenger M.
[AUTONOMOUS DIAGNOSTIC IMAGING PERFORMED BY UNTRAINED OPERATORS USING AUGMENTED REALITY AS A FORM OF "JUST-IN-TIME TRAINING" \[#18055\]](#)
An augmented reality guidance system was developed to guide untrained subjects through ultrasound and optical coherence tomography imaging protocols. Subject proficiency in acquiring images was compared to results from subjects using traditional laptop-based PowerPoint instructions.
- 10:39 AM Buras W. Garami MD Z.
[3D JUST-IN-TIME PROCEDURAL GUIDANCE FOR THE FLEXIBLE ULTRASOUND SYSTEM \(FUS\) UTILIZING MICROSOFT HOLOLENS \(AUGMENTED REALITY\) \[#18056\]](#)
This ExMC project endeavors to create an interface for the new Flexible Ultrasound System (FUS) that fuses conventional and 3-D procedural guidance, an image analysis neural network, and a HoloLens augmented reality head mounted display to enable autonomous operation by Astronauts.
- 10:57 AM Lindsey T. Salinas J. Antonsen E.
[Computer Aided Interpretation and Diagnosis of Medical Ultrasound Images \[#18057\]](#)
Ames Research Center medical analytics team in joint collaboration with the United States Army Institute of Surgical Research (USAISR) is developing automated sonography assessment technology applications.
- 11:15 AM Break [#18058]

Thursday, January 25, 2018

Space Radiation Effects on Cognition and Performance II

9:45 AM

Grand Ballroom C

Chairs: Jacob Raber and Cynthia Lemere

- 9:45 AM Boice J.
[NASA & THE MILLION PERSON STUDY OF LOW-DOSE RADIATION HEALTH EFFECTS \[#18431\]](#)
The Million Person Study of Low-Dose Radiation Health Effects will provide guidance to NASA on radiation health risks faced by astronauts on deep space missions.
- 10:05 AM Rosi S. Krukowski K. Feng X. Riparip L. Jones T. Huang T. Nelson G.
[THE ROLE OF OXIDATIVE STRESS AND INFLAMMATION ON SYNAPTIC FUNCTIONS AFTER EXPOSURE TO SPACE RADIATION \[#18432\]](#)
understanding the mechanism by which cosmic ray affect cognition
- 10:25 AM Davis C. Granata L. Mange A. Guida P. Hienz R.
[OXYGEN \(16O\) ION EXPOSURE INDUCES DEFICITS IN SUSTAINED ATTENTION AND SOCIAL ODOR RECOGNITION MEMORY IN RATS \[#18433\]](#)
Oxygen (16O) ion exposure impairs 24-hr social odor recognition memory and aspects of sustained attention performance in rats.
- 10:45 AM BRITTEN R. WELLMAN L. SANFORD L.
[THE IMPACT THAT SLEEP PERTURBATION HAS ON THE SEVERITY OF GCR-INDUCED IMPAIRMENT OF COGNITIVE FLEXIBILITY \[#18434\]](#)
The interaction between sleep perturbation and GCR exposure on cognitive flexibility has been determined in this study.
- 11:05 AM Discussion [#18435]
- 11:15 AM Break [#18436]

Thursday, January 25, 2018

Spaceflight Injury Biodynamics

9:45 AM

Galleon Ballroom

Chairs: Jeffrey Somers and Nathaniel Newby

- 9:45 AM Burkhart K. Lee D. Allaire B. Keaveny T. Bouxsein M.
[VERTEBRAL STRENGTH AND DENSITY AFTER LONG-DURATION SPACEFLIGHT AND RECOVERY ON EARTH \[#18451\]](#)
Lumbar vertebral strength and volumetric density decline significantly during spaceflight and remain significantly lower than pre-flight levels throughout recovery on Earth.
- 10:05 AM Weaver A. McNamara K. Greene K. Subramanian N.
[SPACEFLIGHT-INDUCED CHANGES IN THE LUMBAR VERTEBRAE AND MUSCULATURE \[#18452\]](#)
The objective of this study was to derive musculoskeletal measurements of the lumbar spine from qCT pre- and post-flight International Space Station (ISS) crewmembers and integrate these into human body model simulations that quantify vertebral strength change due to spaceflight.
- 10:25 AM Somers J. Wells J. Yoganandan N. Humm J.
[CERVICAL SPINE INJURY TOLERANCE IN SPACEFLIGHT \[#18453\]](#)
Development of neck compression force injury assessment reference values (IARVs).
- 10:45 AM Putnam J. Somers J. Jones D. Weaver A. Stitzel J.
[ASSESSING THE SENSITIVITY AND EXTENSIBILITY OF ANTHROPOMORPHIC TEST DEVICE RESPONSES IN SPACEFLIGHT CONDITIONS \[#18454\]](#)
Assessment of anthropomorphic test devices as predictive tools for spaceflight occupant protection.
- 11:05 AM Discussion [#18455]
- 11:15 AM Break [#18456]

Thursday, January 25, 2018

ExMC Technology Development II

1:00 PM

Grand Ballroom B

Chairs: Tianna Shaw and Michael Krihak

- 1:00 PM Zoldak J. Fedak A. Calaway K. Valentine R. Borrelli W.
[MEDICAL CONSUMABLE TRACKING. AN ISS EXPERIMENT \[#18059\]](#)
Results from the first year experiment of Medical Consumable Tracking will be presented
- 1:18 PM Krihak M. Middour C. Gurram M. Wolfe S. Marker N. Winther S. Ronzano K. Bolles D. Toscano W. Shaw T.
[Medical Data Architecture Project Status \[#18060\]](#)
The Medical Data Architecture project developed a prototype system that demonstrated the automated collection, storage and retrieval of medically-relevant data with the capability to send and receive telemetry data.
- 1:36 PM Ebert D. Byrne V. Arellano J. Cole R. Dulchavsky S. Garcia K. Gibson C. Hailey M. Ham D. Hurst V. Kerstman E. McGuire K. Reyes D. Saile L. Sargsyan A. Stephenson J. Young M.
[CLINICAL OUTCOME METRICS FOR OPTIMIZATION OF ROBUST TRAINING \(COMFORT\) \[#18061\]](#)
The COMFORT project was designed to address the clinical outcome differences between physicians and non-physicians in both near-term clinical metrics and long-term mission outcomes.
- 1:54 PM Daniels V. Bayuse T. McGuire K. Antonsen E. Putcha L.
[RADIATION IMPACT ON PHARMACEUTICAL STABILITY: RETROSPECTIVE DATA REVIEW \[#18062\]](#)
This abstract provides a retrospective analysis of an unpublished 2006 Pharmacotherapeutics Lab study; which used a ground-based analog (NASA Space Radiation Laboratory, Brookhaven), to characterize the effects of high energy radioactive particles on pharmaceutical stability.
- 2:12 PM Harrington A. McCubbin F. Vander Kaaden K. Kaur J. Smirnov A. Galdanes K. Schoonen M. Chen L. Tzirka S. Gordon T.
[Pulmonary Inflammatory Responses to Acute Meteorite Dust Exposures – Implications for Human Space Exploration \[#18063\]](#)
This highly interdisciplinary study clarifies important correlations between geochemistry and health by evaluating the relative toxicity of six meteorite samples representative of either basalt or regolith breccia on the surface of the Moon, Mars, or Asteroid 4Vesta.
- 2:30 PM Break [#18064]

Thursday, January 25, 2018

How We Do Business

1:00 PM

Galleon Ballroom

Chair: Susan Steinberg

- 1:00 PM Stewart H. French A. Wood A. Gage A. Lopez D. Chakravarty K. Thomas D. Bardina J. McDermott W. Jenks K. Van-Baalen M. Wu H.
[SPACE RADIATION PROGRAM ELEMENT. SPACE RADIATION TISSUE SHARING FORUM TRANSITION TO THE SCIENCES DATA ARCHIVE \[#18078\]](#)
The Life Sciences Data Archive (LSDA) is a NASA public archive of the Human Research Program and the SpaceBiology Program of space flight and ground experiment data, publications, and listing of NASA Institutional Scientific Collection (ISC) biospecimens available to the science community.
- 1:30 PM Wear M. Charvat J. Lee L. Babiak-Vazquez A. Mason S. Van Baalen M. Murray J.
[PROTECTING ASTRONAUT MEDICAL PRIVACY: REVIEW OF PRESENTATIONS AND PUBLICATIONS FOR ATTRIBUTABILITY \[#18079\]](#)
All abstracts, publications and presentations using astronaut research and medical data from the LSAH/LSDA repositories must be reviewed for attributability. The process that LSAH/LSDA follows for assessing attributability will be presented.
- 1:50 PM Anton W. Havenhill M. Overton E.
[The Evolution of a Top Program Risk \[#18080\]](#)
HRP Management has the responsibility of identifying and managing risks that jeopardize the success of its research and its ability to support exploration mission milestones.
- 2:10 PM Discussion [#18081]
- 2:30 PM Break [#18082]



Thursday, January 25, 2018

Space Radiation: Enabling NASA Exploration Missions - A Panel Discussion

1:00 PM

Grand Ballroom C

Chairs: Lisa Simonsen and Janice Huff

1:00 PM Discussion [#18437]

2:30 PM Break [#18438]



NOTES

Welcome NASA HRP Investigators' Workshop



Island Time Savings

**SHOW YOUR
BADGE
DISCOUNTS**

Discounts Listed on Back



ART GALLERIES

Affaire d'Art

2227 Postoffice

10% off entire Purchase

Betsy by Design

2415 Market

10% off any Purchase/Excluding Gallery Items

From the HeART Gallery

511 23rd Street

10% off Artwork

Galveston Arts Center

2127 Strand

Free Admission 10% off Museum Store

KJRcreations Gallery

2208 Postoffice

10% Off

Rene Wiley Gallery

2128 Postoffice

10% Off All Artwork

The Heard Gallery

2217 Postoffice

10% all gallery prices Minimum Purchase \$50

ATTRACTIONS

Galveston Fishing Pier

90th & Seawall

10% off Pier Pass & Retail Store Age 17+

Need Fishing License

Galveston Helicopter Tours

201 Seawall Blvd

www.galvestonhelicopters.com and click on

It's Island Time for Special Rates

Haunted Mayfield Manor

2213 Harborside Drive

\$2 off Adult Combo Ticket

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2528 Postoffice

\$5 off Historic Tour Carriage Ride

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Use code GICVB25 for 25% off

Pirates Legends of the Gulf Coast

2213 Harborside Drive

\$2 off Adult Combo Ticket

Railroad Museum

2602 Santa Fe Place

\$1 Off Admission

The Grand 1894 Opera House

2020 Postoffice

10% off Tickets

DINING

BLVD. Seafood

2804 R 1/2

Free smoked salmon crostini appetizer per

table of 2 with purchase of entrée

Bubba Gump Shrimp Co.

2501 Seawall

Free Forrest's appetizer of the day or a kid's

meal (1per table with purchase of 2 adult

entrees-kid's 10 & under) 10% off retail only

Farley Girls Café

801 Postoffice

10% off your entire check, sales tax excluded

Jimmy's on the Pier

9001 Seawall

10% off restaurant & retail purchase, sales tax
excluded

Joe's Crab Shack

3502 Seawall

Free appetizer, value up to \$11.99 per table

Little Daddy's Gumbo Bar

2107 Postoffice

Free Chef's select appetizer with purchase of
an entrée

Mario's Seawall Italian & Pizzeria

628 Seawall

Free Chef's select appetizer with purchase of
an entrée

Nonno Tony's

2100 Harborside Dr.

Free Chef's select appetizer with purchase of
an entrée

Number 13

7809 Broadway

10% off food purchase sales tax excluded

Olympia Grill Pier 21

100 21st Street

Enjoy a free Hummus appetizer for each table
of guests

Papa's Pizza, Pasta, Wings, Subs & Salads

4400 Seawall Blvd.

Free Chef's select appetizer with purchase of
an entrée

Riondo's Ristorante on the Strand

2328 Strand

10% off your entire check, sales tax excluded

Saltwater Grill

2017 Postoffice

Free Chef's select appetizer with purchase of
an entrée

Sky Bar Steak & Sushi

2105 Postoffice

Free Chef's select appetizer with purchase of
an entrée

Taquilo's Tex-Mex Cantina

2101 Postoffice

Free Chef's select appetizer with purchase of
an entrée

The Gumbo Diner

3602 Seawall Blvd.

Free Chef's select appetizer with purchase of
an entrée

Willie G's

2100 Harborside

Complimentary appetizer or dessert

w/purchase of an entrée

Yaga's Café

2314 Strand

15% off your entire check, sales tax excluded

FITNESS

Donovan and Rebecca Fitness Center

1805 Market

20% off all Classes

Fit TRI Run

528 23rd Street

\$15 off Running/Walking Shoes \$5 off OOFOS

RELAX Life Wear

Urban Health and Fitness

2009 Postoffice

Second day pass free with purchase of first
day pass

NIGHTLIFE

Bliss Lounge

2413 Strand

25% off Any Pizza

Free Cover Charge

SHOPPING

BLU A Boutique

2218 Postoffice

10% off entire Purchase

Bungalow

2226 Strand

10% off Purchase

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317 23rd Street

10% off Used Books

Gracie's

2228 Strand

10% off Purchase

HaBas

2213 Postoffice

20% off Entire Purchase

Head to Foolsies

2211 Strand

10% Off Purchase

Island Silver

2428 Mechanic

10% off Entire Purchase

Market ABC

2413 Market

10% off any Purchase

Modern Vintage

2005 Postoffice

10% off total sale

Pardon My French

2317 Strand

10% Off Purchase

Somewhere in Time

124 20th Street

10% off entire Purchase

Strand Brass and Christmas on the Strand

2115 Strand

10% Off Excluding Sale Items

Surf Styles

2119 Strand

20% off excludes Surfboards

Tangerine

2218 Postoffice

20% off Purchase

The Admiralty

2221 Strand

10% Off Purchase

The Emporium at Eibands

2201 Postoffice

up to 20% off Purchase

The Naked Mermaid

2113 Postoffice

15% off your most expensive Item

The Style Company

2113 Postoffice

15% Off Discounted Items Not Included

Tina's

2326 Strand

10% Off Purchase

Twice Around Treasures

2528 Market

10% Off Purchase

Yaga's Clothing

2109 Strand

15% off excluding sale items

SPECIALTY RETAIL

Clay Cups Studio

409 22nd Street

15% off Projects

Kites Unlimited

8910 Seawall

10% off of your purchase

Lone Star Heroes Comics & Toys

8910 C Seawall

10% off retail

The Kitchen Chick

528 23rd Street

10% off Purchase Excludes Classes