



National Aeronautics and
Space Administration



2016

HUMAN RESEARCH PROGRAM

Investigators' Workshop
Frontiers in Human Space Exploration Research

February 8-11, 2016

Galveston Island Convention Center
Galveston, TX



NASA Human Research Program Investigators' Workshop Frontiers in Human Space Exploration Research

**February 8-11, 2016
Galveston Island Convention Center
Galveston, TX**

In conjunction with the
Space Radiation Investigators' Workshop

And the
2016 HRP 10th Anniversary Banquet
February 10, 2016

Sponsors

NASA Human Research Program
National Space Biomedical Research Institute

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Conference logistics, administration, technical and publications support provided by All Points, LLC.

NASA Human Research Program Investigators' Workshop Frontiers in Human Space Exploration Research

In conjunction with
Space Radiation Investigators' Workshop

Monday, February 8

General Session (8:00 a.m. – 11:35 a.m.)

7:30 a.m.	Pre-function (1 st floor)	General Registration/Check-in
8:00 a.m.	Grand Ballroom	Greetings from the International Space Station – S Kelly
8:05 a.m.		<i>Welcome</i> – M Shelhamer
8:15 a.m.		<i>Human Research Program Introductory Remarks</i> – W Paloski and B Corbin
8:25 a.m.		<i>National Space Biomedical Research Institute (NSBRI) Introductory Remarks</i> – J Sutton
8:30 a.m.		Plenary: Remarks from NASA Deputy Administrator – D Newman
8:40 a.m.		Plenary: NASA Science and Journey to Mars – E Stofan
9:10 a.m.		Plenary: Updates to NASA's Policy and Procedures – G Allen
9:25 a.m.		Plenary: 1-Year Mission and Twins Study – J Charles
9:55 a.m.		Plenary: Remarks from Center for the Advancement of Science in Space (CASIS) – G Johnson
10:05 a.m.		In Memoriam
10:15 a.m.	Grand Foyer (2 nd Floor)	COFFEE BREAK
10:35 a.m.	Grand Ballroom	Plenary: Extreme Variability is Typical not Normal – B West
11:35 a.m.	Exhibit Hall B	LUNCH
12:45 p.m.	Grand Ballroom A Grand Ballroom B & C Yacht Galleon I Galleon II & III	Space Radiation Carcinogenesis I Twins I Exploration Medical Capability: Evidence Base Exercise/Muscle Studies* Behavioral Health and Performance Risk Assessment: Separation and Connectedness for Long Duration Missions
2:15 p.m.	Grand Foyer (2 nd Floor)	COFFEE BREAK
2:45 p.m.	Grand Ballroom A Grand Ballroom B & C Yacht Galleon I Galleon II & III	Space Radiation Carcinogenesis II Twins II Exploration Medical Capability: Non-Invasive Imaging Small Business Innovation Research Behavioral Health and Performance Standards
4:15 p.m.	Exhibit Hall A	Poster Session A; Cash Bar Reception
5:45 p.m.		Adjourn

** Sessions which highlight studies performed in analog settings (e.g., HERA and :envihab) are indicated by an asterisk.*

Tuesday, February 9

7:30 a.m.	Pre-function (1 st floor)	General Registration/Check-in
8:00 a.m.	Grand Ballroom A Grand Ballroom B & C	Physics I Visual Impairment and Intracranial Pressure Flight Findings
	Yacht Galleon II & III	Exploration Medical Capability: Mixed Topics Space Human Factors for Exploration*
9:30 a.m.	Grand Foyer (2 nd floor)	COFFEE BREAK
9:45 a.m.	Grand Ballroom A Grand Ballroom B & C	NASA Space Radiation Laboratory User's Group Meeting Visual Impairment and Intracranial Pressure Analog and Model-Based Studies*
	Yacht Galleon II & III	Exploration Medical Capability: Renal Stones Space Human Factors Metrics and Methods*
11:15 a.m.	Exhibit Hall B	LUNCH
12:00 p.m.	Grand Ballroom	Introduction to Human Health and Performance Laboratory Building (B21) – J Hayes
12:10 p.m.		Lunch with an Astronaut: Techno-Stories from Space – D Pettit
1:00 p.m.	Ballroom Foyer (2 nd floor)	COFFEE BREAK
1:15 p.m.	Grand Ballroom A Grand Ballroom B & C	Space Radiation Carcinogenesis III and Galactic Cosmic Ray Simulation Visual Impairment and Intracranial Pressure Tools and Devices*
	Yacht Galleon II & III	Communications Occupant Protection
2:45 p.m.	Grand Foyer (2 nd floor)	COFFEE BREAK
3:00 p.m.	Grand Ballroom A Grand Ballroom B & C	Space Radiation Carcinogenesis IV Visual Impairment and Intracranial Pressure Computational Modeling
	Yacht Galleon II & III	NSBRI for Exploration Medical Capability Habitability, Workload, and Sleep
4:30 p.m.	Exhibit Hall A	Poster Session B; Cash Bar Reception
6:00 p.m.		Adjourn

Wednesday, February 10

7:30 a.m.	Pre-function (1 st floor)	General Registration/Check-in
8:00 a.m.	Grand Ballroom	Plenary: Applications of 3D Printing for Exploration Spaceflight – M Napoli, D Irvin, M Drues, J Miller
9:30 a.m.	Grand Foyer (2 nd floor)	COFFEE BREAK
9:45 a.m.	Grand Ballroom A Grand Ballroom B & C	Late Effects of Space Radiation on Cardiovascular Disease and Cataracts Bone Research
	Yacht Galleon II & III	Extravehicular Activity Behavioral Health and Performance Countermeasures*
11:15 a.m.	Exhibit Hall B	LUNCH

* Sessions which highlight studies performed in analog settings (e.g., HERA and :envihab) are indicated by an asterisk.

12:00 p.m.	Grand Ballroom	Lunch Plenary: <i>Life Beyond LEO: Opportunities for Translational Research in Deep Space</i> – J Smith
	Clipper	NSBRI Society of Fellows Luncheon
1:00 p.m.	Grand Foyer (2nd floor)	COFFEE BREAK
1:30 p.m.	Grand Ballroom A	Immunology/Microbiology
	Grand Ballroom B & C	Cardiovascular Flight and Ground Findings*
	Yacht	Solar System Exploration Research Virtual Institute
	Galleon I	Physics II
	Galleon II & III	Behavioral Health and Performance Monitoring Tools*
3:00 p.m.	Grand Foyer (2nd floor)	COFFEE BREAK
3:15 p.m.	Grand Ballroom A	Space Radiation Effects: Immune and Hematopoietic Systems and the Microbiome
	Grand Ballroom B & C	Advanced Exercise Concepts
	Yacht	Education and Outreach
	Galleon II & III	Behavioral Health and Performance Risk Assessment
4:45 p.m.		BREAK
6:45 p.m.	Grand Ballroom	2016 HRP 10th Anniversary Banquet
		<i>Dr. David Watson Poster Competition Awards</i> – G Scott
		<i>NSBRI Pioneer Award</i> – J Sutton
		Keynote: Jeffrey Kluger, TIME Magazine
9:00 p.m.		Adjourn

Thursday, February 11

7:30 a.m.	Pre-function (1 st floor)	General Registration/Check-in
8:00 a.m.	Grand Ballroom A	Central Nervous System I Acute Effects
	Grand Ballroom B & C	Biomechanical/Musculoskeletal Computational Modeling
	Yacht	How We Do Business
	Galleon II & III	Advanced Food Technology I
9:30 a.m.	Grand Foyer (2 nd floor)	COFFEE BREAK
9:45 a.m.	Grand Ballroom A	Central Nervous System II Acute Effects
	Grand Ballroom B & C	Sensorimotor Flight Studies
	Yacht	Oxidative Stress and Damage I
	Galleon II & III	Advanced Food Technology II
11:15 a.m.	Exhibit Hall B	LUNCH
12:00 p.m.	Grand Ballroom	Lunch Plenary: <i>To Err is Human, Even in Commercial Spaceflight: Human Factors in the Scaled Composites SpaceShipTwo Accident</i> – K Wilson
1:15 p.m.	Grand Ballroom B & C	Sensorimotor Ground Studies*
	Yacht	Oxidative Stress and Damage II
	Galleon II & III	International Collaboration
2:45 p.m.	Grand Foyer (2nd floor)	COFFEE BREAK
3:15 p.m.	Grand Ballroom	Plenary: <i>NASA's Human Spaceflight Plans</i> – J Guidi
3:45 p.m.		<i>Closing Comments</i> – M Shelhamer, J Charles
4:00 p.m.		Adjourn

* Sessions which highlight studies performed in analog settings (e.g., HERA and :envihab) are indicated by an asterisk.

Monday, February 8, 2016

Behavioral Health and Performance Risk Assessment: Separation and Connectedness for Long Duration Missions

12:45 PM

Galleon II & III

Chairs: Jason Schneiderman and Diana Arias

- 12:45 PM Feltz D. Ede A. Winn B. Hill C. Samendinger S. Jeffery W. Lawrence F. Pivarnik J. Ploutz-Snyder L.
[*Cyber Partners in Exergames: Boosting Motivation to Maintain Intense Exercise* \[#7040\]](#)
The purpose of the current project is to use group dynamics principles to improve the motivation of astronauts to maintain exercise at higher intensities through the use of an exercise video game (exergame).
- 1:00 PM Whitaker-Azmitia P.
[*Biological Basis of Social Support* \[#7039\]](#)
Social support leads to increased mental and physical well-being, through known biological factors.
- 1:15 PM Kintz Ph.D. N. Palinkas Ph.D. L.
[*ASSESSING THE IMPACT OF COMMUNICATION DELAYS ON PERFORMANCE AND WELL-BEING ABOARD THE INTERNATIONAL SPACE STATION* \[#7038\]](#)
This presentation describes the feasibility and acceptability of conducting a study of experimental communication delays on the International Space Station, and assesses the impact of communication delays on individual and team performance and well-being.
- 1:30 PM Brim W. Weinstock M. Riggs D. Hough G.
[*Family Support for Long Duration and Exploration Missions* \[#7041\]](#)
A literature review and subject matter expert opinion and experience suggest ways that NASA may support astronauts and their families in preparation for long duration space missions to minimize the impact on the mission and the family.
- 1:45 PM Vasterling J. Deming C.
[*Workplace Social Support and Behavioral Health Prior to Long Duration Spaceflight* \[#7042\]](#)
This presentation will summarize a research review project on workplace social support as a potential countermeasure to mitigate behavioral health concerns prior to long duration spaceflight.
- 2:00 PM Discussion
- 2:15 PM Break

Monday, February 8, 2016

Exercise/Muscle Studies*

12:45 PM

Galleon I

Chair: Lori Ploutz-Snyder

- 12:45 PM Sheffield-Moore M. Dillon E. Soman K. Wiktorowicz J. Sur R. Jupiter D. Danesi C. Randolph K. Gilkison C. Durham W. Urban R.
[Proteomic investigation of human skeletal muscle before and after 70 days head-down bed rest](#) [#7088]
We investigated the skeletal muscle proteome in response to long term HDBR with or without exercise and testosterone countermeasures.
- 1:00 PM Ploutz-Snyder L. Downs M. Ryder J. Crowell B. Goetchius E. Seponski C. Ploutz-Snyder R. Scott J.
[INTEGRATED RESISTANCE AND AEROBIC EXERCISE TRAINING WITH SMALL COMPACT EXERCISE EQUIPMENT](#) [#7089]
A compact aerobic (rowing) and resistance exercise device can provide a suitable training stimulus for both cardiovascular and muscle health over 70 days of bed rest.
- 1:15 PM Ploutz-Snyder L. Buxton R. De Witt J. Guilliams M. Hanson A. Peters B. Scott-Pandorf M. Sibonga J.
[Relationship between in-flight training load and musculoskeletal health outcomes](#) [#7090]
Despite completing similar exercise modalities, there is considerable variation between crewmembers in the contents of their exercise programs.
- 1:30 PM Hanson A. Newby N. Peters B. Ploutz-Snyder L.
[The XSENS Force Shoe and Exercise Load Monitoring on ISS](#) [#7093]
An overview of the in-flight evaluation of the XSENS Force Shoe and follow-on exercise load monitoring technology development will be presented in this presentation.
- 1:45 PM Ade C. Broxterman R. Craig J. Hammer S. Schinstok D. Warren S. Wagner J. Wilcox S. Barstow T.
[METABOLIC RESPONSES AND MUSCLE ACTIVATION TO AMBULATION IN SIMULATED LUNAR AND MARTIAN MICROGRAVITY](#) [#7092]
Characterization of the physiologic responses to walking and running when performed in different simulated gravitational environments: Moon (1/6g) and Mars (3/8g).
- 2:00 PM Feltz D. Ede A. Winn B. Hill C. Samendinger S. Jeffery W. Lawrence F. Pivarnik J. Ploutz-Snyder L.
[Cyber Partners in Exergames: Boosting Motivation to Maintain Intense Exercise](#) [#7091]
The purpose of the current project is to use group dynamics principles to improve the motivation of astronauts to maintain exercise at higher intensities through the use of an exercise video game (exergame).
- 2:15 PM Break

Monday, February 8, 2016

Exploration Medical Capability: Evidence Base

12:45 PM

Yacht

Chairs: David Reyes and David Rubin

- 12:45 PM Myers J. Garcia Y. Van Baalen M.
[THE INTEGRATED MEDICAL MODEL: DEVELOPMENT HISTORY, CURRENT RELEVANCE AND FUTURE APPLICATION \[#7095\]](#)
We visit the historical application of IMM in contributing to the assessment of medical mission risk assessment and, through a recent example, we illustrate how IMM has extensible application to new mission architecture challenges.
- 1:00 PM Arellano J. Young M. Boley L. Garcia Y. Saile L. Walton M. Kerstman E. Reyes D. Goodenow D. Myers J.
[Integrated Medical Model \(IMM\) Optimization Version 4.0 - Functional improvements \[#7096\]](#)
The functional improvements of IMM optimization version 4.0 provide improved fidelity that will improve the utility of the IMM 4.0 for decision support.
- 1:15 PM Walton M. Kerstman E. Arellano J. Boley L. Garcia Y. Reyes D. Saile L. Young M. Myers J.
[Integrated Medical Model \(IMM\) 4.0 Verification and Validation \(V&V\) Testing \[#7097\]](#)
V&V testing has shown that IMM 4.0 meets all V&V metrics and should therefore provide much-improved decision-support capability over IMM v3.
- 1:30 PM Kerstman E.
[Qualitative Validation of the IMM Model for ISS and Space Transportation System Programs \[#7098\]](#)
A validation of IMM using medical events and medical resource utilization from ISS and STS missions.
- 1:45 PM Young M. Arellano J. Boley L. Garcia Y. Saile L. Walton M. Kerstman E. Reyes D. Goodenow D. Myers J.
[QUANTITATIVE VALIDATION OF THE INTEGRATED MEDICAL MODEL FOR ISS AND STS PROGRAMS \[#7099\]](#)
A validation study of the accuracy of the Integrated Medical Model conducted by comparing simulation predictions to observed inflight data.
- 2:00 PM Myers J. Goodenow D. Arellano J. Boley L. Garcia Y. Saile L. Walton M. Kerstman E. Reyes D. Young M.
[SENSITIVITY ANALYSIS OF THE INTEGRATED MEDICAL MODEL FOR ISS AND STS PROGRAMS \[#7100\]](#)
Results of using PRCC and SRRC on IMM v4.0 predictions of the ISS and STS missions created as part of the external validation study will be used to show the IMM sensitivity to all modeled medical conditions.
- 2:15 PM Break

Monday, February 8, 2016

Space Radiation Carcinogenesis I

12:45 PM

Grand Ballroom A

Chairs: Albert Fornace and Jerry Shay

12:45 PM Welcome and Introduction [#7499]

12:50 PM [Memoriam For William Morgan](#) [#7500]

12:55 PM Meltzer P. Fornace, Jr. A.
[The Space Radiation Cancer Genome](#) [#7501]
Using mouse models of gastrointestinal cancer, we are working to define the characteristics of the cancer genome in tumors arising from space radiation.

1:25 PM Fornace A. Shay J. Meltzer P. Brenner D. Datta K.
[A STRATEGY FOR RISK ASSESSMENT AND MODEL DEVELOPMENT TO EVALUATE THE INCREASED INCIDENCE AND PROGRESSION OF GASTROINTESTINAL \(GI\) CANCER BY SPACE RADIATION: GI-NSCOR](#) [#7502]
Our newly initiated GI-NSCOR will expand on these findings using a variety of approaches towards developing a better mechanistic understanding of GI cancer risk using refined models for studies of radiation quality and dose-rate effects in relation to individual radiation sensitivity.

1:45 PM Kirsch D. Onaitis M. Stripp B.
[Duke NASA Specialized Center for Research: Lung Cancer Risk from HZE Ions](#) [#7503]
To investigate the effect of HZE particles on lung tumor initiation and progression, the Duke NSCOR has utilized genetically engineered mouse models to alter expression of the genes most commonly mutated in human lung cancer.

2:05 PM Barcellos-Hoff M.
[CANCER BIOLOGY WORKING GROUP](#) [#7504]
This group reviews broad issues related to experimental models and concepts in space radiation carcinogenesis as well as the recent findings and concepts derived from studies funded by the NASA Space Radiation Program.

2:15 PM Break

Monday, February 8, 2016

Twins I

12:45 PM

Grand Ballroom B & C

Chairs: John Charles and Graham Scott

- 12:45 PM Scott G. Charles J. Kundrot C. Shelhamer M.
[NASA and NSBRI's Twins Study: Progress Implementing the First Integrated Omics Pilot Demonstration Study in Space \[#7530\]](#)
An update will be provided to attendees of the 2016 Human Research Program Investigators' Workshop in regards to the NASA and NSBRI funded Twins Study - specifically in regards to progress made in collecting biofluids from Scott & Mark Kelly, both on Earth and in Space - over the last 1.5 years.
- 1:00 PM Bailey S. McKenna M. Taylor L. George K.
[ASSESSING TELOMERE LENGTH AND TELOMERASE ACTIVITY IN TWIN AND UNRELATED ASTRONAUTS \[#7531\]](#)
Our overall goal is to identify and begin to define the risk (and possible underlying mechanisms) of accelerated telomere shortening and changes in telomerase activity associated with spaceflight.
- 1:15 PM Rizzardi L. Feinberg J. Tryggvadottir R. Feinberg A.
[COMPREHENSIVE ANALYSIS OF DIFFERENTIAL EPIGENETIC EFFECTS OF SPACE TRAVEL ON MONOZYGOTIC TWINS \[#7532\]](#)
Investigation of the epigenetic effects (including DNA methylation and chromatin) of long-term extraterrestrial exposure analyzing a space traveler and his earth-bound twin as a control as well as development of protocols for liquid handling in a microgravity environment.
- 1:30 PM Mason C. Garrett-Bakelman F. Zumbo P. Grills G. Melnick A.
[Integrated biochemical and computational approaches to determine the effects of space flight at the genetic, epigenetic, transcriptional, and epitranscriptomic levels \[#7533\]](#)
The thorough and integrated, genome-wide molecular portrait of the epigenomic and epitranscriptomic landscape of these twins will help address the potential long-term effects space travel may have on gene expression regulation and cellular phenotypes.
- 1:45 PM Smith S. Heer M. Zwart S.
[Biochemical Profile: Homozygous twins and a 1-year ISS mission \[#7534\]](#)
Plans for the Biochemical Profile study piece of the Twins Study will be presented.
- 2:00 PM Mignot E.
[Influence of flu immunization on T cell repertoire in NASA twins \[#7535\]](#)
The aim of this study was to compare the effect of flu immunization on T cell receptor (TCR) repertoire, with the ultimate goal to extend the study to examine effect of spending time in space on human immune responses.
- 2:15 PM Break

Monday, February 8, 2016

Behavioral Health and Performance Standards

2:45 PM

Galleon II & III

Chairs: Brandon Vessey and Lauren Landon

- 2:45 PM Holland A. Barrett J. Vessey W.
[AN ASTRONAUT JOB ANALYSIS OF FOUR MISSION TYPES: OPERATIONAL IMPLICATIONS \[#7045\]](#)
In order to select astronauts who can function well under those expected conditions, a job analysis was undertaken recently to extend our understanding of the behavioral competencies that would be required and how those competencies would vary under different mission profiles.
- 3:00 PM Johnston S.
Fatigue Management for Spaceflight Operations **[#7046]**
- 3:15 PM Alexander D. Scully R. Ryder V. Lam C. Satish U. Basner M.
[Effects of Acute Exposures to Carbon Dioxide upon Cognitive Functions \[#7047\]](#)
This chamber study will evaluate two validated batteries of psychometric measures to assess the acute effects of CO2 concentrations at or below ISS levels on cognition and judgment in crew-like subjects.
- 3:30 PM Lockley S. Rahman S. St. Hilaire M. Flynn-Evans E. Barger L. Brainard G. Czeisler C. Klerman E.
[THE ISS DYNAMIC LIGHTING SCHEDULE: AN IN-FLIGHT LIGHTING COUNTERMEASURE TO FACILITATE CIRCADIAN ADAPTATION, IMPROVE SLEEP AND ENHANCE ALERTNESS AND PERFORMANCE ON THE INTERNATIONAL SPACE STATION \[#7048\]](#)
The data from this study will form the basis of operational lighting recommendations for use of the Solid State Lighting Assemblies (SSLA) aboard ISS when deployed in 2015-2016.
- 3:45 PM Discussion
- 4:15 PM Break

Monday, February 8, 2016

Exploration Medical Capability: Non-Invasive Imaging

2:45 PM

Yacht

Chairs: Bara Reyna and Kat Garcia

- 2:45 PM Thompson W. Zoldak J. Eustace J. Wall K. Chan H.
[Flexible Ultrasound System – Ground Demonstration of an Enabling Technology \[#7109\]](#)
The Flexible Ultrasound System (FUS), based on the recently released GE Vivid-E95 and to be delivered in the Spring of 2016, is a software-based system that offers full clinical diagnostic capability combined with a research interface for accommodating novel ultrasound modalities.
- 3:00 PM Chan H. Thompson W. Zoldak J. Eustace J.
[Flexible Ultrasound System – A Development Platform for Advanced Ultrasound Modalities \[#7110\]](#)
The Flexible Ultrasound System (FUS) is a technology development project that addresses NASA's gap in non-invasive diagnostic capability for imaging of internal body parts on future Exploration missions.
- 3:15 PM Qin Y. Liu J. Zhang T. Li X.
[Acceleration of Critical Bone Defect Healing by Low-Intensity Ultrasound in a Rat Tibial Model \[#7111\]](#)
The goal of this study was to evaluate the role of noninvasive ultrasound in acceleration of fracture healing in a rat model. Low-intensity ultrasound induced acoustic radiation force is capable to accelerate large defect and fracture healing.
- 3:30 PM Dentinger A. Cao K. MacDonald M. Ebert D. Garcia K. Sargsyan A.
[AUTOMATIC IMAGE ANALYSIS OF 3D OCULAR STRUCTURES FROM VOLUMETIC OPHTHALMIC ULTRASOUND \[#7112\]](#)
Automatic image analysis methods have been developed and evaluated in a ground-based study to detect anatomical landmarks, render clinically relevant views from 3D ophthalmic ultrasound data, and enhance the definition of ocular structures.
- 3:45 PM Sahul R. NESVIJSKI E.
[WIDEBAND SINGLE CRYSTAL ULTRASOUND TRANSDUCER FOR BONE HEALTH CHARACTERIZATION AND THERAPY \[#7113\]](#)
Wideband ultrasound transducer for bone characterization and therapy using next generation single crystal materials.
- 4:00 PM Mela C. Thompson W. Papay F. Liu Y.
[A Miniature Multimodal Imaging System for Medical Diagnostics and Interventions in Space \[#7114\]](#)
We have developed and tested a miniature multimodal imaging system, the Integrated Imaging Goggle, for use in assisting with medical diagnostics and treatments.
- 4:15 PM Break

Monday, February 8, 2016

Small Business Innovation Research

2:45 PM

Galleon I

Chair: Kathryn Packard

- 2:45 PM Packard K. Woodman K. Yang R.
[Small Business Innovation Research Funding Opportunities \[#7476\]](#)
The NASA Small Business Innovation Research (SBIR) program funds the research, development, and demonstration of innovative technologies that fulfill NASA needs as described in the annual solicitations and have significant potential for successful commercialization.
- 3:15 PM Discussion
- 4:15 PM Break

Monday, February 8, 2016

Space Radiation Carcinogenesis II

2:45 PM

Grand Ballroom A

Chairs: Albert Fornace and Jerry Shay

- 2:45 PM Brenner D. Sachs R. Shuryak I.
[*The Variation in Radiation-Induced Cancer Risks as a Function of Age at Exposure*](#) **[#7505]**
Based both on epidemiological data and on mechanistic modelling, it appears that most radiation-induced cancer risks following adult radiation exposure do not, as often assumed, decrease with increasing age at exposure.
- 3:15 PM Minna J. Adams C. Balmain A. Brekken R. Gao B. Gazdar A. Girard L. Quigley D. Song I. Story M. Xie Y. Shay J.
[*Risks Estimates and Mechanisms of Lung Cancer Pathogenesis After Space Radiation*](#) **[#7506]**
Major findings and research plan of new UTSW NSCOR proposal.
- 3:35 PM Wang Y. Dynan W. Doetsch P. Vertino P.
[*MECHANISMS UNDERLYING THE RISK OF HZE PARTICLE-INDUCED SOLID TUMOR DEVELOPMENT*](#) **[#7507]**
HZE particles induce a higher incidence of lung tumors in C57BL/6J mice versus low-LET radiation, which is involved in HZE particle radiation-induced changes in miRNA expression, DNA repair fidelity, reactive oxygen species (ROS) generation/response and DNA methylation patterns.
- 3:55 PM Weil M. Story M. Ding L. Hwang T. Emmett M. Yu Y. Bacher J. Halberg R. Raber J. Ray A. Thamm D. Liber H. Borak T. Ullrich R.
[*NASA Specialized Center of Research on Carcinogenesis*](#) **[#7508]**
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.
- 4:10 PM Gerson S. Weil M.
[*HEMATOLOGIC CANCER WORKING GROUP*](#) **[#7509]**
The Hematologic Cancer Working Group is a collection of NASA funded investigators and external experts in leukemogenesis who meet regularly by webinar to review new developments in radiation-induced leukemia and adverse hematopoietic effects.
- 4:15 PM Break

Monday, February 8, 2016

Twins II

2:45 PM

Grand Ballroom B & C

Chairs: John Charles and Graham Scott

- 2:45 PM Vitaterna M. Green S. Jiang P. Keshavarzian A. Turek F.
[*The Microbiomic Response to Spaceflight: Studying the Bacteriome of the Gastrointestinal Tract in Twin Astronauts across Space and Time*](#) [#7537]
This project examines the effects of space flight on the gastrointestinal microbiome, as part of an integrated set of –omics studies comparing identical twins, with one twin in space for one year and one twin remaining on Earth.
- 3:00 PM Rana B. Stenger M. Lee S. Macias B. Siamwala J. Piening B. Hook V. Ebert D. Patel H. Smith S. Snyder M. Hargens A.
[*Proteomic Assessment of Fluid Shifts and Association with Visual Impairment and Intracranial Pressure in Twin Astronauts*](#) [#7538]
We are exploring proteomic signatures and genomic mechanisms underlying space flight-induced VIIP symptoms with the future goal of developing early biomarkers to detect and monitor the progression of VIIP.
- 3:15 PM Lee S. Rana B. Stenger M. Sears D. Smith 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*](#) [#7539]
This study of twins affords a unique opportunity to examine the spaceflight-related atherosclerosis risk independent of the confounding factors associated with different genotypes.
- 3:30 PM Basner M. Dinges D. Nasrini J. McGuire S. Hermsillo E. Ecker A. Mollicone D. Moore T. Gur R.
[*Spaceflight Effects on Cognitive Performance in the TWINS Study*](#) [#7540]
Cognition is a brief, comprehensive neurocognitive test battery for spaceflight and part of the Twins Study that compares genomic, physiologic, and cognitive effects of spaceflight accumulated over one year between monozygotic twin brothers.
- 3:45 PM Piening B. Salins D. Snyder M.
[*Putting it all together: integrative multi-omic analysis in the Twins Study*](#) [#7541]
We will discuss the generation of comprehensive longitudinal multi-omic profiles via the integration of all data collected in the Twins Study.
- 4:00 PM Salins D. Snyder M. Piening B.
[*PRECISION DATA OUT OF THIS WORLD MANAGEMENT: MANAGING ALL THE OMIC DATA GENERATED FROM THE TWINS STUDY*](#) [#7542]
Handling the massive amounts of data generated by each site, transmitting data securely between sites, data organization and management along with additional aspects were considered during the exercise of this project.
- 4:15 PM Break

Monday, February 8, 2016

Poster Session A: Bone

4:15 PM

Exhibit Hall A

Metzger C. Bloomfield S.

[ALTERED OSTEOCYTE SCLEROSTIN WITH 90 DAYS OF HINDLIMB UNLOADING](#)
[\[#7191\]](#)

90 days of hindlimb unloading in male rats causes bone loss in the proximal tibia metaphysis and cortical midshaft tibia as well as increase osteocyte sclerostin in cancellous bone.

Li X. Jiao J. Sahul R. Nesvijski E. Qin Y.

[Assessment of Progressive Trabecular Bone Loss using Wideband Ultrasound Transducer and Backscatter Measurement](#)
[\[#7192\]](#)

Evaluate the changes of ultrasonic backscatter parameters, such as apparent backscatter coefficient (ABC) and apparent integrated backscatter (AIB), in trabecular bone alteration using TRS transducer during the process of decalcification.

Narayanan A. Metzger C. Brezicha J. Lenfest S. Cromer W. Bloomfield S. Hogan H. Zawieja D.

[COMPARATIVE ANALYSIS OF GASTROINTESTINAL AND BONE INFLAMMATION IN HINDLIMB UNLOADING AND AFTER AMBULATORY RECOVERY](#)
[\[#7193\]](#)

Gastrointestinal and bone inflammation induced by hindlimb unloading and long-term effects.

Lenfest S. Metzger C. Elizondo J. Bloomfield S. Allen M. Hogan H.

[Comparison of Alendronate and Zoledronate Effects on Bone Turnover and Mechanical Properties for Two Successive Periods of Simulated Microgravity](#)
[\[#7194\]](#)

Bisphosphonate treatment during simulated microgravity improved bone turnover and mechanical properties for a second period of simulated microgravity and an intervening 56 day recovery period.

Delp M. Prisby R. Behnke B. Globus R. Allen M.

[Disuse Osteopenia: A Potential Vascular Coupling Mechanism](#)
[\[#7195\]](#)

Changes in local cardiovascular parameters within bone (i.e., fluid flow and vascular signaling), among other factors, appear to modulate the disuse osteopenia associated with musculoskeletal unloading.

Laughlin M. Murray J. Young M. Wear M. Tarver W. Van Baalen M.

[DO ASTRONAUTS HAVE A HIGHER RATE OF ORTHOPEDIC SHOULDER CONDITIONS THAN A COHORT OF WORKING PROFESSIONALS?](#)
[\[#7196\]](#)

Orthopedic shoulder consultation and surgery rates are compared between NASA astronauts and a cohort of working professionals.

Schreurs A. Shirazi-Fard Y. Zaragoza J. Alwood J. Tahimic C. Halloran B. Globus R.
[Dried Plum prevents bone loss caused by ionizing radiation, reduces pro-resorption cytokines expression, and protects marrow-derived osteoprogenitors \[#7197\]](#)

Future long duration missions outside the protection of the Earth's magnetosphere will achieve total radiation doses capable of causing cancellous bone loss. Here we report that Dried Plum diet completely prevented cancellous bone loss caused by ionizing radiation

Deymier-Black A. Schwartz A. Thomopoulos S.
[Effect of Unloading on the Structure and Mechanics of the Rotator Cuff Tendon-to-Bone Insertion \[#7198\]](#)

The effects of botox-induced paralysis, as an analogue for microgravity, on the adult tendon-to-bone attachment include significant bone loss, decreased tendon cross-section, as well as increased Young's modulus and maximum stress.

Terada M. Schreurs A. Shirazi-Fard Y. Alwood J. Tahimic C. Globus R.
[EFFECTS OF HINDLIMB UNLOADING AND IONIZING ON MURINE GENE EXPRESSION IN SKIN AND BONE \[#7199\]](#)

In this study, we initiated studies to determine whether skin can be used to predict the responses of bone to simulated microgravity and radiation.

Delp M. Ghosh P. Behnke B. Allen M.
[Effects of Spaceflight on the Murine Mandible: Possible Factors Mediating Skeletal Changes in Non-Weight Bearing Bones of the Head \[#7200\]](#)

Spaceflight led to mandibular bone volume loss in mice, suggesting that non-weight bearing bones are altered in microgravity; factors other than a headward fluid shift may also be important in modulating the remodeling of non-weight bearing bones in the head.

Scott R. Alwood J. Nalavadi M. Shirazi-Fard Y. Castillo A.
[Effects of Zoledronate and Mechanical Loading During Simulated Weightlessness on Bone Structure and Mechanical Properties \[#7201\]](#)

The purpose of the study is to examine the combination of an anti-resorptive drug (Zoledronate) and high-force exercise (Cyclical Loading) during simulated weightlessness (Hindlimb Unloading) on bone structure and mechanical properties.

Ploutz-Snyder L. Downs M. Ryder J. Crowell B. Goetchius E. Seponski C. Ploutz-Snyder R. Zwart S. Smith S. Scott J.
[INTEGRATED RESISTANCE AND AEROBIC EXERCISE TRAINING WITH SMALL COMPACT EXERCISE EQUIPMENT - BONE \[#7202\]](#)

Bone mineral content and density assessed by iDXA were unchanged following 70 days of bed rest in all groups.

Bokhari R. Metzger C. Allen M. Lenfest S. Seidel D. Hogan H. Turner N. Zwart S. Bloomfield S.
[MODERATE ELEVATIONS IN IRON STORES IMPROVE SKELETAL PROPERTIES IN CAGE-CONTROL AND HINDLIMB UNLOADED MICE \[#7203\]](#)

High dietary iron intake in adult mice led to higher bone mass, mid-diaphysis mechanical strength and improved trabecular microarchitecture in both control and hindlimb unloaded mice.

Mantri A. Junior M. Bloomfield S.
[Modulation of Bone Response to Disuse by Simulated Oral Contraceptive Use \[#7204\]](#)
Simulated oral contraceptive use appears to have a more positive impact on cortical bone compartments than the cancellous bone.

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

[*Noninvasive Assessment of Bone Quality in Human Distal Radius and Calcaneus using Quantitative Ultrasound* \[#7205\]](#)

Distal radius fractures and lower limb fractures are the most common osteoporotic fractures. Flexible ultrasound system can distinguish bone quality differences in genders and ages. It is thus can be used as a method to predict bone fracture.

Uzer G. Bas G. Sen B. Rubin J.

[*NUCLEAR ENVELOPE MECHANOSOME REGULATES BCATENIN NUCLEAR TRANSPORT* \[#7206\]](#)

Here, with the ultimate goal of identifying potential nucleoskeleton and LINC regulatory mechanisms that could be targeted to combat microgravity, we propose that the microgravity-induced shift of MSC into adipogenic lineage may be accelerated by catabolic nucleoskeletal alterations.

Laughlin M. Murray J. Wear M. Van Baalen M.

[*POST-FLIGHT BACK PAIN FOLLOWING INTERNATIONAL SPACE STATION MISSIONS: EVALUATION OF SPACEFLIGHT RISK FACTORS* \[#7207\]](#)

An initial evaluation of ISS post-flight back pain cases shows no apparent space flight risk factors and the cause is probably multi-faceted and not easily identified in the medical records.

[*Brezicha J. Lenfest S. Kosniewski J. Leach C. Black J. Allen M. Bloomfield S. Hogan H. Pre-Treatment with Bisphosphonates Mitigates Bone Loss at the Tibia Metaphysis and Femoral Neck During Subsequent Hindlimb Unloading and Recovery* \[#7208\]](#)

Administration of bisphosphonates before hindlimb unloading period mitigates bone loss.

Luna C. Yew A. Hsieh A.

[*Simulated microgravity inhibits osteogenic differentiation in human mesenchymal stem cells* \[#7209\]](#)

In this study we demonstrate that, under osteogenic growth conditions, human mesenchymal stem cells become smaller and more rounded, and are unable to express alkaline phosphatase or produce mineralized matrix during long-term clinorotation culture.

Judex S. Sankaran J. Donahue L. Zhang W.

[*SINGLE DISTINCT OR MULTIPLE SUBTLE GENETIC VARIATIONS ALTER BONE'S RESPONSE TO MECHANICAL UNLOADING* \[#7210\]](#)

The identification of CD44, NOD2, ESR1, and ESR2 as modulators of at least some aspects of bone's response to unloading may be critical in identifying and treating individuals more susceptible to spaceflight.

Hargens A. Macias B. Masuda K. Morioka K. Ferguson A. Lotz J.

[*Spinal Structure and Function after 90 Days Long-Duration Simulated Space Flight and Recovery* \[#7211\]](#)

We will compare morphology, biochemistry, and kinematics of spines (including the vertebrae, intervertebral discs, spinal cords and spinal muscles) of 90 day, hind-limb suspended and control rats.

Nordberg R. Mellor L. Lobo E.

[*THE ROLE OF LRP RECEPTORS IN THE REGULATION OF CARTILAGE HOMESTASIS IN MICROGRAVITY* \[#7212\]](#)

Cartilage homeostasis in microgravity may be regulated through LRP receptors within Canonical Wnt-signaling, which are responsive to microgravity and can be suppressed through the addition of sclerostin, a Wnt-inhibitor.

Blaber E. Almeida E.

[*The Role of the CDKN1a/p21 Pathway in Microgravity-Induced Arrest of Stem Cell-based Tissue Regeneration* \[#7213\]](#)

A study investigating the inhibition of stem cell-based tissue regeneration during spaceflight and the effects of this on bone tissue health.

Kwok A. Moore J. Payne V. Livingston E. Bateman T. Lau A. Willey J.

[*UNLOADING INDUCES CARTILAGE DEGRADATION AND BIOMARKERS OF ARTHRITIS IN THE KNEE AND HIP JOINTS* \[#7214\]](#)

Hindlimb unloading of mice for 21 days resulted in both significant thinning of knee articular cartilage and increased biomarkers of catabolic Wnt-signaling from cartilage of the femoral head.

LeBlanc A. Matsumoto T. Jones J. Shapiro J. Lang T. Shackelford L. Smith S. Evans H. Spector E. Ploutz-Snyder R. Sibonga J. Keyak J. Nakamura T. Kohri K. Ohshima H. Moralez G.

[*UPDATE OF BISPHOSPHONATE FLIGHT EXPERIMENT-HRP 2016* \[#7215\]](#)

This report summarizes the current status of the flight experiment "Bisphosphonates as a Countermeasure to Space Flight Induced Bone Loss".

Monday, February 8, 2016

Poster Session A: Cardiovascular

4:15 PM

Exhibit Hall A

Seawright J. Colletta A. Boudreaux R. Metzger C. Shimkus K. Fluckey J. Hogan H. Bloomfield S. Braby L. Woodman C.

[AORTIC MNSOD AND ENOS PROTEIN CONTENT ARE INCREASED IN 56FE IRRADIATED AND PARTIALLY LOADED MICE FOLLOWING RESISTANCE EXERCISE](#) [#7216]

Resistance exercise may provide vascular protection in aorta from irradiated and partial weight borne mice.

Lindner J. Ferencik M. Taqui S. Spellman P. Minnier J. Stevens J. Bobe G. Belcik T. Turker M. Raber J.

[Biomarker assessment for identifying heightened risk for cardiovascular complications during long-duration space missions](#) [#7217]

This is a multidisciplinary grant that is investigating how advanced cardiovascular imaging of coronary arteries and endothelial function together with metabolomics, lipidomics and whole genome sequencing can be used to evaluate cardiovascular risk during NASA deep space missions.

Diaz Artiles A. Heldt T. Young L.

[Cardiovascular Model During Short-Radius Centrifugation and Ergometer Exercise](#) [#7218]

In this research effort, a cardiovascular lumped-parameter model has been developed to simulate the short-term transient hemodynamic response to artificial gravity exposure (in a short-radius centrifuge) combined with ergometer exercise.

Grabham P. Sharma P.

[COMBINED EFFECTS OF SPACE RADIATION AND MICROGRAVITY ON HUMAN CAPILLARIES.](#) [#7219]

Space radiation and microgravity cause additive deleterious effects on the structure and function of human capillary tissue models.

Thosar S. Berman A. Roberts S. Clemons N. Butler M. Shea S.

[Endogenous circadian rhythm in vascular function and cardiovascular risk](#) [#7220]

In this study, using a 'forced desynchrony' protocol we studied the endogenous circadian rhythm in vascular endothelial function as it may relate to the observed early morning peak in adverse cardiovascular events.

English K. Hwang E. Ryder J. Kelly C. Walker T. Ploutz-Snyder L.

[HEART RATE RESPONSES TO UNAIDED ORION SIDE HATCH EGRESS IN THE NEUTRAL BUOYANCY LABORATORY](#) [#7221]

We present heart rate responses to unaided Orion side hatch egress.

Hughson R.

[KEY FINDINGS FROM THE SPACEFLIGHT EXPERIMENT BP REG \[#7222\]](#)

Nine male astronauts participated in experiments to test an inflight blood pressure challenge with rapid leg cuff deflation to assess risk for post-flight orthostatic intolerance during a 3-min stand test. They also performed rebreathing estimates of cardiac output, and we monitored end-tidal PCO₂. Rebreathing cardiac output increased 45% with spaceflight while estimates from finger pressure waveform were unchanged. End-tidal PCO₂ increased 6 mmHg during spaceflight.

Hughson R.

[KEY RESULTS FROM THE SPACEFLIGHT EXPERIMENT VASCULAR \[#7223\]](#)

Nine astronauts (4 women) had increased carotid artery stiffness when measured within 38h of return from ISS. Blood biomarkers obtained inflight revealed greater insulin resistance, more so in men, and greater increases in renin and aldosterone, more so in women. Spaceflight has a negative impact on cardio-metabolic health with potentially important between sex differences.

Levine B. Steding-Ehrenborg K. Seemann F. Bungo M.

[Left atrial volumes increase and atrioventricular plane displacement remains unchanged after 6 months in space \[#7224\]](#)

Left atrial volumes increase and atrioventricular plane displacement remains unchanged after 6 months in space, potentially due to sustained elevations in average 24 hour LA distending pressure (i.e., above the upright but below supine).

LaPelusa M. Charvat J. Lee L. Wear M. Van Baalen M.

[Reported Occurrence of Cerebrovascular Accidents in the NASA Astronaut Population \[#7225\]](#)

Determine whether NASA astronauts are at higher risk for CVA compared to the US population based on their exposure to radiation, isolation and associated mental stress, extended periods of time in microgravity, high-performance aircraft training, and other relevant occupational exposures.

Ade C. Barstow T.

[SPACEFLIGHT AND RISK FACTORS OF HARD CARDIOVASCULAR DISEASE END-POINTS: A CASE-COHORT STUDY \[#7226\]](#)

The objective of the present study was to determine whether non-occupational risk factors and/or spaceflight history are associated with 'hard' cardiovascular disease end-points (i.e., cardiovascular death and non-fatal cardiovascular disease events) in astronauts.

Natarajan M.

[Sustained Endothelial Dysfunction is a Potential Indicator of Radiation-Induced Degenerative Cardiovascular Risk \[#7227\]](#)

Iron ion of space radiation causes vascular endothelial dysfunction and accelerated atherosclerosis in wild type mouse models.

Monday, February 8, 2016

Poster Session A: Computational Modeling

4:15 PM

Exhibit Hall A

Gladding P. Orr M. Negishi K. Borowski A. Hussan J. Hunter P. Kassemi M. Martin D. Levine B. Schlegel T. Thomas J.

[*A MULTISCALE COMPUTATIONAL MODEL OF THE HEART: EXPLORING SPACE MEDICINE AND TERRESTRIAL APPLICATIONS*](#) [#7228]

We have developed a personalised computational model of the heart for monitoring cardiac health in space.

Jagodnik K. Thompson W. Gallo C. Crensil L. Funk J. Funk N. Perusek G. Sheehan C. Lewandowski B.

[*Biomechanical Modeling of the Deadlift Exercise on the HULK Device to Improve the Efficacy of Resistive Exercise Microgravity Countermeasures*](#) [#7229]

The deadlift exercise performed using the Hybrid Ultimate Lifting Kit (HULK) is being modeled using the OpenSim platform in order to refine the design of resistive exercise microgravity countermeasures for exploration-class vehicles and to inform exercise prescriptions for astronauts.

Myers J. Boppana A. Sefcik R. Lewandowski B.

[*Utilizing Open Source Software to Enable Computational Assessment of Medical Imaging*](#) [#7230]

We will discuss our efforts to develop an open-source workflow methodology that segmented medical image data, created a 3D model from the segmented data, and prepared the model for finite-element analysis.

Monday, February 8, 2016

Poster Session A: Extravehicular Activity

4:15 PM

Exhibit Hall A

Conkin J. Norcross J. Alexander D. Sanders R. Matkowski M.

[CARBON MONOXIDE ACCUMULATION IN THE EXTRAVEHICULAR MOBILITY UNIT \[#7231\]](#)

Carbon monoxide can accumulate in the space suit during extravehicular activity.

Jason N. Bekdash O. Meginnis I.

[Characterization of Carbon Dioxide Washout Measurement Techniques in the Mark-III Space Suit \[#7232\]](#)

It is necessary to understand the inspired CO₂ of suit wearers such that future requirements for space suits appropriately address the risk of inadequate washout.

Laughlin M. Murray J. Lee L. Wear M. Van Baalen M.

[COMPILING A COMPREHENSIVE EVA TRAINING DATASET FOR NASA ASTRONAUTS \[#7233\]](#)

LSAH has assembled records from the WETF, NBL and Hydro Lab into a dataset and it is currently the most complete resource for EVA training sessions performed by NASA astronauts.

Abercromby A. Norcross J. Jarvis S.

[EVA Health and Human Performance Benchmarking Study \[#7234\]](#)

This multidisciplinary test will deliver health and human performance benchmark data for humans working in microgravity and planetary space suits as well as shirtsleeve using a standard set of tasks and metrics with quantified reliability.

Dungan L.

[Reduced Gravity Testing Using The Active Response Gravity Offload System \[#7235\]](#)

This presentation will discuss the Active Response Gravity Offload System (ARGOS) gimbal design and development, test design, and future testing plans.

Monday, February 8, 2016

Poster Session A: Muscle and Exercise

4:15 PM

Exhibit Hall A

English K. Mulavara A. Bloomberg J. Ploutz-Snyder L.

[*Calf Strength Loss during Mechanical Unloading: Does It Matter? \[#7236\]*](#)

We examine the effect of bed rest-induced changes in calf strength on balance control, dynamic postural stability, and brief functional performance.

Kendrick D. Stirling L.

[*Designing the Gravity Loading Countermeasure Skinsuit \[#7237\]*](#)

This paper describes the design and construction of the Gravity Loading Countermeasure Skinsuit, a countermeasure garment designed to mitigate physiological deconditioning seen during long duration spaceflight.

Feiveson A. Sibonga J.

[*FE STRENGTH CUTOFFS: ESTIMATING DECLINES IN ASTRONAUT HIP STRENGTH FOR EXTENDED SPACEFLIGHT MISSIONS \[#7238\]*](#)

As an alternative to calculating averaged monthly losses, a model for estimating a spaceflight trend that can be used to project declines in hip strength over a 12- and 36-month spaceflight will be presented.

Hanson A. Downs M. Kalogera K. Buxton R. Cooper T. Cooper A. Cooper R.

[*Miniature Biometric Sensor with Health Risk Assessment Feedback \[#7239\]*](#)

A novel earbud based biosensor was evaluated for use during exercise and medical diagnostics.

Parmar P. Caruso J. Perry R. Martin J. Vickers S. Baptista R. Edwards R. McArtor J. Mitchell L.

[*NET ENERGY COSTS FROM RESISTIVE EXERCISE DONE ON FLYWHEEL-BASED HARDWARE \[#7240\]*](#)

To optimize microgravity workouts and test the hypothesis that eccentric actions on a gravity-independent flywheel erg will be more efficient than concentric actions alone, subjects were tested with concentric and eccentric workouts and total work and net energy expenditure were measured.

Downs M. Newby N. Trinh T. Hanson A.

[*Novel Musculoskeletal Loading System \[#7241\]*](#)

The proposed musculoskeletal system hardware development will be attached to pre-existing small exercise devices for exploration missions to allow for loading at the shoulders and the ability to measure muscle strength.

Parmar P. Caruso J. Perry R. Cesarz G. Roberts A. Hardman H.

[*Physiological Effects of Spaceflight Microgravity Conditions and Mitigating Effects of Flywheel-Based Resistive Exercise \[#7242\]*](#)

An extended review of the hormonal, nutritional, cardiovascular, and physiological changes that humans undergo in microgravity, and different devices used as exercise countermeasures for these changes.

Ryder J. Scott J. Ploutz-Snyder R. Ploutz-Snyder L.
[*Sweat Rates During Continuous and Interval Aerobic Exercise: Implications for NASA Multipurpose Crew Vehicle \(MPCV\) Missions. \[#7243\]*](#)

This study will examine the impact of different aerobic exercise routines on sweat production.

Downs M. Feiveson A. Lee S. Ploutz-Snyder L.
[*Validity of Predicting VO₂max during Long-duration Unloading: Bed rest and Spaceflight \[#7244\]*](#)

Including data from previous measurements of VO₂peak significantly reduced the variability in predicting VO₂peak for individuals.

Monday, February 8, 2016
Poster Session A: Nutrition
4:15 PM **Exhibit Hall A**

Smith S. Heer M. Zwart S.

[Biochemical Profile \[#7245\]](#)

A description of the Biochemical Profile study will be presented.

Monday, February 8, 2016

Poster Session A: Occupant Protection

4:15 PM

Exhibit Hall A

Wells J. Newby N. Somers J.

[ANTHROPOMETRIC TEST DEVICE INJURY METRIC DEVELOPMENT \[#7246\]](#)

The current study used existing human and post-mortem human subject (PMHS) test data combined with physical and finite element model (FEM) simulations of ATD impacts to update thoracic spine and sternal deflection injury risk curves.

Somers J. Wells J. Newby N.

[ASSESSING THE SENSITIVITY AND EXTENSIBILITY OF ANTHROPOMORPHIC TEST DEVICE RESPONSES IN SPACEFLIGHT CONDITIONS \[#7247\]](#)

Study to assess the sensitivity of crash test dummies to spaceflight dynamics.

Newby N. Somers J. Wells J.

[SOYUZ LANDING RISK CHARACTERIZATION \[#7248\]](#)

Correlating injury types and incidences with actual Soyuz landing accelerations will greatly inform NASA occupant protection requirements.

Monday, February 8, 2016

Poster Session A: Pharmacology

4:15 PM

Exhibit Hall A

Farquharson S. Brouillette C.

[*Analysis of ISS Drug Degradation by Raman Spectroscopy*](#) [#7249]

The design and use of a space-worthy Raman analyzer to measure degradation of ISS flown medications will be presented.

Soucy P. O'Toole M. Lanceta L. Nunn B. Ehringer W. Eaton J. Keynton R.

[*Drug Delivery of Antioxidants for Mitigation of Radiation-Induced Cell Damage*](#) [#7250]

Novel drug delivery systems loaded with antioxidants have been fabricated to reduce DNA and cell damage caused by exposure to low LET radiation.

Wotring V. Derendorf H. Kast J. Barger L. Basner M.

[*INFLIGHT PHARMACOKINETIC AND PHARMACODYNAMIC RESPONSES TO MEDICATIONS COMMONLY USED IN SPACEFLIGHT*](#) [#7251]

The new "Rx Metabolism" study was designed to provide unique information on pharmacokinetics and pharmacodynamics in the spaceflight environment.

Monday, February 8, 2016

Poster Session A: Physics and Space Radiation Technologies

4:15 PM

Exhibit Hall A

Ponomarev A. Plante I. Hada M. George K.

[BIOLOGICAL DAMAGE BY STOCHASTIC TRACKS: A NEW COMPUTATIONAL MODEL FOR THE SIMULATION OF RADIATION-INDUCED CHROMOSOME ABERRATIONS \[#7252\]](#)

We are presenting a new computational chromosome and radiation-induced DNA damage model, named BDSTRACKS (Biological Damage by Stochastic Tracks), which incorporates the codes RITRACKS (relativistic ion tracks) and NASARTI (NASA radiation track image).

Over S. Myers J. Ford J.

[Risks from Solar Particle Events for Long Duration Space Missions Outside Low Earth Orbit \[#7253\]](#)

Through integrating existing models, risk assessment of solar particle events for long duration missions outside of low Earth orbit can be performed, allowing for comparison of different mission profiles and their effect on radiation risk.

Plante I.

[Simulation of DNA damage by ionizing radiation at the atomic scale: first results obtained with the code RITRACKS \[#7254\]](#)

Simulation of DNA damage by ionizing radiation at the atomic scale.

Chesny D. Durrance S. Levin G.

[Spacecraft Radiation Shielding by a Dispersed Array of Superconducting Magnets \[#7255\]](#)

Effective spacecraft radiation shielding beyond low-Earth orbit can be achieved via a dispersed "swarm-bot" array of CubeSat-sized superconducting solenoids, thus reducing the total amount of radiation reaching an astronaut habitat "safe zone," and lowering the crew's exposure risk.

Monday, February 8, 2016

Poster Session A: Sensorimotor

4:15 PM

Exhibit Hall A

Beltran E. Wood S. Moore S.

[ASSESSMENT OF PROFICIENCY DURING SIMULATED ROVER OPERATIONS AFTER LONG-DURATION SPACEFLIGHT \[#7256\]](#)

The primary goal of this investigation was to quantify postflight decrements in operational proficiency in a motion-based rover simulation after International Space Station (ISS) expeditions.

Goel R. De Dios Y. Gadd N. Caldwell E. Peters B. Bloomberg J. Oddsson L. Mulavara A.
[DEVELOPMENT OF A PROTOCOL TO TEST UTILIZATION OF SOMATOSENSORY INFORMATION AS A PREDICTOR FOR SENSORIMOTOR ADAPTABILITY \[#7257\]](#)

This project shows the efficacy of using performance in single leg stance with eyes closed on the gravity bed to assess individuals' ability to utilize somatosensory information in a functional postural control task to predict re-adaptation for sensorimotor and functional performance.

Rosenberg M. Peters B. Reschke M.

[DYNAMIC VISUAL ACUITY AND LANDING SICKNESS IN CREWMEMBERS RETURNING FROM LONG-DURATION SPACEFLIGHT \[#7258\]](#)

Using a portable oscillating chair, we test dynamic visual acuity in returning long-duration astronauts to assess the amount of retinal slip that they experience and determine if this is related to degree of motion (landing) sickness.

Temple D. De Dios Y. Layne C. Bloomberg J. Mulavara A.

[Efficacy of stochastic vestibular stimulation to improve locomotor performance in a discordant sensory environment \[#7259\]](#)

Individuals were found to adapt faster to locomotion in a discordant sensory environment when subthreshold amounts of electrical stochastic stimulation were applied to the vestibular system.

Koppelmans V. Cassady K. de Dios Y. Szecsy D. Gadd N. Wood S. Reuter-Lorenz P. Kofman I. Bloomberg J. Mulavara A. Ploutz-Snyder L. Seidler R.

[EXERCISE EFFECTS ON THE BRAIN AND SENSORIMOTOR FUNCTION IN BED REST \[#7260\]](#)

We hypothesized that an exercise intervention during head down tilt bed rest could potentially mitigate the effects of bed rest on the central nervous system.

Galvan-Garza R. Clark T. Merfeld D. Bloomberg J. Oman C. Mulavara A.

[Exhibition of Stochastic Resonance in Vestibular Perception \[#7261\]](#)

This research aimed to demonstrate and quantify the exhibition of stochastic resonance in vestibular perception due to the application of electrical stochastic vestibular stimulation.

Beaton K. Bloomberg J.

[Forecasting Sensorimotor Adaptability from Baseline Inter-trial Correlations \[#7262\]](#)

The principal aim of this work is to look for baseline performance metrics that relate to locomotor adaptability.

Noohibezanjani F. Kinnaird C. Wood S. Bloomberg J. Mulavara A. Seidler R.
[FUNCTIONAL IMAGING OF HUMAN VESTIBULAR CORTEX ACTIVITY ELICITED BY SKULL TAP AND AUDITORY TONE BURST](#) [#7263]

Pneumatically powered skull taps inside fMRI scanner successfully elicit the activation of canonical vestibular cortex, suggesting an equally valid, but more tolerable stimulation method compared to auditory tone bursts.

Boyle R. Popova Y. Varelas J.
[Influence of altered gravity on the vestibular system in fish, snails, and mice.](#) [#7264]

The results suggest that the duration and magnitude - from weightlessness to hypergravity - can influence the structure and function of vestibular mechanisms in vertebrates and invertebrates.

Kofman I. De Dios Y. Lawrence K. Schade A. Reschke M. Bloomberg J. Wood S. Mulavara A. Seidler R.
[NEUROMAPPING: INFLIGHT EVALUATION OF COGNITION AND ADAPTABILITY](#) [#7265]

An update on the stats of inflight component of the ongoing neuromapping study.

De Dios Y. Gadd N. Kofman I. Peters B. Reschke M. Bloomberg J. Wood S. Noohi F. Kinnaird C. Seidler R. Mulavara A.
[OCULAR VESTIBULAR EVOKED MYOGENIC POTENTIALS USING HEAD STRIKER STIMULATION](#) [#7266]

Presenting data collected using head striker stimulation for the Vestibular Evoked Myogenic Potential (VEMP) test, which provides a unilateral measure of otolith (sacculle and utricle) function.

Kofman I. Reschke M. Cerisano J. Fisher E. Phillips T. Rukavishnikov I. Kitov V. Lysova N. Lee S. Stenger M. Bloomberg J. Mulavara A. Tomilovskaya E. Kozlovskaya I.
[PILOT FIELD TEST: PERFORMANCE OF A SIT-TO-STAND TEST AFTER LONG-DURATION SPACEFLIGHT](#) [#7267]

Results of the Sit-to-Stand Test performed as part of the Pilot Field Test study conducted on crewmembers of expeditions 34S-41S.

Kofman I. Reschke M. Cerisano J. Fisher E. Phillips T. Rukavishnikov I. Kitov V. Lysova N. Lee S. Stenger M. Laurie S. Bloomberg J. Mulavara A. Tomilovskaya E. Kozlovskaya I.
[PILOT FIELD TEST: RECOVERY FROM A SIMULATED FALL AND QUIET STANCE STABILITY AFTER LONG-DURATION SPACEFLIGHT](#) [#7268]

Sensorimotor results of the Recovery from Fall Test performed as part of the Pilot Field Test study conducted on crewmembers of expeditions 34S-41S.

Fisher E. Fomina E. Reschke M. Cerisano J. Kofman I. Gadd N. Phillips T. Lee S. Laurie S. Stenger M. Bloomberg J. Mulavara A. Kozlovskaya I. Tomilovskaya E.
[PILOT FIELD TEST: THE ABILITY TO AMBULATE AFTER LANDING AS ASSESSED WITH SEAT EGRESS, WALK, AND OBSTACLE TEST](#) [#7269]

The objective of the Seat Egress, Walk, and Obstacle Test, developed by NASA's Russian collaborators at the Institute of Biomedical Problems, is to address the gap in knowledge of the time course of recovery of sensorimotor abilities.

Cerisano J. Reschke M. Kofman I. Fisher E. Gadd N. Phillips T. Lee S. Laurie S. Stenger M. Bloomberg J. Mulavara A. Kozlovskaya I. Tomilovskaya E.
[PILOT FIELD TEST: RESULTS OF TANDEM WALK PERFORMANCE FOLLOWING LONG-DURATION SPACEFLIGHT \[#7270\]](#)

Summary of U.S. and Russian crew member performance of the Tandem Walk test on landing day, collected as part of the Pilot Field Test experiment.

Nair M. Mulavara A. Bloomberg J. Sangi-Haghpeykar H. Cohen H.
[Relationship Among Visual Dependence, Balance, and Spatial Orientation and Abnormal Loading of the Labyrinth in BPPV \[#7271\]](#)

Patients with a unilateral impairment of the posterior canal and otoliths from BPPV have a visual bias toward the impaired side.

Clark T. Peters B. Gadd N. De Dios Y. Wood S. Bloomberg J. Oman C. Mulavara A.
[RELATIONSHIPS BETWEEN VESTIBULAR MEASURES AS POTENTIAL PREDICTORS FOR SPACEFLIGHT SENSORIMOTOR ADAPTATION \[#7272\]](#)

In a group of ground-based control subjects, we investigate the relationship between various measures of vestibular function as potential predictors for spaceflight sensorimotor adaptation.

Rosenberg M. Galvan-Garza R. Clark T. Sherwood D. Young L. Karmali F.
[SENSORY PRECISION LIMITS VEHICLE CONTROL PERFORMANCE \[#7273\]](#)

Using a short-radius centrifuge, a strong, linear correlation was established between manual control performance and sensory precision, suggesting that the limiting factor in performance is sensory noise.

Cassady K. Koppelmans V. De Dios Y. Stepanyan V. Szecsy D. Gadd N. Wood S. Reuter-Lorenz P. Riascos Castenada R. Kofman I. Bloomberg J. Mulavara A. Seidler R.
[The Effects of Long Duration Bed Rest on Brain Functional Connectivity and Sensorimotor Functioning \[#7274\]](#)

We investigate the effects of prolonged exposure to head down tilt bed rest on resting state brain functional connectivity and its association with behavioral changes in 17 male participants.

Wood S. Clément G.
[Vestibular Evoked Myogenic Potentials \(VEMP\) in Microgravity \[#7275\]](#)

This new ESA-NASA joint study will assess adaptive changes in otolith function using vestibular-evoked myogenic potentials (VEMPs) during and following long-duration spaceflight.

Clark T. Merfeld D.
[VESTIBULAR PERCEPTUAL NOISE AND ADAPTATION TO AN ALTERED GRAVITY ENVIRONMENT \[#7276\]](#)

We investigate the relationship between an individual's vestibular noise, as assayed with self-motion perception thresholds, and their capacity for sensorimotor adaptation to altered gravity environments.

Monday, February 8, 2016

Poster Session A: Space Radiation Cancer

4:15 PM

Exhibit Hall A

Sridharan D. Enerio S. Wang C. Chen J. Narasimhan R. Stampfer M. Pluth J.
[Assessing the Impact of Genetic Susceptibility on Long-term Phenotypes to Model Cancer Risk Post Radiation Exposure \[#7277\]](#)

Assessing the impact of genetic background on surrogate markers of carcinogenesis is key to reducing uncertainties caused by genetic variation in modeling cancer risk post space radiation exposure.

Deng X. Xie M. Park D.

[Bcl2 suppresses the repair of high-LET radiation-induced DNA double-strand breaks \[#7278\]](#)

Bcl2 inhibits Mre11 complex-mediated DNA resection leading to suppression of DSB repair in surviving cells, which may potentially contribute to tumor development.

Park S. Ding L. Minna J. Story M.

[CHARACTERIZATION OF ONCOGENETICALLY ADVANCED HUMAN BRONCHIAL EPITHELIAL CELLS AFTER EXPOSURE TO LOW AND HIGH LET RADIATIONS \[#7279\]](#)

We measured the rate of cellular transformation after low and high LET radiation exposure in immortalized human bronchial epithelial cell lines that varied in their state of oncogenic progression and investigated the molecular, biochemical and phenotypic changes.

Kronenberg A. Gauny S. Grygoryev D. Grossi G. Johnson S. Rwatambuga F. Turker M.
[Comparative Analysis of Charged Particle-Induced Autosomal Mutagenesis in Murine Tissue and Cells \[#7280\]](#)

This project examines mutant frequency and mutational spectra after exposure of mouse kidney epithelium to charged particle radiation, with a focus on the effects of ions of intermediate LET.

Kidane Y.

[Computational Prediction of Ionizing Radiation Responsive Genes \[#7281\]](#)

Computational Prediction of Ionizing Radiation Responsive Genes by overlaying mRNA expression on protein-protein interaction network.

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 \[#7282\]](#)

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.

Kumar S. Suman S. Fornace A. Datta K.

[Effects of radiation quality on signaling pathways regulating intestinal cell migration in C57BL/6J mice \[#7283\]](#)

High energy charged particle perturbs intestinal epithelial cell migration by deregulating Eph-Ephrin signaling and its downstream molecules.

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

[*EPIGENETIC REGULATION OF APOPTOSIS IN ADULT COLON STEM CELLS: RESPONSE TO RADIATION AND DIETARY INTERVENTIONS* \[#7284\]](#)

Ongoing project to investigate epigenetic regulation of apoptosis in adult mouse colon stem cells in response to low dose, HZE radiation and dietary interventions.

Jella K. Li Z. Dynan W.

[*Exosomes as mediators of space radiation-induced non-targeted effects* \[#7285\]](#)

Decreased repair fidelity is a radiation quality-dependent, non-targeted effect, arising at the cell population level and perhaps transmitted by RNA and protein-containing microvesicles known as exosomes.

Farin A. Kondu B. Stripp B.

[*Exposure to high-LET radiation results in p53-dependent airway epithelial progenitor cell depletion and tissue remodeling* \[#7286\]](#)

Using in vitro and in vivo studies, we found that exposure to high-LET, but not low-LET radiation leads to prolonged progenitor cell depletion and lung tissue remodeling in a p53-dependent manner.

Castle K. Moding E. Lee C. Reinsvold M. Williams N. Luo L. Ma Y. Kirsch D.

[*Exposure to HZE Particles Enhances Lung Tumor Development in a Mouse Model of Small Cell Lung Cancer* \[#7287\]](#)

Exposure to a single dose or fractionated doses of X-rays or 56Fe ions increases the incidence and alters the spectrum of lung tumors in a mouse model of small cell lung cancer.

Rampersad R. Onaitis M.

[*FRACTIONATED HIGH LET IRON IRRADIATION EFFECTS ON K-RasG12D-INDUCED TUMOR PROGRESSION* \[#7288\]](#)

High LET radiation leads to increased progression of K-Ras mutant lung adenocarcinoma.

Emmett M. Barnette B. Strain S. Lichti C. Yu Y. Ullrich R.

[*Induction of Hepatocellular Carcinoma by Space Radiation: A Systems Biology Study of Causative Mechanisms* \[#7289\]](#)

To better understand the molecular mechanisms of HZE induced carcinogenesis, we use an in-house developed mouse model of low level HZE-induced hepatocellular carcinoma to study microenvironment changes after exposure to low level HZE.

Todorova P. Mukherjee B. Wang X. Guida P. Story M. McKinnon P. Burma S.

[*Mechanistic Analysis of Particle Radiation-Induced Carcinogenesis Using Validated Mouse Glioma Models* \[#7290\]](#)

Using validated mouse models of radiation-induced glioblastoma (GBM), we are investigating radiation quality effects on carcinogenesis, identifying genetic signatures unique to particle radiation, and delineating specific DNA repair pathways that act as key barriers to transformation.

Cornforth M. Loucas B. Bailey S.

[*Molecular characterization of transmissible chromosome aberrations produced by ions of intermediate and high atomic number* \[#7291\]](#)

Bioinformatic strategies applied to paired-end libraries allowed us to locate DNA sequences surrounding a known radiation-induced reciprocal translocation in a human cell clone, but inversions may require the use of mate-pair libraries or whole-genome sequencing.

de Toledo S. Domogauer J. Colangelo N. Hu T. Howell R. Azzam E.

[*Oxidative Stress and the Cancer Risk of Space Radiation* \[#7292\]](#)

This project investigates molecular mechanisms underlying cancer incidence in middle-aged mice following whole or partial body exposure to low mean absorbed doses of isovelocity 1 GeV/u protons, oxygen, silicon or calcium ions.

Suman S. Kumar S. Fornace A. Datta K.

[*Persistent stress signaling in gastrointestinal tract after exposure to heavy ion space radiation.* \[#7293\]](#)

Persistent stress signaling in gastrointestinal tract is radiation quality dependent.

Wu H. Lu T. Zhang Y. Yeshitla S. Bowler D. Kahdim M. Wilson B.

[*Proton and Fe ion-induced early and late chromosome aberrations in different cell types* \[#7294\]](#)

Chromosomal instability induced by charged particles depends on the cell types.

Aroumougame A.

[*Rad51, A DNA Repair factor, Suppresses Space radiation induced Immune Response* \[#7295\]](#)

Here, in addition to different DNA metabolic functions, we report a novel role for Rad51 in the suppression of immune response signaling following galactic cosmic rays.

Kim S. Bozeman R. Kaisanio A. Kim W. Zhang L. Richardson J. Wright W. Fornace A. Shay J.

[*RADIATION PROMOTES COLORECTAL CANCER INITIATION AND PROGRESS BY INDUCING SENESCENCE-ASSOCIATED INFLAMMATORY RESPONSES* \[#7296\]](#)

SPE promotes colorectal cancer by inducing senescence-associated inflammation which can be protected by pre-treatment of CDDO-EA.

Ding L. Hwang T. Park S. Ullrich R. Weil M. Story M.

[*SOMATIC MUTATIONS AND STRUCTURAL VARIATION ASSOCIATED WITH RADIATION-INDUCED MURINE HEPATOCELLULAR CARCINOMA* \[#7297\]](#)

Common gene alterations, including mutation, structural variation and expression, were identified in both murine and human HCC.

Mishra B. Ortiz L. Luderer U.

[*Space radiation causes premature ovarian failure and epithelial ovarian tumors in mice* \[#7298\]](#)

Irradiation with low doses of charged iron particles induces DNA damage, oxidative stress, and apoptosis in ovarian follicles, causing premature ovarian failure and ovarian tumors.

Bozeman R. Luitel K. Shay J.

[*SPACE RADIATION PROMOTES LUNG CANCER PROGRESSION* \[#7299\]](#)

Radiation exposure leads to an overall reduced lifespan, in addition to a significant increase in invasive carcinoma development in the K-ras LA1 lung cancer mouse model.

Blattnig S.

[*Space Radiation Risk Assessment Project* \[#7300\]](#)

This presentation summarizes recent work of the space radiation risk assessment project.

Loucas B. Cornforth M.

[*The Production of Chromosomal Exchanges by Ions of Different Energies but the Same LET* \[#7301\]](#)

Low energy Li ions produce larger and more complex chromosomal exchanges in fibroblasts than they do in lymphocytes.

Luitel K.

[TRITERPENOID \(CDDO-EA\): A POTENT RADIO-PROTECTOR AGAINST HEAVY ION RADIATION IN A LUNG CANCER MOUSE MODEL \[#7302\]](#)

A potential countermeasure for radiation induced damages in lung.

Monday, February 8, 2016

Poster Session A: Visual Impairment and Intracranial Pressure

4:15 PM

Exhibit Hall A

Greenwood M. Beckman J. Tsai G. Berdahl J.

[*A Non-Randomized, Open-Label Study to Evaluate the Safety and Proof of Concept of Negative Pressure Applied to the Periocular Microenvironment Anterior to the Orbital Rim. \[#7303\]*](#)

To demonstrate safety and proof of concept of the Equinox Balance Goggle Device using negative pressure application on the microenvironment of the eye.

Raghunandan S. Vyas R. Vizzeri G. Taibbi G. Zanello S. Ploutz-Snyder R. Parsons-Wingenter P.

[*Analysis by NASA's VESGEN software of retinal blood vessels before and after 70-day Bed rest: A retrospective study \[#7304\]*](#)

Spectralis images of blood vessels in the retinas of 12 subjects before and after 70 days of bed rest with head-down tilt from NASA's Campaign 11 are undergoing analysis by VESGEN software as a retrospective study.

Wotring V.

[*ARE MEDICATIONS INVOLVED IN VISION AND INTRACRANIAL PRESSURE CHANGES SEEN IN SPACEFLIGHT? \[#7305\]*](#)

This study examined medication usage records for spaceflight crewmembers, affected and unaffected by VIIP, to determine if use of particular medications seemed to examine correlations between medication usage patterns and VIIP status.

Zanello S. Stevens B. Calvillo E. Tang R. Gutierrez-Flores B. Hu L. Skog J. Bershad E.
[*BRAIN GENE EXPRESSION SIGNATURES FROM CEREBROSPINAL FLUID EXOSOME RNA PROFILING \[#7306\]*](#)

Gene expression signatures in the cerebrospinal fluid may reflect neurophysiologic changes associated with increased intracranial pressure.

Raykin J. Forte T. Samuels B. Wang R. Feola A. Mulugeta L. Myers J. Nelson E. Gleason R. Ethier R.

[*Characterization of the biomechanical behavior of the optic nerve sheath and its role in VIIP \[#7307\]*](#)

The biomechanical response of the optic nerve sheath dura mater in response to variations in ICP was characterized to better understand the role of increased ICP in VIIP.

Cromwell R. Taibbi G. Zanello S. Yarbough P. Ploutz-Snyder R.

[*Comparison of Structural and Functional Ocular Outcomes Between 14- and 70-day Bed Rest \[#7308\]*](#)

Results of this study suggest that the duration of head-down bed rest may be critical for replicating microgravity-related ophthalmological changes observed in astronauts on spaceflights of 6 months or longer.

Arbeille P.

[*EFFECT OF DRY IMMERSION INDUCED FLUIDSHIFT ON THE CEPHALIC AND INTRACRANIAL CIRCULATION. \[#7309\]*](#)

After 2h of Dry immersion the following parameters increased from pre DI: Jugular vein volume (440%+/-187 p<0.05), Portal vein section (20%+/-10 p<0.05), MCV velocity (55%+/-66 p<0.05). These parameters returned to baseline after 3days in DI while the plasma volume had drop by 17%+/-8.

Bershad E. Stevens B. Venkatasubba Rao C. Suarez J. Calvillo E. Arbeille P.

[*Effects of Head Down Tilt on Internal Jugular Vein Volume: Preliminary Results from the SPACE-COT Study \[#7310\]*](#)

We present data from the SPACE-COT study on the effects of immediate and short-term HDT on internal jugular vein volumes.

Venkatasubba Rao C. Stevens B. Calvillo E. Suarez J. Bershad E.

[*Effects of Head Down Tilt on Intracranial Blood Volume: Preliminary Results from the SPACE-COT Study \[#7311\]*](#)

We report our findings of cerebral blood volumes changes in acute and short term HDT and exposure to CO₂ in healthy subjects using novel non-invasive technology, Volumetric Integral Phase-shift Spectroscopy (VIPS).

Marshall-Bowman K. Rittweger J. Suarez J. Venkatasubba Rao C. Mulder E. Bershad E.

[*Effects of Head Down Tilt With Or Without 0.5% Carbon Dioxide On Intracranial And Intraocular Pressure: Results From The Space-Cot Study \[#7312\]*](#)

Intracranial and Intraocular pressure were measured during -12 degree head down tilt with and without exposure to 0.5% carbon dioxide.

Platts S. Ribeiro C. Laurie S. Lee S. Martin D. Ploutz-Snyder R. Stenger M.

[*EFFECTS OF SPACEFLIGHT ON VENOUS AND ARTERIAL COMPLIANCE \[#7313\]*](#)

Our primary objective is to determine if space flight alters vascular compliance and whether such an adaptation is related to the incidence of VIIP.

Van Heugten A.

[*Electronic Adjustable Power Eyeglasses For Space and Earth, Project Update \[#7314\]*](#)

Review the rationale for why adjustable spectacle lenses are needed, what we are planning to do, and where we are now.

Ebert D. Macias B. Sargsyan A. Garcia K. Stenger M. Hargens A. Johnston S.

[*Evaluation of an Impedance Threshold Device as a VIIP Countermeasure \[#7315\]*](#)

This investigation will evaluate an impedance threshold device (ITD) as a VIIP countermeasure.

Young M. Mason S. Schaefer C. Wear M. Sargsyan A. Garcia K. Coble C. Gruschkus S.

Law J. Alexander D. Meyers Ryder V. Van Baalen M.

[*EXPLORATORY ANALYSIS OF CARBON DIOXIDE LEVELS AND ULTRASOUND MEASURES OF THE EYE DURING ISS MISSIONS \[#7316\]*](#)

This is an exploratory analysis of the relationship of between ultrasound measures of the eye and inflight CO₂ metrics.

Anderson A. Fellows A. Buckley J.

[*Feasibility of DPOAE Mapping as an In-Flight Measure of Intracranial Pressure In Space \[#7317\]*](#)

We use distortion product otoacoustic emissions in multiple postures to identify promising cochlear regions that may be the most sensitive to changes in ICP.

Stenger M. Hargens A. Dulchavsky S. Ebert D. Lee S. Laurie S. Garcia K. Sargsyan A. Martin D. Ribeiro C. Liu J. Macias B. Arbeille P. Danielson R. Change D. Johnston S. Ploutz-Snyder R. Smith S.

[FLUID SHIFTS \[#7318\]](#)

The purpose of the Fluid Shifts study is to characterize fluid distribution and compartmentalization associated with long-duration spaceflight and to determine the relationship of these findings with ocular structural and functional changes seen in flight.

Melgoza R. Kemp D. Ebert D. Danielson R. Stenger M. Hargens A. Dulchavsky S.

[FLUID SHIFTS: Otoacoustic Emission changes in Response to Posture and Lower Body Negative Pressure \[#7319\]](#)

Our primary objectives regarding OAE measures in this experiment were to 1) validate this method during preflight testing (seated, supine and in head-down tilt position), and 2) determine if OAE measures (and presumably ICP) are responsive to lower body negative pressure and to spaceflight.

Zanello S. Theriot C. Taibbi G. Vizzeri G. Parsons-Wingeter P. Chevez-Barrios P. Rivera A.

[Hindlimb suspension \(HLS\) in rodents for the study of intracranial pressure, molecular and histologic changes in the eye, and CSF production regulation and resorption: a status report of two studies \[#7320\]](#)

We investigate gene expression changes in the retina of hindlimb suspended rats compared to those in normal posture, as well as molecular changes occurring in structures associated with CSF production and reabsorption.

Hawks J. Bashford G. Kedar S. Thorell W. Ghate D.

[IDENTIFYING BIOMARKERS FOR INTRACRANIAL PRESSURE CHANGES IN THE DEVELOPMENT OF A NONINVASIVE MONITORING DEVICE \[#7321\]](#)

A study is presented on identifying potential biomarkers (lamina cribrosa displacement and ocular hemodynamics) that could be used for noninvasive intracranial pressure monitoring during spaceflight.

Scott J. Martin D. Crowell B. Goetchius E. Seponski C. Gonzales R. Matz T. Ploutz-Snyder R. Stenger M. Ploutz-Snyder L.

[Influence of Exercise Modality on Cerebral-ocular Hemodynamics and Pressures \[#7322\]](#)

Our preliminary results suggest that high-intensity interval exercise with a head down tilt acutely increases cerebral blood flow, internal jugular pressure, and estimated transmural pressure gradient.

Trexler M.

[INTEGRATED GARMENT SOLUTION TO MITIGATE VISUAL IMPAIRMENT INTRACRANIAL PRESSURE ISSUES DURING LONG DURATION SPACE FLIGHT \[#7323\]](#)

The efforts of this project are focused on the design and construction of a light weight, fabric based, wearable vacuum system to reduce the intracranial pressure of astronauts during space flight.

Vyas R. Raghunandan S. Vizzeri G. Taibbi G. Mason S. Zanello S. Ploutz-Snyder R. Parsons-Wingeter P.

[Mapping by VESGEN of blood vessels in the retinas of astronauts pre -and post-flight to the ISS \[#7324\]](#)

Spectralis images of blood vessels in the retinas of eight NASA crew members before and after ISS missions are undergoing analysis by VESGEN software.

Hawks J. Hua Y. Song Y. Gu L.

[*SENSITIVITY ANALYSIS OF LAMINAR CRIBROSA DISPLACEMENT AND SCLERAL CANAL EXPANSION TO ACUTE CHANGES IN INTRACRANIAL PRESSURE*](#) [#7325]

A numerical model investigating the sensitivity analysis of the lamina cribrosa displacement and scleral canal expansion as a result of simulated acute changes in intracranial pressure.

Kramer L. Hasan K. Riascos R. Sargsyan A. Otto C. Wolinsky J.

[*Significance of Sinovenous and Internal Jugular Vein Narrowing as it relates to Visual Impairment Syndrome in Astronauts with Persistent Post-flight Intracranial Hypertension using Magnetic Resonance Imaging Derived Cerebral Spinal Fluid Production Rate*](#) [#7326]

There was no statistically significant correlation in CSF production rate between any combination or severity of basal dural sinus or internal jugular vein narrowing to support hemodynamic significance and contribution to persistent intracranial hypertension post-flight.

Ivkovic V. Zhang Q. Baggish A. Cohen A. Nahed B. Dentinger A. Bershad E. Rosenthal E. Strangman G.

[*Testing mechanical countermeasures for cephalad fluid shifts*](#) [#7327]

We will adapt and test two commercial devices in clinical and spaceflight-analog settings—Lymphapress and Kaatsu bands—for their ability to help reduce elevations in intracranial pressure (ICP).

Macias B. Cole C. Kesari S. Liu J. Lee S. Ebert D. Sargsyan A. Stenger M. Hargens A.

[*Validation of a cephalad fluid shift countermeasure*](#) [#7328]

The objectives of this study are to: 1) determine the distribution of skin surface pressures beneath the advanced thigh cuff, 2) calibrate the built-in pressure measurement system of the advanced thigh cuff, and 3) collect subjective feedback and data on the new cuff design.

Roberts D. Zhu X. Marebwa B. Duffy E.

[*Validity of a Computational Fluid Dynamics Simulation for the Non-Invasive Prediction of Intracranial Venous Pressures in an Earth-based Patient Model of VIIP Syndrome*](#) [#7329]

The present study indicates that simulated intracranial venous pressure drops based on MR venography significantly correlate with measured venous pressures, therefore providing a good model to estimated intracranial venous pressures non-invasively in astronauts pre- and post-flight.

Williams M. Bershad E. Levine B. Clark J. Hamilton D. Malm J. Eklund A. Zanello S. Hu X.

[*Zero-G and ICP: Invasive and noninvasive ICP monitoring of astronauts on the ISS \(Williams, Malm\) & Multimodal modeling towards noninvasive assessment of intracranial pressure in weightlessness and biomarker identification of predisposition to VIIP syndrome \(Zanello\)*](#) [#7330]

Description of 3 combined protocols by an international team for invasive monitoring of intracranial pressure in astronauts before, during and after long-duration spaceflight on the ISS, with collection of biomarkers and validation of noninvasive ICP methods

Tuesday, February 9, 2016

Exploration Medical Capability: Mixed Topics

8:00 AM

Yacht

Chairs: Michael Canga and Eric Kerstman

- 8:00 AM Rubin D.
[Exploration Medical Systems - Integrated Health Solutions for Spaceflight \[#7102\]](#)
Crew safety is of paramount importance and only by fully using all available data and embracing innovative medical technologies can NASA provide exceptional health care in highly constrained exploration mission environments.
- 8:15 AM Shah R. Kerstman E.
[Medical Optimization Network for Space Telemedicine Resources \[#7103\]](#)
The Medical Optimization Network for Space Telemedicine Resources is a novel approach to performing a quantitative risk analysis that will assess the relative value of individual resources, both tangible and intangible, needed for the diagnosis and treatment of various medical conditions.
- 8:30 AM Lindsey T.
[EXPLORATION CLINICAL DECISION SUPPORT SYSTEM \[#7104\]](#)
A clinical decision support system that integrates a medical knowledge base, patient data and an inference engine to generate case specific advice for exploration mission environment will be discussed.
- 8:45 AM Krihak M. Ronzano K. Shaw T.
[Exploration Laboratory Analysis \[#7105\]](#)
The Exploration Laboratory Analysis project supports the Exploration Medical Capability (ExMC) Element by identifying technologies and pathways towards maturing point-of-care biomedical diagnostic capability for future manned exploration missions.
- 9:00 AM George, MD, MSPH, FACS R. Ahmed, D.O., MHPE, FACEP R. Cepeda, D.O. J. Hughes, D.O. P. McCarroll, Ph.D. M. Gothard, M.S. M. Schwartz, Ph.D. A. Sheehan C. Griffin, Ph.D., PMP D. Myers, Ph.D. J.
[QUANTIFYING CHANGE IN MISSION RISK ASSOCIATED WITH A CLINICIAN CREW MEDICAL OFFICER: A PILOT STUDY OF A MEDICAL JUDGEMENT PATHWAY METRIC \[#7106\]](#)
Based on pilot data, the Medical Judgment Pathway Metric is a useful tool in the Integrated Medical Model to quantify risk due to clinical judgment in abdominal pain and chest pain simulated scenarios.
- 9:15 AM Ebert D. Byrne V. McGuire K. Hurst V. Kerstman E. Cole R. Sargsyan A. Garcia K. Reyes D. Young M. Dulchavsky S. Gibson C.
[Clinical Outcome Metrics for Optimization of Robust Training \[#7107\]](#)
Medical simulations will systematically compare success of individual diagnostic and therapeutic procedure simulations performed by physician and nonphysician crew medical officer (CMO) analogs.
- 9:30 AM Break

Tuesday, February 9, 2016

Physics I

8:00 AM

Grand Ballroom A

Chairs: John Norbury and Lawrence Heilbronn

- 8:00 AM Durante M.
[ACCELERATOR TESTS OF SHIELDING MATERIALS FOR SPACE TRAVEL \[#7183\]](#)
The ESA-sponsored project ROSSINI is measuring the shielding properties of different materials using high-energy accelerators.
- 8:25 AM Heilbronn L. McGirl N. Castellanso L. Srikrishna A. Ratliff H. Sivertz M. Rusek A. La Tessa C. Cloudsley M. Blattnig S. Slaba T. Beach M. Zeitlin C.
[THICK SHIELDING MEASUREMENTS AT THE NASA SPACE RADIATION LABORATORY \[#7184\]](#)
An overview of the thick target measurement campaign at the NASA Space Radiation Laboratory is given.
- 8:50 AM Wilson J. Slaba T. Badavi F. Reddell B. Bahadori A.
[3DHZETRN: A Computer Efficient GCR/SPE Shield Design Code \[#7185\]](#)
The 3DHZETRN radiation transport code developments are discussed and compared to Monte Carlo simulations.
- 9:15 AM Slaba T. Reddell B. Bahadori A. Cloudsley M.
[Benchmark Analysis for Space Radiation Transport Codes in Thick Shielding for Galactic Cosmic Ray Environments \[#7186\]](#)
Results from an extensive set of benchmark simulations show a local minimum in the dose equivalent versus aluminum thickness curve near approximately 20 g/cm².
- 9:30 AM Break

Tuesday, February 9, 2016

Space Human Factors for Exploration*

8:00 AM

Galleon II & III

Chair: Brent Beutter

- 8:00 AM Holden K. Sandor A. Cross II E. Greene M.
[Effects of Long-duration Microgravity on Fine Motor Skills \[#7486\]](#)
The Fine Motor Skills investigation in progress on the ISS 1-year mission uses four iPad-based tasks to measure fine motor performance of long-duration crewmembers.
- 8:15 AM Wenzel E. Godfroy-Cooper M. Miller J.
[Multimodal Augmented Displays for Surface Telerobotic Missions \[#7487\]](#)
The current research investigated alternative display modalities (auditory and bimodal) as a potential solution for reducing the impact of multi-tasking and latency on performance during surface Extra-Vehicular Activities (EVAs).
- 8:30 AM Schreckenghost D. Billman D. Milam T.
[Automation in Procedures: Guidelines for Allocating Tasks for Performance \[#7488\]](#)
Our research aims to identify guidelines and factors that promote effective strategies for allocating functions to procedure automation.
- 8:45 AM Robinson S.
[Customized Refresher and Just-in-Time Training for Long-Duration Spaceflight Crews \(NSBRI, Robinson\) \[#7489\]](#)
Recent experimental results from ground-based study of spaceflight on-board refresher training for complex-systems repair and robotics operations.
- 9:00 AM Hillenius S. Marquez J. Korth D. Rosenbaum M.
[Evaluation of Crew-Centric Onboard Mission Operations Planning and Execution Tool \[#7490\]](#)
The work proposed here, a collaboration between the Human Research Program and the ISS Program, will inform the design of systems for more autonomous crew operations and provide a platform for research on crew autonomy for future deep space missions.
- 9:15 AM Discussion
- 9:30 AM Break

Tuesday, February 9, 2016

Visual Impairment and Intracranial Pressure Flight Findings

8:00 AM

Grand Ballroom B & C

Chairs: Bill Tarver and Rachel Brady

- 8:00 AM Smith S. Gregory J. Zeisel S. Gibson C. Mader T. Kinchen J. Ueland P. Ploutz-Snyder R. Heer M. Zwart S.
[Risk of visual impairment and intracranial hypertension after space flight: Evaluation of the role of polymorphism of enzymes involved in one-carbon metabolism \[#7558\]](#)
These findings document a genetic predisposition for some astronauts to anatomic and/or physiologic changes that render them susceptible to vision and ophthalmic structural changes during space flight.
- 8:15 AM Otto C. Ploutz-Snyder R. Gibson C. Alexander D. Sargysan A. Garcia K. Riascos R. Kramer L. Patel N. Samuels B. Lee S.
[The Prospective Observational Study of Ocular Health in International Space Station \(ISS\) Astronauts: The Visual Impairment Intracranial Pressure Risk. \[#7559\]](#)
Long duration spaceflight exposure significantly alters ocular structure and function in astronauts.
- 8:30 AM Patel N. Otto C. Gibson C.
[SD-OCT Analysis of the Optic Nerve Head and Surrounding Structures, pre, inflight, and postflight – The Ocular Health Study \[#7560\]](#)
There are morphological changes of the optic nerve head and surrounding tissue with microgravity exposure.
- 8:45 AM Riascos R. Hasan K. Hakimelahi R. Alperin N. Kramer L.
[Longitudinal Quantitative Mri Measurements In Astronauts With Short And Long-Duration Microgravity Exposure \[#7561\]](#)
Quality MRI measures show changes in the right visual cortex, optic radiations and ventricular volumes. Additional serial data for long term monitoring will be necessary to correlate with astronaut health.
- 9:00 AM Alperin N. Olu C. Bagci A. Riascos R. Lam B. Otto C.
[VIIP-RELATED GLOBE DEFORMATIONS ARE LINKED TO CSF VOLUME INCREASE \[#7562\]](#)
Quantification of globe deformations by MRI following short- and long-duration spaceflights reveal a dominant role for CSF and a lesser role for the vascular fluid shift in the development of VIIP.
- 9:15 AM Van Baalen M. Mason S. Young M. Taiym W. Wear M.
Limitations in NASA VIIP Data for an Improved Understanding of VIIP Outcomes [#7563]
- 9:30 AM Break

Tuesday, February 9, 2016

Exploration Medical Capability: Renal Stones

9:45 AM

Yacht

Chairs: Michael Krihak and Bill Thompson

- 9:45 AM Kassemi M. Thompson D. Goodenow D. Gokoglu S. Myers J.
[Effect of Dietary Countermeasures and Impact of Gravity on Renal Calculi Size Distributions Predicted by PBE-System and PBE-CFD Models](#) [#7116]
Study of effects of dietary countermeasures and gravity on renal stone formation using computational models.
- 10:00 AM Myers J. Goodenow D. Gokoglu S. Kassemi M.
[ESTIMATING THE RATE OF OCCURRENCE OF RENAL STONES IN ASTRONAUTS](#) [#7117]
In this discussion, we utilize a combination of deterministic and probabilistic modeling that implements stone growth and agglomeration, urine chemistry and population based renal stone incidences to estimate changes in the rate of renal stone presentation in astronauts.
- 10:15 AM Bailey M. Dunmire B. Simon J. Maxwell A. Harper J. Sorensen M. Wessells H. Coburn M. Crum L. Khokhlova V. Lingeman J.
[Prevention of Renal Stone Complications in Space Exploration](#) [#7118]
We are developing ultrasound based technologies as an option to manage possible kidney stones in space.
- 10:30 AM Simon J. Wang Y. Cunitz B. Sapozhnikov O. Thiel J. Starr F. Bailey M.
[THE EFFECT OF CARBON DIOXIDE ON KIDNEY STONE DETECTION WITH ULTRASOUND](#) [#7119]
The color Doppler ultrasound twinkling artifact, which can be used to highlight hard objects such as kidney stones, is significantly reduced or eliminated from exposure to carbon dioxide at concentrations relevant to what is found on the International Space Station.
- 10:45 AM Reyes D.
[Management of Asymptomatic Renal Stones in Astronauts](#) [#7120]
Screening and management guidelines for renal stones in astronauts were developed to reduce spaceflight mission risks.
- 11:00 AM Discussion
- 11:15 AM Break

Tuesday, February 9, 2016

NASA Space Radiation Laboratory User's Group Meeting

9:45 AM

Grand Ballroom A

Chairs: Adam Rusek and Peter Guida

- 9:45 AM Guida P. Rusek A.
[NSRL User's Group \[#7158\]](#)
This session will provide an opportunity for NSRL Staff to discuss the latest operational and logistical updates to the NASA Space Radiation Laboratory (NSRL), and for the NSRL research community to raise questions and give feedback.
- 10:15 AM Guida P. Rusek A.
[NSRL User's Group \[#7159\]](#)
This session will provide an opportunity for NSRL Staff to discuss the latest operational and logistical updates to the NASA Space Radiation Laboratory (NSRL), and for the NSRL research community to raise questions and give feedback.
- 10:45 AM Wu H. Mayeaux B. Huff J. Simonsen L.
[SRPE Tissue Sharing Initiative \[#7160\]](#)
The Space Radiation Tissue Sharing Forum provides access to an inventory of investigator-stored tissue samples and enables both NASA SRPE members and NASA-funded investigators to exchange information regarding stored and future radiobiological tissues available for sharing.
- 11:00 AM Rusek A. La Tessa C. Sivertz M. Chiang I.
[GCR simulator delivery at NSRL \[#7161\]](#)
We will describe the technical advancements and upgrades carried out at the NSRL in response to, and as part of NASA's study of the effects of the galactic cosmic ray (GCR) field on biological and other systems.
- 11:15 AM Break

Tuesday, February 9, 2016

Space Human Factors Metrics and Methods*

9:45 AM

Galleon II & III

Chair: Kritina Holden

- 9:45 AM Young K. Rajulu S. Amick R.
[Quantification of In-flight Physical Changes - Anthropometry and Neutral Body Posture \(NBP\) \[#7493\]](#)
Quantification of the impacts of microgravity on anthropometry and body posture to ensure optimal crew performance, fit, and comfort.
- 10:00 AM Vos G. Adolf J. Beard B. Litaker H.
[Human Performance Data Project \[#7494\]](#)
The Human Performance Data Project is focused on the identification of operational data, metrics, and measures that may benefit HRP scientists and managers in the pursuit of solutions to reduce or mitigate the risks and gaps associated with human performance.
- 10:15 AM Duda K. Robinson S. Prasov Z. York S. Handley P. Karasinski J. Paddock E. West J.
[Metrics and Methods for Real-Time Task Performance Assessment \[#7495\]](#)
This project is designing, developing, and testing methods and metrics for assessing task performance, workload, and situation awareness in real-time with operationally relevant spaceflight tasks.
- 10:30 AM Iwig C. Oglesby J. Woods A. Dinh J. Salas E.
[DEVELOPMENT OF AN EVIDENCE-BASED MEASUREMENT TOOLKIT FOR ASSESSING HUMAN-AUTOMATION SYSTEM SAFETY AND PERFORMANCE \[#7496\]](#)
Current efforts in the development of an evidence-based measurement toolkit for assessing human-automation system safety and performance are described including results from subject matter expert interviews.
- 10:45 AM Standard Measures Discussion (Whitmore) [#7497]
- 11:15 AM Break

Tuesday, February 9, 2016

Visual Impairment and Intracranial Pressure Analog and Model-Based studies*

9:45 AM

Grand Ballroom B & C

Chairs: Michael Stenger and Beth Lewandowski

- 9:45 AM Laurie S. Hu X. Lee S. Martin D. Phillips T. Ploutz-Snyder R. Smith S. Stenger M. Taibbi G. Zwart S. Vizzeri G.
[EFFECT OF 1% INSPIRED CO2 DURING HEAD-DOWN TILT ON OCULAR STRUCTURES, CEREBRAL BLOOD FLOW, AND VISUAL ACUITY IN HEALTHY HUMAN SUBJECTS \[#7544\]](#)
We investigated if an acute, mild CO2 exposure, combined with head-down tilt, would induce ophthalmic and intracranial pressure changes consistent with the VIIP syndrome.
- 10:00 AM Fuller C. Gompf H. Hoban-Higgins T. Robinson E. Theriot C. Murphy C. Zanello S.
[Head-down tilt as a model for intracranial and intraocular pressures, and retinal changes during spaceflight \[#7545\]](#)
Rodent hindlimb suspension leads to a sustained increase in intracranial pressure within the lateral ventricle, as measured by a chronically implanted biotelemetry pressure catheter.
- 10:15 AM Ethier C. Feola A. Myers J. Nelson E. Raykin J. Samuels B.
[Microgravity-driven Optic Nerve/Sheath Biomechanics Simulations \[#7546\]](#)
Intracranial pressure alters strains in the optic nerve head which may signal mechano-responsive resident cells, induce tissue remodeling, and eventually lead to visual impairment.
- 10:30 AM Lawley J. Williams M. Zhang R. Whitworth A. Levine B.
[ICP During Daily Life in Healthy Adults: What Does Microgravity Add to the Mix? \[#7547\]](#)
Measurement of intracranial pressure during daily life, parabolic flight and 24 hours head down tilt.
- 10:45 AM Anderson A. Fellows A. Phillips S. Chepko A. Archambault-Leger V. Kattamis N. Knaus D. Zegans M. Buckley J.
[Role of cranial venous circulation in microgravity-associated visual changes \[#7548\]](#)
Summary of recent results on our NSBRI-funded project.
- 11:00 AM Discussion
- 11:15 AM Break

Tuesday, February 9, 2016

Communications

1:15 PM

Yacht

Chairs: Chuck Lloyd and Laurie Abadie

1:15 PM

Abadie L.

[TIME Magazine: Communicating Space Medicine in the Popular Imagination \[#7084\]](#)

Join Time Magazine Editor-at-Large Jeffrey Kluger who will share his experiences as a seasoned, science journalist. He'll share tips on how to develop better working relationships between scientists and journalists to educate the public on the importance of space travel and NASA missions.

2:45 PM

Break

Tuesday, February 9, 2016

Occupant Protection

1:15 PM

Galleon II & III

Chair: Jeff Somers

- 1:15 PM Somers J. Newby N. Wells J. Lawrence C. Baldwin M. Currie N.
[SUITED AND UNSUITED HYBRID III IMPACT TESTING AND FINITE ELEMENT MODEL CHARACTERIZATION \[#7169\]](#)
The purpose of this study was to evaluate the Hybrid III ATD models during impact testing in Orion-specific landing orientations both with and without a spacesuit.
- 1:30 PM Somers J. Feiveson A. Méndez C.
[ASSESSING THE EFFECT OF SPACEFLIGHT ON THE PROPENSITY FOR ASTRONAUTS TO DEVELOP DISK HERNIATION \[#7170\]](#)
An investigation of whether spaceflight exacerbates the risk of disc herniation.
- 1:45 PM Wells J. Somers J. Newby N.
[DATA MINING OF HISTORIC HUMAN DATA TO ASSESS THE RISK OF INJURY DUE TO DYNAMIC LOADS \[#7171\]](#)
Study assessing the THOR Anthropomorphic Test Device and its use in mitigating impact injury for spaceflight.
- 2:00 PM Discussion
- 2:45 PM Break

Tuesday, February 9, 2016

Space Radiation Carcinogenesis III and Galactic Cosmic Ray Simulation

1:15 PM

Grand Ballroom A

Chairs: Polly Chang and Mary Helen Barcellos-Hoff

- 1:15 PM Boice J.
[Million Person Study of Low Dose Radiation Health Effects – Relevance to NASA](#) **[#7510]**
- 1:35 PM Edmondson E. Raber J. Belknap J. Iancu O. Kleiman N. Hall E. Gatti D. Fallgren C. Kamstock D. Schmidt C. King A. Weil M.
[Characterization of the Tumor Spectrum Arising in HZE Ion Irradiated Outbred Mice](#) **[#7511]**
Similarities and differences between the tumorigenic, ocular, and cognitive effects of HZE ions and gamma rays were studied in a genetically heterogeneous population of mice.
- 1:50 PM Costes S. Guiet E. Snijders A. Haplerin E.
[Blood-based multi-scale model for cancer risk from GCR in genetically diverse populations](#) **[#7512]**
The overall goal of this work is to establish a computer model that will estimate individualized risk for astronauts based on an array of phenotypic and genetic information.
- 2:00 PM Nelson G.
[GCR Simulator Concept of Operations](#) **[#7513]**
In order to represent exposures to the full suite of space radiation components a multiple ion beam exposure concept with associated logistics for biological samples is described.
- 2:15 PM Blakely E. Sachs R. Mao J. Chang P.
[Simulation of GCR-Induced Harderian Gland and Lung Tumorigenesis](#) **[#7514]**
This newly funded set of studies will allow a significant test of modeling approaches used to estimate carcinogenesis risk from a simulated GCR beamline using a murine strain with a low spontaneous tumor background having well characterized data on nine individual particle beams and gamma rays.
- 2:25 PM Kronenberg A. Turker M.
[GCR Simulator Validation Studies with Human and Mouse Models](#) **[#7515]**
This is a new project designed to assist NASA with the development, implementation and validation of a ground-based galactic cosmic ray simulator at Brookhaven National Laboratory for studies of radiation risk to astronauts.
- 2:35 PM Hada M. Patel Z. Plante I. Ponomarev A. Shavers M. Slaba T. Zait C.
[Computational Model Prediction and Biological Validation using Simplified Mixed Field Exposures for the Development of a GCR Reference Field](#) **[#7516]**
This work addresses the need to develop and utilize mixed field irradiation protocols that approximately represent the shielded tissue environment in space and that can be combined with single-beam studies to validate and further improve cancer risk models.
- 2:45 PM Break

Tuesday, February 9, 2016

Visual Impairment and Intracranial Pressure Tools and Devices*

1:15 PM

Grand Ballroom B & C

Chairs: Dorit Donoviel and Graham Scott

- 1:15 PM Williams M. Malm J. Eklund A. Voss S. Horton N. Marchbanks R. Hamilton D. Ebert D. Levine B.
[Comparison of Continuous Noninvasive and Invasive ICP Measurement](#) [#7565]
This abstract compares TMD and DPOAE noninvasive ICP measurements to invasive ICP measurements in a cohort with controlled ICP during CSF infusion testing.
- 1:30 PM Bershad E. Venkatasubba Rao C. Suarez J. Clark J. Donoviel D. Calvillo E. Kramer L. Rittweger J. Mulder E. Marshall-Bowman K.
[SPACE-COT: Studying the Physiological and Anatomical Cerebral Effects of CO2 and Head Down Tilt](#) [#7566]
This presentation will give an overview and preliminary results of the SPACE-COT study, a ground based analog of space flight at :envihab, combining carbon dioxide and head down tilt for 30 hours.
- 1:45 PM Macias B. Watkins W. Baird S. Clary E. Liu J. Hargens A.
[Lower Body Negative Pressure Counters Simulated Microgravity-Induced Elevations of Intracranial Pressure and Jugular Vein Engorgement](#) [#7567]
Short duration exposures to simulated microgravity (head-down-tilt) increases ICP significantly and importantly, LBNP counteracts these elevations of ICP and cephalad venous congestion.
- 2:00 PM Bershad E. Anand A. DeSantis S. Yang M. Tang R. Calvillo E. Venkatasubba Rao C. Suarez J. Sutton J. Clark J. Donoviel D.
[Vittamed Intracranial Pressure Device Clinical Validation Study](#) [#7568]
The final results of the Vittamed clinical evaluation study will be presented.
- 2:15 PM Dentinger A. Cao K. MacDonald M. Ebert D. Garcia K. Sargsyan A.
[AUTOMATIC IMAGE ANALYSIS OF 3D OCULAR STRUCTURES FROM VOLUMETIC OPHTHALMIC ULTRASOUND](#) [#7569]
Automatic image analysis methods have been developed and evaluated in a ground-based study to detect anatomical landmarks, render clinically relevant views from 3D ophthalmic ultrasound data, and enhance the definition of ocular structures.
- 2:30 PM Discussion
- 2:45 PM Break

Tuesday, February 9, 2016

Habitability, Workload, and Sleep

3:00 PM

Galleon II & III

Chairs: Lauren Leveton and Mihriban Whitmore

- 3:00 PM Thaxton S. Archer R. Schuh S. Vasser K. Whitmire A.
[ISS Habitability Study: Preliminary Results \[#7130\]](#)
Work to date for ISS Habitability study.
- 3:15 PM Thaxton S. Chen M. Hsiang S. Myers J.
[Spacecraft Optimization Layout and Volume \(SOLV\): Development of a Model to Assess Net Habitable Volume \[#7131\]](#)
Work to date for development of Spacecraft Optimization Layout and Volume (SOLV) model.
- 3:30 PM Vos G.
[A Tool for the Automated Collection of Space Utilization Data \[#7132\]](#)
Development of a tool to collect data on crew movement and space utilization in three dimensions.
- 3:45 PM Flynn-Evans E. Caddick Z.
[Sleep environment recommendations for future spaceflight vehicles \[#7133\]](#)
We reviewed best practices for designing an optimal sleep environment to aid in the design of future space vehicles for long-duration, deep space missions, to provide adequate mitigations for potential sleep disruptors.
- 4:00 PM Kearney A.
[THE IMPACTS OF HABITAT DESIGN ON TEAM HEALTH AND PERFORMANCE IN SPACEFLIGHT: RISKS, COUNTERMEASURES, AND RESEARCH RECOMMENDATIONS \[#7134\]](#)
This study synthesizes our current state of knowledge regarding risks to team health and performance from incompatible vehicle and habitat design, highlights promising countermeasures, and points to important areas for further research.
- 4:15 PM Discussion
- 4:30 PM Break

Tuesday, February 9, 2016

NSBRI for Exploration Medical Capability

3:00 PM

Yacht

Chairs: Gary Strangman and Erik Antonsen

- 3:00 PM de Lemos J. Levine B. Khera A. Berry J. Wang T. Hundley W. Ballantyne C. DeFilippe C. Ayers C.
[Improving Cardiovascular Risk Prediction -- Biomarkers and Beyond: Implications for Astronaut Selection and Monitoring During Prolonged Spaceflight \[#7162\]](#)
We present here preliminary results supporting our ongoing project. These preliminary data evaluate a multimodality tool for risk prediction in the general population, that has important implications for astronaut selection.
- 3:15 PM Khera A. Levine B.
[Validation of the NSBRI Astronaut Cardiovascular Health and Risk Modification \(ASTRO-CHARM\) Integrated Cardiovascular Risk Calculator \[#7163\]](#)
The ASTRO-CHARM is an integrated CV risk assessment tool incorporating risk factor data and coronary artery calcium scores to accurately predict the risk of CV events in astronauts. Here, we provide updated event data, enhancements to the tool, and progress on validation in an external cohort.
- 3:30 PM Langer M. Rigby J. Fleshman S. Lewis G.
[Sustained Acoustic Medicine: A Novel Application of Therapeutic Ultrasound to Treat Herniated Disc-Related Low Back Pain in Astronauts \[#7164\]](#)
Long duration, low intensity therapeutic ultrasound is being evaluated for safety and efficacy in treating chronic lower back pain, with a substantial subset having pain secondary to a herniated disc.
- 3:45 PM Main B.
[Variable Focus Eyewear for Spaceflight and Mobile Device Technology for In-flight Vision Testing \[#7165\]](#)
This project has two emphases: 1) Research/deliver recommended options for prescription adjustable power eyeglasses for space flight; 2) Investigate/deliver ongoing recommendations for state of the art, innovative technologies/equipment for in-flight vision testing.
- 4:00 PM Wotring V.
[CHEMICAL POTENCY AND DEGRADATION PRODUCTS OF MEDICATIONS STORED OVER 550 EARTH DAYS AT THE INTERNATIONAL SPACE STATION \[#7166\]](#)
Although medications onboard the ISS are exposed to the unusual environmental conditions of microgravity and somewhat elevated exposure to radiation, no unusual degradation was seen in a pilot-scale examination of medications returned to Earth for chemical analysis after storage on the ISS.
- 4:15 PM Strangman G. Hu G. Zhang Q. Ikvovic V.
[Multi-Use Near-Infrared Spectroscopy System for Spaceflight Health Applications: NINscan-M v2 \[#7167\]](#)
NINscan-M v2 was developed as a multi-use near-infrared imaging and physiological recording system in a handheld form factor and with usability and functionality suitable for in-flight health monitoring.
- 4:30 PM Break

Tuesday, February 9, 2016

Space Radiation Carcinogenesis IV

3:00 PM

Grand Ballroom A

Chairs: Jerry Shay and Mary Helen Barcellos-Hoff

- 3:00 PM Burma S. Todorova P. Camacho C. Hardebeck M. Mukherjee B. Guida P. Story M. Bachoo R.
[Mouse glioma models to estimate cancer risks from HZE particle exposure \[#7517\]](#)
We have established two complementary mouse glioblastoma (GBM) models that can be used to obtain a mechanistic understanding of particle radiation-induced carcinogenesis, and find that Fe ions trigger high grade gliomas that resemble human GBM in their molecular and genetic signatures.
- 3:15 PM Gonzalez-Junca A. Ma L. Barcellos-Hoff M.
[HZE Radiation promotes malignant progression of human epithelial cells by triggering an EMT program and selecting for TGFβ-resistant cells \[#7518\]](#)
Our findings using an in vitro human model link innate immune cells to the TGFβ-mediated EMT program and selection of clones resistant to TGFβ anti-proliferative effects during early stages of radiation carcinogenesis process.
- 3:30 PM Pluth J. Sridharan D. Enerio S. Wang C. Chen J. Narasimhan R. Chappell L. Stampfer M.
[Role of Age and Genetics Variants in Influencing the Effectiveness of High LET Radiation to Produce Changes Reflective of a Higher Carcinogenic Potential \[#7519\]](#)
We have used a large bank of primary mammary epithelial cells to address how age, genetic background and radiation quality affect carcinogenic potential to provide data to better estimate risk.
- 3:45 PM Turker M. Grygoryev D. Lasarev M. Gauny S. Kronenberg A.
[The Relation Between Mutagenesis and Genomic Instability After Particle Exposure In Vivo \[#7520\]](#)
Autosomal mutations are induced in vivo in mouse splenic T cells by high LET HZE ions at low dose and fluence.
- 4:00 PM Shay J.
[Mouse Models of Cancer Risk and Prevention from Space Radiation \[#7521\]](#)
An oral available anti-oxidant/anti-inflammatory modulator reduces terrestrial and space radiation-induced lung and colon cancer initiation and progression.
- 4:15 PM Pluth J. Sridharan D. Asaithamby A. Blattig S. Costes S. Curtis S. Doetsch P. Dynan B. Kidane Y. Kronenberg A. Naidu M. Hlatky L. Peterson L. Ponamarev A. Snijders A. Saha J. Werner E. Hahnfeldt P.
[Evaluating Biomarkers to Model and Predict Cancer Post Cosmic Ray Exposure \[#7522\]](#)
Assess the advantages and limitations of using early and late biomarkers of radiation exposure that impact their usefulness in modeling cancer risk from radiation exposure.
- 4:25 PM Discussion
- 4:30 PM Break

Tuesday, February 9, 2016

Visual Impairment and Intracranial Pressure Computational Modeling

3:00 PM

Grand Ballroom B & C

Chairs: Jerry Myers and Emily Nelson

- 3:00 PM Buckey J.
[Unique gravitational physiology changes relevant for numerical modeling \[#7551\]](#)
Background for talk on physiology relevant for numerical modeling.
- 3:15 PM Phillips S. Chepko A. Archambault-Leger V. Kattamis N. Knaus D. Anderson A. Zegans M. Buckey J.
[NUMERICAL MODELING OF EYE STRUCTURE AND THE CEREBROVASCULAR/CEREBROSPINAL CIRCULATION \[#7552\]](#)
Discussion of the implementation and results of a numerical model developed to investigate causes of visual impairment experienced by astronauts.
- 3:30 PM Myers J. Eke C. Werner C. Nelson E. Mulugeta L. Feola A. Raykin J. Samuels B. Ethier C.
[Microgravity-Induced Physiological Fluid Redistribution: Computational Analysis to Assess Influence of Physiological Parameters. \[#7553\]](#)
A formal uncertainty and sensitivity analysis that evaluated the relative importance of 42 input parameters in a lumped CVS/CNS model in calculating pressures in 16 compartments will be presented.
- 3:45 PM Nelson E. Myers J. Mulugeta L. Feola A. Raykin J. Samuels B. Ethier C.
[A MODEL OF OCULAR HEMODYNAMICS AND INTRAOCULAR PRESSURE DURING ACUTE GRAVITATIONAL CHANGES \[#7554\]](#)
We describe a model simulating volume/pressure alterations in the eye during gravitational changes that includes the effects of blood and aqueous humor dynamics, ICP, and ocular compliance and is validated with three existing datasets on parabolic flight, body inversion, and head-down tilt.
- 4:00 PM Feola A. Myers J. Raykin J. Nelson E. Mulugeta L. Samuels B. Ethier R.
[Probabilistic Modeling of Ocular Biomechanics in VIIP: Risk Stratification \[#7555\]](#)
We utilized finite element models and latin hypercube sampling to characterize how variations in loading and tissue mechanical properties alter the strains in the optic nerve head.
- 4:15 PM Discussion
- 4:30 PM Break

Tuesday, February 9, 2016

Poster Session B: Advanced Food Technology

4:30 PM

Exhibit Hall A

Sirmons T. Douglas G. Cooper M.

[Food Fortification Stability Study \[#7331\]](#)

Five vitamins were added to spaceflight foods and evaluated for sensory acceptability and vitamin degradation over time. With the exception of thiamin, most vitamins did not degrade after one year of storage. The impact to product quality was also minimal.

Schneider M. Foegeding A. Lila M.

[High-Protein And Polyphenol Bar Formulations: Utilizing Whey Protein-Polyphenol Ingredients \[#7332\]](#)

The formation of micrometer protein-polyphenol particles for inhibition of protein bar hardening and stabilization of polyphenol bioactivity during extended space travel.

Massa G. Wheeler R. Hummerick M. Morrow R. Mitchell C. Whitmire S. Ploutz-Snyder R. Douglas G.

[Pick-and-Eat Salad-Crop Productivity, Nutritional Value, and Acceptability to Supplement the ISS Food System \[#7333\]](#)

Crop selection and ground and flight testing will allow us to generate more nutritious, flavorful and abundant food to supplement the packaged diet on ISS.

Tuesday, February 9, 2016

Poster Session B: Behavioral Health and Performance

4:30 PM

Exhibit Hall A

Schmidt L.

[*A MODEL OF PSYCHOSOCIAL FACTORS FOR LONG-DURATION SPACEFLIGHT EXPLORATION MISSIONS*](#) **[#7335]**

A semi-quantitative nomological model of the psychosocial factors most likely to influence teams during long-duration exploration missions (Behavioral Health and Performance, Team Gap 1) will be presented, along with a summary of the modeling process.

Dixon A. Santoro J. Taylor L. Chang C. Kozlowski S.

[*An Investigation Into Team Dynamics Within The Human Exploration Research Analog*](#) **[#7336]**

We will analyze data collected from 8 teams in the Human Exploration Research Analog (HERA), which contributes to the investigation of fluctuations in team processes between different teams and within the same team.

Wu P. Ott T. Morie J. Wall P.

[*ANSIBLE: A Virtual World for Maintaining Social Connectedness between Astronauts and Social Support Networks*](#) **[#7337]**

Preliminary results from testing the ANSIBLE Virtual World Ecosystem at a Mars analog for asynchronously connecting subjects with their friends/family/colleagues.

Rose R. Wu P. Zbozinek T. Hentschel P. Oftedal A. Craske M.

[*Asynchronous Behavioral Health Treatment Techniques*](#) **[#7338]**

The aim of this project is to identify treatment techniques to best provide behavioral health support in an asynchronous environment on exploration class missions, and evaluate these techniques in a randomized controlled trial.

Gonzalez A. Mahaffey B. Kotov R. Kaufman A.

[*Asynchronous Techniques for the Delivery of Empirically Supported Psychotherapies*](#) **[#7339]**

Our objectives are to (1) identify psychotherapeutic techniques relevant for long-duration space missions; (2) isolate existing technologies for asynchronous communication methods; (3) evaluate methods in a randomized clinical trial; and (4) develop best-practice guidelines.

Anderson A. Fellows A. Binsted K. Hegel M. Buckey J.

[*Autonomous Behavioral Health Countermeasures for Spaceflight - Virtual Space Station*](#) **[#7340]**

We present an evaluation of the Virtual Space Station, an autonomous behavioral health countermeasure, and virtual reality for attention restoration on deployment at HI-SEAS Mars analog, the Canada Forces Alert arctic research station, and in laboratory settings.

Goel N. Dennis L. Ecker A. Abel T. Basner M. Bhatnagar S. Dinges D. Kirkpatrick J. Weljie A.

[*Biomarkers as Predictors of Resiliency and Susceptibility to Stress in Spaceflight*](#) [#7341]

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.

Alfano C. Alfano C. Simpson R. Connaboy C. Laughlin M. Zvolensky M. Deng Z.
[*Characterization of Psychological Risk, Overlap with Physical Health, and Associated Performance in Isolated, Confined, Extreme \(ICE\) Environments*](#) [#7342]

The primary goal of this project is to identify the neurobehavioral symptoms with the greatest likelihood of occurrence during extended human space flight and to estimate associated levels of threat imposed to mission-based performance.

Beard B. Ohnesorge K. Whitmire A.

[*Characterize Workload on ISS for Exploration Missions*](#) [#7343]

The focus of this project is to characterize how the International Space Station (ISS) crew members' workload may be contributing to sleep loss, circadian misalignment and fatigue.

Nasrini J. Dinges D. McGuire S. Hermsillo E. Ecker A. Mollicone D. Mott C. Port A. Moore T. Gur R. Basner M.

[*COGNITION IN A HUMAN EXPLORATION RESEARCH ANALOG \(HERA\)*](#) [#7344]

Cognition is a brief, comprehensive neurocognitive test battery for spaceflight and was deployed at NASA's Human Exploration Research Analog. We investigated changes in Cognitive performance over mission duration in N=32 crew members from 8 missions in HERA.

Gur R. Basner M. Moore T. Kabadi S. Nasrini J. Roalf D. Ruparel K. Port A. Jackson C. Dinges D.

[*Cognition Validation Study in High-Performing Healthy Controls*](#) [#7345]

We performed a validation study of Cognition compared to WinSCAT administered on a laptop and a tablet in a sample of 96 high functioning (Masters or above) individuals (48 males, 48 females) age range 25 to 56.

Graber M. Shrestha M.

[*Cognitive Bias and Decision Making Training*](#) [#7346]

Training on how to avoid cognitive bias may help reduce the likelihood of bad decisions, which arise in stressful environments by shifting decision making to the intuitive mode, which is more error prone.

Bedwell W. Roma P. Binsted K.

[*Crew Cohesion on LDEM: A Longitudinal Look at Conflict*](#) [#7347]

We were able to view the evolution of relationship conflict over time as well as the crew's attempt to utilize multiple conflict processes (both individualistic and collectivistic) to address these issues while trying to maintain performance outcomes.

Goel N. Dennis L. Ecker A.

[*Crewmembers Show Deficits and Individual Differences in Neurobehavioral Responses to Stress and Sleep Loss in HERA 14-Day Missions*](#) [#7348]

Crewmembers show deficits and individual differences in neurobehavioral responses to stress and sleep loss in HERA 14-day missions.

Contractor N. Bell S. DeChurch L. Brown S. Hernandez I. Jones B.

[CREWS: Crew Recommender for Effective Work in Space \[#7349\]](#)

The current project conducts a 3-year, multi-method research effort to examine critical individual, relational, and network factors that can be used to optimize team composition to improve team performance in long-distance space exploration missions.

Salas E. Driskell J. Driskell T. Burke S.

[Detecting Stress Effects in Spaceflight Teams Using Real-Time Lexical Indicators \[#7350\]](#)

We present an approach to assess cognitive and emotional state through verbal output in real-time communications, as well as a real-time assessment tool, STRESSnet, to detect cognitive performance deficits, stress, fatigue, anxiety, and depression in the spaceflight operational setting.

Lockley S. St. Hilaire M. Rahman S. Sullivan J. Kristal B. Quackenbush J. Duffy J. Barger L. Czeisler C.

[Development and testing of biomarkers to determine individual astronauts' vulnerabilities to behavioral health disruptions \[#7351\]](#)

The aim of this study is to assess the sensitivity and specificity of a core set of biomarkers to predict neurocognitive and psychological responses to the sleep deprivation and circadian misalignment inherent in ISS operations.

Burns V. Luo B. Gleitsman K. Gu J. Zeitzer J.

[DEVELOPMENT OF A SMART SLEEP MASK FOR CIRCADIAN RHYTHM REALIGNMENT IN SPACE AND ON EARTH \[#7352\]](#)

With SMARTCAP funding, LumosTech, Inc, will develop a smart sleep mask capable of rapidly realigning circadian phase of the user during sleep.

Rokholt C. Landon L.

[Examining the Relationship between Five Factor Personality Facets and Team Performance in a Long Duration Exploratory Mission Analog \[#7353\]](#)

This study examines the relationship between sub-factor personality facets and team performance in a long duration exploratory mission analog.

Bartone P. Krueger G. Roland R. Sciarretta A.

[Individual Differences in Adaptation for Long Duration Space Exploration Missions \[#7354\]](#)

This project provides an evidence review on individual differences in adaptation, with a focus on isolated, confined and extreme environments, and reports on predictors and mitigating factors.

Binsted K. Basner M. Bedwell W. Caldwell B. Chang D. Hunter J. Kozlowski S. Nasrini J. Roma P. Santoro J. Seibert M. Shiro B. Wu P.

[Investigations at HI-SEAS into Team Function and Performance on Long Duration Exploration Missions \[#7355\]](#)

This is an overview of past, current and future missions at HI-SEAS (Hawaii Space Exploration Analog and Simulation), and the team function and performance research conducted there.

Seidler R. Mulavara A. Koppelmans V. Cassady K. Yuan P. Kofman I. De Dios Y. Szecsy D. Riascos-Casteneda R. Wood S. Bloomberg J.

[Long Duration Head Down Tilt Bed Rest Effects on Neurocognitive Performance: Extent, Longevity, and Neural Bases \[#7356\]](#)

In this presentation I will provide an overview of changes in behavior, brain structure, and brain function that we are observing in our bed rest participants in comparison to normative control subjects.

Dinges D. Goel N. Basner M. Rao H. McGuire S. Dennis L. Allen J. Trentalange M.
[Markers of Susceptibility to Neurobehavioral Decrements in Space Flight \[#7357\]](#)
This project seeks to identify genetic markers of the large, and operationally impactful, differential susceptibility to fatigue-related neurobehavioral decrements associated with sleep deprivation, especially chronic partial sleep restriction, as occurs in space flight.

Kozlowski S. Chang C. Biswas S.
[MEASURING THE DYNAMICS OF TEAMWORK \[#7358\]](#)
This project is designed to: (1) benchmark the dynamic variation of team cohesion and identify “shocks” that perturb it; (2) develop unobtrusive measures to assess team interaction dynamics; and (3) develop data fusion, feedback, and regulation systems to help the crew support cohesion.

Langer E. Phillips D. Pagnini F.
[Mindfulness, Recreation, and Relaxation for Long Duration Exploration Missions \[#7359\]](#)
We aim to provide suggestions using all available knowledge about how mindfulness, relaxation and recreation could be meaningfully implemented in long duration space missions.

Burke S. Driskell T. Driskell J. Salas E.
[Moving Towards a Better Understanding of Team Roles in Isolated, Confined Environments \[#7360\]](#)
We describe preliminary results from our project on team roles in long duration space flight which investigates: requisite task and social roles, person-role fit, and the potential dynamic adjustment/reallocation of roles.

Basner M. Dinges D. Nasrini J. McGuire S. Hermsillo E. Ecker A. Johannes B. Gerlach D. Stahn A. Gunga H. Mollicone D. Mott C. Melzer T. Taylor B. Roalf D. Elliott M. Prabhakaran K. Bilker W. Gur R.
[Neurostructural, cognitive, and physiologic changes during a 1-year Antarctic winter-over mission \[#7361\]](#)
This international collaboration investigates neurostructural, cognitive, behavioral, physiologic, and psychosocial changes in a total of N=26 crewmembers during two 1-year Antarctic winter-over seasons in the French/Italian Concordia station.

Deming C. Vasterling J.
[Occupational Social Support Interventions: Weighing the Evidence for their Potential Use as Behavioral Health Countermeasures Delivered Prior to Long-Duration Spaceflight \[#7362\]](#)
Review of the literature in space flight/space analogue, military, emergency service responder, and other high stress professions reveals that occupational social support interventions may be highly applicable to pre-mission phases of long-duration space flight.

Dinges D. Metaxas D. Zhong L. Yu X. Wang L. Dennis L. Ecker A. Yu A. Trentalange M. Jones C. Basner M.
[Optical Computer Recognition of Stress, Affect and Fatigue in Space Flight \[#7363\]](#)
This project is developing and validating an objective, unobtrusive, computational model-based tracker using optical computer recognition to identify facial indications of stress, fatigue and positive and negative expressions in space flight.

Chabal S. Lamb J.
[Performance Degradation Precursors in Operational Teams \[#7364\]](#)
Through observation of operational teams in NASA's HERA facility, our research will identify behavioral and/or biological indices of incipient team resilience breakdown.

Perlman G. Ferayorni F. Ruggero C. Kotov R.

[*Personality and biological predictors of resiliency to chronic stress among high-achieving adults* \[#7365\]](#)

This a prospective study that aims to identify predictors of resiliency among high-achieving adults under high levels of stress.

Hienz R. Davis C. DeWeese T. Roma P. Guida P.

[*Psychostimulants as Potential Countermeasures for Proton-Induced Deficits in Neurobehavioral Function* \[#7366\]](#)

Data will describe the degree to which individual differences in behavioral responses to dopaminergic-related drugs are implicated in proton radiation-induced differential susceptibility to neurobehavioral dysfunction in rats performing the rPVT.

sangwan a. Kaushik L. Hansen J. Pray A. Crisman J. Park J. montano n. Nguyen D.
[*RECENT ADVANCEMENTS IN APOLLO ARCHIVE EXPLORER: AN ONLINE TOOL TO EXPLORE AND STUDY SPACE MISSIONS* \[#7367\]](#)

A web tool called Apollo Archive Explorer that provides rich information access to Audio, Transcripts, Multimedia and Analysis of NASA Apollo missions will be presented. This tool will be useful for researchers interested in studying complex mission communication data.

Shuffler M. Verhoeven D. Savage N. Kramer W.

[*Review of Multi-Team Systems Related to Long Duration Exploration Missions* \[#7368\]](#)

Leveraging a literature review and operations assessment, we explicate the role of multiteam systems in the unique contextual demand of spaceflight, identifying where we need to go in order to understand how the needs of such systems can be better addressed to advance both research and practice.

DiazGranados D. Wildman J. Curtis M.

[*Review of Team Self-Maintenance Related to Long Duration Exploration Missions* \[#7369\]](#)

We have developed an integrative framework on the team self-maintenance process. This framework is built around several key mediating processes: information sharing, shared leadership, self-regulation, recovery, and emotional support. Future research directions will also be discussed.

Ronca A. Moyer E. Talyansky Y. Padmanabhan S. Choi S. Gong C. Globus R.

[*RODENT HABITAT ON ISS: SPACEFLIGHT EFFECTS ON MOUSE BEHAVIOR* \[#7370\]](#)

Behavioral phenotyping of mice flown on the RR1 mission in the Rodent Habitat developed at Ames Research Center is revealing important new insights into the overall health and adaptation of mice to the space environment, and will be used to guide future research on rodents in space.

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

[*SCALE: Shared Cognitive Architectures for Long-term Exploration* \[#7371\]](#)

This project focuses on how to develop, maintain, and monitor shifts in shared cognitive architecture within teams operating at a short distance (i.e. the astronaut crew) as well as between teams operating at a great distance (i.e., the crew and the ground control).

Rose R. Zbozinek T. Hentschel P. Smith S. Oftedal A. O'Brien J. Craske M.

[*Self-Guided Multimedia Stress Management and Resilience Training* \[#7372\]](#)

This study is evaluating the effectiveness, usefulness, and usability of a self-guided, multimedia stress management and resilience training program in a randomized controlled trial with a sample of flight controllers at Johnson Space Center.

McGuire S. Dinges D. Nasrini J. Hermosillo E. Ecker A. Johannes B. Stahn A. Gur R. Basner M.

[*Sleep Continuity and Heart Rate Variability During a 1-Year Antarctic Winter-Over Mission* \[#7373\]](#)

Sleep fragmentation of crew members during one winter over season at Concordia Station was evaluated based on ECG and Actigraphy measurements.

Strangman G. Zhang Q. Ikkovic V. Hu G.

[*Sleep Electroencephalography and Near-Infrared Spectroscopy Measurements for Spaceflight and Analogs* \[#7374\]](#)

NINscan-SE is being developed as an easy-to-use system for polysomnography-type recordings to support spaceflight and spaceflight analog sleep research.

Orr M.

[*SLEEP SPACE: WAITEMATA DHB'S BETTER SLEEP IN HOSPITAL PROGRAM* \[#7375\]](#)

The proposed development of a Better Sleep in Hospital Program inspired by the work of the NASA Behavioral Health and Performance (BHP) Element.

Barger L. Sullivan J. Ronda J. Czeisler C.

[*Sleep-Wake Actigraphy during the ISS one year mission* \[#7376\]](#)

This abstract describes the amount of data we have collected thus far on the ISS one-year mission.

Mollicone D. Mott C.

[*STAR Watch to Deliver Objective Sleep Measures for Spaceflight Operations* \[#7377\]](#)

STAR Watch provides an actigraphy device optimized for space exploration environments.

Hermosillo E. Dinges D. McGuire S. Nasrini J. Ecker A. Mollicone D. Mott C. Port A. Moore T. Gur R. Basner M.

[*Structured Debriefs on Feasibility and Acceptability of the Cognition Test Battery for Spaceflight* \[#7378\]](#)

We performed structured debriefs in a total of N=62 subjects participating in multiple studies in which Cognition was administered. The structured debriefs were focused on the feasibility and acceptability of the Cognition test battery for spaceflight.

Maynard M. Kennedy D.

[*Team Adaptation and Resilience: What Do We Know and What Can Be Applied to Long-Duration Isolated, Confined, and Extreme Contexts* \[#7379\]](#)

We performed an extensive literature review focused on factors that give rise to team adaptation and resilience as well as the resulting by-products of these two related (but distinct) constructs.

DeChurch L. Contractor N. Mesmer-Magnus J. McDonald J. Asencio R.

[*Team Task Switching in Astronaut Crews on the International Space Station: Integrating Multiteam Membership, Multiteam Systems, Multitasking & Multidimensional Networks to Monitor & Enable Functional Work Shifts in Astronaut Crews* \[#7380\]](#)

We present our conceptual framework of team task switching in astronaut crews on the International Space Station, which will serve as the foundation for our programmatic investigation of the effects of switching between teams, tasks, and technologies on task and crew performance.

Dixon A. Santoro J. Lauricella T. Harvey R. Karner J. Chang C. Kozlowski S.

[*Teams On The Ice: A Multi-Year Research Effort* \[#7381\]](#)

Data collected from six teams over five years is investigated to benchmark team processes over time in isolated and confined extreme environments.

Brainard G. Hanifin J. Warfield B. Hasher D. Jasser S. Balaicuis J. Panepinto L. Byrne B. Pineda C. Gerner E. Clarke T. Maida J. Moomaw R. Johnston S. St. Hilaire M. Barger L. Czeisler C. 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](#) [#7382]

A high-fidelity ground analog study and an in-flight study on ISS will help determine if the new ISS solid state light assemblies can be used both to support astronaut vision and serve as an in-flight countermeasure for circadian disruption and sleep disruption on the ISS.

Santoro J. Dixon A. Binsted K. Chang C. Kozlowski S.

[TRACKING LONG-TERM DYNAMICS: THE HAWAII SPACE EXPLORATION ANALOG AND SIMULATION](#) [#7383]

We present results from two teams living in the Hawaii Space Exploration Analog and Simulation (HI-SEAS) as case comparisons and provide insights on benchmarking team processes in isolated, confined, and extreme (ICE) environments.

Santoro J. Olenick J. Dixon A. Ayton J. Chang C. Kozlowski S.

[TRACKING LONG-TERM TEAM DYNAMICS IN THE ANTARCTIC](#) [#7384]

In our continued research on teams living in isolated, confined, and extreme (ICE) environments, we present results on benchmarking team processes collected teams of scientists and technicians operating at remote stations in the Antarctic.

Smith-Jentsch K. Sierra M.

[Training Needs Analysis for Teams in Long Duration Exploration Missions](#) [#7385]

A teamwork-focused training needs analysis revealed gaps in the current and future training curriculum for long duration exploration mission teams and supports recommendations for incorporating additional teamwork competencies and best practices from the teamwork training literature.

Newton D. LePine J. Wellman N.

[Understanding and Preventing Crew Member Task Entrainment](#) [#7386]

Crew member task entrainment occurs when members have difficulty transitioning their cognitive, emotional, or social energies to a new type of task.

Basner M. Dinges D. McGuire S. Nasrini J. Hermsillo E. Ecker A. Mollicone D. Mott C. Port A. Moore T. Gur R.

[Update on the development and validation of the Cognition test battery for spaceflight](#) [#7387]

Cognition is a brief, comprehensive, computerized neurocognitive test battery specifically designed for spaceflight. This presentation gives an update on Cognition validation and feasibility testing efforts.

Burke S. Shuffler M. Kramer W.

[Vocal Intensity: A Team Leadership Metric and Diagnostic Tool?](#) [#7388]

We present a subset of our results of a NASA funded study on shared leadership in which we examine the use of vocal intensity as a team leadership metric, its relationship to shared leadership, and performance.

Volante W. Stowers K. Hancock P.

[Workload and Scheduling Tools for Long Duration Missions](#) [#7389]

Our work looks to synthesis elements of workload into sleep modeling tools to provide a comprehensive framework for future development of a predictive model of workload and sleep patterns on astronaut performance during long duration space missions.

Stahn A. Brauns K. Werner A. Gunga H. Besnard S. Denise P. Dinges D. Basner M. Kühn S.

[X.CAMPUS – HIPPOCAMPAL NEUROPLASTICITY IN SPACE AND EXTREME ENVIRONMENTS #7390](#)

The overarching aim of the present project is to identify the changes in hippocampal subfield volume and its behavioral significance in various experiments including space flight, Antarctic missions, isolation studies, and bed rest experiments.

Tuesday, February 9, 2016

Poster Session B: Behavioral Health and Performance - Standardized Behavioral Measures Toolkit

4:30 PM

Exhibit Hall A

Basner M. McGuire S. Nasrini J. Hermosillo E. Ecker A. Mollicone D. Mott C. Port A. Moore T. Gur R. Dinges D.

[Behavioral Core Measures \(BCM\): Cognition \[#7391\]](#)

Cognition is a brief, comprehensive neurocognitive test battery for spaceflight and part of NASA's Behavioral Core Measures (BCM) tool that standardizes behavioral health data acquisition across space (analog) environments.

Roma P. Standardized Measures Workshop N. Dinges D.

[Behavioral Core Measures Toolkit: Monitoring Teams \[#7392\]](#)

We will present a summary of the selection process and overview of the tools chosen to quantify performance and biopsychosocial adaptation risks across laboratory, space analog, and spaceflight environments via measures of team-relevant inputs, processes, and outcomes.

Stuster J.

[Standardized Behavioral Measures Toolkit \(SBMT\): Journals \[#7393\]](#)

The Journals component of the Behavioral Core Measures project (formerly known as SBMT) is described.

Mollicone D.

[Standardized Behavioral Measures Toolkit \(SBMT\): Objective Sleep Monitoring With STARWatch \[#7394\]](#)

STAR Watch is a wrist-worn sleep monitoring watch optimized for space operations that will be integrated with the Standardized Behavioral Measures Toolkit (SBMT).

Dinges D. Dennis L. Trentalange M. Ecker A. Nasrini J. Basner M.

[Standardized Behavioral Measures Toolkit \(SBMT\): Self-Report Measures \[#7395\]](#)

As a part of the BCM iPad suite, crewmembers will be completing surveys and questionnaires to evaluate several key aspects of behavioral health and crew interaction.

Strangman G. Alexander G. Cefaratti D. Somers B. Will M. Dinges D.

[Standardized Behavioral Measures Toolkit \(SBMT\): Task Performance with ROBoT \[#7396\]](#)

We are adapting the Robotics On-Board Trainer (ROBoT) system for Canada Arm operation to be used as an operationally-relevant performance assessment tool as part of the Standardized Behavioral Measures Toolkit.

Tuesday, February 9, 2016

Poster Session B: Exploration Medical Capability

4:30 PM

Exhibit Hall A

Alptekin G. Jayaraman A. Bernal C. Bonnema M. Wall B. Bruinsma D.

[*A Low-Power Medical Oxygen Concentrator*](#) [#7397]

The progress in the development of a low-power medical oxygen concentrator for long-duration space missions using a proprietary sorbent with increased selectivity is presented.

Jaworske D. Myers J. Goodenow D. Young M. Arellano J.

[*Architecture for Integrated Medical Model Dynamic Probabilistic Risk Assessment*](#) [#7398]

Managing the software architecture process provides a systematic means of creating, documenting, and communicating the design early in the development of dynamic probabilistic risk assessment software.

Buxton R. West M. Kalogera K. Hanson A.

[*Bluetooth Heart Rate Monitors for Spaceflight*](#) [#7399]

The study aimed to benchmark the quality of the current Bluetooth heart rate monitors on the market for potential use during spaceflight.

Hatch M. Beshay M.

[*Cell Phone-based Lateral Flow Assay for Blood Biomarkers Detection*](#) [#7400]

This is a progress update on current development of cell phone-based bio markers measurements system for space applications.

Siu K. Huang C. Boman A. White A. Dmitry O.

[*Do hand dominance and postural selection matter during surgical Skill practice in space?*](#) [#7401]

Hand dominance and postural selection do matter for trainee to practice surgical skills or space-related skills in space more efficiently to reduce muscle fatigue.

Griko Y. Peletskaya E.

[*IN-FLIGHT PERSONALIZED MEDICATION MANAGEMENT*](#) [#7402]

We propose to develop and customize for NASA's applications the market available Personalized Prescribing System (PPS) that would provide a comprehensive, non-invasive solution for safer, targeted medication management for every crew member.

Cubrich L. Bills N. Morien M. Farritor S. Oleynikov D.

[*MINIATURE SURGICAL ROBOTS FOR LONG-TERM MISSION SURGICAL TRAINING & CAPABILITY*](#) [#7403]

As human space exploration shifts to greater distances from Earth, the surgical capability of missions will be of paramount importance for supporting the health and performance of the crew. Miniature surgical robots provide a novel solution to the challenges of surgery in space.

Mudanyali O.

[*MOBILE PHONE LABS FOR NEXT GENERATION MEDICAL DIAGNOSTICS*](#) [#7404]

Holomic Mobile Phone Labs are a series of smartphone-based imaging, sensing and diagnostics technologies, offering numerous opportunities to improve healthcare especially in point of care settings and resource limited environments.

Pantalos G. Crigger M. Kennedy T. Joseph E. Jain I. Roussel T. Shields G. Ayvali E. Meyer A. Morales C. Choset H. Burgess J. Antaki J.
[Parabolic Flight Evaluation of an Aqueous Immersion Surgical System for Reduced Gravity](#) [#7405]

We are developing an Aqueous Immersion Surgical System (AISS) which is a clear enclosure to permit minimally invasive and open surgical procedures within a localized aqueous environment in reduced gravity.

Chan E. Bae C. Berg S. Han C. Bell A. Barrientos C. Eames D. Bauer B. Phipps W. Nelson E. Atkin M.
[rHEALTH X and Vitals Device for ISS Utilization](#) [#7406]

Handheld sensor with vitals device for comprehensive biomedical diagnosis.

Hawks J. Nelson C. Akbarisamani S. Bashford G.
[TRAINING AND ASSISTIVE DEVICE FOR SPACEFLIGHT ULTRASOUND](#) [#7407]

A prototype device for assisting astronauts with ultrasonography during spaceflight has been designed, assembled and tested.

ARBEILLE P. CHAPUT D. BARDES S.
[Validation on 180 patient of a teleoperated Echograph and probe transducer device designed for space ultrasound investigation.](#) [#7408]

180 examinations were performed on the abdomen and pelvis (36%), vascular structures (42%), and small parts (ex. thyroid and muscle, 22%), and 15 were performed on fetuses. Teleoperation of the echograph and motorized probe in remote area (50 to 7000km).provided diagnoses in 97% of the cases.

Tuesday, February 9, 2016

Poster Session B: Immunology and Microbiology

4:30 PM

Exhibit Hall A

Kunz H. Rubins K. Sams C. Quiarte H. Simpson R. Oubre C. Beitman A. Crucian B.
[*Evaluation of Techniques for Performing Cellular Isolation during Microgravity Conditions*](#) **[#7409]**

This study utilized parabolic flight experiments to evaluate the feasibility of performing standard cell purification techniques in microgravity.

Crucian B. Kunz H. Mehta S. Stowe R. Ploutz-Snyder R. Quiarte H. Chouker A. Pierson D.

[*Functional immune alterations, latent Herpesvirus reactivation, physiological stress and clinical incidence onboard the International Space Station*](#) **[#7410]**

Describes a new immune investigation onboard ISS.

Sundaresan A. Olamigoke L. Mansoor E. Mann V. Okoro E.

[*IMMUNE DYSREGULATION AND COUNTERMEASURES IN PHYSIOLOGICALLY STRESSED ENVIRONMENTS.*](#) **[#7411]**

The goal of this study is to delineate response suites which are consequential, direct or indirect effects of the microgravity environment and which of these are essential to lymphocytes.

Cromer W. Narayanan A. Zawieja D.

[*Short Term Space Flight Disrupts Normal Colon Histomorphology and Causes a Reduction in the Size of Lymphatics Serving the Tissue*](#) **[#7412]**

We examined the histology and lymphatic investment of the colons of space flown rats to determine if there were aberrations that would indicate inflammation. We found that there was significant epithelial damage and a decrease in the size of lymphatics in the bowel wall.

Crucian B. Chouker A. Pierson D. Simpson R. Basner M. Otto C. Kunz H. Goodwin T.
[*The 'Exploration Atmosphere' Flight Study on ISS: Assessment of Immunity, Oxidative Stress, Vision and Cognition*](#) **[#7413]**

An overview of the purpose, methods, and outcome variables for the upcoming in-flight "Exploration Atmosphere" study on ISS, which seeks to determine the physiological adaptations to the proposed exploration atmosphere for future exploration-class missions.

Mylabathula P.

[*THE IMPACT OF MODELED MICROGRAVITY ON CYTOMEGALOVIRUS \(CMV\) REACTIVATION AND HOST IMMUNE EVASION*](#) **[#7414]**

This study proposes to use the rotating wall vessel cell culture analog to examine the impact of simulated microgravity on CMV reactivation and the anti-viral properties of T-cells and NK-cells.

Tuesday, February 9, 2016

Poster Session B: Statistics – Informal Statistics Help Desk

4:30 PM

Exhibit Hall A

Feiveson A. Ploutz-Snyder R.

[INFORMAL STATISTICS HELP DESK#7415](#)

Back by popular demand, the JSC Biostatistics Lab is offering an opportunity for informal conversation about challenges you may have encountered with issues of experimental design, analysis, data visualization or related topics.

Tuesday, February 9, 2016

Poster Session B: Statistics – LSAH/LSDA Data Request Help Desk

4:30 PM

Exhibit Hall A

Young M.

[LIFETIME SURVEILLANCE OF ASTRONAUT HEALTH \(LSAH\) / LIFE SCIENCES DATA ARCHIVE \(LSDA\) DATA REQUEST HELPDESK \[#7416\]](#)

This session is intended to provide to HRP IWS attendees instant feedback on archived astronaut data, including such topics as content of archives, access, request processing, and data format.

Tuesday, February 9, 2016
Poster Session B: Informal Help Desk
4:30 PM **Exhibit Hall A**

Gilbert C.
Technology Transfer [#7417]

Tuesday, February 9, 2016

Poster Session B: Mixed Topics

4:30 PM

Exhibit Hall A

Hayes J. Layne C. Merkle L.

[A NASA - UNIVERSITY OF HOUSTON PARTNERSHIP PREPARES GRADUATE STUDENTS FOR CAREERS IN SPACE EXPLORATION \[#7418\]](#)

NASA and the University of Houston team to promote graduate education in space life sciences.

Lee L.

[Access to Archived Astronaut Data for HRP Researchers: Update on Progress and Process Improvements \[#7419\]](#)

Improvements and progress on researcher access to astronaut data will be presented.

Warren L.

[Amplification Strategy to Communicate International Space Station Research \[#7420\]](#)

Have you noticed that you've been hearing more about our International Space Station in the media? Each month, we highlight a different ISS research topic that is strategically focused to maximize amplification and elevate our messages into the mainstream.

Masterova K. Van Baalen M. Wear M. Murray J. Schaefer C.

[COLONOSCOPY SCREENING IN THE US ASTRONAUT CORPS \[#7421\]](#)

The objective of this study is to evaluate the possible effect of increased follow-up times between colonoscopy screenings on the number and severity of polyps identified during the procedures among both current and former NASA astronauts.

Stolc V. Freund F.

[Electromagnetic Basis of Metabolism and Heredity \[#7422\]](#)

Our work demonstrated previously un-described evidence for quantum effects in biology by electromagnetic coupling below thermal noise at the universal electron transport chain (ETC) in vivo.

Young L. Sutton J. Cullinane C.

[ENCYCLOPEDIA OF BIOASTRONAUTICS \[#7423\]](#)

A comprehensive Encyclopedia of Bioastronautics is in preparation to be published by Springer in 2017.

Young L. Natapoff A. Greenberg J.

[GRADUATE TRAINING IN BIOASTRONAUTICS AT MIT AND HARVARD \[#7424\]](#)

Graduate Training in Bioastronautics is offered through Harvard-MIT Program in Health Sciences and Technology.

Haven C.

[INTERNATIONAL DATA SHARING PORTAL \[#7426\]](#)

This poster demonstrates the capabilities of secure, private data sharing among PIs whose Data Sharing Plans have been implemented by the ISSMP.

Wood A. Stewart H. French A. Leung D. Gage A. Trent R. Maese A.
[NASA AMES LIFE SCIENCE REPOSITORIES: A FOUNDATION TO FRONTIERS IN HUMAN SPACE EXPLORATION RESEARCH \[#7427\]](#)

The poster presents an overview of the NASA Ames life science repositories and available biospecimens.

Thompson W. Byrd L. Yager R.
[Process for the Recruitment and Medical Clearance of Test Subjects \[#7428\]](#)

Test Subject Screening has the primary responsibility to provide medically qualified test subjects for ground based and microgravity research studies.

Bershad E. Limper U. Mulder E. Rittweger J.
[Psychogenic Urinary Retention Associated with Head Down Tilt Bed Rest: A Rare Medical Complication during the SPACE-COT study \[#7429\]](#)

We describe a case of recurrent urinary retention during 12 degree head down tilt (HDT) bed rest during the SPACE-COT study. To our knowledge this complication has never been reported previously during a HDT analog.

Burkhardt P. Lanceta L. Soucy P. Eaton J. Li C.
[Radioprotective Effects of Ferritin \[#7430\]](#)

Radiation damage poses a threat to astronauts but by reducing 'loose' intracellular iron it may be possible to reduce this iron pool and protect against radiation-induced DNA damage and cell death.

Globus R. Choi S. Gong C. Leveson-Gower D. Ronca A. Taylor E. Beegle J.
[RODENT HABITAT ON ISS: ADVANCES IN CAPABILITY FOR DETERMINING SPACEFLIGHT EFFECTS ON MAMMALIAN PHYSIOLOGY \[#7431\]](#)

A new capability for long duration habitation of group-housed rodents on the ISS was validated and experiments performed on two spaceflight missions to date, enabling achievement of both basic and translational research objectives.

Thomas D. Finkle T. Warren C. Delaney M.
[The Role of the Life Sciences Data Archive in Space Exploration Research \[#7432\]](#)

This poster will address the interactions between the Principal investigators and Life Sciences Data Archive personnel in the experiment archive process.

Tuesday, February 9, 2016

Poster Session B: Space Human Factors Engineering

4:30 PM

Exhibit Hall A

Clark T. Salazar G. Hanifin J. Brainard G. Schwing B. Litaker H.

[Computational Modeling to Limit the Impact Displays and Indicator Lights Have on Habitable Volume Operational Lighting Constraints](#) [#7433]

The purpose of this study is to evaluate how the light spectrum from LED indicators and display systems are impacting the designed operational lighting environment and what measures can be performed to mitigate those impacts.

Cross E. Chang M. Hambuchen K. Aiken J.

[MEASURING HUMAN-ROBOT COLLABORATION FOR FUTURE LONG-DURATION SPACE MISSIONS](#) [#7434]

The goal of the effort described here is to understand how humans and robots can collaborate to improve overall mission performance; by exploring usability and user experiences of current space robotic system operators.

Sandor A. Moses H.

[Speech Alarms Pilot Study](#) [#7435]

Research investigating performance with speech alarms compared to tone alarms for advanced caution and warning systems. The resulting candidate alarms were evaluated in the Human Exploration Research Analog.

Billman D. Catrambone R. Schreckenghost D.

[Training for Generalizable Skills & Knowledge: Integrating Principles and Procedures](#) [#7436]

We test the hypothesis that training to integrate abstract principles and specific procedures will foster better generalization of skills and knowledge, which is vital for future NASA crewed missions.

Duda K. Steiner, III T. DeBitetto P. West J.

[Wearable Kinematic Systems for Quantifying 3-D Space Utilization in the Microgravity Environment](#) [#7437]

This abstract provides an overview of the wearable kinematic system development for quantifying ISS space utilization for net habitable volume modeling, and presents data from a recent vision+inertial navigation system data collect in the ISS mockup facility at Johnson Space Center.

Tuesday, February 9, 2016

Poster Session B: Space Radiation Acute

4:30 PM

Exhibit Hall A

Jejelowo O. Tariq M. Kim H. Yar Khan S. Wu H.

[GLOBAL TRANSCRIPTIONAL RESPONSE OF MICE TISSUES TO ACUTE DOSES OF PROTON RADIATION \[#7438\]](#)

Global transcriptome profiling of mice irradiated with acute doses of proton radiation.

Carnell L. Simonsen L. Blattnig S. Ambur M. Sidehamer T.

[IBM Watson Supporting Space Radiation \[#7439\]](#)

Application of an advanced analytics platform is being implemented to help answer specific scientific questions, inform key decisions and support cross validation of study results.

Hu S.

[Linking Doses with Clinical Scores of Hematopoietic Acute Radiation Syndrome \[#7440\]](#)

A grading system is applied onto the hematopoietic models to provide dynamical linkage between the absorbed dose and clinical characterization of the hematopoiesis system after exposure.

Tuesday, February 9, 2016

Poster Session B: Space Radiation Central Nervous System

4:30 PM

Exhibit Hall A

Mao X. Zheng J. Hauer-Jensen M. Boerma M. Nelson G.

[*Acute and late Impact of combined exposure to simulated microgravity and low-dose radiation in the brain: a gene network analysis* \[#7441\]](#)

We performed a mouse brain transcriptional profiling study to identify the activation of canonical pathways and genes associated with neurodegeneration at acute and chronic stage after hind limb unloading (HLU), low dose rate γ -irradiation (LDyR), and the combination.

Wang H. Saganti P. Holland D. Rhone J. Hu X.

[*Biological effects of secondary particles from high energy proton and high energy charge particles in neuronal cells* \[#7442\]](#)

We detected the secondary particle from Martian regolith simulant exposed to high energy proton and high energy charge particles, and investigated the biological effects on neuronal cells.

Dutta S. Hadley M. Miller V. Macada E. Britten R.

[*Changes in the hippocampal proteome associated with the induction of Spatial memory impairment by mission-relevant HZE doses.* \[#7443\]](#)

Proteome biomarker differential analysis using high resolution accurate mass instrumentation in hippocampus affecting spatial memory and learning from low doses (~20cGy) of HZE particles.

Davis C. Guida P. Hienz R.

[*Differences in sustained attention and dopamine agonist-induced behavioral in head-only of frontal cortex-only irradiated rats* \[#7444\]](#)

The project describes the effects of protons or x-rays on sustained attention, measured via the rodent psychomotor vigilance test (rPVT) and dopamine agonist-induced yawning and hypothermia.

Vose L. Miry O. Zhang X. Stanton P.

[*EFFECT OF THYROXINE ON SYNAPTIC FUNCTION AND NEUROGENESIS FOLLOWING GALACTIC COSMIC RADIATION* \[#7445\]](#)

Galactic cosmic radiation (GCR) impairs hippocampal neurogenesis, learning, and synaptic plasticity in mice, while thyroid hormone supplementation during GCR exposure has the potential to protect neurogenesis, synaptic and cognitive function.

Vlkolinsky R. Rudbeck E. Nelson G.

[*ELECTROPHYSIOLOGICAL EFFECTS OF PROTON RADIATION IN RAT HIPPOCAMPUS AND MEDIAL PREFRONTAL CORTEX* \[#7446\]](#)

For the first time, we used rats to measure the electrophysiological effects of low doses of proton radiation in the medial prefrontal cortex and the hippocampus by a combination of extracellular and intracellular techniques in vitro in brain slices prepared one month after the exposure.

Baulch J. Acharya M. Baddou A. Kawashita T. Ru N.

[*EPIGENETIC CHANGES IN THE BRAIN OF MICE EXPOSED TO 28-SI PARTICLE RADIATION*](#) [#7447]

Exposure to high LET radiation causes significant changes in global DNA methylation in the brain that correlate with radiation induced cognitive deficits.

Hienz R. Davis C. Roma P. Guida P.

[*Fatigue-like Decrements in Space Radiation-Induced Neurocognitive Function*](#) [#7448]

The present report describes the effects of low-dose proton, ⁵⁶Fe, and ²⁸Si irradiation on within-session changes in measures sensitive to decrements in vigilance (i.e., the time-on-task and response-stimulus-interval effects described in the human PVT literature).

Baulch J. Ru N. Yu L. Syage A. Le M. Limoli C.

[*MICROVESICLE-MEDIATED SIGNALING IN THE RADIATION RESPONSE OF THE BRAIN*](#) [#7449]

The results of these experiments suggest that microvesicle cargo including miR may mediate paracrine cell signaling that confers protection of glioma cells against irradiation and causes loss of neuronal structure in the normal brain.

Wyrobek A. Rabin B. Bhatnagar S. Albertolle M. Straume T. Witkowska H.

[*Molecular characterization of choroid plexus and hippocampal damage and degenerative CNS risks from space radiation*](#) [#7450]

The CP and CSF, the major components of the blood-CSF brain barrier, are sensitive to HZE-radiation-induced molecular abnormalities that can persist long after the exposure and may predict individual susceptibility for behavior impairment and risks for late-onset neurological diseases.

Rabin B. Shukitt-Hale B. Miller M. Carrihill-Knoll K. Espinoza A. Henderson A. McBeth K.

[*PRELIMINARY STUDIES OF THE EFFECTS OF SUBTHRESHOLD EXPOSURE TO ⁵⁶Fe PARTICLES ON COGNITIVE PERFORMANCE*](#) [#7451]

Evaluating the effects of fractionated exposures to doses of HZE particles that are below the threshold for disrupting cognitive performance.

Mao X. Nishiyama N. Pecaut M. Campbell-Beachler M. Gifford P. Haynes K. Bellone J. Hartman R. Gridley D.

[*ROLE OF NADPH OXIDASE IN NEUROVASCULAR STRESS FOLLOWING UNLOADING AND/OR LOW-DOSE RADIATION*](#) [#7452]

Characterize chronic irradiation and unloading-induced oxidative damage in mouse brain.

Cheema A. Altadill T. Nelson G. Mao X.

[*Simulated Microgravity Induces Changes in Brain Lipidome of Brain Tissue*](#) [#7453]

The effect of simulated microgravity was studied by comparative untargeted metabolomics/lipidomics profiling of the brain tissue of mice that were subject to hind limb suspension (HLS) for 21 days.

Whoolery C. Walker A. Richardson D. Rivera P. Reynolds R. Beddow D. Chen B. Eisch A.

[*WHOLE BODY EXPOSURE TO 28SI TRANSIENTLY REDUCES PROLIFERATION BUT PERSISTENTLY DECREASES SURVIVAL OF ADULT-GENERATED HIPPOCAMPAL NEURONS*](#) [#7454]

Whole body exposure to HZE particle ²⁸Si causes a transient decrease in proliferating hippocampal cells but a persistent decrease in surviving adult-generated neurons.

Tuesday, February 9, 2016

Poster Session B: Space Radiation Degenerative

4:30 PM

Exhibit Hall A

Kucik D. Kabarowski J. Barnes S. Gupta K.

[56Fe alters the composition of circulating plasma lipids in wild type mice without affecting levels of HDL and LDL \[#7455\]](#)

56Fe alters the composition of circulating plasma lipids in wild type mice without affecting levels of HDL and LDL.

Baker J. Lenarczyk M. Moulder J. Little M. Hopewell J. Kronenberg A.

[Determination of risk for and occurrence of heart disease from Space Radiation \[#7456\]](#)

Risk factors for heart disease (total cholesterol and triglycerides) are elevated starting at 120 days after irradiation in Male Wistar rats exposed to 1.0 Gy of 600 MeV/n 56Fe (LET = 184 keV/μm) compared with age-matched sham-irradiated controls.

Sridharan V. Cao M. Singh P. Jones T. Campbell-Bleacher M. Nelson G. Byrum S. Tackett A. Hauer-Jensen M. Boerma M.

[Effects of 16O radiation on cellular and functional alterations in the heart \[#7457\]](#)

16O exposure may cause alterations in cardiovascular functions.

Nelson G. Mao X. Jones T. Rodriguez D. Stanbouly S. Sridharan V. Hauer-Jensen M. Boerma M.

[Effects of Low Doses of Gamma Rays and Charged Particles on Mouse Retinal Endothelium and Cultured Microvascular Endothelial Cells \[#7458\]](#)

Low doses of charged particles elicit changes in endothelial cell phenotypes in vitro and in vivo that are relevant to cardiovascular disease.

Pathak R. Bachri A. Ghosh S. Katurbash I. Boerma M. Hauer-Jensen M.

[GT3 suppresses ionizing radiation- and/or microgravity-induced genomic instability: Possible role of RAD50 \[#7459\]](#)

GT3 suppress radiation-induced genomic instability in mouse bone marrow cells.

Sadek H. Aroumougame A.

[IONIZING RADIATION PREVENTS PROLIFERATION OF CYCLING CARDIOMYOCYTES \[#7460\]](#)

Cycling cardiomyocytes in the adult mammalian heart are highly susceptible to low-LET radiation induced DNA lesions.

Tackett A. Byrum S. Sridharan V. Boerma M.

[Proteomic Analysis of Mouse Heart Tissue Following Radiation Exposure \[#7461\]](#)

We show a quantitative proteomic analysis of mouse heart tissue following radiation exposure.

Landes R. Haruta D.

[Radiation Effects on Atrial Fibrillation Incidence in Atomic Bomb Survivors \[#7462\]](#)

Using participants in the Radiation Effects Research Foundation's Adult Health Study of atomic bomb survivors, we provide estimated relative risk of atrial fibrillation after exposure to low to moderate levels of ionizing radiation.

Koturbash I. Miousse I. Sridharan V. Skinner C. Hauer-Jensen M. Boerma M.

[Three types of space radiation cause comparable dynamic alterations in one carbon metabolism and DNA methylation and expression of repetitive elements in the murine heart](#) **#7463**

Different types of space radiation cause comparable epigenetic and metabolic changes in the murine heart.

Wednesday, February 10, 2016

Behavioral Health and Performance Countermeasures*

9:45 AM

Galleon II & III

Chairs: Lauren Landon and Holly Patterson

- 9:45 AM Tannenbaum S. Mathieu J. Alliger G. Donsbach J. Cerasoli C.
[TEAM-LED DEBRIEFS: A COUNTERMEASURE FOR LONG-DURATION SPACE EXPLORATION CREWS \[#7017\]](#)
This presentation describes a program of research studying the use of a crew-led team debriefing countermeasure for promoting team resilience and effectiveness.
- 10:00 AM Mosier K. Fischer U.
[PROTOCOLS FOR ASYNCHRONOUS COMMUNICATION IN SPACE OPERATIONS: COMMUNICATION ANALYSIS \[#7018\]](#)
This poster will contain the results of research to create and test communication protocols for asynchronous communication.
- 10:15 AM Dinges D. Johnston S. Jones C. Ecker A. Baskin P. Trentalange M. Basner M.
[Operational Ground Testing Protocol to Optimize Astronaut Sleep Medication Efficacy and Individual Effects \[#7019\]](#)
To evaluate and mitigate the risk of impaired astronaut cognitive performance while using sleep medications, we conducted a ground-based, double-blind, placebo-controlled trial on the effects of commonly used hypnotics on performance at abrupt awakening from sleep.
- 10:30 AM Britt T. Jennings K. Goguen K. Sytine A.
[The Role of Meaningful Work in Astronaut Health and Performance During Long Duration Space Exploration Missions \(LDSEM\) \[#7020\]](#)
The present report examines how engagement in meaningful work during long duration missions may decrease the demands associated with boredom and monotony, as well as buffer astronauts from the negative consequences associated with other stressors likely to be encountered on these missions.
- 10:45 AM Klerman E. Rahman S. Lockley S.
[Ultra-Short Light Pulses as Efficient Countermeasures for Circadian Misalignment and Objective Performance and Subjective Alertness Decrements \[#7021\]](#)
We examined the efficacy of using a Dynamic Lighting Schedule with intermittent light pulses to induce 8 h phase delays, improve sleep, and enhance performance and alertness, compared to a continuous background light control condition.
- 11:00 AM Discussion
- 11:15 AM Break

Wednesday, February 10, 2016

Bone Research

9:45 AM

Grand Ballroom B & C

Chair: Jean Sibonga

- 9:45 AM Shirazi-Fard Y. Zaragoza J. Schreurs A. Truong T. Tahimic C. Alwood J. Castillo A. Globus R.
[SIMULATED SPACE RADIATION: MURINE SKELETAL RESPONSES DURING RECOVERY AND WITH MECHANICAL STIMULATION \[#7058\]](#)
This study used a unique sequential dual ion exposure (proton and iron) for simulated space radiation to investigate time-dependence of responses in gene expression, cell function, and microarchitecture with respect to radiation and an anabolic stimulus of axial loading (AL).
- 10:00 AM Mellor L. Trivisan B. Taylor M. Krause A. Donahue H. Oxford J. Lobo E.
[SCLEROSTIN INHIBITION IN HINDLIMB UNLOADING MODEL: GOOD NEWS FOR BONE. BAD NEWS FOR CARTILAGE \[#7059\]](#)
Therapeutic intervention against sclerostin in unloading conditions may help with decreasing bone density loss, but it is detrimental to articular cartilage health.
- 10:15 AM Gadomski B. Jiao J. Qin Y. McGilvray K. Easley J. Palmer R. Puttlitz C.
[SHOCK WAVE THERAPY AND LOW-INTENSITY PULSED ULTRASOUND ACCELERATE BONE FORMATION RATES UNDER SIMULATED MICROGRAVITY CONDITIONS \[#7060\]](#)
Shock wave therapy (SWT) and low-intensity pulsed ultrasound (LIPUS) were investigated as countermeasures to the delayed fracture healing experienced during mechanical unloading in a ground-based animal (sheep) model.
- 10:30 AM Gordon G. Romaniello S. Skulan J. Smith S. Zwart S. Anbar A.
[Stable Calcium Isotopes in Urine as a Biomarker of Bone Mineral Balance in Spaceflight \[#7061\]](#)
Ca isotopes in urine of astronauts on the International Space Station shifted towards isotopically lighter values during space flight.
- 10:45 AM Doanhue H. Speacht T. Krause A. Lloyd S. Zhang Y. Laufenberg L. Steiner J. Lang C.
[Integrated Regulation of Bone and Muscle Metabolism by Simulated Microgravity \[#7062\]](#)
We examined the hypothesis is that unloading-induced osteopenia is at least partially dependent on unloading-induced sarcopenia and, conversely, unloading induced sarcopenia is at least partially dependent on unloading-induced osteopenia.
- 11:00 AM Hargens A. Sayson J. Chang D. Healey R. Riascos R. Parazynski S. Coughlin D. Lotz J.
[Risk of Intervertebral Disc Damage after Prolonged Space Flight \[#7063\]](#)
Our investigation aims to understand the higher incidence of herniated intervertebral discs and back pain by pre- and post-flight imaging, functional tests, and pain questionnaires of ISS crews to ascertain mechanisms of back pain as well as degeneration and injury to spinal structures.
- 11:15 AM Break

Wednesday, February 10, 2016

Extravehicular Activity

9:45 AM

Yacht

Chairs: Jason Norcross and Andrew Abercromby

- 9:45 AM Norcross J. McFarland S. Plutz-Snyder R.
[METABOLIC ASSESSMENT OF SUITED MOBILITY USING FUNCTIONAL TASKS](#) [\[#7123\]](#)
Evaluation of spacesuit mobility through measurement of metabolic cost of functional tasks may be an important metric in addition to standard measures of joint torque and range of motion.
- 10:00 AM Pollock N. Natoli M. Martina S. Conkin J. Wessel J. Gernhardt M.
[AMBULATION DURING PERIODS OF SUPERSATURATION INCREASE](#) [DECOMPRESSION STRESS IN SPACEWALK SIMULATIONS](#) [\[#7124\]](#)
We evaluated ambulation exercise associated with simulated spacewalk, finding decompression sickness to be higher with ambulation, more so when it was conducted in a supersaturated state.
- 10:15 AM Conkin J. Pollock N. Natoli M. Martina S. Wessel J. Gernhardt M.
[VENOUS GAS EMBOLI AND AMBULATION AT 4.3 PSIA \(PRELIMINARY\)](#) [\[#7125\]](#)
Ambulation at 4.3 psia even after conservative denitrogenation increases the risk venous gas emboli.
- 10:30 AM Wessel J. Norcross J. Bekdash O. Schaefer C.
[HYPOXIA IN SPACE? WHAT THE PAST TELLS US FOR THE FUTURE...](#) [\[#7126\]](#)
The 10.2psia Shuttle missions were examined as a historical source of information towards comparison to the Exploration Atmosphere.
- 10:45 AM Norcross J.
[Initial incidence of white matter hyperintensities on MRI in astronauts](#) [\[#7127\]](#)
Twenty-one postflight de-identified astronaut MRIs (5 mm slice thickness FLAIR sequences) were evaluated for white matter hyperintensity count and volume.
- 11:00 AM Discussion
- 11:15 AM Break

Wednesday, February 10, 2016

Late Effects of Space Radiation on Cardiovascular Disease and Cataracts

9:45 AM

Grand Ballroom A

Chairs: Zarana Patel and Marjan Boerma

- 9:45 AM Patel Z. Hada M. Kang M. Grande-Allen K.
[DEVELOPMENT OF A 3-D VASCULAR MODEL FOR RADIATION RISK ASSESSMENT OF CARDIOVASCULAR DISEASE](#) [#7153]
This work utilizes an innovative approach towards ground-based radiation risk assessment with the development of 3D tissue cocultures of human endothelial cells, smooth muscle cells, and macrophages grown under shear flow conditions.
- 9:55 AM Durante M.
[Review of PROCARDIO High-LET Data on Radiation-Induced Cardiovascular Disease](#) [#7154]
The EU-project PROCARDIO is a large consortium to study cardiovascular effects of low-dose ionizing radiation in tissue and animal models.
- 10:20 AM Boerma M.
[Update on the Center for Space Radiation Research](#) [#7155]
Altogether, results from animal and cell culture models in the CSRR aid in characterizing the acute response and cardiovascular degenerative effects of low dose protons and heavy ions.
- 10:45 AM Blakely E.
[OVERVIEW OF SPACE RADIATION-INDUCED CATARACTS](#) [#7156]
This presentation will review the published record of radiation-induced cataracts at space-relevant levels of dose and radiation quality.
- 11:10 AM Bowles D. Feger B. Asfour H. Thompson J. Dubois L. Young K. Carnell L. Blattnig S. Bursac N. Dewhirst M. Moseley M.
[Proteomic Signatures of Space Radiation Induced Cardiovascular Degeneration](#) [#7157]
The purpose 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.
- 11:15 AM Break

Wednesday, February 10, 2016

Behavioral Health and Performance Monitoring Tools*

1:30 PM

Galleon II & III

Chairs: Sandra Whitmire and Kristine Ohnesorge

- 1:30 PM Leveton L. Whitmire S.
[Managing and Reducing Behavioral Health and Performance Risks for Exploration Missions via Standardized Measures \[#7024\]](#)
Provides a description of an effort underway at NASA to develop a core set of common behavioral health measures to enable risk monitoring and characterization as well as countermeasure effectiveness.
- 1:45 PM Dinges D. Basner M. Mollicone D. Stuster J. Strangman G. Roma P. Gur R. Stahn A. Dennis L. Trentalange M. Ecker A. Nasrini J. Mott C.
[Standardized Behavioral Measures Toolkit \(SBMT\): Overview\[#7025\]](#)
The goal of this project is to develop an integrated standardized suite of behavioral core measurement tools (BCM) that would be quite feasible to implement within the constraints of spaceflight research, ground-based analogs, and prolonged missions.
- 2:00 PM Miller C. Wu P. Schmer-Galunder S. Ott T. Rye J.
[AD ASTRA: AUTOMATED DETECTION OF ATTITUDES AND STATES THROUGH TRANSITION RECORDINGS ANALYSIS—TECHNIQUES, RESULTS AND OPPORTUNITIES\[#7026\]](#)
We review the results of a multi-year study involving 3 major analog experiments, to assess the ability of automated linguistic analysis techniques to derive individual and team psychosocial state data from non-intrusively acquired texts such as journals and transcribed task dialogues.
- 2:15 PM Roma P. Hursh S. Hienz B.
[Team Composition, Performance, and Biopsychosocial Adaptation: Updates, Insights, and Implications of an Objective Social Behavioral Assay\[#7027\]](#)
Summary and preliminary analyses of laboratory experiments, space analog research, and software development focused of team composition.
- 2:30 PM Liu A. Flynn-Evans E. Galvan R. Rueger M. Natapoff A. Oman C. Lockley S.
[Validation of Assessment Tests and Countermeasures for Detecting and Mitigating Changes in Cognitive Function During Robotics Operations \[#7028\]](#)
We discuss the effects of caffeine and blue-enriched white light on cognitive and task performance in an operationally relevant protocol.
- 2:45 PM Discussion
- 3:00 PM Break

Wednesday, February 10, 2016

Cardiovascular Flight and Ground Findings*

1:30 PM

Grand Ballroom B & C

Chairs: Michael Stenger and Benjamin Levine

- 1:30 PM Lee S. Stenger M. Smith S. Zwart S. Laurie S. Ploutz-Snyder R. Platts S.
[DEFINING THE RELATIONSHIP BETWEEN BIOMARKERS OF OXIDATIVE AND INFLAMMATORY STRESS AND THE RISK FOR ATHEROSCLEROSIS IN ASTRONAUTS DURING AND AFTER LONG-DURATION SPACEFLIGHT \[#7065\]](#)
The purpose of this investigation is to determine whether biomarkers of oxidative and inflammatory stress are elevated during and after long-duration spaceflight and to determine if a relation exists between with structural and functional indices of atherosclerotic risk.
- 1:45 PM Prisk G. Migeotte P.
[3D BALLISTOCRADIOGRAPHY IN MICROGRAVITY \[#7066\]](#)
The overall objective is to correlate cardiovascular parameters with ballistocardiography parameters obtained from 3D movements of the human body due to the mechanical action of the beating heart and the ejection of blood in the arteries.
- 2:00 PM Laurie S. Lee S. Phillips T. Stenger M. Cerisano J. Kofman I. Reschke M.
[PILOT FIELD TEST: USE OF A COMPRESSION GARMENT DURING A STAND TEST AFTER LONG-DURATION SPACE FLIGHT \[#7067\]](#)
Crew members performed a stand test immediately after landing from long-duration space flight and HR and BP responses were measured.
- 2:15 PM Lee S. Feiveson A. Martin D. Cromwell R. Platts S. Stenger M.
[NASA's Standard Measures During Bed Rest: Adaptations in the Cardiovascular System \[#7068\]](#)
Bed rest standard measures for the cardiovascular system implemented before, during, and after bed rest included plasma volume (carbon monoxide rebreathing), cardiac mass and function (2D, 3D and Doppler echocardiography), and orthostatic tolerance testing (80° head-up tilt).
- 2:30 PM Discussion
- 3:00 PM Break

Wednesday, February 10, 2016

Immunology/Microbiology

1:30 PM

Grand Ballroom A

Chairs: Brian Crucian and Cherie Oubre

- 1:30 PM Kunz H. Quiariarte H. Ploutz-Snyder R. Sams C. Crucian B.
[Assessment of Hematologic Parameters during Long Duration Spaceflight \[#7144\]](#)
An overview of in-flight alterations in complete blood count parameters.
- 1:45 PM Chouker A. Sudhoff L. Kaufmann I. Feuerecker M. Crucian B. Sams C. Mehta S. Pierson D. Schelling G.
[From space to the septic patient: assessment of cellular immunity in severely immune compromised conditions \[#7145\]](#)
Assessment of immune dysregulation in terrestrial patient population.
- 2:00 PM Simpson R.
[Salivary Markers \[#7146\]](#)
Long duration spaceflight impairs NK-cell function and evokes an anti-viral T-cell response.
- 2:15 PM Mehta S. Pierson D. Tying S. Crucian B.
[Assessment of Latent virus Reactivation and Immunity in Shingles Patients- Relevance for spaceflight \[#7147\]](#)
To correlate immune dysregulation and latent virus reactivation in astronauts with terrestrial clinical disease, a clinical study was conducted translating the same panel of assays in shingles patients.
- 2:30 PM Voorhies A. Ott C. Pierson D. Torralba M. Mehta S. Lorenzi H.
[STUDY OF THE IMPACT OF LONG-TERM SPACE TRAVEL ON THE ASTRONAUTS' MICROBIOME \[#7148\]](#)
This study tracks all microbes and viruses associated with astronauts spending six months at the International Space Station.
- 2:45 PM Douglas G. Castro-Wallace S. Stahl S. Voorhies A. Lorenzi H.
[Effect of low shear modeled microgravity \(LSMMG\) on the probiotic Lactobacillus acidophilus ATCC 4356 \[#7149\]](#)
The work presented here demonstrates the translation of characteristics of a GRAS probiotic bacteria to a microgravity analog environment.
- 3:00 PM Break

Wednesday, February 10, 2016

Physics II

1:30 PM

Galleon I

Chairs: John Norbury and Lawrence Heilbronn

- 1:30 PM La Tessa C. Sivertz M. Rusek A.
[Cross section measurements at NSRL \[#7187\]](#)
Total, partial and isotopic charge-changing cross sections for a number of projectile-energy-target combinations have been measured at NSRL for providing benchmark data for deterministic and Monte Carlo codes.
- 1:55 PM Maung K. Werneth C.
[Cross Section Calculations and comparison to experiment \[#7188\]](#)
Theory and calculational methods of nuclear scattering cross sections are explained and results are compared with experimental results.
- 2:20 PM Townsend L. Ford W. de Wet W. Werneth C.
[Cross Section Calculations and Comparison to Experiment \[#7189\]](#)
Recent developments in cosmic ray fragmentation modeling are presented.
- 2:45 PM Norbury J.
[ELECTROMAGNETIC DISSOCIATION CROSS SECTIONS FOR HIGH LET FRAGMENTS \[#7190\]](#)
Electromagnetic dissociation cross sections must be included in space radiation transport codes for high LET fragment production.
- 3:00 PM Break

Wednesday, February 10, 2016

Solar System Exploration Research Virtual Institute

1:30 PM

Yacht

Chairs: Gregory Schmidt and Bette Siegel

- 1:30 PM Bleacher J. Young K. Rogers D. Garry B. McAdam A. Glotch T.
[THE EFFECT OF PORTABLE INSTRUMENTS ON EVA AS USED BY ASTRONAUTS DURING GEOLOGIC EXPLORATION OF THE SOLAR SYSTEM \[#7479\]](#)
Currently available portable instruments are used during geologic field work in Hawai'i to evaluate the influence of instrument use on EVA and traverse design and to develop techniques for instrument use during human exploration of the Solar System.
- 1:45 PM Hill J. Caldwell B.
[INTEGRATING AMBULATORY PHYSIOLOGICAL MONITORING INTO ANALOG EVA FIELD DEPLOYMENT \[#7480\]](#)
This research describes integration of wireless physiological monitoring of human performance in field planetary science EVA analogs during an active research program.
- 2:00 PM Hendrix D. Hurowitz J.
[Direct Identification of Mechanically Produced Radical Species on Mineral Surfaces by Electronic Paramagnetic Resonance Spectroscopy \[#7481\]](#)
Detection of radical species on mechanically pulverized mineral species via electron paramagnetic resonance spectroscopy.
- 2:15 PM Zeitlin C. Case A. Schwadron N. Spence H. Mazur J. Joyce C. Looper M. Jordan A. Rios R. Townsend L. Kasper J. Blake J. Smith S. Wilson J. Iwata Y. Farrell W.
[SOLAR MODULATION OF THE DEEP SPACE GALACTIC COSMIC RAY LINEAL ENERGY SPECTRUM MEASURED BY CRaTER, 2009-2014 \[#7482\]](#)
We report measurements of solar modulation of Galactic Cosmic Ray fluxes from the deep minimum of 2009 to the weak maximum of 2014, with emphasis on the observed changes in the Linear Energy Transfer spectra observed at the extremes of the solar cycle.
- 2:30 PM Schoonen M. Hurowitz J. Kaur J.
[REACTIVE OXYGEN SPECIES GENERATION BY LUNAR SIMULANTS IN THE CONTEXT OF POSSIBLE INHALATION EXPOSURES \[#7483\]](#)
A suite of Lunar simulants were evaluated for their ability to generate reactive oxygen species in deionized water and simulated lung fluid.
- 2:45 PM Demple B. Nissen J. Caston R. Bondalapati R. Tsirka S. Schoonen M.
[Cytotoxic and genotoxic effects of lunar dust simulants \[#7484\]](#)
We have studied the ability of lunar dust simulant materials to cause inflammatory and cell death responses in mouse lung slices, and to generate a specific oxidative DNA lesion in mouse cells in culture.
- 3:00 PM Break

Wednesday, February 10, 2016

Advanced Exercise Concepts

3:15 PM

Grand Ballroom B & C

Chairs: Beth Lewandowski and Gail Perusek

- 3:15 PM Ploutz-Snyder L.
[Overview of Spaceflight Exercise Requirements \[#7000\]](#)
It is likely that SPRINT-like exercises augmented with balance training would be the most suitable to maximize likelihood for success on egress tasks.
- 3:30 PM Perusek G. Lewandowski B. Nall M. Norsk P. Linnehan R. Baumann D.
[Human Research Program Advanced Exercise Concepts Overview\[#7001\]](#)
Provides an overview of the Advanced Exercise Concepts project within the Human Research Program, project scope and responsibilities, progress to date, strategic development opportunities.
- 3:45 PM Sheehan C. Funk J. Funk N. Kutnick G. Humphreys B. Bruinsma D. Perusek G.
[Closed Loop Control Compact Exercise Device for Use on MPCV \[#7002\]](#)
A simple proportional-integral-derivative (PID) controller is demonstrated in a prototype motor driven exercise device with comparison to resistive static and dynamic load set points and aerobic work rate targets.
- 4:00 PM Bruinsma D. Bernal C. Perusek G.
[Servomotor-based exercise devices for microgravity applications \[#7003\]](#)
To mitigate bone loss and muscular atrophy in microgravity, we have developed several servomotor-based prototype exercise devices for both long and short duration space missions. We will present design considerations as well as lessons learned throughout the development.
- 4:15 PM Witt E. Chastain J. Tarver S.
[An \(Almost\) No-Power Exercise Device For Orion \[#7004\]](#)
A presentation of performance results and background details for a prototype inertial exercise device that uses (almost) no vehicle power, designed for the Orion vehicle.
- 4:30 PM Discussion
- 4:45 PM Break

Wednesday, February 10, 2016

Behavioral Health and Performance Risk Assessment

3:15 PM

Galleon II & III

Chairs: Lauren Leveton and Laura Bollweg

- 3:15 PM Bryan C.
[Assessment and Monitoring of Astronaut Behavioral Health & Psychological Well-Being Following Long-Duration Exploration Missions \[#7031\]](#)
The current report provides an overview of likely contributors to astronauts' post-mission behavioral health, a description of potential methods for monitoring astronauts' behavioral health following long-duration space flight, and recommended directions for future NASA research.
- 3:30 PM Stuster J.
[Behavioral Issues Associated with Long Duration Space Missions: Review of Astronaut Journals \[#7032\]](#)
This abstract summarizes the Journals Flight Experiment.
- 3:45 PM Bell S. Brown S. Mitchell T.
[Data Mining Review of Team Benchmark Studies Related to Long Duration Space Exploration Missions \[#7033\]](#)
We report the results of our quantitative review of 70 sources that provided data on team functioning in LDSEM-analog environments, and suggest an agenda for future research based on these results and from lessons learned during the review process.
- 4:00 PM Herian M. Vanhove A. Harms P. Luthans F.
[Neurobehavioral Conditions Checklist: A Literature Review and Operational Assessment \[#7034\]](#)
This report presents the results of a systematic effort to understand neurobehavioral signs and symptoms likely to impact crewmember performance on a long-duration space mission; recommendations related to the study of such signs and symptoms are provided.
- 4:15 PM Dinges D. Basner M. Mollicone D. Ecker A. Jones C. Hyder E. Di Antonio A. Dennis L. Kan K.
[Reaction Self-Test \(RST\) From 6-Month Missions on ISS \(PVT on ISS\) \[#7035\]](#)
To inform the question of the whether time in mission in microgravity is associated with increasing stress, we analyzed astronauts' ratings of their stress levels, and other indications of negative neurobehavioral reactions, as a function of time in mission during 6-month stays on ISS.
- 4:30 PM Discussion
- 4:45 PM Break

Wednesday, February 10, 2016

Education and Outreach

3:15 PM

Yacht

Chair: Ronald McNeel

3:15 PM McNeel R. Brezicha J. Anderson A. Koppelmans V. Narayanan A. Raykin J. Fineman R. MacLleish M.

[INNOVATION BY A NEW NSBRI GENERATION \[#7086\]](#)

This workshop will enable selected NSBRI First Award and Mentored Research fellows to highlight key findings yielded from their research.

4:35 PM Hayes J. Merkle L.

[INSPIRING THE NEXT GENERATION IN SPACE LIFE SCIENCES \[#7425\]](#)

The purpose of the Space Life Sciences Summer Institute is to offer a unique learning environment that exposes students to current biomedical issues associated with human space exploration.

4:45 PM Break

Wednesday, February 10, 2016

Space Radiation Effects: Immune and Hematopoietic Systems and the Microbiome

3:15 PM

Grand Ballroom A

Chair: Janice Huff

- 3:15 PM Rosi S. Jopson T.
[*The role of oxidative stress and inflammation on synaptic functions after exposure to space radiation*](#) [#7524]
The work presented here is aimed to understand the short and long term effect of proton and oxygen irradiation on brain function.
- 3:30 PM Sawtell N. Thompson R. Williams M.
[*Acute and long term outcomes of simulated deep space radiation exposure on latent viral CNS infection & CNS pathology*](#) [#7525]
This study addresses the risk of deep space radiation exposure on the brain latently infected with herpes simplex virus.
- 3:45 PM Smilenov L. Hoehn D. Serban G. Vlad G. Young E.
[*The effect of high LET radiation on reconstituted in mice human hematopoietic system*](#) [#7526]
We present results from ground based in vivo study evaluating the effects of high LET radiation on human immune system reconstituted in mice.
- 4:00 PM Cheema A. Gill K. Sridharan V. Boerma M.
[*Modulation of Mouse Fecal metabolome by Exposure to Heavy Ion Radiation*](#) [#7527]
Untargeted metabolomics/lipidomics profiling of fecal samples from mice exposed to oxygen ions (600 MeV/n) at doses of 0.1, 0.25, or 1 Gy for studying radiation induced changes in relative abundance of metabolites.
- 4:15 PM Patel R. Qing Y. Gerson S. Welford S.
[*THE CONTRIBUTION OF GCR EXPOSURE TO HEMATOPOIETIC STEM CELL DYSFUNCTION AND ONCOGENESIS*](#) [#7528]
We are investigating the effects of HZE radiation on the hematopoietic system in mismatch repair defective animals as a surrogate model for aged astronauts.
- 4:30 PM Porada C. Rodman C. Almeida-Porada G. George S. Moon J. Walker S. Wilson P.
[*The Role of the Bone Marrow Microenvironment in Space Radiation-Induced Leukemogenesis*](#) [#7529]
Both direct and bystander effects of simulated SPE/GCR radiation negatively impact human hematopoiesis.
- 4:45 PM Break

Thursday, February 11, 2016

Advanced Food Technology I

8:00 AM

Galleon II & III

Chair: Grace Douglas

- 8:00 AM Cooper M.
[Nutritional Quality of ISS Space Food After Three-Year Storage \[#7007\]](#)
109 ISS food provisions were stored for 3 years at room temperature, prompting significant degradation in thiamin and vitamin C concentrations; countermeasures are needed for current foods for long duration missions to prevent nutritional inadequacy.
- 8:20 AM Peleg M.
[A NEW APPROACH TO MODELING AND PREDICTING VITAMINS DEGRADATION KINETICS \[#7008\]](#)
Vitamins degradation parameters can be estimated from the endpoint concentration ratios of three temperature histories, and used to reconstruct and predict the original and new degradation curves for constant and varying temperature such as those encountered in heat processes and storage.
- 8:40 AM Barrett A. Richardson M. Froio D.
[Stabilized Foods for Use in Extended Spaceflight: Preservation of Shelf-Life, Nutrient Content and Acceptability \[#7009\]](#)
We are investigating food matrix and processing approaches for maintaining vitamin stability throughout prolonged space flight.
- 9:00 AM Discussion
- 9:30 AM Break

Thursday, February 11, 2016

Biomechanical/Musculoskeletal Computational Modeling

8:00 AM

Grand Ballroom B & C

Chairs: William Thompson and Beth Lewandowski

- 8:00 AM Thompson W. Gallo C. Humphreys B. Funk J. Crentsil L. Funk J. Funk N. Perusek G. Jagodnik K. Lewandowski B.
[Biomechanical modeling of human exercise to inform countermeasures for future exploration missions \[#7051\]](#)
We present results of computational modeling of human exercise on the Hybrid Ultimate Lifting Kit (HULK) with variation in load, cadence and stance for squat, single-leg squat and heel raise exercises while the subject is loaded with a bar vs. a harness.
- 8:15 AM Gallo C. Thompson W. Lewandowski B. Humphreys B.
[OpenSim Model Improvements to support High Joint Angle Resistive Exercising \[#7052\]](#)
OpenSim bio-mechanical models were modified to allow modeling of deep squat resistance exercising that, without modification, resulted in abnormal muscle movements.
- 8:30 AM Humphreys B. Bellisario B. Gallo C. Thompson W. Lewandowski B.
[Utilizing Commercial Consumer Hardware and Open Source Computer Vision Software to perform Motion Capture For Reduced Gravity Flights \[#7053\]](#)
An Open source Computer Vision Library, OpenCV, had been investigated to develop a low cost, low profile motion capture system for use with COTS cameras in reduced gravity flights.
- 8:45 AM Newby N. Fincke R. Hanson A.
[ESTIMATING JOINT KINETICS FROM FORCE SHOES VERSUS FORCE PLATES \[#7054\]](#)
This study compared deadlift exercise joint kinetics derived from ground reaction forces measured with a standard laboratory force plate versus from force measuring shoes.
- 9:00 AM Lewandowski B. Jagodnik K. Crentsil L. Humphreys B. Funk J. Gallo C. Thompson W. DeWitt J. Perusek G.
[Supplementing biomechanical modeling with EMG analysis \[#7055\]](#)
An EMG analysis highlighting differences in muscle activation during exercises performed with different loading configurations will be presented.
- 9:15 AM Pennline J. Werner C. Lewandowski B. Sibonga J.
[Bone Model Development for Spaceflight Bone Physiology Analysis \(Proximal Femur\) \[#7056\]](#)
The abstract discusses and outlines the approach for focusing the application of the model to the total proximal femur by adjusting physiological parameters, a finite element model, and seeking validation for data on the proximal femur.
- 9:30 AM Break

Thursday, February 11, 2016

Central Nervous System I Acute Effects

8:00 AM

Grand Ballroom A

Chairs: Greg Nelson and Amelia Eisch

- 8:00 AM Nelson G.
[CNS Working Group \[#7071\]](#)
The CNS working group considers technical and programmatic issues relevant to space radiation exposure risks to the central nervous system.
- 8:10 AM Limoli C. Parihar V. Baulch J. Acharya M.
[Structure function relationships that define charged particle-induced brain injury \[#7072\]](#)
We present data that links long-term cognitive decrements to persistent structural alterations in neurons following charged particle irradiation.
- 8:25 AM Limoli C. Acharya M. Baulch J. Britten R. Nelson G. Parihar V. Vlkolinsky R. Soltesz I.
[NSCOR: Mechanisms Underlying Charged Particle-Induced Disruption of CNS Function \[#7073\]](#)
Highlights of our multidisciplinary CNS research approach will be presented.
- 8:30 AM Walker A. Whoolery C. Lucero M. Redfield R. Ito N. Reynolds R. Richardson D. Rivera P. Palchik G. Shih H. Chen B. Birnbaum S. Eisch A.
[SPACE RADIATION UNEXPECTEDLY ENHANCES PATTERN SEPARATION YET DIMINISHES DENTATE GYRUS NEUROGENESIS IN A DOSE- AND AGE-DEPENDENT MANNER \[#7074\]](#)
HZE particle radiation unexpectedly enhances contextual discrimination in astronaut-age equivalent mice, yet this enhancement was unexpectedly not correlated with the number of new dentate gyrus neurons.
- 8:45 AM Britten R. Miller V. Hadley M. Macadat E.
[Executive function is significantly impaired following exposure to low \(5 cGy\) doses of HZE particles. \[#7075\]](#)
Exposure to low HZE doses impairs Executive function.
- 9:00 AM Davis C. Guida P. Hienz R.
[The effects of head-only or whole-body proton exposure on sustained attention, core body temperature, and activity levels in rats \[#7076\]](#)
This study describes the effects of head-only or whole-body protons on sustained attention, measured via the rodent psychomotor vigilance test (rPVT), and daily patterns of core body temperature and spontaneous locomotor activity in rats.
- 9:15 AM Raber J. Rosi S. Stewart B. Jopson T. Turker M. Impey S.
[The relation between cognitive injury, network stability, and epigenetic change following exposure to space radiation \[#7077\]](#)
Cognitive performance is impaired in 6-month-old C57BL/6J wild-type (Wt) mice two weeks following irradiation with 56Fe, 28Si, and proton irradiation and radiation-induced cognitive injury is associated with cytosine methylation and hydroxymethylation of cytosine in the hippocampus.
- 9:30 AM Break

Thursday, February 11, 2016

How We Do Business

8:00 AM

Yacht

Chairs: Maria Havenhill and Susan Steinberg

- 8:00 AM Romero E. Francisco D.
[NASA HUMAN SYSTEM RISK ASSESSMENT PROCESS \[#7137\]](#)
NASA utilizes an evidence based system to perform risk assessments for the human system for spaceflight missions. The center of this process is the multi-disciplinary Human System Risk Board (HSRB).
- 8:15 AM Anton W. Havenhill M. Overton E.
[Humans vs Hardware: The Unique World of NASA Human System Risk Assessment \[#7138\]](#)
This presentation discusses the challenges of applying traditional likelihood and consequence assessment approaches to human system spaceflight risks.
- 8:30 AM Mindock J. Lumpkins S. Shelhamer M.
[CAPABILITY FOR INTEGRATED SYSTEMS RISK-REDUCTION ANALYSIS \[#7139\]](#)
We will show tools that visualize information from across HRP to aid in identifying areas ripe for cross-disciplinary research and countermeasure development.
- 8:45 AM Steinberg S. Van Baalen M. Rossi M. Riccio G. Romero E. Francisco D.
[CHARACTERIZATION OF EVIDENCE FOR HUMAN SYSTEM RISK ASSESSMENT \[#7140\]](#)
Characterization of evidence for human system risk assessment includes both the source and fidelity of data required to understand risks and the integrated interpretation of all evidence that is essential to develop standards and countermeasures.
- 9:00 AM Donoviel D.
[FIVE YEARS OF NSBRI SMARTCAP FUNDING FOR SMALL COMPANIES: TANGIBLE DELIVERABLES FOR NASA \[#7141\]](#)
We will present an overview of all the deliverables from a highly-leveraged NSBRI grant program that has partnered with industry and accelerated novel biomedical product development for space and Earth.
- 9:15 AM Discussion
- 9:30 AM Break

Thursday, February 11, 2016

Advanced Food Technology II

9:45 AM

Galleon II & III

Chair: Grace Douglas

- 9:45 AM Sirmons T. Cooper M. Douglas G. Barret A. Richardson M. Arias D. Schneiderman J. Slack K. Plutz-Snyder R.
[Meal Replacement Mass Reduction and Integration Acceptability Study](#) [#7012]
Meal replacement bars were developed to enable a 10% mass savings across the food system.
- 10:05 AM Bermudez-Aguirre D. Cooper M. Douglas G.
[Development and provision of functional foods to promote health on long-duration space missions.](#) [#7013]
ISS food items, select commercial foods and new developed functional foods were analyzed for stability of bioactive compounds and sensory quality during storage to determine the capability to provide bioactive compounds in a shelf stable food system on exploration missions.
- 10:25 AM Wheeler R. Massa G. Stutte G. Spencer L. Hummerick M. Sirmons T. Douglas G.
[Pick and Eat Crop Testing: Dwarf Tomato and Pepper as Candidate Space Crops](#) [#7014]
Tomatoes and peppers were studied as candidate crops for supplemental food production systems in space.
- 10:45 AM Discussion
- 11:15 AM Break

Thursday, February 11, 2016

Central Nervous System II Acute Effects

9:45 AM

Grand Ballroom A

Chairs: Greg Nelson and Amelia Eisch

- 9:45 AM Chang P. Lin H. Shaler T. Bakke J. Chan S. Du N.
[Particle radiation-induced dysregulation of protein homeostasis in the brain](#) [#7078]
The goal of our project is to evaluate the impact of particle-radiation induced alterations in polyubiquitin chain dynamics and overall proteomics changes using quantitative proteomics methods to assess potential CNS risks after space radiation exposures.
- 10:00 AM Stanton P. Miry O. Subah G. Gopaul K. Vose L. Zhang X. Moncaster J. Goldstein L. Stanton P.
[Effects of Space Radiation on Long Term Synaptic Plasticity and Neurogenesis in Normal and Alzheimer's Disease Transgenic Mice](#) [#7079]
Space radiation can produce very long-term alterations in synaptic plasticity underlying learning, memory and cognition.
- 10:20 AM Lemere C. Liu B. Fitzpatrick E. Le K. Shi Q. Trojanczyk L. Park M. Wang S. Belanger A. Dubey S. Holton P. Lorello P. Reiser V. Trigg W. O'Banion M. Caldarone B. Di Carli M.
[Early Gender-Specific CNS Effects of 56Fe Radiation in WT and AD Mice](#) [#7080]
We observed early and significant gender, genotype and 56Fe irradiation dose interactions in multiple behavioral tests, PET imaging of neuroinflammation, and cerebral amyloid-beta levels in mice 1-2 months following irradiation in 4 month-old female and male, WT and APP/PS1dE9 Tg mice.
- 10:40 AM Goldstein L. Moncaster J. Wojnarowicz M. Fisher A. Tagge C. Sarangi S. Minaeva O. Miry O. Gopaul K. Xiao-Lei Z. Miller C. Kokiko-Cochran O. Bemiller S. Bjornstad K. Chang P. Blakely E. Lamb B. Stanton P.
[Effects of Space Radiation on Hippocampal-Dependent Learning and Neuropathology in Wild-Type and Alzheimer's Disease Transgenic Mice](#) [#7081]
We used C57BL6 mice and Tg2576 Alzheimer's disease (AD) transgenic mice to investigate short-/long-term effects of low-dose galactic cosmic radiation on microvascular injury, neuroinflammation, AD-linked brain pathologies, neurophysiological abnormalities, and cognitive deficits.
- 10:55 AM O'Banion M. Belcher E. Duclos L. Williams J. Olschowka J.
[Impact of Space Radiation Induced Neuroinflammation on Alzheimer and Parkinson Disease Pathology](#) [#7082]
Effects of space radiation are being examined in two transgenic mouse models of Alzheimer and Parkinson neuropathology using histologic, biochemical and behavioral approaches.
- 11:10 AM O'Banion M. Deane R. Majewska A. Williams J. Olschowka J.
[Impact of Space-Radiation Induced Alterations on Toxic Protein Accumulation Associated with Neurodegenerative Disease](#) [#7083]
This is a new proposal to explore three possible mechanisms underlying accumulation of amyloid beta peptides in irradiated brain.
- 11:15 AM Break

Thursday, February 11, 2016

Oxidative Stress and Damage I

9:45 AM

Yacht

Chairs: Thomas Goodwin and Ruth Globus

- 9:45 AM Lee S. Stenger M. Smith S. Zwart S. Laurie S. Ploutz-Snyder R. Platts S.
[DEFINING THE RELATIONSHIP BETWEEN BIOMARKERS OF OXIDATIVE AND INFLAMMATORY STRESS AND THE RISK FOR ATHEROSCLEROSIS IN ASTRONAUTS DURING AND AFTER LONG-DURATION SPACEFLIGHT \[#7174\]](#)
The purpose of this investigation is to determine whether biomarkers of oxidative and inflammatory stress are elevated during and after long-duration spaceflight and to determine if a relation exists between with structural and functional indices of atherosclerotic risk.
- 10:00 AM Christofidou-Solomidou M. Velalopoulou A. Pietrofesa R.
[RADIATION- AND HYPEROXIA-INDUCED OXIDATIVE CELL DAMAGE\[#7175\]](#)
We developed a novel in vitro model system to identify the mechanisms of lung cell damage following repeated exposure to radiation, hyperoxia or their combination.
- 10:15 AM Garofalo R.
[OXIDATIVE LUNG DAMAGE AND THE ROLE OF H₂S ON SPACE FLIGHT ENVIRONMENT IN A MOUSE MODEL OF RESPIRATORY SYNCYTIAL VIRUS \(RSV\) INFECTION \[#7176\]](#)
The objective of the current study was to investigate the effects of space flight and viral infection on oxidative stress and the role of H₂S using an experimental murine BALB/c model of infection.
- 10:30 AM Limoli C. Baulch J. Craver B. Chmielewski N. Giedzinski E.
[Secondary reactive processes in the brain: The role of radiation-induced oxidative stress and inflammation \[#7177\]](#)
Data will highlight the importance of radiation-induced oxidative stress and inflammation in the brain.
- 10:45 AM Aravindan N. Natarajan M.
[HSL FACILITATED LIPID METABOLISM IS REGULATED BY HZE ION-INDUCED SUSTAINED OXIDATIVE STRESS-DEPENDENT MAPK/NFκB \[#7178\]](#)
This study identifies the signaling mediators that act as modulatory factors and their mechanistic flow-through in high LET radiation-induced sustained oxidative stress mediated HSL dependent regulation of lipid metabolism relevant to the space radiation cardiovascular risks.
- 11:00 AM Discussion
- 11:15 AM Break

Thursday, February 11, 2016

Sensorimotor Flight Studies

9:45 AM

Grand Ballroom B & C

Chairs: Mill Reschke and Rachael Seidler

- 9:45 AM Moore S. Dilda V. Morris T. Yungheer D. Zhang G. Beltran E. MacDougall H. Wood S.
[ASSESSMENT OF OPERATOR PROFICIENCY FOLLOWING LONG-DURATION SPACEFLIGHT \[#7464\]](#)
This project assessed the ability of astronauts to perform complex operations (flying, driving) on the day of landing after 6 months aboard the ISS.
- 10:00 AM Reschke M. Kozlovskaya I. Tomilovskaya E. Kofman I. Cerisano J. Bloomberg J. Stenger M. Lee S. Laurie S. Rukavishnikov I. Fomina E. Wood S. Mulavara A. Feiveson A. Fisher E. Rosenberg M. Kitov V. Lysova N.
[SENSORIMOTOR RESULTS FROM THE JOINT NASA AND RUSSIAN PILOT FIELD TEST \[#7465\]](#)
A sensorimotor and cardiovascular preliminary investigation that was performed in the field at the Soyuz spacecraft landing site to determine functional performance parameters within two hours following returns from long duration flight.
- 10:15 AM Seidler R. Mulavara A. Koppelmans V. Kofman I. De Dios Y. Szecsy D. Riascos-Casteneda R. Wood S. Bloomberg J.
[Spaceflight Effects on Neurocognitive Performance: Extent, Longevity, and Neural Bases \[#7466\]](#)
Our preliminary findings, which document brain structural volumetric increases primarily restricted to sensorimotor regions, will be presented.
- 10:30 AM Clement G. Campbell D. Reschke M. Wood S.
[Effects of exposure to microgravity on the subjective straight ahead. \[#7467\]](#)
Description of the objectives and experimental protocol of a joint ESA/NASA pre- and post-flight study of the subjective straight ahead, i.e., a measure of the internal representation of body orientation.
- 10:45 AM Discussion
- 11:15 AM Break

Thursday, February 11, 2016

International Collaboration

1:15 PM

Galleon II & III

Chairs: John Charles and Ronita Cromwell

1:15 PM Cromwell R. Charles J. Haven C. McFather J.
[Advancing Human Space Flight Science through International Collaboration \[#7151\]](#)
This session presents HRP's involvement and plans for international collaborations.

2:45 PM Break

Thursday, February 11, 2016

Oxidative Stress and Damage II

1:15 PM

Yacht

Chairs: Thomas Goodwin and Ruth Globus

1:15 PM Panel Discussion [#7181]

2:45 PM Break

Thursday, February 11, 2016

Sensorimotor Ground Studies*

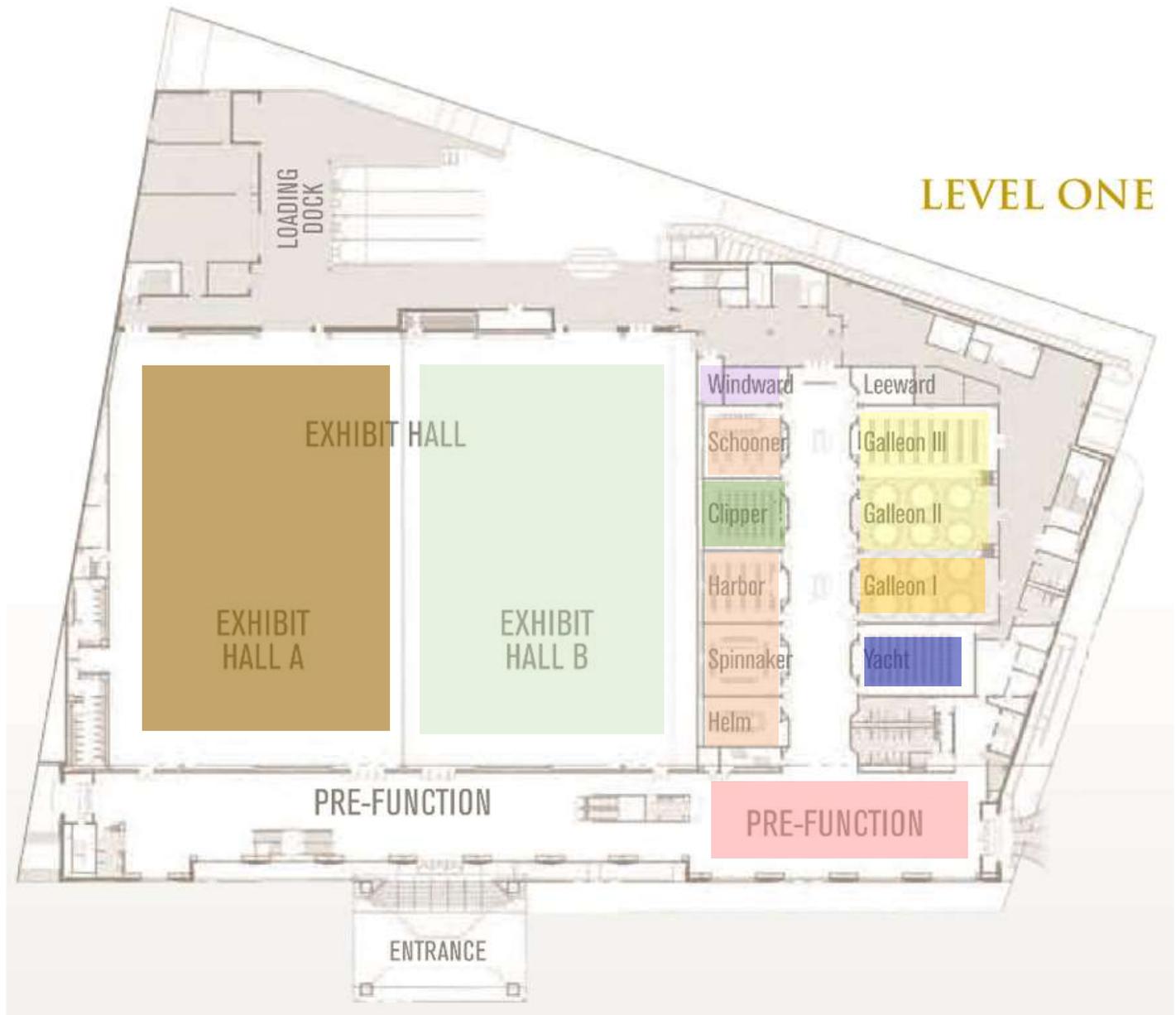
1:15 PM

Grand Ballroom B & C

Chairs: Jacob Bloomberg and Ajitkumar Mulavara

- 1:15 PM Bloomberg J. Peters B. Mulavara A. Caldwell E. Batson C. De Dios Y. Gadd N. Goel R. Wood S. Cohen H. Oddsson L. Seidler R.
[Predictive Measures of Locomotor Performance on an Unstable Walking Surface](#) **[#7470]**
This presentation will discuss recent work to develop predictors of sensorimotor adaptability to inform the design of training countermeasures to enhance the ability of astronauts to adapt to gravitational transitions.
- 1:30 PM Mulavara A. Peters B. De Dios Y. Gadd N. Caldwell E. Batson C. Goel R. Seidler R. Oddsson L. Zanello S. Clark T. Oman C. Cohen H. Millard R. Wood S. Bloomberg J.
[BEHAVIORAL, BRAIN IMAGING AND GENOMIC MEASURES TO PREDICT FUNCTIONAL OUTCOMES POST - BED REST AND SPACEFLIGHT](#) **[#7471]**
The ability to predict the manner and degree to which individual astronauts would be affected would improve the effectiveness of countermeasure training programs designed to enhance sensorimotor adaptability.
- 1:45 PM Cowings P. Toscano w. Reschke M. Gebreyesus F. Rocha C.
[Pre-flight Training of Autonomic Responses for Mitigating the Effects of Spatial Disorientation During Simulated Orion Spacecraft Re-Entry](#) **[#7472]**
A physiological training countermeasure, Autogenic-Feedback Training Exercise (AFTE) was successful at mitigating motion sickness symptoms during simulated Orion Re-entry tests.
- 2:00 PM Karmali F. Galvan-Garza R. Sherwood D. Rosenberg M. Clark T. Oman C. Young L.
[DEVELOPMENT OF A COUNTERMEASURE TO ENHANCE SENSORIMOTOR ADAPTATION TO ALTERED GRAVITY LEVELS](#) **[#7473]**
We are working towards the development of a new pre-flight adaptation protocol to minimize disorientation and to overcome disturbances in manual control.
- 2:15 PM Discussion
- 2:45 PM Break

Galveston Island Convention Center Floor Plan



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|---|---------------------------------|---|----------|--|---------------------------|
|  | Concessions |  | ExMC |  | Registration and Check-In |
|  | Posters |  | BHP/SHFH |  | Speaker Ready Room |
|  | ExMC |  | SHFH |  | Ancillary Breakouts |
|  | NSBRI luncheon (Wednesday only) | | | | |

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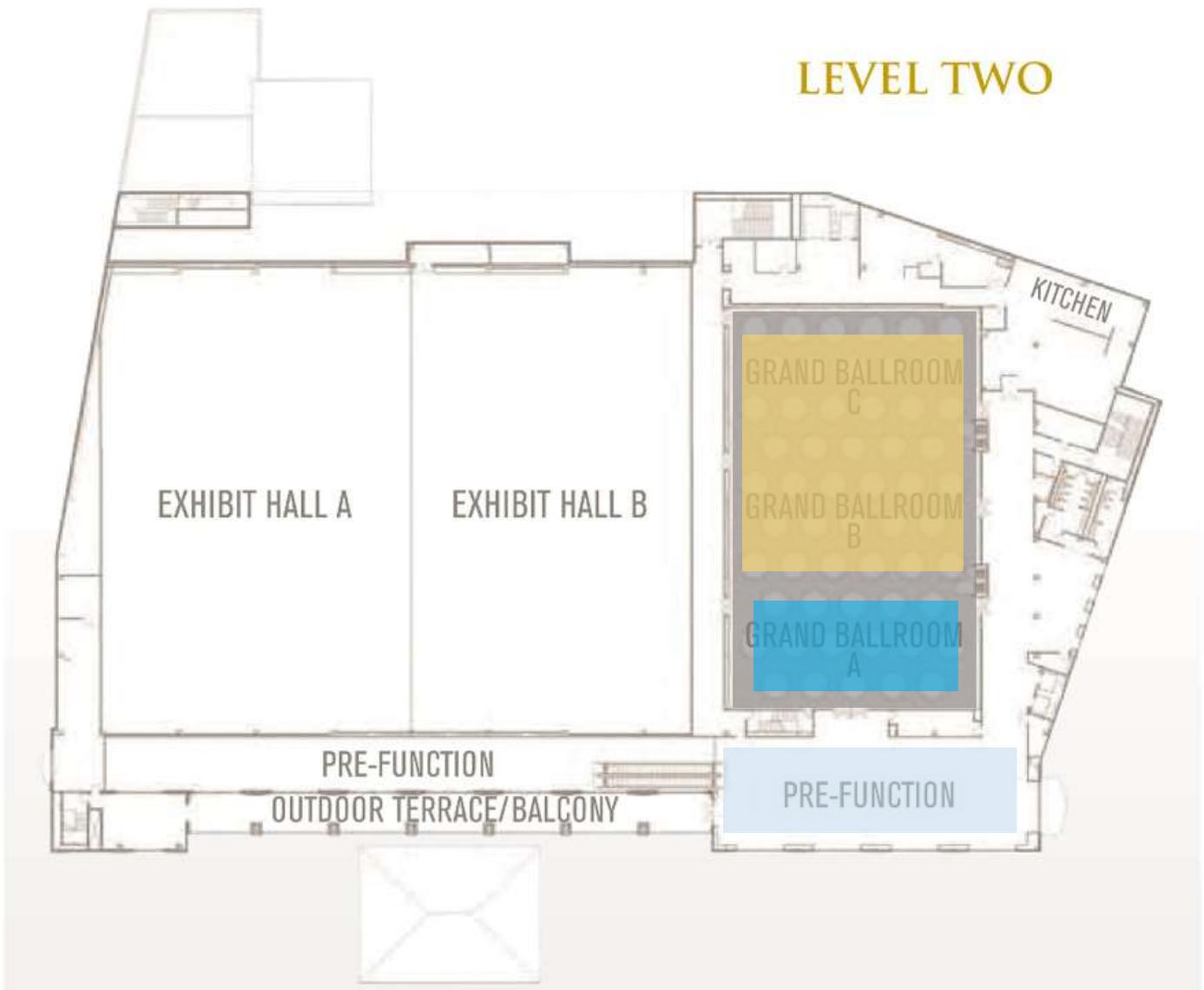
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Galveston Island Convention Center Floor Plan

LEVEL TWO



Plenary HHC SR Coffee Breaks

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*Mobile devices, i.e. smartphones, tablets- NASAmobile
Password: NASA1*