2019 NASA HRP IWS

January 22-25, 2019
Galveston, TX





Human Exploration and Discovery: the Moon, Mars and Beyond!



NASA Human Research Program Investigators' Workshop

Human Exploration and Discovery: The Moon, Mars and Beyond!

January 22-25, 2019
Galveston Island Convention Center
Galveston, TX

And the
2019 HRP Annual Banquet
January 23, 2019

Sponsored by:
NASA Human Research Program

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HRP IWS OVERVIEW

Welcome to the 2019 NASA Human Research Program Investigators' Workshop! (HRP IWS)



The HRP IWS is the annual meeting for NASA-funded investigators. The meeting will be held Tuesday, January 22 through Friday, January 25, 2019, at the Galveston Island Convention Center (GICC) in Galveston, TX. The workshop's goal is to provide an informal, collegial atmosphere for cross-disciplinary interaction. The theme of this year's workshop is ***Human Exploration and Discovery: The Moon, Mars and Beyond!***

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

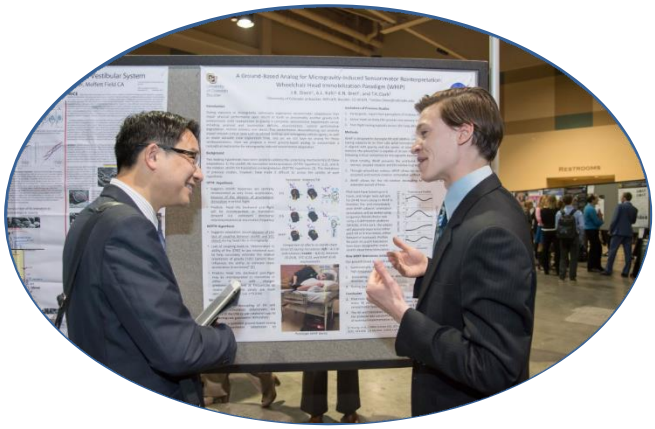
- Exploration Medical Capability (ExMC)
- Human Factors and Behavioral Performance (HFBP)
- Human Health Countermeasures (HHC)
- International Space Station Medical Projects (ISSMP)
- Space Radiation (SR)

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

COFFEE: Complimentary coffee and tea service will be provided daily during breaks throughout the conference. Please see the program agenda beginning on page 5 to note all break times.

CONFERENCE APP: Stay connected with up-to-the-minute information regarding the IWS by downloading the free conference app. You will be able to create your own schedule, take notes, and connect with fellow attendees all at your fingertips.

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

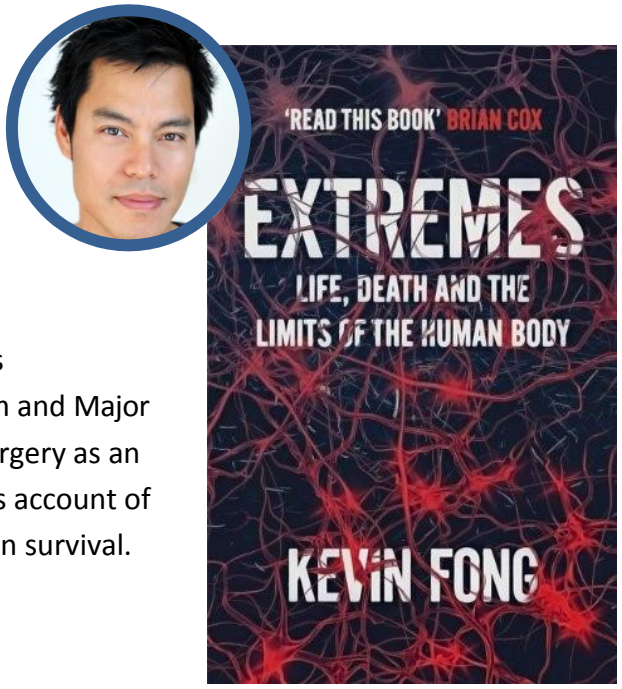


TWO DYNAMIC POSTER SESSIONS

The 2019 IWS has two poster sessions held concurrently with the HRP Grad Student and Postdoc Poster Competition. Poster Sessions A and B provide more opportunities to learn about current HRP research, more opportunities to network, and more opportunities to hear from young investigators.

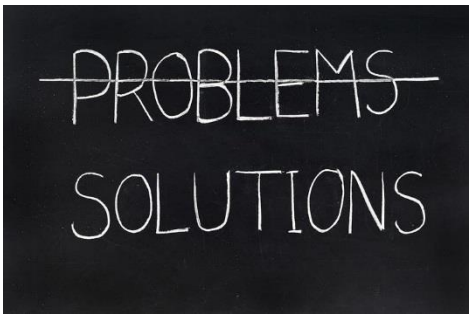
Join us Tuesday and Thursday in Exhibit Hall A after the afternoon sessions. Cash bar available.

2019 HRP BANQUET ft. DR. KEVIN FONG



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

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



INNOVATION CHALLENGE

Innovation often starts with connecting the dots. To become "connectable", it is essential that we share our challenges. HRP supports creating a culture where we talk about our challenges with the aim to find better solutions faster. We therefore encourage you to think about some tough challenges in your research and shared them in your presentation or poster. This might lead to new connections and collaborations with (cross-discipline) colleagues and lead to the solutions we need to accomplish our mission. Join us in the Innovation Pavilion (Grand Ballroom A) all week to start the discussion! Also, please join us for the Expert Speed Matching event on Wednesday, January 23rd, at 5:15pm in the Innovation Pavilion – a new innovation event for 2019!

CONVENTION CENTER MAP

Galveston Island Convention Center Level 1

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

Galveston Island Convention Center Level 2

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

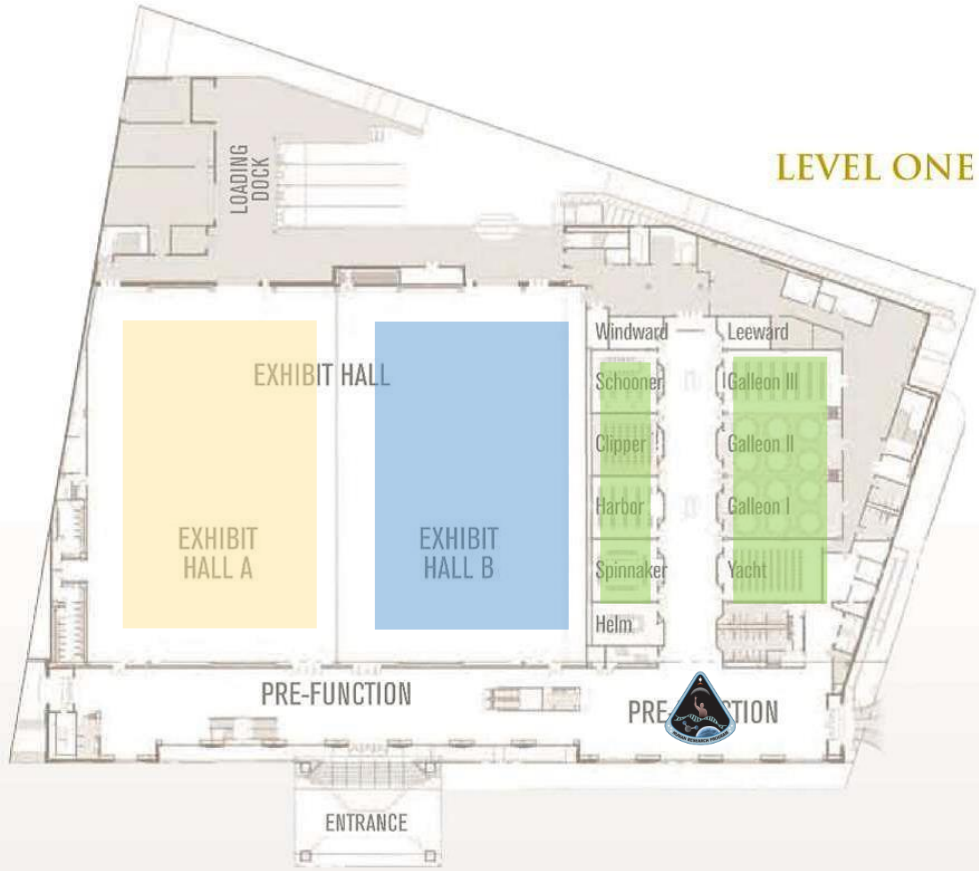
Wi-Fi Access:

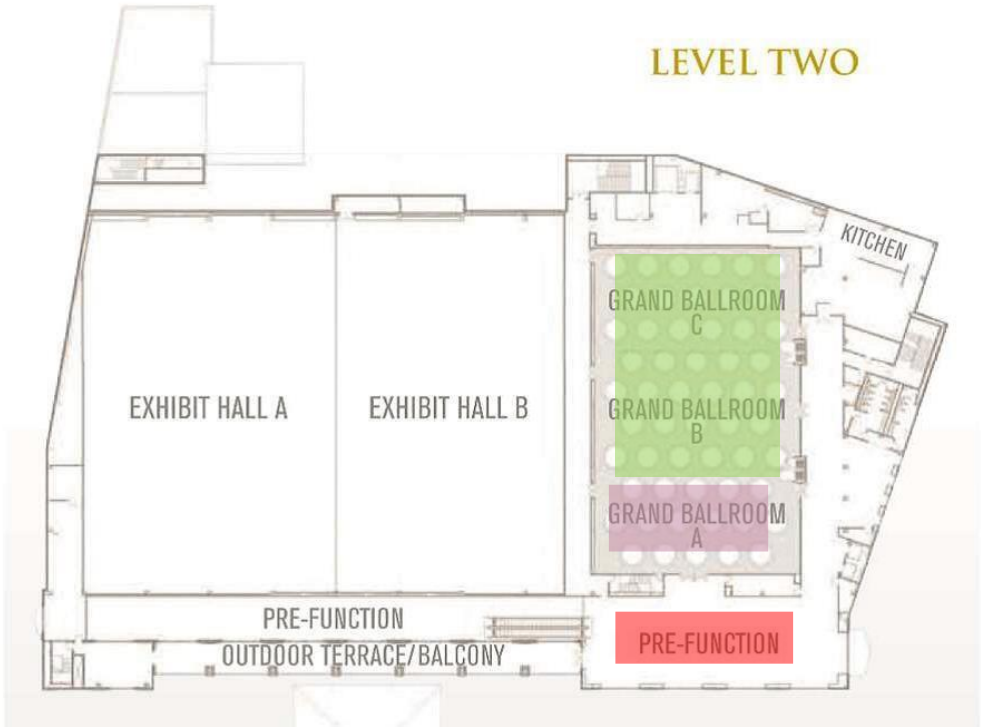
Network for Laptops:
NASAlaptops

Password:
NASAHRP1

Network for Mobile Devices (smartphones, tablets):
NASAmobile

Password:
NASAHRP2







NASA Human Research Program Investigators' Workshop

Human Exploration and Discovery:
The Moon, Mars and Beyond

Tuesday, January 22		**General Session (8:00 a.m. – 12:00 p.m.)**
7:00 a.m.	Pre-function (1st floor)	General Registration/Check-in
8:00 a.m.	**Exhibit Hall B**	**Welcome – J Fogarty**
8:05 a.m.		Remarks from the NASA Associate Administrator for the Human Exploration and Operations Mission Directorate (HEOMD) – W Gerstenmaier
8:10 a.m.		Remarks from the NASA Johnson Space Center (JSC) Director – M Geyer
8:15 a.m.		Remarks from the Human Research Program (HRP) Director – W Paloski
8:30 a.m.		***Plenary:*** *Deep Space Gateway* – J Crusan
9:00 a.m.		***Plenary:*** *Remarks from the NASA Chief Health and Medical Officer* – JD Polk
10:00 a.m.	Grand Foyer (2nd floor)	**BREAK**
10:30 a.m.		***Plenary****: Exploring New Frontiers in Science and Medicine for Space Health* – D Donoviel
11:15 a.m.		***Plenary:*** *Integrated HRP Research* – All HRP Elements
12:00 p.m.		**LUNCH**
1:00 p.m.	Galleon I	Exploration Medical Capability Element Priorities and Collaborations
	Galleon II & III	Spaceflight Countermeasures for Supporting Behavioral Health and Performance
	Grand Ballroom B	Central Nervous System, Behavioral Performance, and Sensorimotor Changes (CBS) Integrated Project
	Grand Ballroom C	NSCOR: Space Radiation and Gastrointestinal Cancer: A Comprehensive Strategy for Risk Assessment and Model Development
2:30 p.m.	Grand Foyer (2nd floor)	**BREAK**
3:00 p.m.	Galleon I	Pharmaceutical Research for Exploration Missions
	Galleon II & III	Team Composition and Support: A Dynamic Challenge for Long-Duration Missions
	Grand Ballroom B	Central Nervous System, Behavioral Performance, and Sensorimotor Changes (CBS): Results from Relevant Research
	Grand Ballroom C	NASA Specialized Center of Research on Carcinogenesis
4:30 p.m.	Exhibit Hall A	Poster Session A; Cash Bar Reception
6:00 p.m.		**Adjourn**

Wednesday, January 23		
7:00 a.m.	Pre-function (1st floor)	General Registration/Check-in
8:00 a.m.	**Exhibit Hall B**	***Plenary:*** *Gallaudet 11: The Deaf Right Stuff* – J Allen, H Larson, D Myers, M Reschke
8:45 a.m.		***Plenary:*** *Innovative and Inclusive: Diversity in the Sciences* – E Hillman

9:30 a.m.	**Exhibit Hall B**	***Plenary:*** *From Outer Space to Inner Space: How NASA Technologies and Space Exploration Help Game Changing Brain Discovery and Innovation in Neuroscience and Neurosurgery* – B Kateb
10:15 a.m.	Grand Foyer (2nd floor)	**BREAK**
10:30 a.m.	Galleon I	Exploration Medical System Design
	Galleon II & III	Human Capabilities Assessments for Autonomous Missions
	Grand Ballroom B	SANS Research and Medical Updates
	Grand Ballroom C	Space Radiation: Countermeasures in Space
12:00 p.m.	Grand Foyer (2nd floor)	**Obtain LUNCH**
12:45 p.m.	**Exhibit Hall B**	***Lunch Plenary:*** *The Continuum of Health in Space* – A Sawyer
1:45 p.m.	Galleon I	Communications
	Galleon II & III	Autonomy and Decision Making in Future Spaceflight Missions
	Grand Ballroom B	Imaging and the Brain – From SANS to Cognition
	Grand Ballroom C	Biomarkers and Precision Medicine for Risk Assessment
3:15 p.m.	Grand Foyer (2nd floor)	**BREAK**
3:30 p.m.	Galleon I	ExMC Closed Session
	Galleon II & III	Habitability Assessment for Future Spaceflight Vehicles
	Grand Ballroom B	VIIP and Psychological :envihab Research (VaPER bedrest campaign) – Study Results
	Grand Ballroom C	Space Radiation: Biomarkers and Proteomics
5:00 p.m.	**Pre-function (1st floor)**	**Cash Bar Happy Hour**
5:15 p.m.	Grand Ballroom A	***Innovation Activity:*** *Expert Speed Matching*
6:45 p.m.	**Exhibit Hall B**	**2019 HRP Annual Banquet**
		Keynote: *Extremes: The Fastest Century* – Kevin Fong; Author of *Extremes: Life, Death and the Limits of the Human Body*
9:00 p.m.		**Adjourn**

Thursday, January 24

7:00 a.m.	Pre-function (1st floor)	General Registration/Check-in
8:00 a.m.	**Exhibit Hall B**	***Plenary:*** *Interagency Plenary* – M Homer, J Salinas, L Low, E Hill
9:00 a.m.	Grand Foyer (2nd floor)	**BREAK**
9:30 a.m.	Galleon I	SANS Hypotheses and Countermeasures
	Galleon II & III	Team Adaptation in Extreme Environments
	Grand Ballroom B	Characterizing Spaceflight-Related Skeletal Changes and Biomechanics
	Grand Ballroom C	GCR Sim1: Defining the Mixed Particle Field
11:00 a.m.		**LUNCH**
12:30 p.m.	Galleon I	Education
	Galleon II & III	Health and Performance Measurement and Methods for Future Spaceflight
	Grand Ballroom B	Enabling Human Exploration Part 1: Multi-system Physiological Adaptations and Countermeasures for Long Duration Spaceflight
	Grand Ballroom C	GCR Sim2: Mixed Field Results and Predictive Modeling



2:00 p.m.	Grand Foyer (2nd floor)	**BREAK**
2:30 p.m.	Galleon I	Science Fiction to Science Fact Competition Showcase
	Galleon II & III	Neurocognitive and Neurobehavioral Health for Future Exploration Missions
	Grand Ballroom B	Enabling Human Exploration Part 2: Benchmarking Physiological Performance of Exploration Mission Tasks
	Grand Ballroom C	NSRL User Group – A Focus on Dose Rate Studies
4:00 p.m.	Exhibit Hall A	Poster Session B; Cash Bar Reception
5:30 p.m.		**Adjourn**

Friday, January 25

7:00 a.m.	Pre-function (1st floor)	General Registration/Check-in
8:00 a.m.	Galleon I	How We Do Business
	Galleon II & III	ISSMP Flight
	Grand Ballroom B	Radiation, Immunity and Herpesvirus Reactivation – Clinical Risks for Astronauts during Deep Space Exploration
	Grand Ballroom C	Spaceflight and Cardiovascular Disease – A Clinical Perspective
9:30 a.m.	Grand Foyer (2nd floor)	**BREAK**
9:45 a.m.	Galleon II & III	ISSMP Analogs
	Grand Ballroom B	Mechanisms Underlying Charged Particle-Induced Disruption of CNS Function
	Grand Ballroom C	Cardiovascular Disease – Evidence Base to Assess Risk
11:15 a.m.	Grand Foyer (2nd floor)	**Obtain LUNCH**
12:00 p.m.	**Exhibit Hall B**	***Lunch Plenary:*** *Human Interface, Space Futures* – M Shelhamer
1:00 p.m.	Galleon II & III	Epidemiology and Risk Modeling
	Grand Ballroom B	Challenges and Advances in Food and Nutrition to Support Long Duration Exploration
	Grand Ballroom C	Space Radiation: Cardiovascular Disease and Late CNS Effects
2:30 p.m.	Grand Foyer (2nd floor)	**BREAK**
3:00 p.m.	**Exhibit Hall B**	***Plenary:*** *Astronaut Perspective* – D Pettit
4:00 p.m.		***Plenary:*** *HRP Awards and HRP Poster Competition Awards* – W Paloski
4:15 p.m.		**Closing Remarks – J Fogarty**
4:30 p.m.		**Adjourn**

AGENDA AT A GLANCE DAY 1

TUESDAY, JANUARY 22, 2019

	Plenary (Exhibit Hall B)	Poster (Exhibit Hall A)	Galleon I	Galleon II & III	Innovation Pavilion (Ballroom A)	Grand Ballroom B	Grand Ballroom C
8:00 AM	Plenary Sessions						
10:00 AM	Break						
10:30 AM	Plenary Sessions						
12:00 PM	Lunch						
1:00 PM			ExMC Priorities & Collaborations	Spaceflight CM-Behav Health & Performance		CBS Integrated Project	NSCOR-SR & GI Cancer
2:30 PM	Break						
3:00 PM			Pharmaceutical Research for EM	Team Comp & Support		CBS Results from Research	NSCOR- Cancer
4:30 PM		Poster Session A					
6:00 PM	Adjourn						

FEATURED PLENARY SPEAKERS



William Gerstenmaier

Associate Administrator
Human Exploration and Operations Mission Directorate
NASA Headquarters



Mark Geyer

Director
NASA Johnson Space Center (JSC)



William Paloski

Director
Human Research Program
NASA JSC



Jason Crusan

Director
Advanced Exploration Systems, NASA's Human Exploration and Operations Mission Directorate
NASA Headquarters



JD Polk

Chief Health and Medical Officer
NASA Headquarters



Dorit Donoviel

Director
Translational Research Institute for Space Health

Tuesday, January 22, 2019

Central Nervous System, Behavioral Performance, and Sensorimotor Changes (CBS) Integrated Project

1:00 PM **Grand Ballroom B**

Chairs: **Thomas Williams and Greg Nelson**

1:00 PM Williams T. Mulavara A. Norsk P. Simonsen L. Whitmire A.
CBS INTEGRATED RESEARCH PLAN **[#19019]**

NASA's HRP directed a completely integrated approach to systematically identify and investigate the relationships amongst three risks: CNS, BMed and Sensorimotor, and hereafter referred to the CBS Integrated Research Plan.

1:18 PM Nelson G.
WORKSHOP OUTBRIEF - OPTIMIZATION OF TRANSLATIONAL ANIMAL MODELS TO ASSESS HUMAN SPACEFLIGHT PERFORMANCE FOR STUDYING THE IN- FLIGHT EFFECTS OF SPACE RADIATION: THE JOURNEY TO MARS AND BACK **[#19020]**
This presentation will present findings and recommendations from a workshop focused on bridging the gap between radiation-induced effects observed in animal models and prediction of specific outcomes in human performance in space.

1:36 PM Mulavara A. Bloomberg J. Ronca A. Zanello S. Britten R. Clement G. Nelson G. Boyle R. Davis C. Yates B. Schneiderman J. Reschke M. Sowa M.
VESTIBULAR/SENSORIMOTOR DATA MINING FOR THE INTEGRATED CENTRAL NERVOUS SYSTEM, BEHAVIORAL MEDICINE, AND SENSORIMOTOR (CBS) PLAN **[#19021]**
This paper reports the outcome of the Vestibular/sensorimotor data mining for the integrated central nervous system, behavioral medicine, and sensorimotor (CBS) plan

1:54 PM Gilkey K. Lewandowski B. Matar M. Pavelchek C. Gokoglu S. Myers J.
CONCEPTUAL COMPUTATIONAL FRAMEWORK FOR THE INTEGRATED CENTRAL NERVOUS SYSTEM, BEHAVIORAL MEDICINE AND SENSORIMOTOR SYSTEM SPACEFLIGHT RISK **[#19022]**
The Cross-cutting Computational Modeling Project (CCMP) supports the HRP effort aimed at determining the integrated effects of space radiation, microgravity environment and isolation stress on central nervous system performance, behavioral health and sensorimotor system performance.

2:12 PM Lewis L. Ronca A. Boyle R. Alwood J. Sowa M.
MODEL TRANSLATION & SPACE BIOLOGY INTEGRATION TO INFORM HUMAN RESEARCH PROGRAM RISKS **[#19023]**
The HRP Cross-Cutting Model Translation & Space Biology Integration (MTSBI) Project facilitates the translation of data from model organisms, including the integration of NASA Space Biology research, to expedite the Path to Risk Reduction (PRR) for the protection of human health in space.

2:30 PM Break

Tuesday, January 22, 2019

Exploration Medical Capability Element Priorities and Collaborations

1:00 PM **Galleon I**

Chair: **Nancy Fleming**

1:00 PM Lehnhardt K.
EXPLORATION MEDICAL CAPABILITY SCIENCE AND RESEARCH OVERVIEW AND UPDATE **[#19070]**
This presentation will focus on scientific and technical conceptual drivers for the Exploration Medical Capability Element, the current and future research risks and gaps, and provide an overview of Element progress to date.

1:15 PM McGuire K. Mindock J. Urbina M.
EXPLORATION MEDICAL CAPABILITY SYSTEMS ENGINEERING OVERVIEW AND UPDATE **[#19071]**
This talk will provide an overview of the work done by HRP's Exploration Medical Capability element Systems Engineering team over the last year and what their next steps are.

1:30 PM Schier J. Seibert M.
ADDRESSING HUMAN RESEARCH NEEDS FOR SPACE COMMUNICATIONS TO MITIGATE HUMAN SPACE FLIGHT RISKS **[#19072]**
NASA's planned deep space communication capability, suggest areas where current capabilities may fail to mitigate HRP element risks when taken into deep space, and open dialog on a path forward for new collaborative work between HRP and SCaN to maximize the utility of the Gateway proving ground.

1:45 PM Krihak M. Gurram M. Wolfe S. Marker N. Lin J. Schmitt B. Winther S. Ronzano K. Toscano B. Shaw T.
MEDICAL DATA ARCHITECTURE PROJECT STATUS **[#19073]**
The Medical Data Architecture (MDA) project developed a second version of prototype software that provided role-based access control of data and the storage and display of exercise and ultrasound files.

2:00 PM Latorella K. Hollister M. Levy J. Messer W. Fluegel B. Odenwald C. Cerro J. Greer K. Charewicz D. Wass M. Lewandowski B.
EXPLORATION MEDICAL CAPABILITY – MEDICAL WORKSTATION DESIGN, INTEGRATION & EVALUATION **[#19074]**
This effort focused on development of a medical workstation for the Deep Space Gateway, integration of that workstation into the vehicle, and various evaluations of the design and integration.

2:15 PM Discussion

2:30 PM Break

Tuesday, January 22, 2019

NSCOR: Space Radiation and Gastrointestinal Cancer: A Comprehensive Strategy for Risk Assessment and Model Development

1:00 PM **Grand Ballroom C**

Chair: **Al Fornace**

1:00 PM Simonsen L. Huff J.
WELCOME TO NASA's 30th ANNUAL SPACE RADIATION INVESTIGATORS' WORKSHOP **[#19158]**
Workshop will highlight advances made by NASA's NSCOR teams, the status of cardiovascular research and understanding of late CNS pathologies, progress in assessing countermeasures, as well as, research results and operation of the NSRL GCR Simulator sequential field and dose rate studies.

1:15 PM Fornace A. Datta K. Shay J. Meltzer P. Brenner D.
GASTROINTESTINAL (GI) NSCOR FOR: CANCER RISK, DEVELOPMENT OF RISK MITIGATION STRATEGIES BASED ON INJURY RESPONSES, AND RISK MODELING **[#19159]**
This is an invited mandatory overview presentation of the gastrointestinal cancer NSCOR program.

1:45 PM Shay J. Luitel K.
COUNTERMEASURES FOR MOUSE MODELS OF SPACE RADIATION-INDUCED TUMORS **[#19160]**
CDDO is an effective countermeasure to reduce radiation-associated cancer progression

2:05 PM Brenner D. Shuryak I.
UNDERSTANDING EXTRAPOLATION OF RADIATION RISKS FROM TERRESTRIAL TO SPACE EXPOSURES: ARE LOW-DOSE NON-TARGETED EFFECTS FROM DIFFERENT HZE IONS ADDITIVE? **[#19161]**
Low dose HZE-induced non-targeted effects appear to saturate at low doses; If this is the case it may be that subsequent low-dose HZE exposures may result in sub-additive effects.

2:25 PM Discussion

2:30 PM Break

Tuesday, January 22, 2019

Spaceflight Countermeasures for Supporting Behavioral Health and Performance

1:00 PM **Galleon II & III**

Chairs: **Jeri Stephenson and Diana Arias**

1:00 PM Klein T. Weber J. Foitschik T. Crucian B. Schneider S. Abeln V.
THE EFFECT OF EXERCISE ON THE BRAIN DURING ISOLATION – INVESTIGATIONS IN THE HUMAN EXPLORATION RESEARCH ANALOG (HERA) **[#19474]**
Daily physical exercise routines during isolation might have positively affected CNS function, as brain cortical activation and neurotropic factors were not impaired in HERA C3 compared to HERA C4, where the exercise routines were reduced by

1:18 PM Rose R. Zbozinek T. Smith S. Oftedal A. Yang A. Lampert B. Tomiyama A. Craske M.
AUTONOMOUS MULTIMEDIA STRESS MANAGEMENT AND RESILIENCE
We are presenting on the findings of a study that evaluated the effectiveness of a computer-based stress management training program (SMART-OP) in an RCT with NASA-JSC flight controllers, instructors, and directors in comparison to a wait list control (WLC) group.

1:36 PM Brainard G. St. Hilaire M. Clark T. Rahman S. Hanifin J. Warfield B. Kemp J. Disoke F. Glodjo T. Jasser S. Ayers M. Panepinto L. Kanumilli S. Nelson N. Hasher D. Vadalia S. Balaicuis J. Byrne B. Pineda C. Gerner E. Maida J. Johnston S. Moomaw R. 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
Three ground analog studies and one ISS in-flight study are determining if solid-state lighting can be used to support astronaut vision and serve as an in-flight countermeasure for circadian misalignment, sleep disruption and performance deficits on the ISS.

1:54 PM Rose R. Zbozinek T. Wu P. Foale C. Oftedal A. Yang A. Craske M.
ASYNCHRONOUS BEHAVIORAL HEALTH TREATMENT TECHNIQUES FOR LONG- DURATION MISSIONS **[#19477]**
We are reporting on the progress and preliminary data analyses of a RCT study at UCLA examining the efficacy, feasibility, and acceptability of a behavioral health treatment program that can be used in asynchronous communication environments.

2:12 PM Gonzalez A.
ASYNCHRONOUS TECHNIQUES FOR THE DELIVERY OF EMPIRICALLY SUPPORTED PSYCHOTHERAPIES: A RANDOMIZED CONTROLLED TRIAL **[#19478]**
This presentation will report results from a randomized controlled trial evaluating different asynchronous communication methods for providing behavioral health care during long duration space missions.

2:30 PM Break

Tuesday, January 22, 2019

Central Nervous System, Behavioral Performance, and Sensorimotor Changes (CBS): Results from Relevant Research

3:00 PM **Grand Ballroom B**

Chairs: **Andrea Hanson and Cynthia Lemere**

3:00 PM Grabham P. Wuu Y. Sharma P.
COMBINED EFFECT OF SPACE RADIATION AND SIMULATED MICROGRAVITY ON HUMAN BLOOD MICRO-VESSEL MODELS: SYNERGISTIC AND ADDITIVE EFFECTS **[#19025]**
An examination of the effects of charged particles and simulated microgravity alone, and in combination, on human micro-vessel tissue models reveals a number of detrimental effects of these agents.

3:20 PM Rosi S.
THE ROLE OF OXIDATIVE STRESS AND INFLAMMATION ON SYNAPTIC FUNCTIONS AFTER EXPOSURE TO SPACE RADIATION **[#19026]**
Mechanistic analysis of the GCR effects on cognitive and behavioral performances in male and female mice will be discussed along with evidence for new countermeasure drugs that can prevent loss of cognitive and behavioral functions in

3:40 PM Eisch A. Whoolery C. Lucero M. Reynolds R. Soler I. Tran F. DeSalle M. Ito N. Redfield R. Richardson D. Shih H. Rivera P. Chen B. Birnbaum S. Stowe A. Yun S.
SPACE RADIATION UNEXPECTEDLY ENHANCES PATTERN SEPARATION YET DIMINISHES DENTATE GYRUS NEUROGENESIS IN MALE C57BL/6J MICE
Dr. Eisch reviews the Eisch Lab team's work showing mice are exposed to whole body space radiation are better at the mission-critical and hippocampal-dependent cognitive process of pattern separation relative to sham exposed mice.

4:00 PM Guttmann L. Schreurs A. Tahimic C. Torres S. Steczina S. Lowe M. Ronca A. Globus R.
OVEREXPRESSION OF CATALASE IN MITOCHONDRIA PARTIALLY MITIGATES THE EFFECTS OF SIMULATED MICROGRAVITY AND SOCIAL ISOLATION ON CYTOKINE EXPRESSION IN MOUSE HIPPOCAMPUS **[#19028]**
Overexpression of Catalase in Mitochondria Partially Mitigates the Effects of Simulated Microgravity and Social Isolation on Cytokine expression in mouse

4:20 PM Discussion

4:30 PM Break

Tuesday, January 22, 2019

NASA Specialized Center of Research on Carcinogenesis

3:00 PM **Grand Ballroom C**

Chair: **Michael Weil**

3:00 PM Weil M. Ullrich R. Ding L. Emmett M. Yu Y. Bacher J. Halberg R. Raber J. Edmondson E. Ray A. Thamm D. Borak T. Story M.
CARCINOGENESIS NSCOR: OVERVIEW AND DOSE RATE EFFECTS **[#19147]**
The goals of the Carcinogenesis NSCOR are to identify biomarkers of HZE ion-induced carcinogenesis, examine the malignancy of HZE ion-induced tumors, test countermeasures against space radiation effects, and measure space-relevant dose rate effects.

3:30 PM Story M. Ding L. Edmondson E. Hwang T. Raber J. Weil M.
CARCINOGENESIS NSCOR: BIOMARKERS OF HZE ION CARCINOGENESIS **[#19148]**
This abstract describes the ongoing molecular characterization of radiation-induced hepatocellular carcinoma, particularly those generated by space radiation.

3:50 PM Halberg R. Udho E. Raber J. Perez R. Ray A. Weil M. Bacher J.
CARCINOGENESIS NSCOR: MECHANISMS UNDERLYING INCREASED MALIGNACY FROM SPACE RADIATION **[#19149]**
As one component of the NASA Specialized Center of Research on Carcinogenesis, we characterized the malignancy of HZE ion-induced tumors in laboratory mouse and determined the efficacy of potential countermeasures.

4:10 PM Raber J. Perez R. Fallgren C. Emmett M. Bartnette B. Ullrich R. Ding L. Bacher J. Udo E. Halberg R. Ray A. Borak T. Story M. Weil M.
CARCINOGENESIS NSCOR: NEUROBEHAVIORAL CHARACTERIZATION, BIOMARKERS, and COUNTERMEASURES **[#19150]**
This presentation will provide a progress report of Carcinogenesis NSCOR Project 4 focused on neurobehavioral characterization following simulated space radiation exposure and testing potential countermeasures against the detrimental effects of space radiation exposure on the brain.

4:30 PM Break

Tuesday, January 22, 2019

Pharmaceutical Research for Exploration Missions

3:00 PM **Galleon I**

Chair: **Kris Lehnhardt**

3:00 PM Bayuse T. Blue R. Daniels V. Antonsen E.
Supplying a Pharmacy for Exploration Spaceflight **[#19169]**
We will discuss the current state of literature regarding drug stability, metabolism, and effectiveness during spaceflight highlighting the gaps in current knowledge and the challenges in translating terrestrial-based drug studies to a meaningful interpretation of drug response in space.

3:15 PM Cory W. Daniels V. Bayuse T. Blue R. Antonsen E. Lehnhardt K.
EXMC APPROACH TO PHARMACEUTICAL STABILITY RESEARCH: AN OVERVIEW **[#19170]**
This presentation will describe ExMC plans to study the stability of medications under relevant conditions, beginning with those currently on the ISS formulary, with the goal of providing a safe and effective pharmacy for exploration missions.

3:30 PM Daniels V. Bayuse T. Blue R. Antonsen E. Lehnhardt K.
ASSESSMENT OF DRUG STABILITY USING A GROUND-BASED ANALOG FOR SPACE RADIATION **[#19171]**
Exploration Medical Capabilities Element pilot experiment evaluates the pharmaceutical stability of a group of prioritized pharmaceuticals exposed to simulated Galactic Cosmic Radiation beams at the NASA Space Radiation Laboratory; and analog utility for exploration spaceflight.

3:45 PM Farquharson S. Shende C. Smith W. Brouillette C.
DEVELOPMENT AND APPLICATION OF A DRUG STABILITY ANALYZER TO DEGRADED DRUGS **[#19172]**
A new Line-Scan Drug Stability Analyzer was designed, built, and used to measure drugs flown on the ISS, drugs irradiated at the Brookhaven National Laboratory, and drugs degraded by acid hydrolysis.

4:00 PM Discussion

4:30 PM Break

Tuesday, January 22, 2019

Team Composition and Support: A Dynamic Challenge for Long-Duration Missions

3:00 PM **Galleon II & III**

Chairs: **Jimmy Garrett and Sarah Huppman**

3:00 PM Landon L.
THE TEAM RISK: TEAMWORK MAKES THE DREAM WORK **[#19486]**
Team factors (team cohesion, dyadic relationships, shared team cognition) are likely to change dynamically in response to each interaction and event experienced. Monitoring and optimizing team composition at a more micro level (e.g., per task) can support team functioning and performance.

3:20 PM Contractor N. Antone B. Lungeanu A. Bell S. DeChurch L.
MODELING TEAM COMPOSITION DECISIONS FOR LONG-DURATION SPACE EXPLORATION **[#19487]**
Agent-based modeling provides an approach for modeling the influence that team composition has upon the development of interpersonal relationships between crew members placed in isolated, confined, and controlled environments.

3:40 PM Bell S. Vazquez M. Wojick H. Vinokhodova A. Gushin V. DeChurch L. Contractor N.
PSPA AS A MEANS OF MEASURING INTERPERSONAL COMPATIBILITY IN ICE **[#19488]**
Data collected from 5, 4-person HERA crews in isolation for up to 45 days, provide evidence for the usefulness of the PSPA as a measure of interpersonal compatibility.

4:00 PM DeChurch L. Lungeanu A. Park P. Contractor N.
CREST: CREW RECOMMENDER FOR EFFECTIVELY SWITCHING TASKS
This study presents a computational model examining task, team, technology, and social network factors that explain what make some tasks “sticky” or “attractive”.

4:20 PM Discussion

4:30 PM Break

Tuesday, January 22, 2019

Poster Session A: Bone

4:30 PM **Exhibit Hall A**

McEnroe B. McEnroe B. Davison S. Chen L. Vargas L. O'Brien I. Kozerski A. Vanhoover A. Carter K. Caruso J.
DWELL TIMES FROM A CHRONIC HIGH-SPEED EXERCISE INTERVENTION AS A CORRELATE TO CALCANEAL ACCRETION **[#19175]**
Dwell times were examined as a correlate to calcanea accretion produced from chronic high-speed exercise.

Ko F. Mortreux M. Riveros D. Nagy J. Rutkove S. Bouxsein M.
DOSE-DEPENDENT SKELETAL DEFICITS IN RATS BY VARIED REDUCTION IN MECHANICAL LOADING **[#19177]**
Rats exposed to simulated microgravity by varied reductions in mechanical loading exhibit dose-dependent bone loss.

Allaway H. Pierson R. Hogan H. Bloomfield S.
WILL USE OF LONG-ACTING, REVERSIBLE CONTRACEPTIVES MITIGATE BONE LOSS IN FEMALE RATS DURING SIMULATED EXPLORATION CLASS MISSIONS? **[#19178]**
This TRISH funded postdoctoral fellowship project will assist in determining the impact of hormonal contraception on bone health in using a rodent model of microgravity.

Little S. Allaway H. Bokhari R. Seidel D. Wahl K. Turner N. Ford J. Suva L. Bloomfield S.
CAN ACUTE GALACTIC COSMIC RADIATION-INDUCED BONE LOSS BE MITIGATED BY DIETARY MODULATION OF INFLAMMATORY CYTOKINES?
This bio-specimen sharing project will leverage the impact of a NASA funded project performed at the NSRL to explore how dietary intake of omega-3 fatty acids may mitigate radiation-induced bone loss.

Bird E. Petersen L. Bailey J. Hargens A. Lotz J.
ATROPHY AND LEAN MUSCULAR CHANGES OF THE CERVICAL EXTENSORS AFTER SPACEFLIGHT **[#19180]**
Preflight, post flight and over 1 month post flight scans of the cervical extensor muscles in astronauts are analyzed to determine cervical extensor muscle atrophy as well as lean muscle composition changes. LEAN MUSCULAR CHANGES IN THE CERVICAL EXTENSORS OF ASTRONAUTS AFTER SPACEFLIGHT

Carpenter R. Borg A. Johnson D. Davis C. Lau A.
BONE MECHANICAL PROPERTY CHANGES IN RATS EXPOSED TO SPACE RADIATION **[#19181]**
Mechanical Experimentation of Femurs in Rats exposed to Space Radiation.

Sanseverino M. Speacht T. Donahue H. Lau A.
THE EFFECTS OF HIND LIMB SUSPENSION AND CAST IMMOBILIZATION ON BONE STRENGTH **[#19182]**
Finite Element Analysis of Bone Strength in Mice using the Hind Limb Suspension and Cast Immobilization Model.

Hezrony B. Speacht T. Donahue H. Lau A.
EFFECTS OF COMBINED HIND LIMB SUSPENSION AND SRANKL ON BONE STRENGTH IN MICE BY FINITE ELEMENT ANALYSIS **[#19183]**
Finite Element Analysis of Bone Strength in Mice subjected to Hind Limb Suspension and sRANKL.

Piserchia J. Speacht T. Donahue H. Lau A.
THE EFFECTS OF HIND LIMB SUSPENSION AND CAST MEDIATED IMMOBILIZATION ON BONE MATERIAL AND MECHANICAL PROPERTIES **[#19184]**
Material Property Characterization of Bones from mice subjected to hind limb suspension and cast immobilization.

Elizondo J. Lenfest S. Metzger C. Brezicha J. Looper A. Bloomfield S. Hogan H.
CHARACTERIZING VOLUNTARY JUMPING EXERCISE IN RATS AS A COUNTERMEASURE TO SUBSEQUENT UNLOADING **[#19185]**
We characterize the ground reaction forces and bone formation rates for a voluntary jumping exercise countermeasure in hindlimb unloaded rats.

Ramachandran V. Dalal S. Jones J. Henry S. Winkler C. Rogers J. Baskin D. Shender B.
EXERCISE REGIMEN FOR PREVENTION AND MITIGATION OF ACUTE AND CHRONIC NECK PAIN IN HIGH-PERFORMANCE AIRCREW **[#19186]**
High performance aircrew underwent a 6-week regimen with a portable neck exercise device resulting in increased neck strength, range of motion, endurance and less severe and frequent neck pain, with results translatable to the astronaut community.

Axpe E.
A HUMAN MISSION TO MARS: PREDICTING THE BONE MINERAL DENSITY LOSS OF ASTRONAUTS **[#19187]**
A round-trip manned mission to Mars is anticipated to last roughly three years. Exposure to spaceflight conditions causes loss of bone mineral density (BMD) in astronauts. In this study, we develop a predictive mathematical model for the bone mineral density loss in a potential mission to Mars.

Friedman M. Zhang Y. Maroni C. Wayne J. Farber C. Donahue H.
EFFECTS OF GENETIC VARIATION ON MOUSE BONE RESPONSE TO UNLOADING **[#19188]**
Genetic differences result in some mouse strains being less sensitive to unloading, resulting in less bone loss.

Hargens A.
SPINAL STRUCTURE AND FUNCTION AFTER 90 DAYS SIMULATED SPACE FLIGHT **[#19189]**
Hind-limb suspension of rats produces a head-down tilt of approximately 30 degrees and effectively unloading the hind limbs. This unloading model reproduces some physiological adaptations to spaceflight, but it's unclear if this model is appropriate for studies of intervertebral discs.

Tuesday, January 22, 2019

Poster Session A: Cardiovascular

4:30 PM **Exhibit Hall A**

ARBEILLE P.
TELE-OPERATED MOTORIZED, CARDIAC, TRANSCRANIAL, OPHTALMIC, SUPERFICIAL PROBE, for the SONOSCANNER ECHOGRAPH ONBOARD ISS. **[#19190]**
With 3 additional new motorized probes the ISS Sonoscanner Echograph will allow for remotely controlled Cardiac, intracranial, ophthalmic, superficial vessel/organs and pelvic organs echography in the ISS.

Gerlach D. Manuel J. Hoff A. Kronsbein H. Hoffmann F. Heußer K. Ehmke H. Jordan J. Beissner F. Tank J.
PHARMACOLOGICAL BAROREFLEX TESTING DURING FMRI REVEALS HUMAN BAROREFLEX CIRCUITS AT THE BRAINSTEM LEVEL **[#19191]**
We developed a methodology to identify the autonomic baroreflex network at the brainstem level that might be applied to elucidate human autonomic neural adaptation to short- and long term weightlessness.

Mitchell R. Frederick N. Tansey P. Holzman E. Zawieja D. Delp M. Bagher P.
ALTERATIONS IN NITRIC OXIDE-MEDIATED SIGNALS IN CORONARY ARTERIES FOLLOWING SPACEFLIGHT **[#19192]**
Nitric oxide-mediated signals were altered in murine coronary arteries following spaceflight.

Jacob N. Liu J. Bhayana S. Yadav M. Lee P. Boerma M. Sridharan V.
MICRORNA BIOMARKERS OF RADIATION-INDUCED CARDIOVASCULAR INJURY **[#19193]**
The study focus on developing blood test for early detection of delayed cardiovascular complications resulting from high-LET radiation exposure to astronauts during long-duration space travel.

Werner C. Egler S. Brock R. Humphreys B. Nelson E. Lewandowski B. Martin B. Oshinski J. Samuels B. Either R. Myers J.
INVESTIGATION OF HYDROSTATIC EFFECTS ON A LUMPED PARAMETER WHOLE BODY MODEL OF THE CARDIOVASCULAR SYSTEM **[#19194]**
NASA's Cross-cutting Computational Modeling Project (CCMP) has developed a lumped parameter whole body model (WBM) that describes the pressures and flows of the cardiovascular system (CVS) and cerebral spinal fluid (CSF) system.

Whittle R. Alonso Blanco D. Diaz Artiles A.
INDIVIDUAL DIFFERENCES IN CARDIOVASCULAR RESPONSES TO ORTHOSTATIC STRESS **[#19195]**
In this study we use different gravitational scenarios to examine cardiovascular (CV) system-level responses to a population-based distribution of individual CV parameters to determine those that can be best used to forecast individual response when subjected to orthostatic stress.

Grabham P. Brown L.
A DETERMINATION OF BIOACTIVE PROTEINS SECRETED BY THE HUMAN VASCULATURE IN RESPONSE TO LOW DOSE SPACE RADIATION. **[#19196]**
Proteomics analysis of proteins secreted by human microvessels after exposure to space radiation

Lindsey T. Garami Z.
AUTOMATED 4-ARY ULTRASOUND CLASSIFICATION OF CAROTID ARTERY STENOSIS **[#19197]**
Deep neural network models that classify sonographic carotid artery images into one of four stenosis categories.

Alfonso Garcia A. Li C. Haudenschild A. Bec J. Mcmasters J. Panitch A. Griffiths L. Marcu L.
OPTICAL IMAGING PLATFORM FOR CONTINOUS MONITORING OF VASCULAR TISSUE DEVELOPMENT IN A BIOREACTOR **[#19198]**
We have developed an optical imaging platform based on fluorescence dynamics that monitors biochemical and morphological changes caused by the recellularization process of vascular engineered tissues cultured in a bioreactor.

Koslovsky M. Asadi A. Komitov S. Arellano J. Mason S. Garcia K.
A SOFTWARE APPLICATION FOR AUTOMATED DOPPLER FLOW IMAGE FEATURE EXTRACTION **[#19199]**
We have developed an open source, vendor-agnostic tool that uses machine learning to facilitate rapid extraction of Doppler waveforms from digital imaging and communications in medicine format image data.

Saavedra-Torres J. Zuniga-Ceron L. Pinzon Fernandez M. Lopez Garzon N.
MEDICAL CHALLENGES IN THE CARDIOVASCULAR SYSTEM OF AN ASTRONAUT: HYPOTHESIS IN CELL TRANSPLANT AND EXTRACELLULAR MATRIX IN ACUTE MYOCARDIAL INFARCTION **[#19200]**
The objective of this study is to demonstrate on theoretical models, and possible compensation mechanisms cellular and extracellular matrix biodiversity as form of transplant and implant, as treatment of tissue in patients with myocardial infarction or with advanced heart failure.

Tuesday, January 22, 2019

Poster Session A: Exploration Medical Capability

4:30 PM **Exhibit Hall A**

Papier A. Hawkes J.
SHOWCASE OF THE VISUALDX AUGMENTED INTELLIGENCE PROJECT **[#19201]**
The technology showcase will introduce the VisualDx system featuring the artificial intelligence capabilities of skin lesion recognition, and outline specific NASA project deliverables in order to provide diagnostic support to spaceflight crew.

Gervais L. Ziegler J. Christe D. Sharipov A.
MINIATURIZED DIAGNOSTICS PLATFORM FOR HEALTH ASSESSMENT IN DEEP SPACE **[#19202]**
We report on the development of a portable easy to use medical diagnostics device capable of detecting high priority analytes of liver and kidney function, creatinine, alkaline phosphate (ALP) and aspartate aminotransferase (AST), from a finger-prick of blood.

Pollock N. Archambault P. Rhéaume C. Razdan P. Fortier F. Tran K. Dutil-Fafard L. Lafond D.
DEVELOPMENT OF INTEGRATED MEDICAL CONDITION INFORMATION FOR PROLONGED SPACE MISSIONS **[#19203]**
Future space exploration missions will require increasing levels of medical autonomy; we aid readiness by developing a knowledge base and requirements analysis tool to address high priority medical conditions.

Lacombe J. Chen P. Pflughoeft K. AuCoin D. Porada C. Gu J. Zenhausern F.
DEVELOPMENT OF A VERTICAL FLOW PAPER-BASED PLATFORM (VFP) FOR MONITORING HEALTH OUTCOMES IN INFLIGHT CONDITION **[#19204]**
We developed in this project a miniaturized and easy-to-use diagnosis platform able to detect and quantify expression levels of gene and protein biomarkers for monitoring health condition during long space missions.

Wu J. Grant G. Sharp M. Miller K. Sutton E. Broderick T. Doerr H. Badger J. Tackett E. Pantalos G.
ASSESSING OPERATIONAL RESOURCES FOR VARIOUS LOGISTICS MODELS FOR RESUPPLYING SURGICAL EQUIPMENT ON EXPLORATION SPACE FLIGHT MISSIONS **[#19205]**
This study assesses the feasibility and performance of additive manufactured (aka 3-D printed) as-needed surgical equipment and determine its operational resource footprint compared against conventional resupply from Earth.

Badger J. Farrell L. Wu J. Broderick T. Pantalos G.
ROBOTIC ASSISTANCE IN SURGICAL TASKS FOR EXPLORATION SPACE FLIGHT **[#19206]**
This abstract explores the use of caretaker robotics as assistants in surgical tasks to raise the competency of the crew member executing the surgical procedures.

Pantalos G. Higginson T. Barrow B. Heidel J. Deshpande R. Ackerman L. Hedge M. Koetter M. Roussel T. Sharp K. Sutton E. Dhamotharan V. Burgess J. Antaki J.
SUBORBITAL FLIGHT EVALUATION OF AN AQUEOUS IMMERSION SURGICAL SYSTEM FOR REDUCED GRAVITY **[#19207]**
The aqueous immersion surgical system (AISS) is a clear, rigid or flexible chamber attached to the skin over the surgical site that is filled with an immersion fluid (saline + antibiotic) to control bleeding, cleanse the wound, and maintain a clear visual field during surgery in reduced gravity.

Carroll D. Pantalos G. Sawyer A.
APPLYING SURGICAL TRAINING PRINCIPLES FOR DEEP SPACE MISSION READINESS: BUILDING A CURRICULUM FOR SKILL ACQUISITION, PRACTICE, AND REAL-TIME GUIDANCE **[#19208]**
Crew Medical Officer proficiency in a series of basic surgical procedures is critical for crew safety in long-duration space missions, mandating development of a training protocol that incorporates burgeoning technological capabilities into a strategic curricular framework.

Gallo C. Humphreys B. Schepelmann A. West N. Thompson W. Lewandowski B. Latorella K.
MEDICAL STATION VOLUME EVALUATION USING MOTION CAPTURE **[#19209]**
The volume required to perform various medical procedures was determined using motion capture.

Buras W. Garami MD Z.
3D JUST-IN-TIME PROCEDURAL GUIDANCE FOR THE FLEXIBLE ULTRASOUND SYSTEM (FUS) UTILIZING MICROSOFT HOLOLENS (AUGMENTED REALITY), AN ADAPTIVE USER INTERFACE, AND DEEP MACHINE LEARNING TO SUPPORT AND INSURE PROCEDURAL COMPETENCE **[#19210]**
Our team is developing a novel 3D procedural guidance system for spaceflight ultrasound that fuses Augmented Reality Head Mounted Display with standard training materials to enable closed loop guidance for training and just-in-time support for Autonomous Medical Operations

Reyes D. Kerstman E. Lehnhardt K.
THE IMPACT OF HEROIC MEDICAL CARE ON SUBSEQUENT MISSION MEDICAL OUTCOMES **[#19211]**
The impacts of a large expenditure of medical resources on a catastrophically ill crew member were modeled to determine the effects on subsequent mission medical outcomes.

Jain I. Warner S. Greenbaum S. Hedge M. Hailey M. Pantalos G.
USING CONVENTIONAL METHODS FOR TRAUMA FLUID RESUSCITATION IN REDUCED GRAVITY **[#19212]**
For this intravenous infusion study, fluid flow rates were compared in simulated reduced gravity environments for multiple needle gauges, compression bag pressures, and solution viscosities.

Fer D. Thananjeyan B. Henry R. Garcia Kilroy P. Goldberg K. Pantalos G.
A ROADMAP FOR ARTIFICIAL INTELLIGENCE IN SUPPORT FOR SURGERY IN SPACE **[#19213]**
We propose a hierarchy of prediction models, with proof of concept, that need to be developed in order to address surgical care in space taking into consideration the need to predict the motion of surgical end effector and their effect on the surgical environment.

Schaible M. Orlando T. Farrell W. Horanyi M.
The chemical effects of charged dust on lung tissue analogs **[#19214]**
The toxic chemical effects of charged dust analogous to that found on airless body regoliths is studied experimentally.

Gurram M.
MEDICAL DATA MANAGEMENT FRAMEWORK FOR ANALYTICAL APPLICATIONS **[#19215]**
The Medical Data Architecture (MDA) project objective is to facilitate the process of gathering requirements in designing a flight system to manage medically relevant data on board.

Zoldak J. Calaway K. Huffman M. Miller R. Li Y. Valentine R.
HEMOCUE WHITE BLOOD CELL ANALYZER, COTS ISS DEMONSTRATION **[#19216]**

Demple B. Caston R. Catalano T. Hendrix D. Hurowitz J. Nekvasil H.
TOXIC IMPACT OF LUNAR REGOLITH SIMULANTS ON HUMAN LUNG CELLS: EFFECTS OF ARTIFICIAL "SPACE WEATHERING" **[#19218]**
Artificial space weathering of lunar regolith simulants may enhance their cytotoxic and genotoxic effects.

Hall M. Hall M. Wessells H. Samson P. Sweet R. Dunmire B. Cunitz B. Harper J. Sorensen M. Bailey M.
RENAL STONE MANAGEMENT TECHNOLOGY DEVELOPMENT AND CLINICAL VALIDATION STUDY **[#19219]**
We report on the technology as it applies to a space analogue, the Emergency Department (ED), where patients are being screened and enrolled for acute, unscheduled kidney stone presentations.

Hellmer R. Eaton M. Cheng S. Su Z.
TESTING OF COMPACT X-RAY SOURCE FOR SPACE MEDICINE TOMOSYNTHESIS IMAGING **[#19220]**
Stellarray is testing a unique, multi-array x-ray source for electrical, x-ray flux and source performance, including electrical insulation, thermal management and radiation shielding.

Menon J.
AUTONOMOUS MEDICAL RESPONSE AGENT **[#19221]**
An autonomous medical response agent (AMRA) that assists patients in self diagnosis and treatment while coordinating care with remote specialists is discussed.

Marnat M.
EVERYWEAR, MOBILE DATA COLLECTION AND HEALTH MONITORING **[#19222]**
EveryWear, is a technology demonstrator project, developed by CNES and MEDES, in the scope of ESA-CNES joined program for the PROXIMA mission of French astronaut Thomas Pesquet.

Tuesday, January 22, 2019

Poster Session A: Food and Nutrition

4:30 PM **Exhibit Hall A**

Barrett A. Froio-Blumsack D. Richardson M.
STABILIZED FOODS FOR USE IN EXTENDED SPACEFLIGHT: PRESERVATION OF SHELF-LIFE, NUTRIENT CONTENT AND ACCEPTABILITY **[#19223]**
Vitamin retention in dry food was measured after 4 years at 70F and in high water activity food after 2 years at 70F.

Cooper M. Sirmons T. Froio-Blumsack D. Gengelbach L. Young M. Douglas G.
IMPROVEMENT OF SHELF LIFE FOR SPACE FOOD THROUGH HURDLE APPROACH **[#19224]**
In Hurdle Approach Study, various technologies, food modifications, and storage temperatures are being employed to determine how best to extend the shelf life of 16 space foods and 8 condiments for broader application to the requirements of a long-duration space food system.

Zhang Y. Richards J. Cameron M. Richardson B. Nichols C. Dreschel T. Spencer L. Romeyn M. Hada M. Plante I. Feiveson A. Wu H. Massa G. Douglas G. Levine H.
RESPONSE OF HYDRATED CROP SEEDS TO SIMULATED SPACE RADIATION **[#19225]**
In this study, we evaluated the effect of charged particles and simulated GCRs on hydrated seeds of Arabidopsis thaliana, mizuna mustard, 'Outredgeous' red romaine lettuce, and 'Red Robin' dwarf tomato.

Hummerick M. Massa G. Wheeler R. Romeyn M. Spencer L. Morrow R. Mitchell C. Roma P. Young M. Douglas G.
PREPARATION FOR PICK-AND-EAT FOOD PRODUCTION ON THE INTERNATIONAL SPACE STATION: HAZARD ANALYSIS CRITICAL CONTROL POINTS (HACCP) PLAN DEVELOPMENT **[#19226]**
This study focuses on growth of plants for food production on the International Space Station (ISS) using the Veggie vegetable production system. Microbial levels for crops have been baselined, and critical control points in produce production and handling are discussed.

Caldwell B. Halpern B. Hunter J.
EFFECT OF 70-DAY 6° HEAD-DOWN TILT ON ODORANT IDENTIFICATION AND MENU ACCEPTABILITY **[#19227]**
An objective of this head down tilt study was to determine whether identification of food-related odors, both related and unrelated to the bed rest menu changed during the experience of extended HDT, and if this affected the acceptability of foods in the diet of bed rested subjects.

Escobar C. Escobar A.
PRO-WASH™ – PRODUCE WASH AND AERATION FOR SPACE HABITATS
Space Lab is developing & testing an ozone based produce disinfection system for spacecraft habitats, to safely and reliably provide a 3-log reduction in food-borne pathogens for a variety of fruits and vegetables without reducing food quality.

Sakai T. Moteki Y. Takahashi T. Shida K. Kiwaki M. Smiakawa Y. Matsui A. Conan O. Morikawa K. Onta T. Ohshima H. Furkawa S.
APPLICATION OF ENCAPSUALTED FREEZE-DRIED PROBIOTICS FOR INTERVENTION STUDY ON INTERNATIONAL SPACE STATION **[#99999 INSERT LINK AND ABSTRACT #]**

In order to evaluate efficacy of Lactobacillus casei in crewmembers staying on International Space Station, Yakult Honsha Co., Ltd and JAXA initiated a joint space research project (OpNom: “Probiotics”).

Tuesday, January 22, 2019

Poster Session A: Immune and Microbiology

4:30 PM **Exhibit Hall A**

Jiang P. Green S. Chlipala G. Turek F. Vitaterna M.
CHANGES IN THE MAMMALIAN GUT MICROBIOME DURING SPACEFLIGHT
Spaceflight alters the gut microbiome in mice, implicating a shifted metabolism both in the microbiota and the host.

Jimenez M. Traverso G. Langer R.
A HIGH THROUGHPUT MICROBE STABILIZATION PIPELINE FOR LONG-TERM IN SITU GASTROINTESTINAL DELIVERY **[#19231]**
We have established a pipeline for assessing microbe stability for use in gastrointestinal resident microbe delivery systems.

Paul A. Mhatre S. Cekanaviciute E. Schreurs A. Tahimic C. Globus R. Crucian B. Bhattacharya S.
REDUCED GRAVITY CONTRIBUTES TO NEUTROPHIL TO LYMPHOCYTE RATIO SHIFTING AND PROMOTION OF THE OXIDATIVE STRESS RESPONSE **[#19232]**
Reduced gravity results in increased granulocyte to lymphocyte ratio (GLR) and neutrophil to lymphocyte ratio (NLR), and production of reactive oxygen species (ROS) that can be utilized to monitor astronaut health on long duration spaceflights.

Chiu C. Granados A. Briggs B. Juran C. Federman S. McIntyre A. Bezdan D. Deng X. Lupisella M. Burton A. Almeida E. Mason C. Achari A.
IN-FLIGHT METAGENOMIC MONITORING OF INFECTIONS AND ASSOCIATED HOST RESPONSES IN ASTRONAUTS **[#19233]**
We are leveraging nanopore sequencing technology to establish routine in-flight metagenomic monitoring of potential infections and host responses to infection in astronauts.

Porada C. Kuhlman B. Almeida-Porada G.
MICROGRAVITY IMPAIRS ANTI-LEUKEMIC ACTIVITY OF HUMAN NK CELLS **[#19234]**
Our results demonstrate that conditions of microgravity markedly impairs their ability of human NK cells to recognize/lyse human leukemic cells

Cromer W. Wang W. Zhang X. Gasheva O. Zawieja D.
EXTENDED DURATION SPACEFLIGHT INDUCED CHANGES IN MURINE GASTROINTESTINAL LYMPH VASCULATURE, IMMUNE STATUS AND METABOLITES **[#19235]**
We examined the status of the murine GI immune system after 1 month long flights and found that there a significant deficits in lymphatic capacity, immune cell number and production of cytokines/metabolites.

David L. Johnson S.
PERSONALIZING PREBIOTIC THERAPIES FOR ASTRONAUTS' GUT MICROBIOTA **[#19236]**
Here, we describe prebiotic personalization assays that could be used for customizing nutritional supplements for astronauts' gut microbiota.

Makedonas G. Mehta S. Krieger S. Chouker A. Basner M. Stahn A. Pierson D. Crucian B.
UPDATE: ANTARCTIC WINTEROVER AS AN ANALOG FOR SPACEFLIGHT IMMUNE DYSREGULATION **[#19237]**
We update the progress for two separate ESA-NASA activities at Concordia Station (interior) and Neumayer-III Station (coastal) that assessed the effect of Antarctica winterover on immunity, stress and latent herpesvirus reactivation.

Mehta S. Crucian B.
Varicella Zoster virus shedding after antiviral drug (Valacyclovir) treatment in Antarctic expeditioners **[#19238]**
Effect of an antiviral drug, valacyclovir on the reactivation and shedding of varicella zoster virus in Antarctic expiditioners.

Tuesday, January 22, 2019

Poster Session A: Informal Help Desk

4:30 PM **Exhibit Hall A**

4:30 PM Technology Transfer

Tuesday, January 22, 2019

Poster Session A: Mixed Topics

4:30 PM **Exhibit Hall A**

Wood A. French A. Chakravarty K. Lopez D. Del Alto M. Stewart H.
NASA AMES INSTITUTIONAL SCIENTIFIC COLLECTION (ISC) **[#19240]**
This poster presents information about space flown biological samples that are currently available from NASA Ames Institutional Scientific Collection.

Cole R. Easter B. Levin D. Lemery J.
MARTIAN MEDICAL ANALOGUE AND RESEARCH SIMULATION (2MARS) AT THE MARS DESERT RESEARCH STATION (MDRS) **[#19241]**
Selected experiences and lessons learned will be presented from previous Martian Medical Analogue and Research Simulation (2MARS) expeditions at the Mars Desert Research Station (MDRS) site in Utah.

Karavolos E.
DEVELOPMENT OF CLOSED LOOP ENVIRONMENTAL LIFE SUPPORT SYSTEM **[#19242]**
New Approach to Closed Loop Environmental Life Support Systems.

Venkateswaran K.
LESSONS LEARNED DURING FLIGHT DEFINITION PHASE OF THE OMICS IN SPACE PROJECT **[#19243]**
During flight definition phase, OIS team coordinated with NASA ISSMP team that provides planning, integration, and implementation services for Human Research Program research tasks. The ISSMP scrutinized OIS objectives to maximize the utilization of the ISS for research.

Thompson W. Parsons Y.
PROCESS FOR THE RECRUITMENT AND MEDICAL CLEARANCE OF TEST SUBJECTS **[#19244]**
The abstract provides and overview and clear guidelines for the recruitment of requested Test Subjects. It also provides Investigators guidance and information in regards to the process for requesting medical qualification of subjects.

Noppe A. von der Wiesche M. Paulke F. Mulder E.
NEW BED REST PARADIGM: STRICT ADHERENCE OF 6°-HEAD DOWN TILT WITH OR WITHOUT INCREASED AMBIENT CO2 – AN IMPROVEMENT TO THE GROUND-BASED MICROGRAVITY ANALOGUE? **[#19245]**
Strict Adherence of 6°-Head Down Tilt during the VaPER-Study at DLR could be an improvement of the common bed rest model for SANS related Research.

Granados A. Briggs B. Deng X. Achari A. Chiu C.
DEVELOPMENT OF SEQUENCING PROTOCOLS FOR MICROBIAL METAGENOMIC DETECTION AND HUMAN TRANSCRIPTOME PROFILING ABOARD THE INTERNATIONAL SPACE STATION **[#19246]**
The development and establishment of an infrastructure for routine Omic sequencing in space.

Donovan F.
A REVIEW AND COMPARISON OF MOUSE AND RAT RESPONSES TO MICRO GRAVITY, HYPER GRAVITY AND SIMULATED MODELS OF PARTIAL GRAVITY; COMPARISON TO HUMAN RESEARCH DATA **[#19247]**
We compared published mouse and rat spaceflight data, examining differences due to species, age, gender, and habitat and compared the responses to the documented human responses.

Ershad F. Sim K. Yu C.
Fully rubbery electronic materials, integrated electronics and sensory skins **[#19248]**
We demonstrate a class of transistors, integrated circuits and sensors fully out of rubbery semiconductors, conductors and dielectrics, which is complementary to the existing class of rigid wafer electronics.

Mishra T. Garrett-Bakelman F. Meydan C. Piening B. Rizzardi L. Charles J. Kundrot C. Scott G. Bailey S. Basner M. Feinberg A. Lee S. Mason C. Mignot E. Rana B. Smith S. Snyder M. Turek F.
The NASA TWINS STUDY: A MULTI-OMIC, MOLECULAR AND PHYSIOLOGICAL ANALYSIS OF A YEAR-LONG HUMAN SPACEFLIGHT **[#19249]**
The NASA Twins Study is an integrated multi-omic and physiological analysis of the changes that occurred during a year-long spaceflight; it serves as a roadmap for future interdisciplinary studies to understand potential health risks of long-duration missions and develop countermeasures.

Goukassian D. Kishore R. Hakobyan A. Vangala M. Garikipati V. Mills P. Zuriega M. Walsh K. Arakelyan A.
EFFECT OF SPACE FLIGHT ON ASTROUNATS PLASMA-DERIVEDEXOSOMAL miRNA EXPRESSION **[#19250]**
Our results suggest that space flights may induce marked miRNA expression changes in the circulating exosomes that may reflect alterations in multiple gene and protein pathways in tissues and cells.

De Leon P. Newton C.
OPERATIONS AT A LUNAR/MARS ANALOG BASE **[#19251]**
Space analog facilities sometimes offer the necessary lab equipment, but current available systems are more suited for deep space travel simulations designed for a microgravity environment, rather than reduced gravity planetary scenarios, and without extravehicular activities (EVAs).

Lee D. Hochberg Y. Lee D.
Attention, resources and startup preferences: evidence from a randomized trial
We explore which resources startups respond most to offers of/ funding, networking, beta customers or feedback.

Marnat M.
PERSPECTIVES, A VIRTUAL REALITY PLATFORM ON-BOARD ISS **[#19253]**
PERSPECTIVES is an adaptive virtual reality platform developed by CNES in the scope of ESA-CNES joined program for PROXIMA.

Tuesday, January 22, 2019

Poster Session A: Muscle, Exercise, EVA and Performance

4:30 PM **Exhibit Hall A**

Rittweger J. Tomilovskaya E. Albracht K. Bottinelli R. Capri M. Cerretelli P. Clarke M. Flück M. Franceschi C. Gelfi C. Koryak Y. Layne C. Narici M. Reed J. Shenkman B. Sies W. Stäudle B. Laughlin M. Kozlovskaya I.
SARCOLAB-3: NEUROMUSCULAR AND MYOTENDINOUS ALTERATIONS IN-FLIGHT IN PLANTAR FLEXOR MUSCLES **[#19254]**
In-flight measurements of muscle size and muscle strength suggest that existing exercise countermeasures are still not fully effective for preventing weakness and wasting of the calf musculature.

Huffman R. Thompson W. Gallo C. Quiocho L.
IMPROVEMENT OF SCALING AND INVERSE KINEMATIC RESULTS WITH ADDITIONAL UPPER BODY JOINTS ADDED TO OPENSIM RAJAGOPAL MODEL **[#19255]**
Team has improved the quality of scaling and inverse kinematics results by adding additional upper body joints to the standard Rajagopal OpenSim biomechanics model.

Wang Z. Siu K. Chien J.
MEASURING FOOT PRESSURE IS CRUCIAL FOR STEPPING OVER MULTIPLE OBSTACLES FOR FUTURE ASTRONAUTS **[#19256]**
Foot pressure is critical for locomotor behavior in different gravity environments

Koschate J. Drescher U. Thieschaefer L. Hoffmann U.
CARDIORESPIRATOY REGULATION IN RESPONSE TO DYNAMIC EXERCISE – COMBINED EFFECTS OF CONFINEMENT, RESTRICTED SLEEP AND PHYSICAL ACTIVITY **[#19257]**
The effects of 45 d of isolation in combination with restrictions for sleep and physical training on muscular oxygen uptake kinetics and cardiovascular regulation during moderate exercise as well as peak exercise capacity were studied.

Maynard C. Newby N. Kalogera K. Humphreys B. Fincke R. Donnan S. Estep P. Hernandez Y. Vu L. Beltran E. Downs M.
MED-2 ISS FLIGHT STUDY **[#19258]**
The results will be presented for the study that assessed the biomechanical form and operational envelope of crew members performing resistance and aerobic rowing exercises using the Miniature Exercise Device-2 (MED-2) on ISS.

Wood S. Shen Y. Anderson A.
MAGNETOMETER-FREE CHARACTERIZATION OF SPACESUIT WEARER JOINT KINEMATICS USING INERTIAL AND STRAIN SENSORS **[#19259]**
In order to prevent injuries during extravehicular activity and ground training, this research develops a wearable sensor system to observe the dynamics of the interaction between spacesuits and their wearers.

Sainz Ubide V. Diaz Artiles A.
ESTIMATION OF INDIVIDUALIZED METABOLIC COST DURING EVA PLANETARY EXPLORATION **[#19260]**
We propose to develop a novel probabilistic estimation metabolic cost model capable of predicting individualized energy expenditure as well as adjusting in real-time based on physiological and metabolic data gathered during the traverse.

Frenkel D. Huffman R. Quiocho L. Lostroscio K.
DYNAMICS OF A VIBRATION ISOLATION SYSTEM INCLUDING INERTIA OF THE HUMAN BODY **[#19261]**
We present a rigorous formulation for driving the simulation of a Vibration Isolation System (VIS) for a countermeasures exercise device by the subject exercise data without requiring an articulated human in the VIS dynamics model.

Mortreux M. Riveros D. Bouxsein M. Rutkove S.
MODERATE DAILY DOSE OF RESVERATROL MITIGATES MUSCLE DECONDITIONING IN RATS EXPOSED TO A MARTIAN GRAVITY ANALOGUE **[#19262]**
Assessment of the therapeutic potential of resveratrol to mitigate muscle impairment in a partial gravity analogue

Diaz Artiles A. Sainz Ubide V. Patel R. Thompson W. Lewandowski B.
BIOMECHANICAL MODELING OF HEAL-RAISE EXERCISE USING THE HULK DEVICE **[#19263]**
We implemented a computational simulation in OpenSim to investigate the biomechanics of heal-raise exercises using the (Hybrid Ultimate Lifting Kit) HULK device to determine whether foot stance (15 degrees Inward, 15 degrees Outward, Straight) has an effect on exercise performance.

Mortreux M. Ko F. Riveros D. Bouxsein M. Rutkove S.
LONGITUDINAL TIME COURSE OF MUSCLE DETERIORATION IN A RAT MODEL OF PARTIAL GRAVITY **[#19264]**
Using quadrupedal unloading, we investigated the time course of muscle deterioration in 3 partial gravity analogues

Perez F. Navarro Tichell P. Diaz Artiles A.
CARDIOPULMONARY AND MUSCULOSKELETAL RESPONSES TO EXERCISE IN HYPO-GRAVITY ENVIRONMENTS **[#19265]**
We conducted a human experiments to study cardiopulmonary and musculoskeletal responses to ergometer exercise under different levels of simulated hypo-gravity using a tilt paradigm.

Lostroscio K. Blocker A. Quiocho L. Carey S.
EXERCISE ON A VIBRATION ISOLATION SYSTEM SIMULATOR **[#19266]**
Exercise was completed on a six degree of freedom platform, with motion corresponding to simplified cases a vibration isolation system would need to implement to protect spacecraft from exercise forcing functions, and motion capture and ground reaction force measurements were collected.

Fincke R. Kalogera K. Crowell J. Downs M. Goetchius E. DeWitt J. Hanson A. Magruder D. Swan B.
ASSESSMENT OF EXPLORATION EXERCISE CONCEPTS AND OPERATIONS METHODOLOGY IN A BAA HABITAT TEST ENVIRONMENT **[#19267]**
Discussion of testing on exercise concepts and operations in the BAA Habitat Test environment.

Burkhart C. Hanson A. Perera J. Claunch C.
MODULAR BLUETOOTH INTEGRATOR FOR EXERCISE SYSTEMS **[#19268]**
This presentation will provide a high-level overview of MoBI (Modular Bluetooth Integrator), its planned applications to ground analogs (e.g. NEEMO 23 & IPAS), and define how an integrated human performance tool can be generated via this asset as part of next generation exercise system design.

Ryder J. Crowell B. Song H. Ewert M.
SWEAT RATES DURING CONTINUOUS AND INTERVAL AEROBIC EXERCISE: IMPLICATIONS FOR NASA MULTIPURPOSE CREW VEHICLE (MPCV) MISSIONS **[#19269]**
Analysis of sweat produced during different exercise protocols.

Tuesday, January 22, 2019

Poster Session A: Sensorimotor

4:30 PM **Exhibit Hall A**

Hupfeld K. Lee J. Gadd N. Kofman I. De Dios Y. Riascos R. Bloomberg J. Mulavara A. Seidler R.
THE IMPACT OF ONE YEAR IN SPACE ON BRAIN STRUCTURE **[#19270]**
One year (n= 2) versus six months (n= 6) of spaceflight results in larger and more variable structural brain changes, including larger magnitude gray matter volume and cortical thickness changes in sensorimotor and vestibular regions.

FELIPE L. Cavazos R.
VIRTUAL REALITY: A TOOL FOR BALANCE TRAINING AFTER SPACEFLIGHTS **[#19271]**
The application of virtual reality as a prospective balance stimulation approach after spaceflight trips.

CAVAZOS-GUAJARDO R. FELIPE L.
NEUROPHYSIOLOGY OF THE VESTIBULAR SYSTEM IN SPACE **[#19272]**
The impact of zero gravity in regards the changes of the vestibular system.

Kabbaligere R. Lee B. Layne C.
ADAPTATION IN GAIT AND DYNAMIC BALANCE CONTROL TO UNLOADED WALKING **[#19273]**
30 minutes of vertical unloaded walking produces changes in dynamic balance and gait performance in healthy young adults

Bretl K. Clark T.
EXTENDED HUMAN ACCLIMATION TO THE "CORIOLIS" CROSS-COUPLED ILLUSION FOR ARTIFICIAL GRAVITY **[#19274]**
Humans continue to acclimate to the cross-coupled illusion over numerous testing sessions (up to 50), suggesting that even individuals who acclimate slowly could be "trained" to tolerate an operationally desired spin rate.

Chien J. Wang Z. Siu K.
WALKING ON INCLINED SURFACE ENHANCES OBSTACLE NEGOTIATION CAPABILITY FOR ASTRONAUTS **[#19275]**
To train walking on the inclined surface will be the benefit of enhancing the capability for obstacle negotiation due to the transfer leading effect

Suri K. Clark T.
COMPARISON OF VESTIBULAR PERCEPTUAL THRESHOLDS IN ROLL TILT AND PITCH TILT **[#19276]**
Vestibular thresholds in roll tilt and pitch tilt were tested to quantify pitch tilt thresholds and identify any differences between pitch and roll tilt.

Boyle R. Popova Y. Varelas J.
NEUROVESTIBULAR RESPONSES TO ALTERED GRAVITY IN VERTEBRATES **[#19277]**
Despite the permanence of gravity in evolution the animal senses exposure to a novel, non-1G, environment and adaptive functional neural changes are initiated in the short term and structural modifications may occur.

Dixon J. Brazell V. Clark T.
VALIDATION OF A NEW GROUND-BASED ANALOG FOR POST-SPACEFLIGHT ASTRONAUT NEUROVESTIBULAR IMPAIRMENT: THE WHEELCHAIR HEAD IMMOBILIZATION PARADIGM **[#19278]**
This work presents preliminary results from the validation of a new ground-based analog for post-spaceflight astronaut sensorimotor impairment that can be leveraged to develop new countermeasures necessary for future crewed planetary exploration.

Clement G. Caldwell E. Gadd N. Rosenberg M. Reschke M.
CHANGES IN THE SUBJECTIVE STRAIGHT AHEAD IN ASTRONAUTS AFTER SPACEFLIGHT **[#19279]**
This joint ESA/NASA pre- and postflight study investigated the influence of exposure to microgravity on the subjective straight ahead in crewmembers returning from long-duration expeditions to the International Space Station.

Reschke M. Peters B. Rosenberg M. Tomilovskaya E. Kofman I. Rukavishnikov I. Kitov V. Osetsky N. Bloomberg J. Mulavara A. Clement G. Taylor L. Wood S. Fisher E. Gadd N. Kozlovskaya I.
POSSIBILITIES FOR TREATING SENSORIMOTOR DISTURBANCES IN ASTRONAUTS AND COSMONAUTS AFTER LONG-DURATION SPACE FLIGHTS **[#19280]**
New and specific preflight, as well as potential inflight countermeasures must be designed and tested to enable crewmembers to function autonomously immediately after they land.

Peters B. Caldwell E. Mulavara A. Rosenberg M. Clement G. Bloomberg J. Reschke M.
ORION CREW PERFORMANCE AND SAFETY DURING EMERGENCY EGRESS IMMEDIATELY AFTER POSTFLIGHT WATER LANDINGS: AN OMNIBUS PROPOSAL **[#19281]**
Using the 6-dof to simulate wave motion, we will test functional performance when subjects are exposed to wave motion and test the efficacy of a visual countermeasure for improving their performance.

Willey J. Kwok A. Moore J. Delp M. Zawieja D. Mao X. Livingston E. Rosas S.
GAIT PATTERN CHANGES AFTER 33 DAYS ABOARD ISS REFLECT NEUROMOTOR DEFICITS PRIMARILY IN THE HIND LIMBS OF MICE **[#19282]**
Rodent gait changes after 33 days in orbit on ISS primarily reflect neuromotor deficits and occur to a greater extent in the hind limb

Tuesday, January 22, 2019

Poster Session A: Spaceflight Associated Neuro-ocular Syndrome (SANS)

4:30 PM **Exhibit Hall A**

ARBEILLE P.
PRELIMINARY RESULTS FOR JUGULAR VEIN VOLUME AND MIDDLE CEREBRAL VEIN VELOCITY INCREASE DURING 6 MONTH ISS SPACEFLIGHT. **[#19283]**
At rest the Jugular vein was enlarged inflight due to a signifcant amount of blood at the cephalic level. The MCV increased, probably by compression of the vein (lumen reduction) as neither cerebral nor carotid flows changed. LBNP reduced Jug vein volume and MCV velocity to preflight level.

Wang L. Wei X. Li D. Shi J. Feng X. Maslov K.
LABEL-FREE PHOTOACOUSTIC LYMPHATIC FLOWGRAPHY **[#19284]**
A label-free photoacoustic lymphatic flowgraphy (PALF) system is developed by leveraging ultrasonic tagging followed by photoacoustic detection, capable of imaging water content in deep tissue without using exogenous contrast.

Bershad E. Venkatasubba Rao C. Marshall-Goebel K. Damani R. Cohen H. Clark J. Sangi-Haghpeykar H. Strangman G. Kramer L. Hasan K. Stern C. Rittweger J.
SPACE-CENT: STUDYING THE PHYSIOLOGICAL AND ANATOMICAL EFFECTS OF CENTRIFUGATION AND HEAD DOWN TILT **[#19285]**
This study will assess the cerebral and ocular effects of 60 days of bedrest combined with an artificial gravity countermeasure.

Ethier C. Feola A. Nelson E. Meyers J. Samuels B.
CHOROIDAL THICKENING IMPARTS SIGNIFICANT MECHANICAL INSULT TO ONH TISSUES **[#19286]**
Chroidal swelling, as is seen in astronauts, has a surprisingly large mechanical effect on optic nerve head tissues and depends sensitively on choroidal anatomy.

Zanello S. Theriot C. Loughlin T. Chevez-Barrios P. Rivera A.
A GENE EXPRESSION AND HISTOLOGIC APPROACH TO STUDY PRODUCTION AND OUTFLOW OF CEREBROSPINAL FLUID IN HINDLIMB SUSPENDED RATS **[#19287]**
An examination of the ultrastructure and gene expression regulation in the choroid plexus and arachnoid villi in rats

Mujat M. Zhao Y. Lu Y. Iftimia N. Ferguson R.
OCULAR BLOOD FLOW IMAGING AND QUANTIFICATION **[#19288]**
Optical Coherence Tomography and Laser Doppler Flowmetry are used to provide structural (thickness maps and volume) and hemodynamic (net blood flow) characterization of retina and choroid to monitor functional and structural changes of the eye encountered in space exploration missions.

Main B. Buscemi P.
DEVELOPMENT OF A SELF-IMAGING, COMPACT, WIDE ANGLE, HIGH RESOLUTION RETINAL IMAGING SYSTEM FOR HUMAN SPACEFLIGHT APPLICATIONS **[#19289]**
This completed project developed a compact, self-imaging, auto-focusing, auto-image capture, non-mydriatic, 45+ degree wide-angle, high resolution retinal imaging device; the first of its kind available today. This device will save significant astronaut time.

Smith S. Zwart S. Chang A. Gregory J. Chen J. Bhatti T. Zeisel S. Gibson C. Mader T.
ASTRONAUT OPHTHALMIC ISSUES AND ONE-CARBON METABOLISM: EXPANDED POLYMORPHISM EVALUATION AND EVALUATION IN A POTENTIAL ANALOG POPULATION **[#19290]**
This paper will review recent progress in the one carbon genetics/biochemistry research as related to SANS.

Williams M. Bershad E. Levine B. Clark J. Malm J. Eklund A. Zanello S. Hu X. Laurie S. Stenger M. Scott J.
ZERO G AND ICP: INVASIVE AND NONINVASIVE ICP MONITORING AND SANS BIOMARKER IDENTIFICATION **[#19291]**
We present the protocol for pre-/ post-flight lumbar puncture for direct ICP monitoring, noninvasive ICP, and biomarker analysis for astronauts on the ISS

Gasheva O. Zawieja S. Castorena-Gonzalez J. Wang W. Narayanan A. Zhang X. Cromer W. Bagher P. Delp M. Gashev A. Zawieja D.
SPACEFLIGHT ALTERS CERVICAL LYMPHATIC FUNCTION IN MICE **[#19292]**
Data indicate that there are an alterations of cervical lymphatic function in response to spaceflight.

Buckey J. Phillips S. Anderson A. Chepko A. Archambault-Leger V. Fellows A.
PRE-FLIGHT BODY WEIGHT PREDICTS OCULAR CHANGES IN SPACE **[#19293]**
An analysis of data from long-duration astronauts shows that body weight is a strong predictor of who will develop visual changes.

Petersen L. Hargens A. Levine B.
MOBILE NEGATIVE PRESSURE SUIT AS AN INTEGRATED COUNTERMEAURE **[#19294]**
Mobile, flexible, intravehicular LBNP-suit to simulate effects of gravity and provide integrative countermeasure

Covington K. Anderson A. Rieke C. Fellows A. Buckey J.
ANALYSIS OF DISTORTION PRODUCT OTOACOUSTIC EMISSIONS WITH CHANGES IN POSTURE AND FLUID SHIFT **[#19295]**
This abstract summarizes research performed on DPOAE map amplitude and phase data.

Main B. Buscemi P.
CREATE THE TECHNICAL REQUIREMENTS, STRATEGIC ROADMAP, AND FINANCIAL REQUIREMENTS TO DEVELOP A MULTIFUNCTIONAL OPHTHALMIC VISION TESTING DEVICE FOR DEEP SPACE MISSIONS **[#19296]**
Develop a Multifunctional Ophthalmic Device that can conduct multiple vision tests in a single device (i.e. retinimaging, OCT, visual fields, functional vision, etc.) - Phase 1

Main B. Buscemi P.
DEVELOPMENT OF A GOGGLE-BASED VISUAL FIELDS DEVICE PROTOTYPE **[#19297]**
During this project (Phase 1), we will develop a prototype of a novel, visual fields device that will be goggle shaped/sized for the purposes of conducting visual fields testing of astronauts in-flight. This device could also be designed to conduct other visual testing functions.

Rasmussen J. Gutierrez C. Karni R. Naqvi S. Aldrich M. Zhu B. Morrow J. Sevick-Muraca E.
THE USE OF HEAD AND NECK ADVANCED PNEUMATIC COMPRESSION AS A COUNTERMEASURE TO SANS **[#19298]**
We use near-infrared fluorescence lymphatic imaging to assess gravity-driven lymphatic drainage in patients with head and neck lymphedema and to show that longitudinal advanced pneumatic compression treatment can aid in lymphatic drainage from the head and neck region.

Marshall-Goebel K. Strangman G. Venkatasubba Rao C. Clark J. Frett T. Petrat G. Arz M. Bershad E.
PHYSIOLOGICAL MONITORING OF FLUID SHIFTS DURING CENTRIFUGATION **[#19299]**
Various physiological monitoring technologies were tested during exposure to short-arm human centrifugation to monitor body fluid distribution and shifting

Martin B. Rohr J. Sass A. Sater S. Oshinski J. Ethier C. Lee C.
NON-INVASIVE QUANTIFICATION OF OPTIC NERVE AND SHEATH GEOMETRIC CHANGES AND MECHANICAL PROPERTIES BY HEAD-DOWN TILT MAGNETIC RESONANCE IMAGING **[#19300]**
A non-invasive MRI-based method for quantification of optic nerve and nerve sheath structural changes and mechanical properties under head-down tilt was developed and applied in ten healthy control subjects.

Fuller C. Hoban-Higgins T. Gompf H. Robinson E.
HEAD-DOWN TILT AS A MODEL FOR INTRACRANIAL AND INTRAOCULAR PRESSURES, AND RETINAL CHANGES DURING SPACEFLIGHT **[#19301]**
This translational ground-based program was developed to begin to address the etiology of visual system structural and functional changes observed in astronauts during both inflight and postflight periods.

Sevick-Muraca E. Kwon S. Rasmussen J. Pinal A. Morrow J. Karni R.
QUANTIFICATION OF LYMPHATIC PUMP STRENGTH AND ASSESSMENT OF CSF DRAINAGE INTO THE LYMPHATICS DURING HDT **[#19302]**
We show that increased peripheral lymphangion pumping and impaired lymph outflow into the cervical LNs may contribute to cephalad fluid shifts under microgravity as simulated by HDT.

Patterson C. Amelard R. Robertson A. Hughson R.
USE OF CODED HEMODYNAMIC IMAGING TO TRACK DYNAMIC CHANGES IN JUGULAR VENOUS PRESSURE **[#19303]**
We will demonstrate the utility of CHI to quantitatively track dynamic fluctuations of CVP and IJV volume that could help identify abnormal responses that might be reflective of elevated ICP and risk for SANS during microgravity.

Zhu B. Sevick-Muraca E.
IMAGING LYMPHATIC FUNCTION: INSTRUMENTATION VALIDATION FOR UNDERWATER MICROGRAVITY SIMULATION STUDIES **[#19304]**
This work developed a near-infrared imaging device for visualizing the lymphatics in head out immersion studies to mimic simulated cephalad shifts that occur under microgravity.

Kemp D. Ebert D. Melgoza R. Caldwell T. Danielson R. Stenger M. Hargens A. Dulchavsky S.
OTOACOUSTIC EMISSION PHASE CHANGE AS AN INDICATOR OF INTRACRANIAL PRESSURE CHANGE: BASIS AND OPTIMIZATION FOR FLUID SHIFT STUDIES **[#19305]**
We examined available data on changes in otoacoustic emission phase, ear canal acoustics, and middle ear pressure during posture changes.

Kernagis D.
CERVICAL LYMPHATIC FUNCTION QUANTIFICATION AND ASSOCIATED MOLECULAR CHANGES IN RESPONSE TO SIMULATED MICROGRAVITY **[#19306]**
The focus of this study is to assess the impact of simulated microgravity on peripheral and deep cervical lymphatic function as measured by lymphatic flowgraphy imaging technology developed in the laboratory of Dr. Lihong Wang.

Zanello S. Bershad E. Hu X. Kitchen R. Yu S. Skog J.
THE USE OF BIOFLUIDS FOR BIOMARKER DISCOVERY IN SANS: RNASEQ EXPRESSION ANALYSIS ON PILOT GROUND BIOFLUID SAMPLES **[#19307]**
Proof-of-concept for transcriptomic profiling in various human biofluids to be used in a flight study for the characterization of SANS.

Macias B. Otto C. Ploutz-Snyder R. Sargsyan A. Alexander D. Kramer L. Riascos R. Samuels B. Gibson B. Patel N. Lee S. Laurie S. Stenger M.
PROSPECTIVE OBSERVATIONAL STUDY OF OCULAR HEALTH IN ISS ASTRONAUTS – THE OCULAR HEALTH STUDY **[#19308]**
The purpose of this study is to characterize and quantify the ocular, neurological, and cardiovascular variables associated with the development of SANS before, during, and after long-duration ISS missions.

Stenger M. Hargens A. Dulchavsky S. Arbeille P. Danielson R. Ebert D. Garcia K. Johnston S. Laurie S. Lee S. Liu J. Macias B. Martin D. Minkoff L. Ploutz-Snyder R. Ribeiro C. Sargsyan A. Smith S.
FLUID SHIFTS **[#19309]**
The purpose of this study is to characterize the fluid distribution and compartmentalization associated with long-duration spaceflight and to determine if a relation exists between these fluid distribution measures and the ocular structural and functional changes characteristic of SANS

Parsons-Wingerter P. Murray M. Predovic M. Vizzeri G. Taibbi G. Mason S. Young M. Zanello S.
DIFFERENCES IN PRE AND POST VASCULAR PATTERNING WITHIN RETINAS OF ISS CREW MEMBERS AND HEAD-DOWN TILT SUBJECTS BY VESGEN ANALYSIS **[#19310]**
We evaluated the role of retinal blood vessels in the Spaceflight-Associated Neuro-ocular Syndrome (SANS) etiology with NASA's VESsel GENeration Analysis

AGENDA AT A GLANCE DAY 2

WEDNESDAY, JANUARY 23, 2019

	Plenary (Exhibit Hall B)	Poster (Exhibit Hall A)	Galleon I	Galleon II & III	Innovation Pavilion (Ballroom A)	Grand Ballroom B	Grand Ballroom C
8:00 AM	Plenary Sessions						
10:15 AM	Break						
10:30 AM			Exploration Medical Sys Des	Autonomy-Human Capabilities Assess		SANS Research & Medical Updates	SR: CMs in Space
12:00 PM	Obtain Lunch						
12:45 PM	Lunch Talk						
1:45 PM			Communications	Autonomy & Decision Making		Imaging & Brain-SANS to Cognition	Biomarkers & Precision Med
3:15 PM	Break						
3:30 PM			ExMC Closed Session	Hab Assess for Future Vehicles		VaPER Study Results	SR: Biomarkers & Proteomics
5:00 PM	Cash Bar in Foyer						
5:15 PM					Expert Speed Matching		
6:45 PM	Banquet						
9:00 PM	Adjourn						

FEATURED PLENARY SPEAKERS



Harry O. Larson

Subject Participant, Gallaudet 11 Study

Gallaudet University Alumni, 1961



David O. Myers

Subject Participant, Gallaudet 11 Study

Gallaudet University Alumni, 1961



Elizabeth Hillman

President

Mills College



Babak Kateb

Chairman/CEO, Society for Brain Mapping and Therapeutics (SBMT)

President, Brain Mapping Foundation



Aenor Sawyer

Chief Health Innovation Officer

Translational Research Institute for Space Health



Kevin Fong

Consultant Anaesthetist

University College London Hospitals

Wednesday, January 23, 2019

Exploration Medical System Design

10:30 AM **Galleon I**

Chair: **Kerry McGuire**

10:30 AM Rubin D. Lumpkins S. Cerro J. Reilly J. Thompson W. Amador J. Mindock J. Urbina M.
EXMC CREW HEALTH AND PERFORMANCE SYSTEM CONCEPT OF OPERATIONS FOR EXPLORATION SYSTEMS **[#19077]**
This talk will discuss the Crew Health and Performance System architecture and its evolution from previous ExMC concept of operations documents, including the Medical System Concept of Operations and Human System Integration Concept of Operations.

10:45 AM Hanson A. Mindock J. Okon S. Hailey M. McGuire K. Urbina M. Burba T. Cerro J. Thompson W.
ExMC Model Informing Research Prioritization and Exploration System Development **[#19078]**
This presentation will describe how the use of model based systems engineering practices are being used to help prioritize research needs and design medical systems for exploration missions.

11:00 AM Thompson W. Jannette A. Mindock J. Urbina M. McGuire K. Hailey M. Boley L. Burba T. Lee E. Deacon S. Mosher T. Okon S. Hanson A.
ExMC TRADE STUDY TOOL SUITE OVERVIEW **[#19079]**
The Trade Study Tool Suite is the result of a multi-center collaborative effort to develop automated computational tools that characterize and help cross-examine the exploration medical system architecture's trade space, informing mission development and research prioritization .

11:15 AM Lee E. Mosher T. Latorella K. Ashraf A. De Jesus R.
MEDICAL ITEM DATABASE (MEDID) OVERVIEW **[#19080]**
The Medical Item Database (MedID) has been developed (and continues to be developed) to amass information on medical devices, supplies and pharmaceuticals. MedID is a web-based tool that consists of medical resource items with their associated metadata

11:30 AM Hailey M. Bardina J. McGuire K. Urbina M. Hanson A. Cerro J. Mindock J.
EXMC STATUS OF GATEWAY MEDICAL SYSTEM RECOMMENDATIONS **[#19081]**
This presentation will focus on work performed in FY18 by aerospace medicine clinicians and systems engineers to define notional clinical content for the Gateway Medical subsystem of the Crew Health & Performance system and create draft medical requirements.

11:45 AM Discussion

12:00 PM Break

Wednesday, January 23, 2019

Human Capabilities Assessments for Autonomous Missions

10:30 AM **Galleon II & III**

Chairs: **Brent Beutter and Vince Cross**

10:30 AM Whitmire A. Williams T. Cross E. Holden T. Robinson S.
HUMAN CAPABILITIES ASSESSMENTS FOR AUTONOMOUS MISSIONS **[#19116]**
Seven teams from academic institutions and NASA centers will plan and implement collaborative, focused research towards the development of standards, guidelines and automation tools for an advanced, autonomous decision-support system for use by astronauts in future exploration missions.

10:48 AM Vera A. Holden T. Dempsey D. Russi-Vigoya N. Beutter B. Wu S.
CHARACTERIZING FLIGHT CONTROLLER PROBLEM-SOLVING TOWARD INCREASINGLY AUTONOMOUS CREW OPERATIONS **[#19117]**
A series of flight control observations and interviews were conducted over a seven month period in order to identify standards and guidelines for on-board systems to support increasingly earth-independent operations.

11:06 AM Holden K. Russi-Vigoya N. Adelstein B. Cross E.
HUMAN PERFORMANCE STANDARDS AND GUIDELINES **[#19118]**
Results from an autonomous mission-related standards and guidelines data mining effort are presented.

11:24 AM Vera A. Wu S. Holden T.
OUTCOMES: AUTONOMOUS CREW OPERATIONS TECHNICAL INTERCHANGE MEETING **[#19119]**
Preliminary onboard capability requirements and proposed research questions for supporting crew autonomy in deep space exploration

11:42 AM Robinson S. Liu A. Oman C.
LONG-DURATION SPACEFLIGHT CREW TRAINING – SUMMARY OF JUST-IN-TIME TRAINING RESEARCH AT UC DAVIS AND MIT **[#19120]**
This presentation will summarize the results of a long-running collaborative UC Davis/MIT research effort in Just-in-Time Training for long-duration astronauts, and will lay out a research strategy for developing predictive human-performance models for individual astronauts.

12:00 PM Break

Wednesday, January 23, 2019

SANS Research and Medical Updates

10:30 AM **Grand Ballroom B**

Chairs: **Michael Stenger and William Tarver**

10:30 AM Brunstetter T. Tarver W. Gibson C. Mason S. Van Baalen M.
SPACEFLIGHT ASSOCIATED NEURO-OCULAR SYNDROME (SANS): CLINICAL UPDATE **[#19441]**
NASA Space Medicine will provide an annual clinical update on the latest Spaceflight Associated Neuro-ocular Syndrome (SANS; formerly "VIIP") analyses, diagnostic technologies and protocols, and program initiatives.

10:48 AM Scott J. Martin D. Crowell B. Gonzales R. Ritter M. Stenger M. Ploutz-Snyder L. Tucker W. Haykowsky M.
INFLUENCE OF EXERCISE MODALITY ON CEREBRAL-OCULAR HEMODYNAMICS AND PRESSURES **[#19442]**
Modestly raising intraocular pressure with swimming goggles during exercise is a potential SANS countermeasure.

11:06 AM Lee S. Martin D. Miller C. Scott J. Laurie S. Macias B. Ploutz-Snyder L. Stenger M.
WHAT LEVEL OF GRAVITY IS REQUIRED TO PREVENT SPACEFLIGHT-ASSOCIATED NEURO-OCULAR SYNDROME (SANS)? **[#19443]**
The primary objective of this study was to characterize cardiovascular and ocular changes across a range of gravity levels to determine if levels less than 1-G mitigate SANS-related parameters associated with headward fluid shifts.

11:24 AM Ebert D. Sargsyan A. Macias B. Garcia K. Kemp D. Young M. Hargens A. Johnston S. Stenger M.
IMPEDANCE THRESHOLD DEVICE AS A SPACEFLIGHT-ASSOCIATED NEURO-OCULAR SYNDROME COUNTERMEASURE **[#19444]**
This investigation evaluated an impedance threshold device (ITD) as a SANS countermeasure.

11:42 AM Zanello S. Theriot C. Vizzeri G. Parsons-Wingerter P. Chevez-Barrios P.
THE EYE AND HINDLIMB SUSPENSION IN THE RAT: INITIAL RESULTS **[#19445]**
A summary and interpretation of the histologic and transcriptomic analysis of the retina in rats subjected hindlimb suspension.

12:00 PM Break

Wednesday, January 23, 2019

Space Radiation: Countermeasures in Space

10:30 AM **Grand Ballroom C**

Chairs: **Janice Huff and Jerry Shay**

10:30 AM Hellweg C. Koch K. Spitta L. Chishti A. Hu Y. Lau P. Henschenmacher B. Diegeler S. Konda B. Feles S. Schmitz C. Berger T. Baumstark-Khan C.
FROM HEAD TO TOE: THE CELLULAR RESPONSE TO HEAVY ION EXPOSURE **[#19462]**
The strong activation of pro-inflammatory signaling in human cells after heavy ion exposure might be a suitable target for countermeasure development.

10:50 AM Huff J. Simonsen L.
NASA SPACE RADIATION HEALTH RISKS AND MITIGATION STRATEGIES **[#19463]**
NASA utilizes integrated design tools and risk models to optimize mission parameters to minimize radiation exposure and increase safe days in space. NASA is also considering medical countermeasures and lifestyle choices (e.g., diet, exercise) to further reduce health and performance risks.

11:10 AM Shay J. Luitel K.
NASA OFFICIAL GCR SIMULATION: COMPARING ACUTE TO CHRONIC EXPOSURE **[#19464]**
Comparing acute to chronic GCR simulations may determine if countermeasures will be required for long-term space missions

11:30 AM Werneth C. Slaba T. Blattnig S. Huff J. Norman R.
A METHODOLOGY FOR INVESTIGATING THE IMPACT OF BIOLOGICAL COUNTERMEASURES ON THE RISK OF EXPOSURE INDUCED DEATH **[#19465]**
A general methodology for incorporating BCM into the NASA Space Radiation Cancer Risk model of the REID will be described and includes modifications of the background mortality rates (hazard rates) and the radiation risk coefficients.

11:50 AM Discussion

12:00 PM Break

Wednesday, January 23, 2019

Autonomy and Decision Making in Future Spaceflight Missions

1:45 PM **Galleon II & III**

Chairs: **Donna Dempsey and Gordon Vos**

1:45 PM Holden K. Schreckenghost D. Greene M. Cross E. Stephenson J. Lancaster J. Morin L.
ELECTRONIC PROCEDURES FOR CREWED MISSIONS BEYOND LOW EARTH ORBIT (LEO) **[#19001]**
Results from two studies related to levels of automation and integration in electronic procedures are presented.

2:03 PM DeChurch L. Niler A. Mesmer-Magnus J. Contractor N.
TASK MANAGEMENT IN SPACE MULTITEAM SYSTEMS **[#19002]**
We examined how task, social, and contextual attributes of the working environment impacted task management for individuals operating in a long-distance multi-team space exploration simulation.

2:21 PM Flynn-Evans E. Kirkley C. Shin O. Bathurst N. Gregory K.
EVALUATION OF BIOMATHEMATICAL MODELS DESIGNED TO PREDICT PERFORMANCE IN AN OPERATIONAL ENVIRONMENT **[#19003]**
We evaluated how well biomathematical models predict performance in the Human Exploration Research Analog.

2:39 PM Gokhman I. Plummer G. DeChurch L. Bell S. Vazquez M. Contractor N.
CREW INFORMATION SHARING AND DECISION MAKING OVER TIME **[#19004]**
This study examines information sharing and decision making in HERA C4 crews to understand how the processes and quality of crew decision making in isolation evolve over time.

2:57 PM Billman D. Catrambone R. Sliwinska K. Eurich S. Leventhal J. Feldman J. Schreckenghost D.
TRAINING FOR GENERALIZABLE SKILLS AND KNOWLEDGE: INTEGRATING PRINCIPLES AND PROCEDURES **[#19005]**
Generalization (transfer) in operating and explaining simulated habitat systems to tasks with novel goals, conditions, or tasks was assessed following different training methods, including exploratory assessment after varied retention intervals.

3:15 PM Break

Wednesday, January 23, 2019

Biomarkers and Precision Medicine for Risk Assessment

1:45 PM **Grand Ballroom C**

Chairs: **Janice Huff and Ajit Mulavara**

1:45 PM Sabatier L. Ferlazzo M. Foray N.
SPACE RADIATION AND INDIVIDUAL RADIOSENSITIVITY **[#19007]**
Radiation exposure is a major limiting factor for long duration manned space flights.

2:05 PM Costes S.
PREDICTING CANCER RISK FROM IONIZING RADIATION **[#19008]**
We have hypothesized that DNA repair capacity can be used as a marker to evaluate and differentiate individual radiation sensitivity.

2:25 PM Goel N. Dennis L. Ecker A.
BIOMARKERS AS PREDICTORS OF RESILIENCY AND SUSCEPTIBILITY TO STRESS IN SPACE FLIGHT **[#19009]**
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.

2:45 PM Lockley S. St. Hilaire M. Rahman S. Kristal B. Sullivan J. Quackenbush J. Duffy J. Barger L. Czeisler C.
DEVELOPMENT AND TESTING OF BIOMARKERS TO DETERMINE INDIVIDUAL ASTRONAUTS' VULNERABILITIES TO BEHAVIORAL HEALTH DISRUPTIONS **[#19010]**
The goal of this study is to develop a candidate biomarker panel that can predict neurocognitive and psychological responses to sleep deprivation and circadian misalignment.

3:05 PM Chan E. Yu R. Bearg S. Han C. Bae C. Eames D. Nelson E.
RHEALTH LIGHT SCATTERING PERFORMANCE AND SKYE SENSOR CORE TEMPERATURE CAPABILITIES FOR UNIVERSAL BIOMEDICAL DIAGNOSIS **[#19011]**
We present our rHEALTH technologies light scattering and SKYE sensor core temperature monitoring capabilities.

3:15 PM Break

Wednesday, January 23, 2019

Communications

1:45 PM **Galleon I**

Chair: **Laurie Abadie**

1:45 PM Abadie L.
ALAN ALDA SCIENCE COMMUNICATIONS WORKSHOP **[#19044]**
This 90-minute workshop, conducted by an Alda Center instructor will guide participants through exercises to help them better communicate their science effectively, and become more aware of connecting and engaging with various audiences.

3:15 PM Break

Wednesday, January 23, 2019

Imaging and the Brain - From SANS to Cognition

1:45 PM **Grand Ballroom B**

Chairs: **Peter Norsk and Thomas Williams**

1:45 PM Kramer L. Hasan K. Stenger M. Sargsyan A. Riascos R. Ploutz-Synder R. Macias B.
MICROGRAVITY-INDUCED CHANGES IN PITUITARY MORPHOLOGY, BRAIN VOLUMETRY, AND CEREBRAL SPINAL FLUID HYDRODYNAMICS: RELATIONSHIP TO SPACEFLIGHT ASSOCIATED NEURO-OCULAR SYNDROME **[#19122]**
Long duration microgravity exposure deforms the pituitary gland similar to that found with idiopathic intracranial hypertension supporting the hypothesis that microgravity increases intracranial pressure.

2:03 PM Martin B. Rohr J. Sass A. Sater S. Macias B. Stenger M.
MAGNETIC RESONANCE IMAGING QUANTIFICATION OF OPTHALMIC CHANGES DUE TO SPACE FLIGHT **[#19123]**
Methods were developed and applied to quantify optic nerve tortuosity, 3D optic nerve and nerve sheath geometry, and posterior optic globe deformation in long duration mission astronaut magnetic resonance imaging (MRI) data sets.

2:21 PM Roberts D.
PROLONGED MICROGRAVITY AFFECTS HUMAN BRAIN STRUCTURE AND FUNCTION **[#19124]**
Prolonged exposure to microgravity is associated with brain structure and cognitive performance changes.

2:39 PM Seidler R. Mulavara A. Koppelmans V. Lee J. Hupfeld K. Banker L. Kofman I. DeDios Y. Gadd N. Riascos R. Bloomberg J.
SPACEFLIGHT EFFECTS ON NEUROCOGNITIVE PERFORMANCE: EXTENT, LONGEVITY AND NEURAL BASES **[#19125]**
Human brain structure and function change with spaceflight; these changes vary with the number of previous missions flown, mission duration, and spaceflight-induced sensorimotor changes.

2:57 PM Gur R. Ruparel K. DeStefano L. Blake J. Dinges D. Stahn A. Nasrini J. Ecker A. Roalf D. Basner M.
TASK DEPENDENT RECRUITMENT OF BRAIN NETWORKS IN HIGH PERFORMING INDIVIDUALS DURING THE COGNITION TEST BATTERY **[#19126]**
We will be reporting activation patterns for all Cognition tasks that will help ground these behavioral measures in functional brain systems.

3:15 PM Break



Wednesday, January 23, 2019

ExMC Closed Session

3:30 PM **Galleon I**

3:30 PM	Discussion
5:00 PM	Break

Wednesday, January 23, 2019

Habitability Assessment for Future Spaceflight Vehicles

3:30 PM **Galleon II & III**

Chairs: **Alexandra Whitmire and Claudia Acemyan**

3:30 PM Greene M. Thaxton S. Adolf J.
ISS HABITABILITY DATA COLLECTION AND FINDINGS **[#19097]**
This presentation provides an overview of the 'ISS Habitability' study.

3:48 PM Vos G. Fink P. Ngo P. Morency R. Simon C. Williams R. Perez L.
A TOOL FOR THE AUTOMATED COLLECTION OF SPACE UTILIZATION DATA **[#19098]**
This presentation is focused upon delivery of the final results of an HRP funded project to develop a tool to collected space utilization data in an automated fashion.

4:06 PM Duda K. Steiner T. Endsley T. Meyen F. West J. Chamitoff G.
WEARABLE KINEMATIC SYSTEMS FOR QUANTIFYING 3-D SPACE UTILIZATION IN THE MICROGRAVITY ENVIRONMENT **[#19099]**
Research and development of a vision+inertial navigation system for astronaut usage on-board the International Space Station.

4:24 PM Chen M. Arellano J. Hsiang S. Lim C. Ramirez C. Morency R. Goodenow D. Myers J.
SPACECRAFT OPTIMIZATION LAYOUT AND VOLUME (SOLV): DEVELOPMENT OF A MODEL TO ESTIMATE VOLUME **[#19100]**
This presentation describes the efforts to develop a constraint-driven, optimization-based computational model that can be used in early design phases to estimate spacecraft/habitat volume based on mission attributes and critical task volumes.

4:42 PM Anderson A. Banerjee N. Boppana A. Baughman A. Lin S. Witte Z. Wall R. Klaus D.
SPACECRAFT HABITAT DESIGN EVALUATION USING ALTERNATIVE REALITY TECHNOLOGIES **[#19101]**
This study evaluates the spectrum of virtual reality (VR), hybrid reality (HR), augmented reality (AR), and traditional physical reality (PR) mockups in spacecraft habitat design evaluations.

5:00 PM Break

Wednesday, January 23, 2019

Space Radiation: Biomarkers and Proteomics

3:30 PM **Grand Ballroom C**

Chairs: **Dawn Bowles and Polly Chang**

3:30 PM Chang P. Shaler T. Bakke J. Grover A. Chen S. Lin H.
INVESTIGATION INTO THE EFFECT OF PARTICLE RADIATION ON THE UBIQUITIN PROTEASONE SYSTME IN NEURONAL STEM CELLS AND BRAIN TISSUES. **[#19449]**
Particle radiation alters the regulation of site-specific protein degradation and phosphorylation in the central nervous system.

3:50 PM Azzam E. Hayati S. Rabin B. de Toledo S. Shibata M. Acioglu C. Elkabes S. Baisre A.
LATE BIOCHEMICAL AND HISTOLOGICAL CHANGES IN THE BRAIN OF RATS EXPOSED TO LOW FLUENCES OF HZE PARTICLES **[#19450]**
The goal of the study is to enhance our understanding of the mechanisms underlying cognitive and behavioral changes, which may alleviate the uncertainty in predicting neurodegenerative risks to astronauts during and subsequent to prolonged space

4:10 PM Dynan W. Li Z. Jella K. Jaafar L. Moreno C.
EXOSOMES AND SECRETORY FACTORS AS MEDIATORS OF NON-TARGETED EFFECTS OF HZE PARTICLES **[#19451]**
Irradiation of human bronchial epithelial cells with high charge and energy particles significantly stimulated exosome release, and the resulting exosomes contained damage-associated molecular patterns and a distinctive ensemble of miRNAs.

4:25 PM Bailey S. Luxton J. McKenna M. Taylor L. George K.
ASSESSING TELOMERE LENGTH AND TELOMERASE ACTIVITY IN TWIN AND UNRELATED ASTRONAUTS **[#19452]**
Monitoring telomere length dynamics and genome instability are important aspects of evaluating general health, disease, and aging risk, as well as for developing personalized countermeasures for astronauts who participate in long-duration missions in low earth orbit and beyond.

4:40 PM Wyrobek A. Bowles D. Fiehn 0. Settles M. Froenicke L. Witowska H. Peterson L. Straume T.
VARIATION IN CNS DAMAGE SIGNALING AND BLOOD SENTINELS OF NEUROPATHOLOGY AFTER EXPOSURE TO SPACE RADIATION **[#19453]**
This project will provide proof-of-principle whether radiation-affected molecules in CSF are detectable in peripheral blood, and whether sensitive CNS signaling pathways are suitable targets for biological countermeasures to reduce acute and persistent CNS risks from space radiation.

5:00 PM Break

Wednesday, January 23, 2019

VIIP and Psychological :envihab Research (VaPER bedrest campaign) - Study Results

3:30 PM **Grand Ballroom B**

Chairs: **Michael Stenger and Steven Laurie**

3:30 PM
Laurie S. Macias B. Lee S. Stenger M.
VaPER: LINKING PCO2 TO PHYSIOLOGY **[#19492]**
Results from the VaPER bed rest study will be presented.

3:45 PM
Lovering A. Kysar J. Christian K. Ortega-Schwartz K. Macias B. Lee S. Stenger M. Laurie S.
CROSSING THE THRESHOLD: EFFECT OF MILD HYPERCAPNIC BED REST ON VENTILATORY CHEMOSENSITIVITY TO CARBON DIOXIDE **[#19493]**
Subjects who develop increased retinal thickness with prolonged hypercapnic bed rest have blunted ventilatory responses to carbon dioxide prior to hypercapnic bed rest.

4:00 PM
Christian K. Lovering A. Laurie S. Lee S. Macias B. Stenger M. Ortega-Schwartz K.
VaPER: OPTIC DISC EDEMA DURING HYPERCAPNIC 6° HEAD-DOWN TILT BED REST- SANS SUFFICIENT SLEEP? **[#19494]**
Investigation of sleep and circadian rhythm differences prior to, during, and following a 30-day hypercapnic head-down tilt intervention.

4:15 PM
Nasrini J. Dinges D. Stahn A. Ecker A. Moore T. Gur R. Basner M.
CHANGES IN COGNITIVE PERFORMANCE WITH MONTH-LONG EXPOSURE TO 0.5% ATMOSPHERIC CO2 AND 6-DEGREES HEAD-DOWN TILT IN THE VAPER STUDY **[#19495]**
We investigated 11 subjects during a month-long chronic exposure to elevated (0.5%) CO2 and 6-degrees head-down tilt at :envihab. We found deteriorating cognitive performance under these conditions, especially for subjects who concurrently exhibited ocular changes consistent with SANS.

4:30 PM
Ade C. Caldwell J. Bemben D.
OMICS AND BIOCHEMICAL MARKERS OF CARDIOVASCULAR HEALTH: RELATIONSHIP WITH BEDREST AND STANDARD PHYSIOLOGICAL MEASURES **[#19496]**
Determine if cardiovascular and bone-health related circulating microRNA (c-miR) are altered following 30 days HDBR

4:45 PM
Rana B. Darshi M. Sharma K. Zhao J.
METABOLOMIC ALTERATIONS DURING A SIMULATED SPACEFLIGHT ENVIRONMENT **[#19497]**
We present the results of mass spectrometry based targeted and untargeted metabolomics analysis of longitudinally collected urine and plasma samples from individuals participating in a controlled 30 day or 70 day head-down tilt bed rest study.

5:00 PM
Lee J. Hupfeld K. Banker L. Mahadevan A. De Dios Y. Kofman I. Gadd N. Bloomberg J. Mulavara A. Seidler R.
BED REST COMBINED WITH 0.5% CO2 AS A SPACEFLIGHT ANALOG TO STUDY NEUROCOGNITIVE CHANGES: EXTENT, LONGEVITY, AND NEURAL BASES **[#19363]**
In eleven healthy subjects, exposure to 30 days of −6° head-down tilt bed rest with 0.5% ambient CO2 resulted in significant changes in regional brain gray matter volumes, brain white matter diffusion indices, intracranial free water distribution, and sensorimotor and cognitive functions.

5:15 PM
Break

Wednesday, January 23, 2019

Expert Speed Matching

5:15 PM **Grand Ballroom A**

5:15 PM	Discussion
6:00 PM	Break

AGENDA AT A GLANCE DAY 3

THURSDAY, JANUARY 24, 2019

	Plenary (Exhibit Hall B)	Poster (Exhibit Hall A)	Galleon I	Galleon II & III	Innovation Pavilion (Ballroom A)	Grand Ballroom B	Grand Ballroom C
8:00 AM	Plenary						
9:00 AM	Break						
9:30 AM			SANS CMs & Hypotheses	Team Adap in Extreme Environ		Skeletal Changes & Biomechanics	GCR Sim1
11:00 AM	Lunch						
12:30 PM			Education	Health & Performance Msrmt & Methods		Enabling Human Exploration Part 1	GCR Sim2
2:00 PM	Break						
2:30 PM			Sci-Fi to Sci-Fact Competition Showcase	Neurocognitive & Neurobehavioral Health		Enabling Human Exploration Part 2	NSRL User Group-Dose Rate Studies
4:00 PM		Poster Session B					
5:30 PM	Adjourn						

FEATURED PLENARY SPEAKERS

Mary Homer

Chief of Radiological and Nuclear Countermeasures Branch

US Department of Health & Human Services (HHS)-Office of the Assistant Secretary for Preparedness and Response (ASPR)/Biomedical Advanced Research and Development Authority (BARDA)

Jose Salinas

Chief

Clinical Decision Support and Automation Research Branch

US Army Institute of Surgical Research

Lucie Low

Scientific Program Manager, NIH-NASA Liaison POC

National Center for Advancing Translational Sciences

National Institutes of Health (NIH)

Esther Hill

Manager, Science and Technical Project Services (National Science Foundation Polar Programs)

Leidos

Thursday, January 24, 2019

Characterizing Spaceflight-Related Skeletal Changes and Biomechanics

9:30 AM **Grand Ballroom B**

Chairs: **Jean Sibonga and Jeffrey Somers**

9:30 AM Tahimic C. Torres S. O'Neil N. Schreurs A. Blaber E. Alwood J. Hogan H. Globus R. Shirazi-Fard Y.
TIME-DEPENDENT EFFECTS OF LONG DURATION SIMULATED WEIGHTLESSNESS IN THE RAT SKELETON **[#19037]**
We present findings from our study that aims to determine the responses of bone to simulated weightlessness and recovery.

9:45 AM Smith S. Heer M. Shackelford L. Zwart S.
BIOCHEMICAL PROFILE: PROVIDING INSIGHT INTO BONE BIOCHEMISTRY ON ISS MISSIONS **[#19038]**
This paper will review bone biochemistry data from the Biochem Profile experiment.

10:00 AM Greene K. McNamara K. Moore A. Dang J. Khattab K. Lenchik L. Weaver A.
QUANTIFYING LUMBAR AND CERVICAL MUSCULATURE CHANGES WITH LONG-DURATION SPACEFLIGHT USING MRI **[#19039]**
This study investigates the morphological changes of lumbar and cervical spinal musculature pre- and post-flight using non-invasive quantification of muscle volume and cross-sectional area with magnetic imaging resonance.

10:15 AM Weaver A. McNamara K. Greene K. Khattab K. Lenchik L.
MODELING SPACEFLIGHT-INDUCED CHANGES IN CERVICAL AND LUMBAR INJURY RISK **[#19040]**
The objective of this study was to derive muscle measurements of the cervical and lumbar spine from MRI pre- and post-flight International Space Station (ISS) crewmembers and integrate these into human body model simulations that quantify cervical and lumbar injury risk due to spaceflight.

10:30 AM Greenhalgh P. Somers J. Newby N. Yoganandan N. Humm J.
DEVELOPMENT OF LATERAL LOWER NECK INJURY RISK FUNCTIONS FOR HYBRID III AND THOR-K ANTHROPOMORPHIC TEST DEVICE **[#19041]**
The purpose of this study is to develop new Anthropomorphic Test Device Injury Assessment Reference Values specifically for spaceflight applications.

10:45 AM Jones D. Gaewsky J. Somers J. Newby N. Gayzik F. Weaver A. Stitzel J.
ASSESSING THE SENSITIVITY AND EXTENSIBILITY OF ANTHROPOMORPHIC TEST DEVICE RESPONSES IN SPACEFLIGHT CONDITIONS **[#19042]**
Using finite element numerical models, this study aims to assess Anthropomorphic Test Device sensitivity to injury risk in spaceflight loading conditions.

11:00 AM Break

Thursday, January 24, 2019

GCR Sim1: Defining the Mixed Particle Field

9:30 AM **Grand Ballroom C**

Chairs: **Lisa Simonsen and Adam Rusek**

9:30 AM Simonsen L. Slaba T. Rusek A. Guida P.
"NASA's GALACTIC COSMIC RAY SIMULATOR: CAN I USE IT?" **[#19084]**
NASA has developed a GCR simulation capability at the NASA Space Research Laboratory to deliver a spectrum of ions and energies that closely approximate those estimated to make up the shielded GCR environment in space.

9:45 AM Rusek: Lessons learned from '18B and '18C **[#19085]**

10:05 AM Slaba T.
GCR SIMULATOR BEAM DEFINITION AND SIMULATED EXPOSURES IN A HIGH RESOLUTION MOUSE PHANTOM **[#19086]**
A summary of beam selection for the GCR simulator is provided along with simulation results in a high resolution mouse phantom.

10:25 AM Loucas B. Cornforth M.
PROTRACTED EXPOSURE TO NASA'S GCR-SIMULATOR: CYTOGENETIC VALIDATION AND BEAM TIME OPTIMIZATION **[#19087]**
Optimization of the GCR-Simulator by irradiating cells with low LET light ions at the limiting low dose rate.

10:40 AM Panel Discussion: Beam definition and delivery **[#19088]**

11:00 AM Break

Thursday, January 24, 2019

SANS Hypotheses and Countermeasures

9:30 AM **Galleon I**

Chair: **Mark Shelhamer**

9:30 AM	Discussion
11:00 AM	Break

Thursday, January 24, 2019

Team Adaptation in Extreme Environments

9:30 AM **Galleon II & III**

Chairs: **Kelly Reid and Lauren Landon**

9:30 AM Kozlowski S. Chang C. Biswas S.
MEASURING, MONITORING, AND REGULATING TEAMWORK FOR LONG DURATION MISSIONS **[#19480]**
Data from long duration mission analog environments (8-12 months) indicates that team cohesion destabilizes and declines, an unobtrusive team interaction technology captures those declines, and thus there is the potential to provide targeted countermeasures to maintain team cohesion.

9:50 AM Tannenbaum S. Maynard T. Mathieu J. Kennedy D. Levy J.
TEAM ADAPTATION IN ICE CONDITIONS: AN EVENT BASED APPROACH **[#19481]**
An examination of team adaptation, resilience, and effectiveness in deep sea saturation dive teams that operate in isolated, confined, and extreme (ICE) conditions.

10:10 AM DeChurch L. Rudra K. Contractor N.
USING INTERACTION DATA TO PREDICT INTERPERSONAL RELATIONSHIPS IN SPACE MULTITEAM SYSTEMS **[#19482]**
The objective of this project is to develop a model to predict whether a member of a multiteam system will select another member(s) as sources of: information, leadership, followership, hindrance, and/or work enjoyment.

10:30 AM Contractor N. DeChurch L. Larson L. Gokhman I. Wojcik H. Bell S.
COLLECTIVE INTELLIGENCE IN SPACE CREWS **[#19483]**
This study investigates the effects of ICE environments on Campaign 3 and 4 HERA crew performance over time on creative thinking, problem solving, ethical deliberation, and psychomotor tasks.

10:50 AM Discussion

11:00 AM Break

Thursday, January 24, 2019

Education

12:30 PM **Galleon I**

Chair: **Laurence Young**

12:30 PM Young L. Allaway H. Cunha M. Marshall-Bowman K. Vivekanand V. Jimenez M. *SPACE HEALTH CAREER DEVELOPMENT- THE TRISH POST-DOCTORAL FELLOWS* **[#19046]**
Five TRISH post-doctoral fellows cover a wide variety of space exploration risk mitigation topics - from bone and radiation protection to artificial gravity..

2:00 PM Break

Thursday, January 24, 2019

Enabling Human Exploration Part 1: Multi-system Physiological Adaptations and Countermeasures for Long Duration Spaceflight

12:30 PM **Grand Ballroom B**

Chairs: **Liz Goetchius and Stuart Lee**

12:30 PM Laughlin M. Reed J. Layne C. Koryak Y. Clarke M. Tomilovskaya E. Albracht K. Shenkman B. Stäudle B. Kozlovskaya I. Rittweger J.
SARCOLAB-3: CHANGES IN KNEE FLEXOR AND EXTENSOR TORQUE GENERATION DURING A SIX-MONTH SPACE FLIGHT MISSION **[#19048]**
Knee flexor and extensor strength changes during six-month space flights to the International Space Station.

12:50 PM Goetchius L. Scott J. English K. Buxton R. Downs M. Ryder J. Ploutz-Snyder L. Ploutz-Snyder R.
HIGH INTENSITY TRAINING DURING SPACEFLIGHT:RESULTS FROM THE SPRINT STUDY **[#19049]**
Summary of the results from the In-flight Sprint Study

1:10 PM Lee S. Ribeiro C. Laurie S. Macias B. Rosenberg M. Kofman I. Mulavara A. Fomina E. Bloomberg J. Reschke M. Kozlovskaya I. Stenger M.
EFFICACY OF LOWER BODY COMPRESSION GARMENTS DURING THE FIRST 24 HOURS AFTER LONG-DURATION SPACEFLIGHT **[#19050]**
The objective of this study was to systematically evaluated the efficacy of lower body compression garments in the hours after landing following International Space Station missions.

1:30 PM Gunga H.
CORE BODY TEMPERATURE CHANGES UNDER DIFFERENT PHYSICAL AND ENVIRONMENTAL CONDITIONS ON EARTH AND IN SPACE **[#19051]**
Changes in body core temperature during short-term exercise can be markedly attenuated in space, which might aggravate the physical, psychological, and cognitive performance of humans on ISS.

1:50 PM Discussion

2:00 PM Break

Thursday, January 24, 2019

GCR Sim2: Mixed Field Results and Predictive Modeling

12:30 PM **Grand Ballroom C**

Chairs: **Eleanor Blakely and Amy Kronenberg**

12:30 PM Blakely E. Chang P. Bakke J. Grover A. Rusek A. Snyder D. Rosen C. Bjornstad K. Beitman A. Rhone J. Mao J. Hada M. Sachs R.
HARDERIAN GLAND TUMORIGENESIS: DUAL PARTICLE BEAM EXPOSURES **[#19090]**
The goal of our research is to systematically evaluate how dual beam exposures can shape the murine tumorigenesis response, depending on the number, linear energy transfer (LET) and dose of the single beam components.

12:45 PM Huang E. Woong Ham D. Lin Y. Wang S. Zhao A. Ebert M. Blakely E. Chang P. Sachs R.
MURINE HARDERIAN GLAND TUMORS AND IN VITRO CHROMOSOME ABERRATIONS INDUCED BY EXPOSURE TO MIXED BEAMS WITH SOME HIGH-LET COMPONENTS: SYNERGY THEORY **[#19091]**
For cancer surrogate endpoint experiments, improved synergy theory shows an example of synergy induced by an NSRL GCR mixed beam; by using a variance-covariance matrix it gives 2-fold tighter, less pessimistic 95% CI than would incorrectly neglecting adjustable parameter correlations.

1:00 PM Kronenberg A. Gauny S. Tabocchini A. Grossi G. Grygoryev D. Torres E. Fuentes Anaya A. Boutros S. Turker M. Raber J.
GCR SIMULATION STUDIES WITH HUMAN AND MOUSE MODELS **[#19092]**
The goal of this project is to assist NASA with the validation of a GCR simulator at the NASA Space Radiation Laboratory at Brookhaven National Lab, using human and mouse model systems.

1:15 PM Hada M. Rhone J. Beitman A. Plante I. Ponomarev A. Slaba T. Patel Z. Saganti P.
COMPUTATIONAL MODEL PREDICTION AND BIOLOGICAL VALIDATION USING SIMPLIFIED MIXED FIELD EXPOSURES FOR THE DEVELOPMENT OF A GCR REFERENCE FIELD **[#19093]**
A comparison between computational modeling simulation of chromosome aberrations and experimental results to mixed ion fields simulating GCR.

1:30 PM Plante I. Ponomarev A. Patel Z. Slaba T. Hada M.
RITCARD: RADIATION INDUCED TRACKS, CHROMOSOME ABERRATIONS, REPAIR, AND DAMAGE **[#19094]**
RITCARD: RADIATION INDUCED TRACKS, CHROMOSOME ABERRATIONS, REPAIR, AND DAMAGE

1:45 PM Luitel K.
LUNG CANCER PROGRESSION USING FAST SWITCH MULTIPLE ION BEAM EXPOSURE +/- CDDO COUNTERMEASURE **[#19095]**
Understanding lung carcinogenesis using multiple ion beam radiation and countermeasure prevention.

2:00 PM Break

Thursday, January 24, 2019

Health and Performance Measurement and Methods for Future Spaceflight

12:30 PM **Galleon II & III**

Chairs: **Alexandra Whitmire and Lisa Juliette**

12:30 PM Hattar S.
DIRECT EFFECTS OF LIGHT EXPOSURE ON MOOD AND COGNITION: HOW ANIMAL STUDIES ARE PAVING THE WAY. **[#19103]**
In this presentation, I am going to present new and exciting findings that show that light can modulate important behavioral outcomes independent of circadian or sleep disruptions.

12:48 PM Leitgab M.
THE MULTI-SENSOR CREW DEVICE (MSCD) PROJECT **[#19104]**
A report will be given on FY18 activities in the Multi-sensor Crew Device project, aiming at integrating multiple sensors into one astronaut-worn device providing continuous collection of data fully correlated in position and time, for environmental and physiological monitoring purposes.

1:06 PM Roma P. Schneiderman J. Blackwell Landon L.
OVERVIEW OF NASA BEHAVIORAL HEALTH & PERFORMANCE STANDARD MEASURES **[#19105]**
We will provide an overview of the selection, development, validation, and operational integration of the NASA Behavioral Health & Performance (BHP) Standard Measures suite, including preliminary analyses of results from HERA and NEK.

1:24 PM Holden K. Greene M. Cross E. Feiveson A.
EFFECTS OF LONG-DURATION MICROGRAVITY ON FINE MOTOR SKILLS **[#19106]**
Results from an ISS study of the effects of long-duration microgravity on fine motor skills are presented.

1:42 PM Stuster J. Adolf J. Byrne V. Greene M.
TASKS AND ABILITIES FOR THE HUMAN EXPLORATION OF MARS **[#19107]**
The research team conducted an analysis of the tasks that are likely to be performed during a conjunction-class Mars expedition and then identified the occupational specialties and the cognitive, physical, and social abilities necessary to perform the work.

2:00 PM Break

Thursday, January 24, 2019

Enabling Human Exploration Part 2: Benchmarking Physiological Performance of Exploration Mission Tasks

2:30 PM **Grand Ballroom B**

Chairs: **Meghan Downs and Marissa Rosenberg**

2:30 PM Ryder J. Fullmer P. Buxton R. Crowell B. Goetchius E. Bekdash O. DeWitt J. Hwang E. Feiveson A. English K. Ploutz-Snyder L.
IDENTIFICATION OF MUSCLE FITNESS STANDARDS FOR EXPLORATION MISSION TASKS **[#19054]**
This study identified minimal strength requirements for space exploration tasks.

2:50 PM Ade C. Barstow T.
IDENTIFICATION OF AEROBIC FITNESS STANDARDS FOR EXPLORATION MISSION TASKS **[#19055]**
Aim of this study was to determine key aerobic fitness variables that can individually map the level of success for key planetary critical mission tasks and use this information to develop a predictor-testing model that can be performed with in-flight equipment

3:10 PM Reschke M. Rosenberg M. Kofman I. Tomilovskaya E. Rukavishnikov I. Bloomberg J. Stenger M. Lee S. Mulavara A. Osetsky N. Fisher E. Ribeiro L. Freeman-Perez S. Miller C. Taylor L. Kozlovskaya I.
RESULTS FROM THE JOINT U.S./RUSSIAN/ FIELD TEST: A PROGRESS REPORT **[#19056]**
Preliminary results of the joint U.S. and Russian neurosensory studies

3:30 PM Norcross J. Jarvis S. Bekdash O. Cupples S. Abercromby A.
EVA HUMAN HEALTH AND PERFORMANCE BENCHMARKING MICROGRAVITY PROTOCOL **[#19057]**
The strategy for the development of a standard measures protocol to evaluate human health and performance in a microgravity spacesuit is discussed.

3:50 PM Discussion

4:00 PM Break

Thursday, January 24, 2019

Neurocognitive and Neurobehavioral Health for Future Exploration Missions

2:30 PM **Galleon II & III**

Chairs: **Ajit Mulavara and Jayati Roy Choudhury**

2:30 PM — Alfano C. Bower J. Laughlin M. Connaboy C. Simpson R.
PREVALENCE, SEVERITY, AND COURSE OF MENTAL HEALTH SYMPTOMS AT TWO ANTARCTIC STATIONS DURING WINTEROVER **[#19152]**
We examined the prevalence, severity, and course of various mental health symptoms in a large Antarctic sample at two research stations during the winterover

2:50 PM — Sinnott A. LaGoy A. Simpson R. Bower J. Laughlin M. Alfano C. Connaboy C.
AN EXAMINATION OF MENTAL HEALTH ON VIGILANCE AND COGNITIVE PERFORMANCE DURING AN ANTARCTIC WINTER OVER **[#19153]**
We examined the psychological responses associated with vigilance and cognitive performance across a 5-month Antarctic winterover

3:10 PM — Roalf D. Basner M. Prabhakaran K. Dinges D. Stahn A. Nasrini J. McGuire S. Hermosillo E. Ecker A. Johannes B. Gerlach D. Gunga H. Melzer T. Taylor B. Elliott M. Bilker W. Gur R.
NEUROSTRUCTURAL, COGNITIVE, AND PHYSIOLOGIC CHANGES DURING A 1- YEAR ANTARCTIC WINTER-OVER MISSION: NEUROIMAGING RESULTS
Here we present neuroimaging data on two winter-over expeditions to Antarctica, which include exposure to ICE environment. We report changes in brain volume and gray-matter density, which largely normalize 6 months following return from mission.

3:30 PM — Basner M. Dinges D. Stahn A. Nasrini J. Hermosillo E. Ecker A. Smith M. Johannes B. Healey B. van den Berg F. Gunga H. Pattyn N. Moore T. Roalf D. Gur R.
CHANGES IN COGNITIVE PERFORMANCE, SLEEP, AND AUTONOMIC FUNCTIONS DURING A 1-YEAR ANTARCTIC WINTER-OVER MISSION **[#19155]**
We investigated crews of 13 and 12 during the 2015 and 2016 winter-over in the Antarctic Concordia station. Continuous actigraphy and proximity data, and monthly Cognition battery and 24h heart rate measurements were collected. Systematic changes with time in mission were observed.

3:50 PM — Discussion

4:00 PM — Break

Thursday, January 24, 2019

NSRL User Group - A Focus on Dose Rate Studies

2:30 PM **Grand Ballroom C**

Chairs: **Lisa Simonsen and Peter Guida**

2:30 PM Guida P. Rusek A.
NSRL USER GROUP: BIOLOGY, OPERATIONS AND LESSONS LEARNED FROM NSRL 18B AND 18C **[#19164]**
A review of biology operations, including lessons learned from initial studies with the Full Spectrum NSRL GCR Simulator, will be discussed and questions from the user community will be taken.

3:00 PM O'Banion M. Trojanczyk L. Grose V. Williams J. Olschowka J.
EFFECTS OF NASA GCR-SIM EXPOSURE ON CENTRAL NERVOUS SYSTEM ENDPOINTS AND ALZHEIMER NEUROPATHOLOGY **[#19165]**
We describe an ongoing study using single and protracted dose fractions, totaling 500 mGy, on multiple central nervous system endpoints in APP/PS-1 and wild-type littermate C57BL/6 mice exposed to the NASA GCR-Sim radiation beam.

3:20 PM Ray A. Fallgren C. Weil M.
GSAM PROJECT: FEASIBILITY OF AN EXTENDED FRACTIONATED EXPOSURE **[#19166]**
Experience gained from running an extended fractionated exposure with the GCRsim beam will be described.

3:40 PM Panel Discussion: Animal handling

4:00 PM Break

Thursday, January 24, 2019

Science Fiction to Science Fact Competition Showcase

2:30 PM **Galleon I**

Translational Research Institute for Space Health

2:30 PM	Presentations
4:00 PM	Break

Thursday, January 24, 2019

Poster Session B: Cancer

4:00 PM **Exhibit Hall A**

Aroumougame A.
SPACE RADIATION INDUCED CHROMOSOME INSTABILITY ACTIVATES IMMUNE SIGNALING IN HUMAN CELLS **[#19311]**
This study suggests that genomic instability triggered by defective clustered DNA lesions repair provokes cGAS-STING cytosolic DNA sensing pathway mediated immune signaling and that might contribute to the initiation of cancer following space radiation exposure.

Beitman A. Rhone J. Chang P. Blakely E. Sachs R. Saganti P. Hada M.
CHROMOSOME ABERRATIONS INDUCED BY GCR SIMULATED MIXED BEAM EXPOSURE IN HUMAN LYMPHOCYTES, FIBROBLASTS AND EPITHELIAL CELLS **[#19312]**
GCR simulated 6 beams mixture exposure was performed at NSRL/BNL and chromosome aberrations were studied in human fibroblasts, lymphocytes and epithelial cells.

Rhone J. Beitman A. Ikeda H. Plante I. Souda H. Yoshida Y. Held K. Fujiwara K. Takahashi A. Saganti P. Hada M.
INCREASED CHROMOSOME ABERRATIONS IN CELLS EXPOSED SIMULTANEOUSLY TO SIMULATED MICROGRAVITY AND RADIATION **[#19313]**
Combined effect of simulated microgravity and high- and low-LET radiation was studied with human fibroblast cells.

Pluth J. To J. Knoblauch T. Weidmeyer B. Sridharan D. Mori H. Pluth J.
RADIATION DOSE RATE AND GENETICS IMPACT ON MAMMARY GLAND DEVELOPMENT **[#19314]**
We used low fractionated doses of x-ray to mimic the chronic radiation experience in space and defined how mammary organ growth and development was affected as compared to an acute exposure. A second aim of our work was to define how genetics may influence the effects of radiation on mammary growth.

Azzam E. Herbig L. Moore L. Chidambaram S. da Silva A. Herbig U.
COSMIC RADIATION DOES NOT CAUSE PERSISTENT TELOMERIC DOUBLE STRANDED BREAKS IN MOUSE BRAIN **[#19315]**
The question whether low mean absorbed dose of high atomic number (Z) and high energy (E) HZE particles cause telomeric DNA double stranded breaks in cells of the hippocampus and activate adaptive responses in murine brain was investigated.

Xu L. Walker R. Zhu Y. Wang Y. Pineda M. Killian J. Kumar S. Suman S. Datta K. Shay J. Fornace A. Meltzer P.
INTEGRATIVE GENOMICS OF SPACE RADIATION INDUCED GASTROINTESTINAL TUMORS **[#19316]**
Genomics methods are being applied to determine the oncogenic mechanism of space irradiation in mouse models of gastrointestinal tumors.

SUMAN S. KUMAR S. MOON B. ANGDISEN J. KALLAKURY B. FORNACE JR. A. DATTA K.
HZE-INDUCED GASTROINTESTINAL TUMORIGENESIS IN APC1638N/+ MICE IS DEPENDENT ON SEX AND RADIATION QUALITY EVEN IF DOSES ARE EXTREMELY LOW **[#19317]**
we have demonstrated that the HZE-induced intestinal and colon tumorigenesis is related to ion energy, LET, and sex.

Udho E. Bacher J. Koth R. Matkowskyj K. Heubner S. Albrecht D. Newton M. Vo T. Dague K. Storts D. Weil M. Halberg R.
HEPATOCELLULAR CARCINOMA: A NEW MOUSE MODEL AND BIOMARKER IDENTIFICATION **[#19318]**
Results of investigating hepatocellular carcinoma (HCC) and metastasis using a new mouse model are presented, results include a validated mouse model and being able to detect HCC with a non-invasive blood test.

Jella K. Aramgam S. Switchenko J. Yu D. Dynan W.
EFFECT OF GCR EXPOSURE ON THE FUNCTIONAL STATUS OF THE DNA REPAIR MACHINERY AND ITS CONTRIBUTION TO CANCER RISK **[#19319]**
The project will test a hypothesis that exposure to galactic cosmic radiation is associated with chronic DNA damage signaling leading to a decline in NAD+ levels, that this potentiates lung cancer risk, and that the effect can be blunted with a nicotinamide riboside dietary countermeasure.

Welford S. Patel R.
Mlh1 deficiency increases the risk of hematopoietic malignancy after simulated space radiation exposure. **[#19320]**
We assessed the risk to hematopoietic malignancy in a mouse model of age related decline in DNA repair capacity and found significant sensitization to lymphoma development after simulated space radiation.

Shuryak I. Cunha M. Brenner D.
SPACE RADIATION QUALITY FACTORS INCORPORATING BOTH TARGETED AND NONTARGETED EFFECTS **[#19321]**
The approach implemented here produces a simple equation for HZE ion quality factors based on a model that combines NTE and TE contributions for HZE ions, and TE only for the reference radiation (gamma rays).

Barnette B. Nia A. Strain S. Lichti C. Yongjia Y. Ullrich R. Emmett M.
AN INTEGRATED OMICS APPROACH TO DEFINE THE MOLECULAR MECHANISMS INDUCED BY LOW DOSE, HIGH-ENERGY, HIGH CHARGE IONS (HZE) IN RELATION TO HEPATOCELLULAR CARCINOMA (HCC) **[#19322]**
Our approach utilizes a multi-omic, systems biology platform encompassing lipidomics, proteomics and deep RNA sequencing to define microenvironmental changes induced by HZE exposure.

Ponomarev A. Plante I. Patel Z. Slaba T. Hada M.
COMPUTER VISUALIZATION OF THE EXPERIMENTAL COUNT OF CHROMOSOMAL ABERRATIONS **[#19323]**
An algorithm to classify chromosomal aberrations in the 3-color FISH experiment.

Cornforth M. Kittler R. Loucas B. Ray F. Robinson E. Bedford J. Spellman P. Anur P. Peto M. Gray J. Williams E. Bailey S.
Molecular characterization of transmissible chromosome aberrations produced by ions of intermediate and high atomic number **[#19324]**
We have successfully sequenced across a radiation-induced chromosome translocation breakponit in human cells

Cunha M. Shuryak I. Brenner D.
MICRODOSIMETRIC LINKS BETWEEN SPACE RADIATION EXPOSURE AND CARCINOGENESIS. IMPLICATIONS FOR RISK ESTIMATION AND RADIOPROTECTORS **[#19325]**
Including microdosimetric quantities in radiation carcinogenesis models makes the link between the unique energy deposition pattern of different space radiations at the cellular level and the observed biological response to better understand the role of space radiation in carcinogenesis

Story M. Polsdofer E. Sishc B. Ding L.
Determining Gender Differences in the Incidence of Lung Adenocarcinoma After Space Radiation Exposure. **[#19326]**
This project is designed to evaluate the effects of radiation quality, sex disparities and the potential for pharmaceutical mitigation of radiogenic lung cancer risk.

Sadaphal V. Fletcher E. Todorova P. Mukherjee B. Ghosh S. Burma S.
CIRCULATING MICRO-RNA AS A BIOMARKER FOR SPACE RADIATION DOSIMETRY AND EARLY DIAGNOSIS OF GLIOBLASTOMA **[#19327]**
MicroRNA deregulation in blood can serve as a biomarker to measure the extent of space radiation received by an astronaut, as well as aid in early detection of glioblastomas in clinics with the help of a magnetite/polymeric-nanoparticle based microfluidic device.

Burma S. Fletcher E. Sadaphal V. Todorova P. Story M.
EFFECTS OF RADIATION QUALITY ON CHARGED PARTICLE-INDUCED BRAIN TUMOR DEVELOPMENT **[#19328]**
We are using mouse models of radiation-induced gliomas to understand how radiation quality effects tumor development.

Emmett M. Barnette B. Nia A. Strain S. Lichti C. Yu Y. Ullrich R.
MOLECULAR BIOSYNTHETIC PATHWAY ALTERATIONS INDUCED BY LOW DOSE, HIGH CHARGE, HIGH-ENERGY IONS (HZE): A MULTI-OMICS STUDY OF HZE-INDUCED HEPATOCELLULAR CARCINOMA (HCC) **[#19329]**
Molecular biosynthetic pathway alterations induced by low dose HZE.

Thursday, January 24, 2019

Poster Session B: CNS

4:00 PM **Exhibit Hall A**

Hinshaw R. Sowa M. Park J. Kim D. Tanzi R. Hada M. Guida P. Lemere C.
IN VITRO EXPOSURE OF BRAIN CELLS WITH SIMULATED GALACTIC COSMIC RAYS **[#19330]**
We present the first of several experiments investigating the effect of space-like radiation on the progression of Alzheimer's disease in human neural culture models, and we show the success of transporting human and murine in vitro cultures to and from Brookhaven National Laboratory.

Rabin B. Switzer III R. Cahoon D. Poulose S. Rottman V. Hurd P. Wilats L. Cacioppo A. Chigurupati S. Bachus S. Shukitt-Hale B.
PARTIAL BODY EXPOSURES TO HZE PARTICLES: ROLE OF OXIDATIVE STRESS IN THE DISRUPTION OF NEURONAL FUNCTION AND COGNITIVE PERFORMANCE **[#19331]**
There were not significant differences in radiation-induced changes in neuronal function or cognitive performance following exposure restricted to the head or to the body.

Jones C. Mange A. Granata L. Johnson B. Guida P. Hienz R. Davis C.
PLASMA KC/GRO AS AN EARLY BIOMARKER OF LONG-TERM SOCIAL RECOGNITION IMPAIRMENTS FOLLOWING 16O ION EXPOSURE **[#19332]**
This project investigated the effects of exposure to 1 or 10 cGy 16O ions (1000 MeV/n) on social recognition, sustained attention, plasma cytokine levels, and cell proliferation in the subventricular zone.

Liu G. Liu B. Lorello P. Saido T. Caldarone B. Lemere C.
LATE EFFECTS OF SINGLE VS. FRACTIONATED 56FE RADIATION DOSING ON WT AND ALZHEIMER'S DISEASE-LIKE MICE **[#19333]**
APP NL-F/NL-F mice and their age-matched C57BL/6 controls exposed to either a single or fractionated dose of 56Fe irradiation showed differential effects in behavior, pathology, and cytokine levels compared to non-irradiated controls.

Davis C. Johnson B. Granata L. Guida P. Hienz R. Robinson S.
USING CHEMOGENETICS TO UNDERSTAND RADIATION-INDUCED NEUROBEHAVIORAL DEFICITS **[#19334]**
The current study employees chemogenetic techniques to understand the mechanisms underlying radiation-induced neurobehavioral deficits.

Chau C. Liu B. Liu G. Lemere C.
THE LONG-TERM GLIAL RESPONSE TO 56FE Radiation IN APP/PS1 Tg Mice **[#19335]**
We undertook a follow-up study to elucidate the sex- and dose-specific long-term effects of 56Fe IRR on plaque-specific glial pathologies by performing a close-up inspection of glial cells associated with similar, moderate-sized Aβ plaques.

Wang H. Kim J. Fox D. Saganti P.
STUDY ON RADIATION EFFECT AND RADIOPROTECTION ON HUMAN NEURONS DERIVED FROM HUMAN INDUCED PLURIPOTENT STEM CELLS **[#19336]**
We use a human neuron model to study space radiation risks on the CNS and develop effective countermeasure.

Mao X. Nelson G. Byrum S. Nishiyama N. Stanbouly S. Drew A. Mohan seenivasan v. Boerma M.
BIOCHEMICAL AND PROTEOMIC APPROACHES REVEAL THE EFFECTS OF SPACE RADIATION IN RABBIT RETINA **[#19337]**
We characterized the impact of low-dose space radiation with two radiation types on rabbit retina and changes in protein expression profiles were also examined.

Porada C. Kuhlman B. Cordazzo Vargas B. Coleman M. Almeida-Porada G. Wilson P.
DEFINING THE EFFECTS OF MARS MISSION-RELEVANT DOSES OF SEP/GCR RADIATION ON THE SMALL INTESTINE **[#19338]**
Mars-relevant doses of both SEP protons and HZE ions (56Fe) exert multiple deleterious effects on the small intestine

Wilson P. Kuhlman B. Walker S. Langefeld C. Pardee T. Yang J. Lacombe J. Evans A. Saxena M. Coleman M. Zenhausern F. Almeida-Porada M. Porada C.
NOVEL MODELS TO MONITOR IN VIVO EFFECTS OF SEP/GCR RADIATION ON HUMAN HEMATOPOIETIC AND GI SYSTEMS **[#19339]**
We present data using a humanized mouse hematopoietic stem cell (HSC) xenograft model and intestinal epithelium microfluidic cell culture device (HuMiX) to identify molecular pathways/targets induced by space radiation exposure and test a nanoparticle-based radiation countermeasure.

Datta K. Kumar S. Suman S. Fornace A.
LONG-TERM STRESS AFTER HEAVY ION RADIATION INDUCES SENESCENCE AND SENESCENCE ASSOCIATED SECRETORY PHENOTYPE TO DECREASE CELL MIGRATION IN MOUSE INTESTINE **[#19340]**
Heavy ion space radiation decreases intestinal epithelial cell migration.

Ade C. Banister H. Parr S. Turpin V.
EFFECTS OF RADIATION ON MICROVASCULAR FUNCTION IN THE INTACT HUMAN CIRCULATION **[#19341]**
The objective of this work was to determine the effects of radiation exposure on cutaneous microvascular reactivity in the intact human circulation

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Poster Session B: Human Factors and Behavioral Performance

4:00 PM **Exhibit Hall A**

Howard R.
COMPARISON OF FOUR AND EIGHT PERSON DEEP SPACE HABITATS FOR DEEP SPACE EXPLORATION **[#19342]**
This paper will explore sensitivities in crew size by introducing the crew functions potentially required for deep space habitation in the context of both planetary and microgravity habitats, giving consideration to crew productivity, habitat functions, and launch vehicle implications.

Haney N. Urman A. Cagle Y. Hatch G. Ursenbach S. Morey J.
ARTIFICIAL INTELLIGENCE AND IT'S ROLE IN HEALTHCARE OF DEEP SPACE EXPLORATION **[#19343]**
With large-scale datasets, artificial intelligence and machine learning could provide real time feedback to CPAP machines in order to best mediate obstructed breathing during sleep while on missions in outer space.

Schubert M. Kim K. Gimmon Y. Beaton K.
EXPOSURE TO AN EXTREME ENVIRONMENT COMES AT A SENSORIMOTOR COST **[#19344]**
We found significant sensorimotor degradation walking tandem over the duration of the NEEMO 21 and 22 missions.

Miller, PhD K. Pantalos, PhD G. Sutton, MD E.
APPLYING BASIC EDUCATION AND TRAINING STRATEGIES TO SUPPORTING COMPLEX MEDICAL PROCEDURES IN AN EXTREME ENVIRONMENT **[#19345]**
Our project, Creating Surgical Capabilities for Exploration Space Flight, used stepwise theoretical framework grounded on accepted theories of adult education and training to guide development and testing of a detailed task analysis of a laproscopic appendectomy to be duplicated in zero G.

Tang S. Shelhamer M. Yaovatsakul K. Spencer C. Roberts D.
MULTIDIMENSIONAL ANALYSIS OF HUMAN PHYSIOLOGY AND PERFORMANCE IN RELATION TO SPACEFLIGHT **[#19346]**
Our project aims to jointly track human physiology and performance under spaceflight-like stressors, and look for correlations in signal patterns that could relate physiological and performance changes.

Clark T. Kolomenski A.
Innovations in Spacecraft Proximity & Navigation Lighting **[#19347]**
This report is about an innovation project that explored alternative exterior lighting techniques for navigation and proximity lighting that may be able to provide improve the crew's visibility of robotic, berthing, and docking tasks.

Stahn A. Dinges D. Nasrini J. Kaizi-Lutu M. Ecker A. Kühn S. Werner A. Brauns K. Moore T. Gunga H. Roalf D. Gur R. Mathias B.
HYBRID TRAINING - A SENSORY STIMULATION COUNTERMEASURE FOR LONG DURATION SPACE EXPLORATION MISSIONS **[#19348]**
Sensory deprivation and monotony during isolation and confinement are critical risks for developing neurobehavioral disorders. Hybrid Training is as a sensory stimulation augmentation countermeasure to mitigate these risks and is currently tested during two winter-overs in Antarctica.

Burkhart K. Allaire B. Anderson D. Bouxsein M.
6-MONTH SPACEFLIGHT HAS MINIMAL INFLUENCE ON LUMBAR SPINE LOADING AND VERTEBRAL FRACTURE RISK DURING ACTIVITIES OF DAILY LIVING **[#19349]**
Musculoskeletal models of the trunk showed a slight increase in spinal loading post-flight, but in all individuals and for all simulated activities the ratio of vertebral compressive load to vertebral compressive strength remained well below one, indicating a low risk of vertebral fracture.

Banker L. Lee J. Gadd N. Kofman I. De Dios Y. Bloomberg J. Mulavara A. Seidler R.
SENSORIMOTOR ADAPTATION CHANGES DURING ELEVATED CO2 HEAD-DOWN TILT BEDREST **[#19350]**
Based on our previous findings, we hypothesize that eleven subjects exposed to elevated CO2 combined with 30-day head-down tilt bedrest will not exhibit savings in a sensorimotor adaptation task.

Bracken B. Festa E. Sun H. Leather C. Strangman G.
VALIDATION OF A PORTABLE, DURABLE, RUGGED FUNCTIONAL NEAR-INFRARED SPECTROSCOPY (FNIRS) DEVICE, THE FNIRS PIONEER **[#19351]**
We validated the fNIRS Pioneer, against the NINScan, using a gold-standard task known to affect cognitive workload (n-back) and the more complex MATB task at three levels of difficulty, finding that effects on HbO2 were similar between devices and correlated with task workload level.

Newton D. LePine J. Wellman N.
A DYNAMIC VIEW OF TASK ENGAGEMENT **[#19352]**
Transitioning between tasks in multifaceted work environments.

Kozlowski S. Biswas S. Chang C.
TEAM COHESION BADGE: DEVELOPMENT OF GALVANIC SKIN RESISTANCE MODALITY **[#19353]**
This research is adding a galvanic skin resistance sensor to our existing team interaction sensor technology to enhance its ability to infer team member affect from interactions and physiological; validation research is in progress.

Bannova O. Dorribo Camba J.
INTRODUCING VISUAL NOVELTY IN SPACE HABITATS: A STUDY ON PROJECTIONS AS MECHANISMS TO AUGMENT PERCEPTION **[#19354]**
We present exploratory study designed comparing user perception of a confined space under three conditions based on various visual augmentations of the environment by projection-based techniques that inform design implications of mixed reality technologies in a space habitat environment.

Barshi I. Dempsey D.
the Effects of Long Duration Space Flight on Training Retention and Transfer **[#19355]**
This is a study of the effects of long duration space flight on the retention and transfer of trained skills and knowledge.

Thoolen S. Ivkovic V. Zhang Q. Strangman G.
BEHAVIORAL CORE MEASURES: ROBOTIC ON-BOARD TRAINER (ROBOT) SKILL ACQUISITION AND ASSOCIATED (NEURO)PHYSIOLOGICAL RESPONSE **[#19356]**
ROBoT-r learning appeared adequate for pre- and inflight training in a new compressed training protocol compared to previously used protocols, and simultaneous monitoring using NINscan showed potential (neuro)physiological correlates associated with risk of performance decrements

Duda K. Stankovic A. York S. Siegmann A. Robinson S. West J.
REAL-TIME ESTIMATION OF THE EFFECTS OF A SIMULATED LONG-DURATION EXPLORATION MISSION ON FLIGHT PERFORMANCE, WORKLOAD, AND SITUATION AWARENESS **[#19357]**
Development activity and research progress on the Draper real-time performance metrics workstation within the NASA HERA analog environment.

Fischer U. Mosier K. Tofighi D. Russell M.
UNDERSTANDING KEY COMPONENTS OF SUCCESSFUL AUTONOMOUS SPACE MISSIONS **[#19358]**
This (poster) presentation summarizes our ongoing research efforts to develop a scientifically grounded model of the relationship between crew autonomy and crew/mission control collaboration and the extent to which individual and team variables moderate/mediate this relationship.

Beutter B. Karasinski J.
UTILITY OF THE ROBOTICS ON-BOARD TRAINER FOR REDUCING HUMAN FACTORS AND BEHAVIORAL PERFORMANCE RISKS **[#19359]**
This work examines the utility of NASA's Robotics On-Board Trainer to make progress on the HRP Human Factors Risks and the potential for developing new sensitive performance metrics.

Vimal V. Lackner J. DiZio P.
TRAINING DYNAMIC STABILIZATION SKILL AND ITS LONG TERM RETENTION IN A SPACEFLIGHT ANALOG CONDITION **[#19360]**
We created an effective training program that significantly enhanced every person's dynamic stabilization performance in a spaceflight analog condition and this learning was retained over 4 months.

Stahn A. Dinges D. Roalf D. Gur R. Katharina B. Werner A. Gunga H. Buchert R. Kühn S. Basner M.
HYPER.CAMPUS – EFFECTS OF ARTIFICIAL GRAVITY ON STRUCTURAL AND FUNCTIONAL BRAIN PLASTICITY DURING HEAD-DOWN TILT BED REST **[#19361]**
This project assesses the neurobehavioral effects of 60 days of head-down tilt bed rest with and without artificial gravity. Primary outcomes are changes in brain structure and function, and specifically the hippocampus and other neural correlates of spatial cognition.

Duda K. Endsley T. Stankovic A. Robinson S. Karasinski J. Marquez J. West J.
HUMAN-AUTOMATION AND ROBOTIC SYSTEMS INTEGRATION (HARI) TRADE STUDY **[#19362]**
The objective of this current project is to conduct a systematic assessment of the critical factors and needs of HARI tasks against current and emerging automation/robotic technologies.

Caldwell B. Hill J.
HUMAN-SYSTEMS INTEGRATION AND FUNCTION ALLOCATION FOR HUMAN EXPLORATION OF MARS **[#19364]**
Wireless physiological monitoring technology was implemented during multiple field simulated Mars deployments coordinating science return activities with time delays, highlighting both human-system integration and function allocation challenges for Mars mission operations.

Waterman G. Waterman G. Milstein O. Coderre K. Posey J. Charles J.
ASTRORAD HUMAN FACTORS EVALUATION BY INTERNATIONAL SPACE STATION CREW: DEVELOPING OPERATIONAL RADIATION PROTECTION **[#19365]**
Description of the ergonomic evaluation of the AstroRad vest on the International Space Station to yield valuable crew feedback to define operational use cases and impact final design of the vest.

Wenzel E.
HUMAN FACTORS STANDARD MEASURE RECOMMENDATIONS FOR SPACEFLIGHT, ANALOGS, AND OTHER RESEARCH STUDIES **[#19366]**
The Human Research Program requires a core set of reliable, valid human factors performance measures, which will be used to inform these systems to adapt to crew state and capabilities, assess/track crew state over time, and help inform scheduling and task allocation decisions.

Wenzel E. Dempsey D. Feldman J. Barshi I.
HCAAM INTEGRATION: JUST IN TIME TRAINING **[#19367]**
Long-duration exploration missions (LDEMs) will require unique and likely challenging training considerations beyond current practices, necessitating training practices such as just in time training to evolve.

Banerjee N. Baughman A. Lin S. Witte Z. Klaus D. Anderson A.
DEVELOPMENT OF ALTERNATIVE REALITY ENVIRONMENTS FOR SPACECRAFT HABITAT DESIGN EVALUATION **[#19368]**
This paper details the development of a physical reality, augmented reality, virtual reality, and hybrid reality environment for use in spacecraft habitat design evaluation.

Ivkovic V. Thoolen S. Zhang Q. Strangman G.
QUANTIFYING OPERATIONALLY-RELEVANT PERFORMANCE AND PHYSIOLOGY IN A LONG-DURATION SPACEFLIGHT ANALOG **[#19369]**
Using a research version of the Robotics On-Board Trainer (ROBoT-r) for Canadarm2 simulation, plus our NINscan brain imaging device, we examined operationally-relevant performance and cerebral responses during 45-day sequestrations in JSC's Human Exploration Research Analog (HERA).

Dias R. Doyle T. Robertson J. Thorgrimson J. Gupta A. Mormann B. Pozner C. Smink D. Lipsitz S. Musson D. Yule S.
DEVELOPMENT OF A MULTI-MODAL INTEGRATIVE SYSTEM TO ANALYZE COGNITIVE LOAD AND TEAM DYNAMICS DURING MEDICAL EVENT MANAGEMENT ON SIMULATED LONG-DURATION SPACE MISSIONS **[#19370]**
In this study, we describe a multi-modal monitoring and analytics system that uses unobtrusive physiological sensors and computer vision to measure team cognitive load and team dynamics during simulated medical events on long-duration exploration missions.

Feigh K. Pritchett A. IJtsma M. Ma L. Ye S.
OBJECTIVE FUNCTION ALLOCATION FOR HUMAN-ROBOTIC INTERACTION **[#19371]**
Progress made in our development of an objective method for function allocation for human robot teaming.

Dorneich M. Finseth T. Keren N. Franke W. Vardeman S.
ADAPTIVE STRESS TRAINING FOR HAZARDOUS CONDITIONS **[#19372]**
The aim of this project is to develop and test an adaptive virtual reality (VR) stress training system that will utilize graduated stress exposure during task training to enhance crew resilience to acute stress.

Wusk G. Basner M. Schneiderman J. Nasrini J. Baskin P. Dinges D. Roma P.
INDIVIDUAL DIFFERENCES IN COGNITIVE PERFORMANCE UNDER CHRONIC PARTIAL SLEEP RESTRICTION IN ISOLATION AND CONFINEMENT **[#19373]**
Preliminary analyses of cognitive performance under partial sleep restriction in HERA 45-day missions.

Amare R. Schlabach M. Bahadori A. Eckels S.
INDIVIDUALIZED FRAMEWORK USING VOXELIZED PHANTOMS LINKED WITH ADVANCED THERMAL MANIKINS TO DESIGN SPACE SUITS **[#19374]**
To propose a new framework to use Voxelized Phantoms with Thermal Manikin to design Space Suits unique to meet the requirements of the astronauts.

Pinedo C. Dixon J. Davis E. Zuzula E. Baker M. Clark T.
EVALUATION OF AN ACHIEVABILITY LIMIT DISPLAY FOR A FUEL-CONSTRAINED, PILOTED, PLANETARY LANDER **[#19375]**
In this study we present the results of a 10 subject evaluation of an achievability limit display that provides a prediction for an achievable landing zone for use in fuel-constrained, piloted, planetary lander mission.

Chandra Shekar M. Hansen J.
SPEAKER INDEXING: FINDING WALDO IN THE FEARLESS STEPS APOLLO CORPUS **[#19376]**
This work involves identifying and indexing speakers who worked in the backroom (MOCR) on the Apollo 11 Mission and updating this information on the CRSS UTDallas Online apollo explorer tool.

Lockley S. Rahman S. St. Hilaire M. Clark T. Hanifin J. Barger L. Czeisler C. Brainard G.
LIGHTING PROTOCOLS FOR EXPLORATION – HERA CAMPAIGN **[#19377]**
This study applies a dynamic lighting schedule - including blue-enriched light to enhance alertness and circadian adaptation and blue-depleted light to minimize pre-sleep alertness - to examine the feasibility and efficacy of the new solid-state lighting assembly system on the ISS.

Joglekar A. Sangwan A. Belitz, C. H.L. Hansen J.
FEARLESS STEPS: APOLLO-11 CORPUS ADVANCEMENTS FOR SPEECH TECHNOLOGIES FROM EARTH TO THE MOON **[#19378]**
The abstract highlights the efforts conducted by the Center for Robust Speech Systems Lab at The University of Texas at Dallas in the digitization, analysis and rich knowledge extraction of the audio data from the NASA-Apollo Missions, and their associated Challenge Tasks

LaGoy A. Sinnott A. Simpson R. Laughlin M. Bower J. Alfano C. Connaboy C.
INTERACTIONS BETWEEN PSYCHOLOGICAL, BEHAVIORAL AND COGNITIVE PARAMETERS DURING PROLONGED EXPOSURE TO ISOLATED, CONFINED AND EXTREME ENVIRONMENTS **[#19379]**
Changes in psychological factors predict changes in behavioral and cognitive performance metrics across increased exposure to isolated, confined and extreme environments.

DeChurch L. Plummer G. Mesmer-Magnus J. Contractor N.
THE DEVELOPMENT OF CREW SHARED COGNITION **[#19380]**
Our study investigates the convergent validity of shared cognition that varies in both content and nature of emergence, we look at trends in shared cognition over long periods of time, and finally, we investigate the impact that environmental factors have on these trends.

Carter D. Shuffler M. Schecter A. DeChurch L. Contractor N. Zaccaro S. Burke S. Landon L. Lungeanu A. Pendergraft J. Trainer H. Jones J. Larson L. Niler A.
DEVELOPING A COUNTERMEASURE TOOLKIT TO FACILITATE COORDINATED PERFORMANCE IN SPACEFLIGHT MULTITEAM SYSTEMS **[#19381]**
This paper describes the development and evaluation of our countermeasure toolkit to facilitate spaceflight multiteam system collaboration and coordination.

Voros J. McGinley J. McGuire S. Walker M. Karki P. Ahmed N. Szafir D. Clark T.
TRUST IN AN AUTONOMOUS INTELLIGENT SYSTEM FOR NAVIGATIONAL GUIDANCE ON A PLANETARY ROVER TASK **[#19382]**
We evaluated trust in an autonomous intelligent system for providing navigational guidance for a teleoperated planetary rover, as compared to that from a human "ground controller".

Pendergraft J. Carter D. Tseng S. Landon L. Slack K. Shuffler M.
ADAPTATION AND RESILIENCE OF A SPACEFLIGHT MULTITEAM SYSTEM: EVOLUTION OF NASA'S MISSION CONTROL CENTER **[#19383]**
This paper evaluates the history of the multiteam system collaboration within NASA's mission control center over the past century in order to pave the way for the development of countermeasures to facilitate multiteam system collaboration in future missions.

DeChurch L. Schultz M. Contractor N.
NETWORKS AS FILTERS: SELECTIVE INFORMATION TRANSMISSION IN CONVERSATIONS ABOARD SKYLAB **[#19384]**
This paper builds from an interactionist perspective on relations to theorize dyadic and network mechanisms of content filtering. This framework is applied to develop a new explanation for the organizational conflict during NASA's Skylab 4 mission.

Burke C. Halfman T. Kilcullen M. Driskell T. Driskell J. Salas E.
EXPLORING TEAM ROLES ON ICE: A LONGITUDINAL INVESTIGATION WITH ANTARCTIC WINTER-OVER TEAMS **[#19385]**
Presents the results of an investigation examining the dynamic nature of team roles and their relationship to team performance over time within the context of Antarctic Winter-Over teams.

DeChurch L. Mesmer-Magnus J. Niler A. Plummer G. Contractor N.
TEAM COGNITION IN CONTEXT: A META-ANALYSIS **[#19386]**
We use meta-analysis to explore the internal and external team contexts under which team cognition is most critical to team performance.

DeChurch L. Lungeanu A. Contractor N.
THE EMERGENCE AND DEVELOPMENT OF CREW SHARED MENTAL MODELS: AN AGENT-BASED MODEL **[#19387]**
We developed an agent-based model that considers aspects of the individuals, their relations with one another, and the nature of their interactions as the mission unfolds to continuously update the degree to which they share mental models.

Johnson J. Zurek M. Contractor N. DeChurch L.
TEAM DYNAMICS IN SPACEFLIGHT ANALOGS: AGREEMENT, INFORMAL SOCIAL ROLES, AND TEAM VIABILITY AND CONFLICT IN THE HUMAN EXPLORATION RESEARCH ANALOG (HERA) **[#19388]**
We examine the relationship among shared mental models of task and teamwork elements, team agreement on members' social roles, isomorphism between formal and informal role properties, particularly leadership, as well as team structure and team viability and conflict within HERA.

Burke C. Paoletti J. Moavero J. Dinh J. Szabo K. Salas E.
IDENTIFYING TRIGGER POINTS FOR TEAMWORK DEGRADATIONS: EXAMINING CULTURAL DIVERSITY IN SPACEFLIGHT TEAMS **[#19389]**
Based on a systematic examination of a set of archival sources, this poster highlights challenges and associated trigger points within culturally diverse teams that may cause degradations in coordinated action and highlights how this information is being used to drive future project efforts.

Rosen M. Kazi S. Khaleghzadegan S. Salas E.
UNOBTRUSIVE ASSESSMENT OF INDIVIDUAL AND TEAM COMPETENCIES ACROSS THREE ANALOGS **[#19390]**
This abstract summarizes progress in a program of research to develop and validate unobtrusive measures of LDSE competencies across three different analog environments.

DeChurch L. Tanaka K. Ennab N. Contractor N.
ANTECEDENTS AND OUTCOMES OF NETWORK ACUITY IN SPACE MULTITEAM SYSTEMS **[#19391]**
Network acuity--a novel extension of social intelligence--is potentially used for replacement of individual attributes (e.g., personality) and a predictor for task performance in space exploration.

DeChurch L. Izadinia N. Contract N. Waechter A.
USING OPTIMIZATION METHODS TO BENCHMARK PERFORMANCE IN SPACE TEAMS **[#19392]**
We developed Constrained Mixed Integer Deterministic Nonlinear Nonconvex Single-objective Programming models to benchmark performance in a multiteam long-distance space exploration simulation.

Marcinkowski M. Bell S. DeChurch L. Contractor N. Vinokhodova A. Gushin V.
TOWARD A TEAM-SPECIFIC INTERVENTION FOR LDSE TEAMS **[#19393]**
We describe the initial development of Team Enrichment Opportunities (TEOs)--evidence-based interventions that are customized to the individual differences and relations of a specific crew.

Dinges D. Basner M. Stahn A. Roma P. Hensch T. Nindl B. Flanagan S. Martin B. Gur R. Cordoza M. Bilker W.
NSCOR FOR EVALUATING RISK FACTORS AND BIOMARKERS FOR ADAPTATION AND RESILIENCE TO SPACEFLIGHT: EMOTIONAL VALENCE AND SOCIAL PROCESSES IN ICC/ICE ENVIRONMENTS **[#19394]**
The purpose of this NSCOR study is to investigate three different human confinement analogs and an animal model; this NSCOR will generate data converging on biomarkers of neurobehavioral and neurobiological resilience in spaceflight analog environments.

Shuffler M. Carter D. Pendergraft J. Smith J. Alvarado L. Landon L.
PROJECT FUSION: LEVERAGING QUALITATIVE METHODS TO ADVANCE SPACEFLIGHT MULTITEAM SYSTEM DYNAMICS & COUNTERMEASURES **[#19395]**
Qualitative research maximizes limited yet rich data regarding multiteam system dynamics in spaceflight; accordingly, we summarize different techniques currently in use, along with their benefits, challenges, and contributions that can advance both SFMTS countermeasures and outcomes.

Desai R. Kangas B. Limoli C.
NON-HUMAN PRIMATE (NHP) CENTRAL NERVOUS SYSTEM (CNS) RADIATION/PERFORMANCE DATA MINING **[#19396]**
This work will focus on how a combination of spaceflight stressors may impact CNS-related neurobiological, neurochemical, neurobehavioral and cognitive function in nonhuman primates.

Dinges D. Basner M. Strangman G. Stuster J. Roma P. Mollicone D. Gur R. Stahn A. Dennis L. Ecker A. Nasrini J. Mott C.
STANDARDIZED BEHAVIORAL MEASURES FOR DETECTING BEHAVIORAL HEALTH RISKS DURING EXPLORATION (BEHAVIORAL CORE MEASURES) **[#19397]**
The goal of this project is to develop a standardized suite of behavioral health core measurement tools that would be feasible to implement within the constraints of spaceflight research, in ground-based analogs, and prolonged missions in isolated, confined, extreme environments.

Antone B. Lungeanu A. DeChurch L. Bell S. Contractor N.
SCHEDULE OPTIMIZATION TO IMPROVE TEAM OUTCOMES IN LONG-DURATION SPACE EXPLORATION **[#19398]**
We use computational modeling to examine the effect of scheduling on team composition in long-duration space exploration analogs.

Acemyan C. Adolf J.
LOW-, MEDIUM-, OR HIGH-FIDELITY? DEFINING LEVELS OF FIDELITY FOR THE DESIGN AND EVALUATION OF ENVIRONMENTS **[#19399]**
This work defines low-, medium-, and high-fidelity in the context of designing and evaluating environments—including physical, augmented, and virtual spaces.

Contractor N. Larson L. Gomez-Zara D. DeChurch L. Bell S.
INFORMAL LEADERSHIP IN SPACE CREWS **[#19400]**
This project examines the effects of social identity and social identification on the emergence of informal leadership networks in a 12-person complex mixed motives task.

mann V. Sundaresan A. Okoro E. Chaganti M. Williams C. Doursout M. Kulkarni A. Ngantcha P.
PROTECTION AGAINST NEURODENERATIVE DISEASE ON EARTH AND IN SPACE USING ETAS AS A SUPPLEMENT ON BRAINS OF ALZEIMER MICE -IMPLICAIONS ON BRAIN HEALTH AND MEMORY **[#19401]**
USE OF A NOVEL ENZYME TREATED EXTRACT (ETAS) SUPPLEMENT TO IMPROVE NEUROPROTECTIVE FUNCTIONS OF BRAIN TISSUE AND TO MITIGATE THE DETRIMENTAL EFFECTS OF MICROGRAVITY ON BRAIN MEMORY AND COGNITION.

Schneiderman J. Nguyen T. Roma P.
ASSESSMENT OF SPACEFLIGHT MEDICAL CONDITIONS' AND TREATMENTS' POTENTIAL IMPACTS ON BEHAVIORAL HEALTH AND PERFORMANCE **[#19402]**
Progress update on our ongoing effort to systematically assess how spaceflight medical conditions and their treatments may systematically contribute to behavioral health and performance risks in spaceflight.

Vazquez M. Wojcik H. Bell S. Gushin V. Vinokhodova A. Contractor N. DeChurch L. Moscati C.
TEAM CONFIGURATIONS OF PSYCHOLOGICAL DISTANCE AND TEAM PERFORMANCE **[#19403]**
Psychological distance networks were examined in their relation to team performance over time.

Bell S. Vinokhodova A. Gushin V. Contractor N. DeChurch L.
TOWARD A PROCESS MODEL OF INTERPERSONAL RELATIONSHIP FORMATION IN ICE ENVIRONMENTS **[#19404]**
We present our current process model of relationship formation in ICE environments, an important US-Russia collaborative effort that combines different approaches used to understand interpersonal compatibility in space crews.

Roma P. Schorn J. Schneiderman J.
ASSESSMENT OF CBS OPERATIONAL PERFORMANCE MEASURES **[#19405]**
Progress update on assessment of existing research measures of the brain performance pathways underlying the core tasks, individual and team neurobehavioral performance capabilities, and behavioral health and performance competencies for long-duration space exploration missions.

Holden K. Cross E.
HUMAN CAPABILITIES ASSESSMENT FOR AUTONOMOUS MISSIONS (HCAAM) INTEGRATION **[#19406]**
HCAAM research-related integration efforts are described.

Ershad F. Sim K. Yu C.
SOL-GEL-ON-POLYMER PROCESSED OXIDE SEMICONDUCTOR NANOMEMBRANE BASED SOFT UNNOTICEABLE ELECTRONICS FOR WEARABLE HUMAN-MACHINE INTERFACES **[#19407]**
We demonstrate multifunctional, wearable, stretchable, and imperceptible electronics for human machine interfaces (HMIs) that offer intelligent feedback to create closed-loop HMIs.

Shuffler M. Carter D. Pendegraft J. DeMass R. Alvarado L. Smith J. Carmona B. Mcelhenny E.
PROJECT FUSION: IDENTIFYING KEY CHARACTERISTICS OF SPACEFLIGHT MULTITEAM SYSTEMS WITH HISTORIOMETRIC ANALYSIS **[#19408]**
In Project FUSION, we are working to identify key SFMTS characteristics via the historiometric analysis of extracted incidents from interviews and observed interactions, as well as archival documentation from prior SFMTS-involved missions, analogs, and international partner analogs.

Newby N. Somers J.
SOYUZ LANDING RISK CHARACTERIZATION **[#19409]**
This study summarizes the occurence rates and types of injuries crewmembers are sustaining during Soyuz landings.

Young K. Kim H. Rajulu S.
QUANTIFICATION OF IN-FLIGHT PHYSICAL CHANGES: ANTHROPOMETRY AND NEUTRAL BODY POSTURE **[#19410]**
Nine subjects completed the study, collected pre-, in-, and postflight body measurements to determine how dimensions change during spaceflight.

Hong P. Vimal V. Zheng H. DiZio P. Lackner J.
DEVELOPING MACHINE LEARNING TECHNIQUES TO PREDICT THE PERFORMANCE OF SPACEFLIGHT TRAINEES USING THEIR TRAINING HISTORY **[#19411]**
We developed a machine technique to predict the future performance of a trainee in spaceflight tasks by analyzing their learning history in a training facility. The demonstration task requires trainees to dynamically stabilize themselves in a Multi-Axis Rotation System.

Landon L. Roma P. Whitmire A. Slack K.
EXAMINING HABITABILITY ON THE INTERNATIONAL SPACE STATION: BEHAVIORAL HEALTH AND PERFORMANCE CONSIDERATIONS **[#19412]**
A BHP-oriented supplement was awarded to the BHP Lab to examine psychological factors in addition to human factors concerns of efficient and effective layouts and designs previously examined by human factors researchers.

Sarma M. Ocobock C. Gettler L.
TOTAL ENERGY EXPENDITURE AND SOCIAL CONTEXT/DYNAMICS IN EXTREME ENVIRONMENTS **[#19413]**
Individuals with greater social support and greater resilience spend energy more efficiently when exposed to an extreme environment for the first time.

Hillenius S.
Autonomous Scheduling System Improvements Prior to HCAMM Integration **[#19414]**
Overview of additional enhancements for the Playbook tool prior to HCAMM integration work.

McLaughlin A. Pryor M. Hicks W. Byrne V.
CREATING A TAXONOMY OF VARIABLES AFFECTING COGNITIVE AID DESIGN VIA AN INVESTIGATION OF HYBRID AIDS **[#19415]**
The purpose of this project is to develop evidence-based guidelines for the design of cognitive aids and just-in-time training for rarely performed non-safety-critical tasks.

Iwig C. Salas E.
HUMAN-AUTOMATION INTERACTION MEASUREMENT (HAIM) TOOLKIT: FROM THEORETICAL FRAMEWORK DEVELOPMENT TO FINAL TOOLKIT DELIVERY **[#19416]**
This abstract highlights the major improvements made to the third and final prototype of the Human-Automation Interaction (HAIM) toolkit and summarizes the development process from the initial theoretical framework development all the way to the completion of the final toolkit prototype.

Iwig C. Salas E.
HUMAN-AUTOMATION INTERACTION MEASUREMENT (HAIM) TOOLKIT: FROM THEORETICAL FRAMEWORK DEVELOPMENT TO FINAL TOOLKIT DELIVERY **[#19417]**
The HAIM Toolkit was developed to aid designers assessing their systems by providing them with a collection of resources, measures, and guidelines for measurement in an effort to inform development of safe and efficient human-automation systems.

Coleman M. Saxena M. Bicher S. Wei H. Evans A. Shelby M. Kuhlman B. Porada C. Almeida-Porada G. Wilson P. Schmid T.
DEVELOPMENT OF CURCUMIN NANOPARTICLES FOR RADIATION PROTECTION **[#19418]**
We have developed curcumin-loaded nanoparticles, which show promising results in enhancing curcumin solubility, while lowering its toxicity to provide raddioprotection based on our prelimenary data.

Thursday, January 24, 2019

Poster Session B: Space Radiation Miscellaneous

4:00 PM **Exhibit Hall A**

Mao X. Stanbouly S. Nishiyama N. Wang C.
TRANSCRIPTOMIC ALTERATIONS OF SIMULATED MICROGRAVITY AND LOW-DOSE RADIATION IN THE MOUSE BRAIN AND RETINA **[#19419]**
we performed a mouse transcriptional profiling study in the brain and eye to identify and characterize the genomic response associated with neurodegeneration at early stage after exposure to simulated microgravity and low-dose radiation.

Rosenberg S. Xia J. Chiu L. Garcia-Villada L. Wang A. Perren J. Shen X. Lynn E. Sawakuchi G. Li L. Miller K.
Discovery of human radiation-protection genes and pathways **[#19420]**
This project leverages our discovery of a set of conserved bacterial proteins that, when overproduced, confer reduced cellular levels of endogenous DNA damage.

Cekanaviciute E. Malkani S. Paulino Lima I. Costes S.
COMPARING HUMAN IMMUNE SENSITIVITY TO IONIZING RADIATION **[#19421]**
We compared ionizing radiation-induced DNA and cellular damage of primary immune cells from a large cohort of healthy people to identify radiation-resistant and radiation-sensitive subjects for studying genomic associations with radiation sensitivity.

Weil M. Borak T. Krumland N. Phillips P.
A FACILITY TO INVESTIGATE HEALTH EFFECTS FROM HIGH LET RADIATION AT SPACE-RELEVANT DOSE RATES AND TOTAL EXPOSURES **[#19422]**
A facility capable of irradiating mice and rats with high LET radiation at space-relevant dose rates for times exceeding one year is in operation.

Steller J. Ronca A. Powell T. Jansson T.
EFFECTS OF NEAR-CONTINUOUS LOW-DOSE NEUTRON IRRADIATION ON PREGNANCY OUTCOMES IN MICE **[#19423]**
The objective of this study is to determine the impact of near-continuous neutron irradiation in pregnant mice on litter characteristics, fetal growth, and placentation.

Berger T. Aeckerlein J. Marsalek K. Przybyla B. Wirtz M. Matthiae D. Gaza R. Hussein H. Patel C. Shelfer T. Murrow D. Waterman G. Milstein O. Gaza R. Leitgab M. Lee K. Semones E.
MATROSHKA ASTRORAD RADIATION EXPERIMENT (MARE) ON THE ORION EM-1 FLIGHT: HOW TO TACKLE THE HAZARD OF RADIATION FOR EXPLORATION MISSIONS **[#19424]**
The Abstract describes the concept of the MATROSHKA AstroRad Radiation Experiment (MARE) to be flown on the NASA ORION EM-1 Mission for the Investigation of the Radiation load on humans and the protection properties of the AstroRad vest.

Beltran E. Orlando T. La Saponara V. Seibers Z.
RADIATION SAFETY SYSTEMS INTEGRATION FOR EVA AND SURFACE OPERATIONS IN HUMAN SPACE EXPLORATIONS **[#19425]**
REVEALS focus is on radiation protection and establishing radiation risk mitigation strategies. The development and testing of new materials, and developing a practical operational integration in spacesuits and crew surface mobility would decrease the probability of radiation exposure.

Fox D. Jezuit E. Clay D. Doddabele R.
GENETIC SCREENING IN DROSOPHILA FOR RADIATION RESISTANCE MECHANISMS **[#19426]**
To identify new molecularly targeted strategies to promote radiation resistance, we are undertaking candidate and unbiased genetic screens in the fruit fly, Drosophila.

Nia A. Shavkunov A. Ullrich R. Emmett M.
RADIATION INDUCED LIPID CHANGES IN LIVER BY MALDI IMAGING COMBINED WITH SPATIAL SHRUNKEN CENTROID CLUSTERING **[#19427]**
We report here the changes in lipid profiles of liver tissues after exposure to radiation using Spatial Shrunken Centroid Clustering.

Orlando T. Frey E. First P. Jiang Z.
NEW MATERIAL SYSTEMS FOR INTEGRATING NEUTRON DOSIMETRY INTO SPACESUITS **[#19428]**
A novel 2D material system for detecting neutrons has been proposed to address the need for flexible dosimeters capable of spacesuit integration.

Laiakis E. Barnette B. Strain S. Lichti C. Yongjia Y. Ullrich R. Fornace Jr A. Emmett M.
GLOBAL METABOLOMIC ANALYSIS OF LOW DOSE, HIGH ENERGY IRRADIATED SPLEEN TISSUE REVEALS PERSISTENT PRO-INFLAMMATORY CHANGES **[#19429]**
Longitudinal metabolomic responses of low dose, high energy irradiated spleen tissue.

Hu S.
ACUTE RADIATION RISKS TOOL (ARRT) SOFTWARE DEVELOPMENT AND ALGORITHM VALIDATION **[#19430]**
An operational tool is developed to assess acute radiation risks for the crew in real-time based on on-board dosimeter measurement.

Moses R. Singleterry R. Bushnell D.
MASS-BASED GCR SHIELDING ESTIMATES FOR CIS-LUNAR PREPARATIONS FOR HUMANS ON MARS **[#19431]**
The purpose of this paper is to illustrate those options by providing mass GCR radiation shielding designs, estimates, and potential material sources for several mission scenarios focused on safe days in space that include cis-lunar training durations as well as for roundtrip Mars missions.

Haggett L. Xia J. Rosenberg S.
MECHANISMS OF PROTECTION FROM RADIATION BY NATURAL PROTEINS **[#19432]**
This project leverages proteins that confer lower-than-normal levels of spontaneous DNA damage to cells to discover molecular mechanisms of protection from radiation by overproduced natural proteins.

AGENDA AT A GLANCE DAY 4

FRIDAY, JANUARY 25, 2019

	Plenary (Exhibit Hall B)	Poster (Exhibit Hall A)	Galleon I	Galleon II & III	Innovation Pavilion (Ballroom A)	Grand Ballroom B	Grand Ballroom C
8:00 AM			How We Do Business	ISSMP Flight		Radiation, Immunity & Herpesvirus Reactivation	Spaceflight & CV Disease
9:30 AM	Break						
9:45 AM				ISSMP Analogs		Charged Particle-Induced Disruption of CNS Function	CV Disease-Evidence Base
11:15 AM	Obtain Lunch						
12:00 PM	Lunch Talk						
1:00 PM				Epidemiology & Risk Models		Food & Nutrition	SR-CV Disease & Late CNS
2:30 PM	Break						
3:00 PM	Astronaut Plenary						
4:00 PM	Poster Awards & Closing Remarks						
4:30 PM	Adjourn						

FEATURED PLENARY SPEAKERS



Mark Shelhamer

Associate Professor, Otolaryngology – Head and Neck Surgery

Johns Hopkins



Don Pettit

Astronaut

NASA JSC

Friday, January 25, 2019

How We Do Business

8:00 AM **Galleon I**

Chair: **Susan Steinberg**

8:00 AM Antonsen E.
Human System Risk at NASA **[#19109]**
This talk is intended to explain how Human System Risks are evaluated and prioritized by the relevant organizations at NASA.

8:15 AM Anton W.
RESEARCH TO MEET MISSION MILESTONES: MORE THAN WHAT MEETS THE EYE **[#19110]**
HRP makes adjustments to its research plans in response to and addresses risks associated with evolving policy constraints that impact how its work meets mission milestones.

8:30 AM Thomas D. Stealey S. Rose R. Warren C. Finkle T. Keune J.
NASA'S LIFE SCIENCES DATA ARCHIVE: ENABLING REUSE OF DATA **[#19111]**
The abstract describes the activities performed by the Life Science Data Archive and the Lifetime Surveillance of Astronaut Health projects to capture and preserve life sciences data for NASA.

8:45 AM Leinweber L. McIntyre L. Goodenow D. Gilkey K. Myers J.
MEDICAL EXTENSIBLE DYNAMIC PROBABILISTIC RISK ASSESSMENT TOOL (MEDPRAT) PROTOTYPE **[#19112]**
An overview of the Human Research Program's next generation medical risk tool

9:00 AM Steinberg S. Waid M. Miller M. Milstead L. Kimmel L. Haven C. Stewart H.
MAPPING THE HUMAN RESEARCH PROGRAM RESEARCH AND TECHNOLOGY PIPELINE TO EXPLORATION LIFE CYCLE PLANNING **[#19113]**
HRPs strategy for translation and maturation of research and risk mitigation products into recommendations for requirements useable by the vehicle development and end users in Orion, Deep Space Gateway (DSG), Lunar Surface and Deep Space Transport (DST) programs.

9:15 AM Discussion

9:30 AM Break

Friday, January 25, 2019

ISSMP Flight

8:00 AM **Galleon II & III**

Chair: **Scott Wood**

8:00 AM Wood S. Sandoz G.
INTEGRATING YOUR RESEARCH ON ISS: AN OVERVIEW OF COMPLEMENT PLANNING PAST, PRESENT AND FUTURE **[#19135]**
This is an overview of the research complement planning process that is facilitated by ISS Medical Projects to implement your flight research studies.

8:15 AM Zwart S. Bloomberg J. Crucian B. Lee S. Ott M. Oubre C. Reschke M. Roma P. Smith S. Stenger M. Mullenax C.
SPACEFLIGHT STANDARD MEASURES **[#19136]**
The Spaceflight Standard Measures Project was designed to collect a set of core measurements, representative of many of the Human Research Program-defined human spaceflight risks, from astronauts on International Space Station (ISS) missions.

8:30 AM Van Baalen M. Van Baalen M. Wear M. Babiak-Vazquez A. Evans R. Montague K.
USE of MEDICAL REQUIREMENTS DATA IN NASA RESEARCH **[#19137]**
Brief description of how medical requirements for spaceflight can be leveraged for research purposes.

8:45 AM Ray S. Perry L. Morshedi P.
MAGICAL MYSTERY TOUR: ISS HUMAN DATA SHARING **[#19138]**
Science Integration data sharing coordinators will review the ISS human research data sharing process, beginning with rules, boards, and procedures associated with processing data requests.

9:00 AM Discussion

9:30 AM Break

Friday, January 25, 2019

Radiation, Immunity and Herpesvirus Reactivation - Clinical Risks for Astronauts during Deep Space Exploration

8:00 AM **Grand Ballroom B**

Chairs: **Janice Huff and Brian Crucian**

8:00 AM Moreels M. Baatout S.
IMPACT OF PARTICLE IRRADIATION ON THE IMMUNE SYSTEM: FROM THE CLINIC TO MARS **[#19433]**
Overview of the impact of charged particles on the human immune system in astronauts and cancer patients.

8:18 AM Simpson R. Mylabathula P. Li L. Bigley A. Crucian B. Mehta S. Laughlin M. Rezvani K.
SIMULATED MICROGRAVITY 'DISARMS' HUMAN NK-CELLS AND INHIBITS ANTI-TUMOR CYTOTOXICITY **[#19434]**
Microgravity suppresses NK cell function by depleting cytotoxic granules, hindering lysosomal degranulation and attenuating TNFα and IFNγ production.

8:36 AM Lorenzi H. Voorhies A. Mehta S. Crucian B. Torralba M. Moncera K. Feiveson A. Pierson D. Ott M. Zurek-Varela E.
STUDY OF THE IMPACT OF LONG-TERM SPACE TRAVEL ON THE ASTRONAUTS' MICROBIOME **[#19435]**
We will present the latest results of the Astronaut's Microbiome project.

8:54 AM Simpson R. Bigley A. Agha N. Baker F. Spielmann G. Kunz H. Mylabathula P. Rooney B. Laughlin M. Mehta S. Pierson D. Crucian B.
NK-CELL FUNCTION IS IMPAIRED DURING LONG-DURATION SPACEFLIGHT: IMPACT OF 6 AND 12-MONTH MISSIONS TO THE ISS **[#19436]**
NK-cell function is reduced by ~50% during the flight phase of an ISS mission

9:12 AM Mehta S. Simpson R. Wu H. Rithidech K. Makedonas G. Stowe R. Rooney B. Krieger S. Agha N. Bigley J. Moreno-Villanuena M. Szpara M. Shipley M. Pierson D. Chouker A. Crucian B.
FUNCTIONAL IMMUNE' ISS INVESTIGATION: HERPES SIMPLEX VIRUS TYPE-1 REACTIVATION ASSOCIATED WITH A CASE OF PERSISTENT DERMATITIS DURING SPACEFLIGHT **[#19437]**
To determine the etiology for atypical persistent skin rashes manifested by some crewmembers, we present a case study of a crewmember during a long duration spaceflight in whom we detected HSV-1 both in saliva and in skin lesions.

9:30 AM Break

Friday, January 25, 2019

Spaceflight and Cardiovascular Disease - A Clinical Perspective

8:00 AM **Grand Ballroom C**

Chairs: **Zarana Patel and Stuart Lee**

8:00 AM Moudgil R.
RADIATION INDUCED CARDIOVASCULAR DISEASES: AN ODYSSEY OF BEDSIDE TO BENCH TO BEDSIDE APPROACH **[#19468]**
Clinical outcomes in radiation-induced cardiovascular disease can be replicated in animal models. We will discuss methods of designing these animal models with use of investigative tools that have direct translational capabilities from preclinical to clinical scenarios.

8:20 AM Chung C. Milgrom S. Lin S. Lopez-Mattei J. Gladish G. Yusuf S. Gandhi S. Dabaja B. Slack R.
IMAGING AND SERUM BIOMARKERS TO PREDICT AND IDENTIFY EARLY CARDIAC INJURY FROM RADIATION EXPOSURE **[#19469]**
We will collect and analyze data on cardiovascular impairment, as well as associated imaging and serum biomarkers, in patients with cardiac exposure to ionizing radiation during radiotherapy (RT) for cancer treatment.

8:40 AM Lee S. Ribeiro C. Martin D. Smith S. Zwart S. Laurie S. Macias B. Stenger M.
DEFINING THE RELATIONSHIP BETWEEN BIOMARKERS OF OXIDATIVE AND INFLAMMATORY STRESS AND THE RISK FOR ATHEROSCLEROSIS IN ASTRONAUTS DURING AND AFTER LONG-DURATION SPACEFLIGHT **[#19470]**
The purpose of this investigation is to determine whether biomarkers of oxidative and inflammatory stress are elevated during and after long-duration spaceflight and whether a relationship exists between these biomarkers and indices of atherosclerotic risk.

9:00 AM Charvat J. Lee S. Stenger M. Van Baalen M. Johnston S. Barlow C. Leonard D. Willis B. DeFina L.
CARDIOVASCULAR DISEASE RISK IN NASA ASTRONAUT ACROSS THE LIFESPAN: A MATCHED HISTORICAL COHORT STUDY **[#19471]**
Discussion of incidence of cardiovascular disease among astronauts in relationship to a matched cohort.

9:15 AM Patel Z.
SUMMARY OF THE 2018 SPACE RADIATION ELEMENT CVD/DEGEN EVIDENCE REVIEW **[#19472]**
A multidisciplinary panel of radiobiologists and clinicians were charged with evaluating the progress of the current research to quantify the risk of space radiation-induced cardiovascular diseases; this is a summary of the major questions, findings, and recommendations from the review.

9:30 AM Break

Friday, January 25, 2019

Cardiovascular Disease - Evidence Base to Assess Risk

9:45 AM **Grand Ballroom C**

Chairs: **John Baker and Janusz Kabarowski**

9:45 AM Simonetto C. Eidemüller M. Schöllnberger H. Kaiser C.
MECHANISTIC MODELING OF ATHEROSCLEROSIS TO INTEGRATE BIOLOGICAL AND EPIDEMIOLOGICAL EVIDENCE ON RADIATION EFFECTS **[#19013]**
Process-oriented models of cardiovascular disease allow to link presumed biological radiation effects to specific age-time patterns in the incidence risk.

10:05 AM Bishawi M. Brown Z. Lee F. Chiang Y. Abraham D. Mao L. Slaba T. Kidane Y. Thompson J. Foster M. Moseley M. Truskey G. Dewhirst M. Bowles D.
PROTEOMIC SIGNATURES OF SPACE RADIATION INDUCED CARDIOVASCULAR DEGENERATION **[#19014]**
We are testing the hypothesis that the proteomic signatures arising from different space radiation exposure scenarios correlate with the resulting type, onset, and magnitude of cardiovascular dysfunction.

10:25 AM Baker J. Lenarczyk M. Little M. Hopewell J. Kronenberg A.
DETERMINATION OF RISK FOR AND OCCURRENCE OF HEART DISEASE FROM SPACE RADIATION **[#19015]**
We are determining the increased risk for developing degenerative cardiac disease as a result of exposure to representative components of space radiation.

10:45 AM Goukassian D. Cimini M. Garikipati S. Addya S. Blakely E. Chang P. Kishore R.
Cardiovascular Disease Risks Due to Single Full Body gamma and HZE radiation – long -term Dose response StudieS **[#19016]**
These data identify potential IR-induced cardiovascular risk target genes and may guide efforts to minimize radiation-induced cardiovascular risks.

11:00 AM Tahimic C. Terada M. Steczina S. Abegaz M. Schreurs A. Shirazi-Fard Y. Cimini M. Goukassian D. Globus R.
EFFECTS OF SIMULATED WEIGHTLESSNESS ON THE RAT HEART **[#19017]**
We present findings from our study that aims to determine the responses of cardiac tissue to simulated weightlessness and recovery.

11:15 AM Break

Friday, January 25, 2019

ISSMP Analogs

9:45 AM **Galleon II & III**

Chair: **Brandon Vessey**

9:45 AM Vessey B. Pietrzyk R. Spence L.
IS A SPACEFLIGHT ANALOG THE RIGHT CHOICE FOR YOUR RESEARCH? **[#19128]**
Investigators will be provided an overview of opportunities for spaceflight analog research.

10:00 AM Vessey W. Shepanek M. Crain J. Hill E.
REALITIES OF LIFE AND RESEARCH IN THE ANTARCTIC: MCMURDO AND SOUTH POLE **[#19129]**
This presentation will provide an overview of life and conduct of research in Antarctic stations in order to correct common misconceptions about how these stations typically operate and to inform the scientific community of challenges to conducting research in these environments.

10:15 AM Spence L.
MODIFICATIONS TO HERA TO MEET USER NEEDS **[#19130]**
This presentation will provide an overview of recent modifications made to the HERA facility and simulation platform to support Campaign 5 research.

10:30 AM Addante R. Haugen P.
Crew Member Experiences in Analog Mission Studies **[#19131]**
An Engineer and Behavioral Scientist from Analog Mission crew will offer specialized insight into human factors and design efficiencies of analog studies, with applications to design & interpretation of future studies.

10:45 AM Roma P. Schneiderman J. Blackwell Landon L.
OVERVIEW OF NASA BEHAVIORAL HEALTH & PERFORMANCE STANDARD MEASURES **[#19132]**
We will provide an overview of the selection, development, validation, and operational integration of the NASA Behavioral Health & Performance (BHP) Standard Measures suite, including preliminary analyses of results from HERA and NEK.

11:00 AM Discussion

11:15 AM Break

Friday, January 25, 2019

Mechanisms Underlying Charged Particle-Induced Disruption of CNS Function

9:45 AM **Grand Ballroom B**

Chair: **Richard Britten**

9:45 AM Acharya M. Baulch J. Baddour A. Apodaca L. Kramar E. Alikhani L. Angulo M. Kang H. Parihar V. Dickstein D. Wang J. Weil M. Soltesz I. Britten R. Wood M. Limoli C.
LOW DOSE RATE NEUTRON EXPOSURE DISRUPTS NEUROTRANSMISSION AND COGNITIVE FUNCTION **[#19141]**
This study demonstrates for the first time that exposure to mission relevant doses and dose rates of neutrons pose significant risks of eliciting progressive and debilitating effects on cognitive function that may also hasten age-related neurodegenerative pathologies.

10:05 AM BRITTEN R. DUNCAN V. FESSHAYE A. WELLMAN L. SANFORD L.
THE IMPACT THAT SLEEP PERTURBATION HAS ON THE SEVERITY OF GCR-INDUCED IMPAIRMENT OF COGNITIVE FLEXIBILITY **[#19142]**
Sleep perturbation results in the unmasking of latest GCR-induced deficits in ATSET performance.

10:25 AM Parihar V. Angulo M. Usmani M. Barrett A. Syage A. Yu L. Acharya M. Baulch J. Charles L.
SEX-SPECIFIC EFFECT OF CHARGED PARTICLE IRRADIATION ON BRAIN FUNCTION **[#19143]**
Females are more resistant to adverse neurocognitive effects of space radiation

10:40 AM Klein P. Limoli C. Soltesz I.
SIMULATED GALACTIC COSMIC RAYS PERSISTENTLY DISRUPTS HIPPOCAMPAL NETWORKS **[#19144]**
Our work indicates that mission-relevant total doses, dose rates and relevant mixed ion compositions of galactic cosmic rays produce long-lasting deficits in cell-type specific elements of hippocampal networks.

11:00 AM Stark C. Kolarik B. Stark S. Wood M. Keiser A. Kwapis J. Baulch J. Acharya M. Limoli C.
CROSS-SPECIES ASSESSMENT OF HIPPOCAMPAL FUNCTION AND THE EFFECTS OF SPACE-BASED RADIATION **[#19145]**
We will present a cross-species approach (mouse and human) for behaviorally assessing hippocampal function and changes in hippocampal function that may result from exposure to galactic cosmic radiation.

11:15 AM Break

Friday, January 25, 2019

Challenges and Advances in Food and Nutrition to Support Long Duration Exploration

1:00 PM **Grand Ballroom B**

Chair: **Grace Douglas**

1:00 PM Goulette T. Dixon W. Zhou J. Peleg M. Decker E. McClements D. Xiao H.
DEGRADATION KINETICS OF VITAMINS B1 AND C IN SPACEFLIGHT FOOD PROCESSING AND STORAGE **[#19031]**
A novel and interactive kinetic modeling program produced by our research group was utilized to identify the two degradation parameters: decay rate constant at a given reference temperature or kTref, and temperature sensitivity term or cest, for the targeted vitamins in each food matrix.

1:18 PM Smith S. Heer M. Zwart S.
BIOCHEMICAL PROFILE: PROVIDING INSIGHT INTO VITAMIN STATUS ON INTERNATIONAL SPACE STATION (ISS) MISSIONS **[#19032]**
This paper will review vitamin status data obtained from the Biochemical Profile experiment.

1:36 PM Douglas G. Crucian B. Kloeris V. Krieger S. Mehta S. Lorenzi H. Smith S. Young M. Zwart S.
THE INTEGRATED IMPACT OF DIET ON HUMAN IMMUNE RESPONSE, THE GUT MICROBIOTA, AND NUTRITIONAL STATUS DURING ADAPTATION TO A SPACEFLIGHT ANALOG **[#19033]**
In this study we sought to determine the effect of the nominal shelf-stable spaceflight diet (SD) compared to an "enhanced" shelf-stable spaceflight diet (ED) on human biochemistry, immunology, and the microbiome in a ground-based space mission simulation.

1:54 PM Schreurs A. Steczina S. Lowe M. Bretl K. Tahimic C. Sowa M. Globus R.
POTENTIAL COUNTERMEASURE AGAINST THE EFFECTS OF SIMULATED SPACEFLIGHT ON MULTIPLE TISSUES **[#19034]**
Our data provides evidence of a potential countermeasure for the multiple tissue damage due to simulated spaceflight.

2:12 PM Hummerick M. Massa G. Johnson C. Scotten J. Spencer L. Wheeler R.
BASELINE MICROBIAL ASSESSMENT OF FRESH PLANT PRODUCE FOR SPACE **[#19035]**
We evaluated microbial levels of controlled environment-grown lettuce, mizuna, cherry tomato, radish and green peppers, comparable retail produce purchased at local grocery stores, and reported values in the literature to develop standards for microbial safety for space grown produce.

2:30 PM Break

Friday, January 25, 2019

Epidemiology and Risk Modeling

1:00 PM **Galleon II & III**

Chairs: **Zarana Patel and Ryan Norman**

1:00 PM Reynolds R.
SPACE RADIATION AND MORTALITY: EXAMINING THE EVIDENCE **[#19060]**
In this talk we will review the published research on space radiation dose and mortality risk among astronauts and cosmonauts.

1:20 PM Norman R. Blattnig S. Werneth C. Slaba T.
NASA LUNG CANCER RISK – INVESTIGATING UPDATES FOR NEVER-SMOKERS **[#19061]**
New data and improved modeling in the Life Space Study cohort of atomic bomb survivors increased our understanding of the interplay between smoking and lung cancer, which has allowed an investigation of the impact of these new results on lung cancer risk due to space radiation.

1:40 PM Boice J.
EVALUATION OF SEX-SPECIFIC DIFFERENCES IN LUNG CANCER RADIATION RISKS & RECOMMENDATIONS FOR USE IN TRANSFER MODELS **[#19062]**
Healthy American women and men exposed to chronic low-dose radiation within the Million Person Study of Low-Dose Health Effects are studied to learn whether differences exist in sex-specific lung cancer risks following prolonged exposure over years, and not acutely.

2:00 PM BRITTEN R. DUNCAN V. FESSHAYE A. LIMOLI C.
THE IMPACT of Z<15 IONS and NEUTRONS ON COGNITIVE FLEXIBILITY: NUMBERS NEEDED TO HARM ANALYSIS **[#19063]**
EXPOSURE TO LOW DOSES OF SPACE RADIATION LEADS TO SEVERE IMPAIRMENT OF EXECUTIVE IN FUNCTION IN 14-36% OF INDIVIDUALS

2:20 PM Discussion

2:30 PM Break

Friday, January 25, 2019

Space Radiation: Cardiovascular Disease and Late CNS effects

1:00 PM **Grand Ballroom C**

Chairs: **Cynthia Lemere and Michael O'Banion**

1:00 PM Lemere C. Hinshaw R.
SEX- AND APO E-SPECIFIC LATE CNS AND CARDIOVASCULAR EFFECTS OF MIXED BEAM GALACTIC COSMIC RADIATION: A PREVIEW OF UPCOMING STUDIES **[#19455]**
In our NASA successor grant, we will extend our research by comparing sham and 2 dose exposures (0.5 Gy and 0.75 Gy) of the new simplified 5-ion mixed field beam for simulated GCR at dose ratios of 74% proton, 18% alpha and 8% HZE in both in vivo and in vitro studies.

1:20 PM O'Banion M. Deane R. Belcher E. Hinkle J. Dionisio-Santos D. Williams J. Olschowka J.
IMPACT OF SPACE-RADIATION INDUCED ALTERATIONS ON TOXIC PROTEIN ACCUMULATION ASSOCIATED WITH NEURODEGENERATIVE DISEASE **[#19456]**

HZE radiation and protons reduce active transport of amyloid beta across the blood-brain barrier, suggesting a mechanism for accumulation of amyloid in mouse models of Alzheimer's disease following radiation exposure.

1:40 PM Boerma M. Cao M. Sridharan V. Singh P. Landes R. Chicco A. Weil M.
EFFECTS OF CHRONIC AND SINGLE-DOSE CHARGED PARTICLE EXPOSURE ON CARDIAC FUNCTION AND STRUCTURE IN MULTIPLE ANIMAL MODELS **[#19457]**
Here, we use animal models to assess effects of chronic neutron exposure on heart function and structure. Results are compared with those of high-dose rate proton and oxygen ion exposures in previous animal studies. We also test whether aspirin alters the cardiac response to radiation.

1:55 PM Suzuki C. Venkatesh S. Mareedu S. Moore L. Azzam E.
TISSUE SHARING PROJECT: EFFECTS OF SPACE RADIATION ON THE CARDIAC MITOCHONDRIAL STRESS RESPONSE **[#19458]**
Space radiation and cardiac mitochondrial stress

2:10 PM Kabarowski J. Walters K. Gupta K. Barnes S. Wilson L. Chang P.
THE ABILITY OF HEAVY IRON IONS TO INCREASE ATHEROSCLEROTIC CARDIOVASCULAR DISEASE RISK IN MICE INVOLVES INCREASED VASCULAR ADHESION ASSOCIATED WITH ALTERATIONS IN THE VASCULAR LIPIDOME. **[#19459]**
While terrestrial radiation is an established risk factor for atherosclerosis, the major cause of cardiovascular disease (CVD), the effects of galactic cosmic radiation (GCR) are less understood.

2:25 PM Discussion

2:30 PM Break