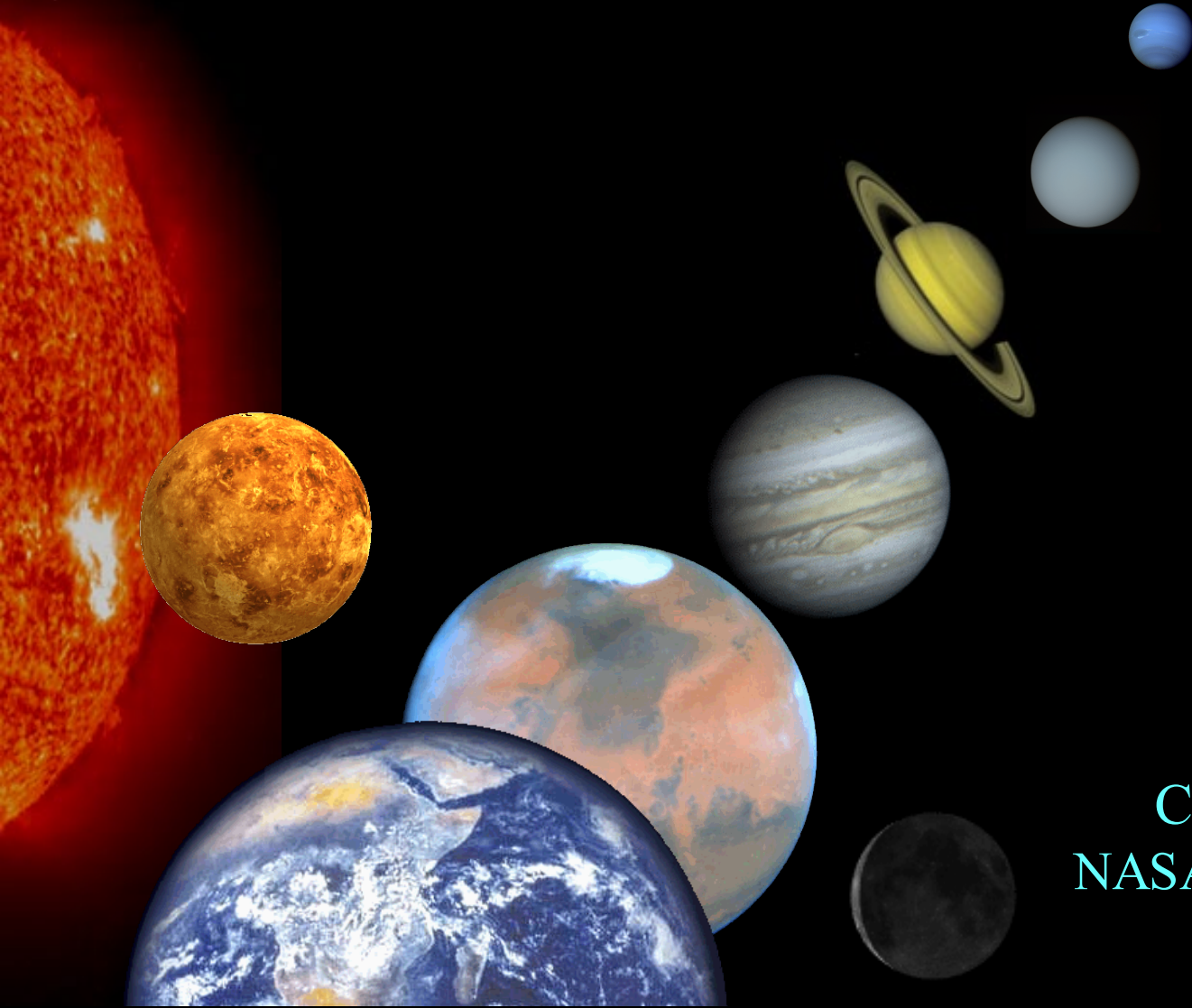


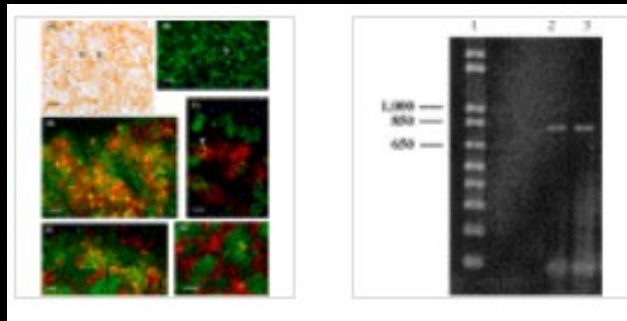
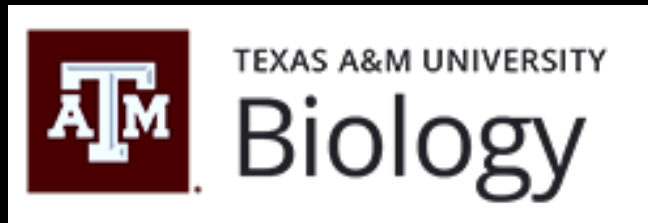
Science Management: NASA Human Research Program



Cherie M. Oubre, Ph.D.
NASA Johnson Space Center
December 3, 2021

Education

- **TAMU Ph.D. in Microbiology (August 1999 - May 2005).**
 - **Drs. Rita Moyes and Luc Berghman (Poultry Science)**
 - **Host-Pathogen/Humoral Immune development using chicken as model organism.**



Post-Doctoral Research

- **Post-doctoral Research (June 2005 – June 2007)**
 - **US Air Force School of Aerospace Medicine contractor**
 - **Brooks City Base in San Antonio, TX**
 - **War fighter health (hyperbaric wound healing, probiotics development and biomarkers for exhaustion).**



Journal of Wound Care, VOL. 16, NO. 6 | Research

Retrospective study of factors affecting non-healing of wounds during hyperbaric oxygen therapy

C.M. Oubre ✉, A. Roy, C. Toner, J. Kalns

Wyle/KBR – NASA Contractor

- **June 2007 – March 2018**
 - **Science Management**
 - **Spaceflight Associated Neuro-ocular Syndrome**
 - **Microbiology**
- **Managed research for several disciplines to enable PIs to perform science and make sure results were reviewed for importance to the mission.**
 - **Cardiovascular**
 - **Immunology**
 - **Bone**
 - **Pharmacology**
 - **Nutrition**
 - **Sensorimotor**

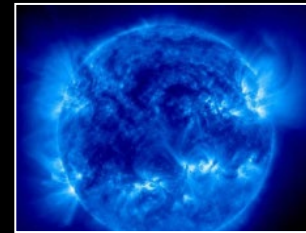


Human Research Program

To reduce the risks to human health & performance during space exploration missions through a focused program of:

Basic, applied, and operational research leading to the development and delivery of:

- **Human health, performance, and habitability standards**
- **Countermeasures and risk mitigation solutions**
- **Advanced habitability and medical support technologies**



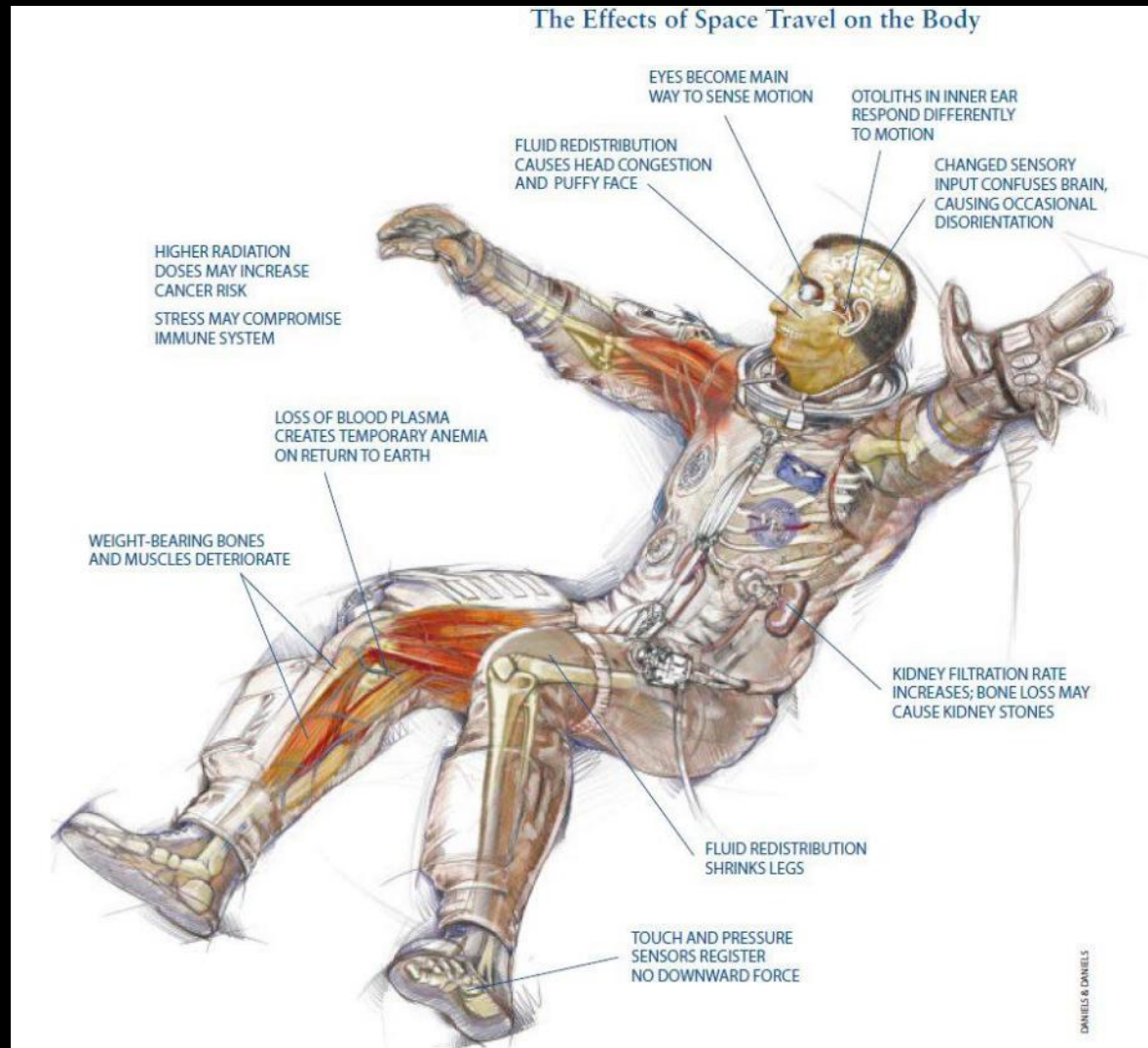
Evidence → Risks → Gaps → Research → Products

Keeping Astronauts Healthy

The primary job of many NASA scientists is to maintain the health and ensure the safety of the astronaut crew.

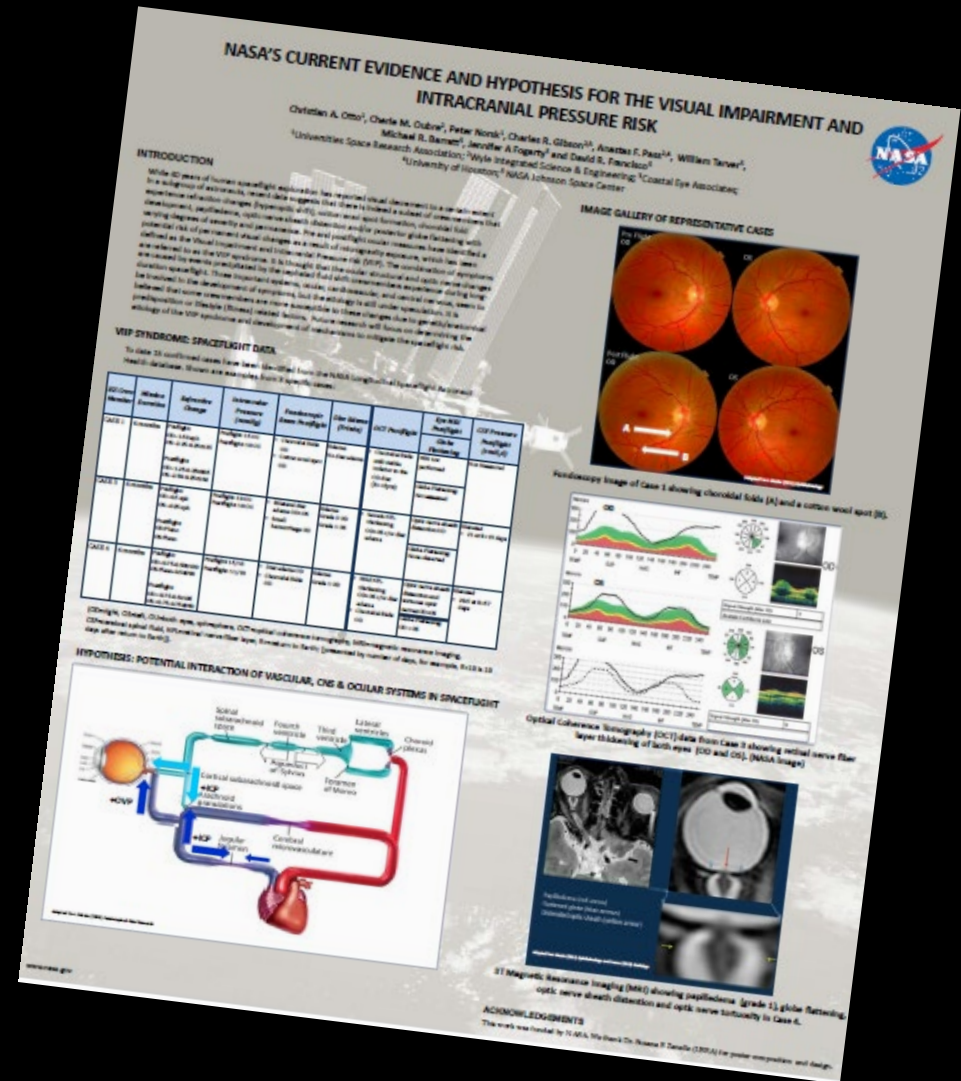


Spaceflight impacts on Human System

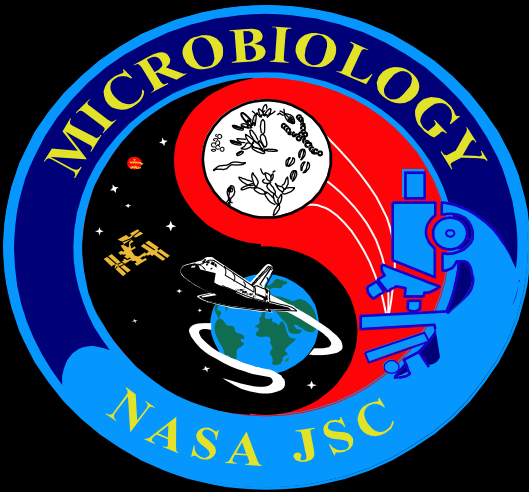


Initiation of the Vision Risk

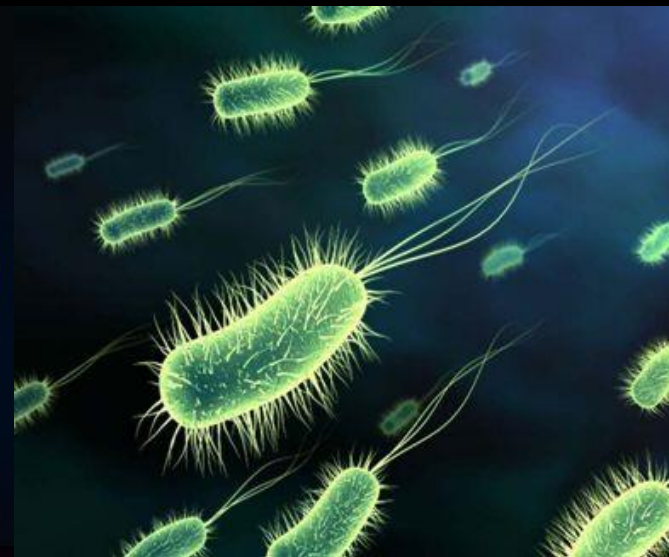
- **Deputy Scientist**
- **Worked with a diverse team to understand the newly identified health risk**
- **Joint development of research plans with medical, engineering and research groups.**



Spaceflight Microbiology



The Microbiology Laboratory at the Johnson Space Center is responsible for addressing crew health and environmental performance issues related to microbial infection and contamination.



Microbes are everywhere, but how do they get on board the ISS?

Sources of microbial contamination on the ISS

Microorganisms are transported to the ISS by the spacecraft itself, cargo, food, water and the crew.



Microbiology Laboratory

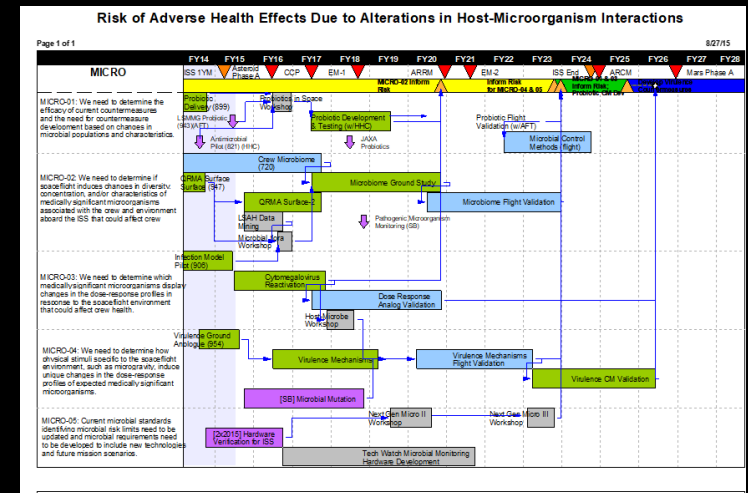
- Discipline Scientist
- Managed Human Research Program Risk:

Risk of Adverse Health Effects Due to Host-Microorganism Interactions



Evidence Report:

Risk of Adverse Health Effects Due to Host-Microorganism Interactions



HUMAN RESEARCH ROADMAP

HRP

DATA

EXPLORATION

[Home](#) | [HRP Goals and Objectives](#) | [Human Research Roadmap](#) | [HRP Organizational Structure](#) | [Acronyms](#) | [Reviews](#) | [Help](#)

EVIDENCE

MDRP

RISKS

GAPS

TASKS

REPORTS

EXPLORE

SEARCH

Human Research Roadmap

A Risk Reduction Strategy for Human Space Exploration

Explore the Roadmap

Search the Roadmap

Research: Does being in space lead to changes in bacteria?

- Yes! Researchers have found that some bacteria become more infectious and harmful after being in space.



- Other research has shown that bacteria that are normally yellow actually stop producing their yellow color and turn white.

Microbiology Laboratory

- **Investigative Research**
 - **Veggie Monitoring**
 - **Host-Pathogen Interactions Flight Study**



Environmental Monitoring and Remediation

- Determines levels of microbial contamination in the environment, astronauts perform regular checks of the air, water, and surfaces.
 - **Book chapters**
 - **Hardware Evaluations**



Engineering Controls



Expedition 9 photo of Functional Cargo Block (FCB) Panel #406 showing visible mold growth on the fabric covering of the panel. (NASA Photo ISS009E28779)

Spaceflight Technology Development: RAZOR



Research Operations and Integration

- **NASA Civil Servant (March 2018 – present)**
 - **Human Research Program – Research Operations and Integration**
 - **Deputy Element Scientist for flight research**

Implement spaceflight research for the Human Research Program



Research Implementation

- Work with PIs to understand research goals and develop ways to capture data during spaceflight
 - Crew-time – before, during and after flight are limited
 - Spaceflight environment – microgravity, radiation, confinement, etc
 - Up/down mass constraints
 - Technology constraints



Research Implementation

- **Work with groups inside and outside of NASA to enable the science:**
 - **NASA Medical Operations**
 - **NASA Flight Operations Directorate**
 - **International Partners**
 - **Commercial Vehicle Providers**



Research Implementation

- **Science Baseline Data Collection (BDC) Support:**
 - **Astronaut testing support**
 - **Informed Consent Briefings**
 - **Communication of testing details/requirements**
 - **Post-flight including rally airport (commercial)**
 - **Provide real-time guidance for operations**
 - **Coordinate and negotiate with internal/external groups to include the required science times**



A composite image of space featuring Earth, the Moon, Mars, a satellite, and a comet. The Earth is in the foreground, showing blue oceans and white clouds. The Moon is in the upper left, and Mars is in the upper right. A satellite is in the center, and a comet is in the lower right. The background is a starry space.

Questions?

cherie.m.oubre@nasa.gov