

## EXPLORATION MEDICAL CAPABILITY - ADVANCING MEDICAL SYSTEM DESIGN AND RISK-INFORMED DECISION MAKING FOR DEEP SPACE EXPLORATION

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**BACKGROUND:** Within NASA's Human Research Program, the Exploration Medical Capability (ExMC) Element has three primary focus areas: clinical and scientific research, systems engineering and trade space analysis, and technology development and demonstrations. These focus areas feed into the overarching goal of enabling progressively Earth-Independent Medical Operations (EIMO), a new paradigm that will be necessary for future Artemis and Mars medical and vehicle systems. This EIMO end state aligns with NASA's Moon to Mars Objectives, which clearly outline the need for NASA deep space exploration missions to reduce their reliance upon Earth and become increasingly autonomous, in preparation for the first human Mars mission.

**OVERVIEW:** To advance exploration medical systems and ultimately, integrated crew health and performance systems, ExMC's portfolio includes: funding ground development & testing of novel medical capabilities; creation of new approaches for the development of medical protocols and procedures; deployment of innovative technologies into analog environments; technology demonstrations in spaceflight; and eventual transition to operations of new capabilities for deep space exploration missions. The portfolio also includes: pharmaceutical research targeting stability, pharmacokinetics, and pharmacodynamics; integrated data architectures and clinical decision support tools; and systems engineering and trade space analysis tools to assist NASA in the development of future medical system models as well as the medical system requirements that can serve as a foundation for deep space exploration missions. All of these investments are done in a collaborative and coordinated fashion with other NASA stakeholders, such as the Environmental Control and Life Support Systems – Crew Health and Performance System Capability Leadership Team and the Health and Medical Technical Authority.

**DISCUSSION:** In this presentation, ExMC will provide an overview of our work from across our portfolio, all of which will inform future EIMO efforts at NASA. ExMC's research and development investments are targeted to reduce the human system risks associated with deep space exploration to the Moon and Mars.