

**CONCEPT CLEARANCE RECORD  
FY 2017 RESEARCH INITIATIVE – NCATS**

TITLE: NIH-CASIS Coordinated Program in Tissue Chip Systems for Translational Research in Space

OBJECTIVE(S): This proposed initiative seeks to leverage recent advances in tissue engineering and microfabrication to create microphysiological systems and organ-on-chip technology platforms that recapitulate human physiology, to better determine the molecular basis of human disease and/or the effectiveness of diagnostic markers and therapeutic intervention for disease treatment. The initiative will focus on the deployment and further development of tissue chip technology to facilitate space-related research at the International Space Station (ISS) and integrate results from that research into an improved understanding of human physiology. This initiative will advance biomedical research approaches and clinical technologies for use on Earth and in space and for research in Earth- and space-based facilities that could improve human health.

DESCRIPTION: Through a Memorandum of Understanding, NIH and the Center for the Advancement of Science in Space (CASIS) have partnered to collaborate and coordinate efforts that will help refine tissue chip technology for biomedical research use at the ISS.

Among the areas of research encouraged in this proposed initiative is translational research examining the mechanisms that underlie the effects of diseases or conditions associated with bone and cartilage, skeletal muscle, brain, gastrointestinal tract, lung, liver, microvasculature, skin, or other tissues, as well as research designed to improve the translation of existing knowledge of strategies for the prevention and treatment of such diseases or conditions.

Biphasic awards are planned. NCATS anticipates that the first phase will involve studies on ground development using tissue chip technology in microgravity environments, flight integration, experiments at the ISS and post-flight analysis. Successful projects will transition into the second phase for re-flight and additional experiments and analysis.

IMPORTANCE: The ability to use tissue chip technology to conduct biomedical research in space provides unprecedented opportunities to study the effects of microgravity, reduced-gravity environments at the ISS, and radiation exposure on many of the human body's systems. It is now widely known that accelerated aging occurs in space, due to muscle wasting, osteoporosis, reduced cardiopulmonary function, immune response, and other factors, but that these conditions are reversible when astronauts return to Earth. It is anticipated that this initiative by NCATS and CASIS will delve into the molecular basis, including epigenome changes, for these human conditions and provide information for novel targets for drug development.

PROJECT/PROGRAM OFFICER:

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