IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Life and Physical Sciences under reduced Gravity (7)

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THE INTERNATIONAL SPACE STATION U.S. NATIONAL LAB – TISSUE ENGINEERING AND REGENERATIVE MEDICINE

Abstract

The International Space Station (ISS) U.S. National Laboratory is enabling a new era of research in space aimed at improving life on Earth. The ISS National Lab accomplishes this by promoting and brokering a diverse range of research in life sciences, physical sciences, remote sensing, technology development, and education.

One area of focus for the National Lab is to actively support research efforts that are germane to the tissue engineering and regenerative medicine community. These efforts are in part solicited through sponsored requests for proposals such as previous ones focused on the Impact of Microgravity on Fundamental Stem Cell Properties and Microphysiological Systems for Organs-on-Chips Research.

Recently the ISS National Lab partnered with other government agencies to cosponsor research efforts that utilize advances in stem cell science, tissue biology, and engineering as well as the unique environment of the ISS National Lab. In 2016 the National Lab began a collaboration with the National Center for Advancing Translational Sciences (NCATS) and in 2018 expanded the collaboration to include the National Institute of Biomedical Imaging and Bioengineering (NIBIB). The goal of the collaboration is to promote and fund research into human physiology and disease on the ISS U.S. National Laboratory. As a result of the collaboration the groups have funded nine separate projects, five in 2017 and four in 2018. The first project focused on Microgravity as Model for Immunological Senescence and its Impact on Tissue Stem Cells and Regeneration launched on SpaceX-16 December 4th 2018. Four more of the project teams are set to launch on SpaceX-17.

Also, in 2018 the National Science Foundation (NSF) partnered with the ISS National Lab in the area of tissue engineering in order to issue two new awards. Currently the NSF has an open solicitation to fund tissue engineering and mechanobiology related research onboard the ISS National Lab.

Recently it was reported that a magnetic 3D bioprinter, Organaut, developed by 3D Bioprinting Solutions was used to print human cartilage tissue and a rodent thyroid onboard the ISS. It is anticipated

that in the next year or two the biofabrication capabilities available on the ISS will be further increased through the installation of Techshot's BioFabriation Facility as well as the 3D Bioprinter from Made In Space and Allevi.

Through partnerships with commercial entities and government agencies the ISS National Lab is a platform for advancing the issue engineering and regenerative medicine programs of today and tomorrow.