

IVGen Mini Techport May 2024

Project Description:

Intravenous (IV) fluids are an important treatment modality for multiple medical conditions that have the potential to occur during Mars missions and that may lead to adverse crew health and mission outcomes without appropriate treatment. However, carrying sufficient volumes of IV fluids with adequate shelf life to support such missions is currently not feasible due to anticipated mass and volume constraints of future vehicles and the relatively short shelf-life of terrestrial IV fluids. The goal of the IntraVenous Fluid Generation for Exploration Missions, Miniaturized, (IVGen Mini) project is to develop a low mass and volume IV fluid generation device that can produce IV fluids in situ and that reduces the need to launch and store large quantities of IV fluids. It builds on the original IVGEN system developed by the Human Research Program's Exploration Medical Capability Element that successfully demonstrated the capability to produce in-situ IV fluids aboard the ISS in 2010 using an ISS potable water source. Flight demonstration objectives for this system included purification via packed bed resin, bubble removal, sterilization, passive mixing in microgravity, and United States Pharmacopeia (USP) tested compliance. The project will culminate in a flight technical demonstration on the ISS in 2025/2026.

Anticipated Benefits:

IVGen Mini technology could be used on Earth to generate purified water and IV fluid in remote environments where medical resources are limited. For spaceflight exploration missions, an in-situ capability of generating IV Fluids reduces the overall mass and volume of the medical system and ensures access to fluids within their shelf-life, as terrestrial IV Fluids have a shelf-life of around 16 months.

The technology miniaturization effort is targeting a greater than 50% mass/volume savings as compared to pre-positioning of IV Fluid for a long duration mission. Additional enhancements are being made to the filtration assembly to minimize the risk of air or bubbles entering the final product to more effectively remove and eliminate endotoxins and other impurities.



Depiction of IVGen Mini in Microgravity Science Glovebox