Fiscal Year:	FY 2011	**Task Last Updated:**	FY 10/11/2011
PI Name:	McQuillen, John		
Project Title:	IntraVenous Fluid GENeration for Exploration Missions (IVGEN)		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Operational and clinical research		
Joint Agency Name:		**TechPort:**	Yes
Human Research Program Elements:	(1) **ExMC**:Exploration Medical Capabilities		
Human Research Program Risks:	(1) **Medical Conditions**:Risk of Adverse Health Outcomes and Decrements in Performance Due to Medical Conditions that occur in Mission, as well as Long Term Health Outcomes Due to Mission Exposures		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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City:	Cleveland	**State:**	OH
Zip Code:	44135	**Congressional District:**	10
Comments:			
Project Type:	FLIGHT	**Solicitation / Funding Source:**	Directed Research
Start Date:	04/01/2006	**End Date:**	08/31/2011
No. of Post Docs:	0	**No. of PhD Degrees:**	0
No. of PhD Candidates:	0	**No. of Master' Degrees:**	0
No. of Master's Candidates:	0	**No. of Bachelor's Degrees:**	0
No. of Bachelor's Candidates:	0	**Monitoring Center:**	NASA JSC
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Flight Program:	Shuttle/ISS		
Flight Assignment:	ISS ; STS-131		
Key Personnel Changes/Previous PI:			
COI Name (Institution):			
Grant/Contract No.:	Directed Research		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	The ability to generate intravenous (IV) fluids for medical care from available spacecraft potable or technical water supplies will greatly reduce launch mass for NASA's future exploration class missions. In spite of designing and testing several systems, NASA has not yet met that goal. As a result, NASA's Human Research Program initiated a detailed effort examining several different technologies for first purifying water and then mixing effectively with appropriate solutes. IntraVenous Fluid GENeration for Exploration Missions (IVGEN) will demonstrate a microgravity compatible water purification to the standards required for intravenous administration, and a pharmaceutical mixing system. This hardware is a prototype that will allow flight surgeons more options to treat ill or injured crewmembers during future long-duration exploration missions. Trade studies were used to down-select different technologies based on minimizing mass, volume, and power requirements. Experiments were conducted in normal and short duration reduced gravity facilities to verify actual performance of the selected technologies. Pressure driven systems with a gas-liquid separator and a DI (deionization) cartridge have been shown to generate Sterile Water for Injection per the United States Pharmacopeia (USP) standards. Furthermore, by pre-positioning a sterile magnetic stir bar and salt within an IV (intravenous) bag, the desired medical solution can be quickly and effectively generated. Given the limitations with both the normal gravity and ground-based reduced gravity testing, these results need to be verified on orbit using a prototype. Further, an appropriate system level test should be conducted prior to deployment. Accordingly, the objectives of this experiment include the following: • Produce an acceptable IV solution that meets USP requirements • Verify on orbit, using available microgravity-compatible technology and techniques, the acceptability of that solution, and • Obtain sufficient engineering data to permit scaling of the system per actual mission needs • Demonstrate end-to-end system level performance See also https://
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	IVGEN technology could be used on Earth to generate purified water and IV fluid in Third World countries where medical resources are limited.
Task Progress:	During the past year, electronic data was analyzed. A plan was developed and implemented to ascertain the cause for not meeting the USP target for acceptable saline concentration in the two samples that were produced. For the first case, the cause was attributed to the introduction of a larger than acceptable air bubble into the liquid feed. For the second case, the cause was that an insufficient amount of salt was premeasured into the mixing bags. A final report was generated--see Bibliography section.
Bibliography Type:	Description: (Last Updated: 09/07/2020)
NASA Technical Documents	McQuillen JB, McKay TL, Griffin DW, Brown DF, Zoldak JT. "Final Report for Intravenous Fluid Generation (IVGEN) Spaceflight Experiment." Washington, D.C. : National Aeronautics and Space Administration, 2011. NASA technical memorandum ; NASA/TM-2011-217033. https://ntrs.nasa.gov/citations/20110014585 , Jul-2011