Fiscal Year:	FY 2021	**Task Last Updated:**	FY 12/05/2020
PI Name:	Koehne, Jessica Ph.D.		
Project Title:	Printed Electrochemical Sensor Strip for Quantifying Bone Density Loss in Microgravity		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:			
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **HHC**:Human Health Countermeasures		
Human Research Program Risks:	(1) **Bone Fracture**:Risk of Bone Fracture due to Spaceflight-induced Changes to Bone (2) **Osteo**:Risk Of Early Onset Osteoporosis Due To Spaceflight		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	Jessica.e.koehne@nasa.gov	**Fax:**	FY
PI Organization Type:	NASA CENTER	**Phone:**	650-604-6818
Organization Name:	NASA Ames Research Center		
PI Address 1:	Center for Nanotechnology		
PI Address 2:	Mail Stop 229-3		
PI Web Page:			
City:	Moffett Field	**State:**	CA
Zip Code:	94035	**Congressional District:**	18
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2019 HERO 80JSC019N0001-FLAGSHIP & OMNIBUS: Human Research Program Crew Health. Appendix A&B
Start Date:	10/01/2020	**End Date:**	09/30/2021
No. of Post Docs:		**No. of PhD Degrees:**	
No. of PhD Candidates:		**No. of Master' Degrees:**	
No. of Master's Candidates:		**No. of Bachelor's Degrees:**	
No. of Bachelor's Candidates:		**Monitoring Center:**	NASA JSC
Contact Monitor:	Stenger, Michael	**Contact Phone:**	281-483-1311
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Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Graf, John Ph.D. (NASA Johnson Space Center)		
Grant/Contract No.:	Internal Project		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	The Human Research Program has outlined risks associated with human spaceflight within the Human Research Roadmap. One such risk is listed as the risk of bone fracture due to spaceflight-induced changes to bone. Our objective to create a printed amino-terminal collagen crosslinks (NTX) quantification sensor strip coupled with a facile urine collection and volume measurement device. The proposed project will be a ground-based study with the potential to be further developed for spaceflight. To accomplish the proposed objective, we will complete the following Aims. Aim 1: Develop conductive, telopeptide selective, and dielectric inks for printed sensor. Aim 2: Print and electrochemically characterize 3-electrode device for NTX detection. Aim 3: Integrate sensor with urine collection device and handheld potentiostat hardware. If successful, the proposed project will reduce risk of crew bone fracture by continuously evaluating bone health by monitoring mineral metabolism as excreted NTX for bone reabsorption. Future studies could expand the scope of health monitoring to include interferon gamma, tumor necrosis factor-alpha, 25 OH-vitamin B, and bone specific alkaline phosphatase, and/or other molecules of interest. Additionally, these sensors will be manufactured entirely by printing technology. It is anticipated that they can eventually be manufactured in an in-space environment, which directly compliments Space Technology Mission Directorate's In-Space Manufacturing project. By relying on simple printing technology, analytical sensors can be fabricated in space, which would enable adaptive crew health monitoring on long-duration space mission and future habitation.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2021.
Bibliography Type:	Description: (Last Updated: 04/14/2023)