Fiscal Year:	FY 2009	**Task Last Updated:**	FY 06/18/2009
PI Name:	Chan, Eugene M.D.		
Project Title:	Reusable Handheld Electrolytes and Lab Technology for Humans (rHEALTH Sensor)		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Operational and clinical research		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **ExMC**:Exploration Medical Capabilities		
Human Research Program Risks:	(1) **Bone Fracture**:Risk of Bone Fracture due to Spaceflight-induced Changes to Bone (2) **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 (3) **Osteo**:Risk Of Early Onset Osteoporosis Due To Spaceflight		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Zip Code:	02139-3323	**Congressional District:**	8
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	SBIR Phase II
Start Date:	01/09/2009	**End Date:**	01/08/2011
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
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Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):			
Grant/Contract No.:	NNX08CB51P		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	The goal of the rHEALTH sensor is to provide rapid, low-cost, handheld complete blood count (CBC), cell differential counts, electrolyte measurements, and other lab tests based on a reusable, flow-based microfluidic platform. For Phase II, we will develop an rHEALTH prototype to be delivered to NASA for reusable CBC, cell differential counts, and electrolyte measurements. Each subassembly and individual assay will be tested individually prior to full integration into the system level prototype. The rHEALTH sensor is a compact, portable device that employs cutting-edge fluorescence detection optics, innovative microfluidics, and unique capabilities. Based on its streamlined design, the rHEALTH sensor is able to perform a suite of different assays using a single drop of blood. Furthermore, the entire system allows cost-effective operation because of its nanoliter operating volumes. This is in contrast to existing point-of-care diagnostics devices such as the iSTAT and Piccolo systems which only perform one panel of assays per disposable reagent cartridge. The result is a highly practical, cost-effective, and powerful sensor. The successful completion of the Phase II program is a significant milestone for our rHEALTH sensor. It means that we would have been successful in shrinking hospital-sized clinical laboratory into a portable device. POTENTIAL NASA COMMERCIAL APPLICATIONS: (1) Real-time health monitoring. The proposed rHEALTH sensor is designed to monitor daily astronaut status so that adverse health events can be managed. (2) Real-time intervention. The ability to measure routine health status allows clinical intervention at appropriate times. (3) Electrolyte measurement on a daily basis for long space flight. (4) CBC measurements on a daily basis. (5) Measurement of cardiac biomarkers for chest pain to rule out myocardial infarction. (6) Measurement of CBC and electrolytes in response to astronaut illness. (7) Monitoring of astronaut renal function to assess volume status. (8) Tracking of bone biomarkers and calcium levels throughout duration of missions to assess intangible bone loss and remodeling.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	(1) Real-time health monitoring. Development of the rHEALTH allows monitoring of health status in real-time at the bedside or doctor's office. (2) Real-time intervention. Clinical intervention can be accomplished rapidly in acute situations with a handheld monitor. (3) Measurement of daily hematocrit for patients on coumadin or other anti-coagulation to diagnose early blood loss. (4) Detection of acute myocardial damage rapidly and outside the hospital so that life-saving therapy can be administered for heart attack patients. (5) Monitoring resolution of a patient's infection by tracking white blood cell counts throughout a prolonged antibiotic course. (6) Monitoring daily renal function of patients with kidney transplants or those with end-stage renal disease. (7) Measurement of athletes volume status during prolonged training for early diagnosis and dehydration. (8) Daily monitoring of electrolyte status for those individuals taking diuretics. Frequently, diuretics such as furosemide may cause hypokalemia and need to have their daily electrolyte status assessed.
Task Progress:	New project for FY2009. Reporting not required for this SBIR Phase 2 project.
Bibliography Type:	Description: (Last Updated: 01/06/2015)