Fiscal Year:	FY 2010	**Task Last Updated:**	FY 06/21/2010
PI Name:	Thomas, James David M.D.		
Project Title:	Impact of Long Duration Space Flight on Cardiac Structure and Function		
Division Name:	Human Research		
Program/Discipline:	NSBRI		
Program/Discipline--Element/Subdiscipline:	NSBRI--Cardiovascular Alterations Team		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **HHC**:Human Health Countermeasures		
Human Research Program Risks:	(1) **Cardiovascular**:Risk of Cardiovascular Adaptations Contributing to Adverse Mission Performance and Health Outcomes		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	thomasj@ccf.org	**Fax:**	FY 216-445-7306
PI Organization Type:	NON-PROFIT	**Phone:**	216-445-6312
Organization Name:	The Cleveland Clinic Foundation		
PI Address 1:	Cardiovascular Medicine		
PI Address 2:	9500 Euclid Ave		
PI Web Page:			
City:	Cleveland	**State:**	OH
Zip Code:	44195-0001	**Congressional District:**	11
Comments:			
Project Type:	FLIGHT	**Solicitation / Funding Source:**	2009 Crew Health NNJ09ZSA002N
Start Date:	05/01/2010	**End Date:**	04/30/2014
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:**	NSBRI
Contact Monitor:		**Contact Phone:**	
Contact Email:			
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Borowski, Allen (Cleveland Clinic Foundation) Bungo, Michael (University Of Texas, Houston) Greenberg, Neil (Cleveland Clinic Foundation) Kassemi, Mohammad (Case Western Reserve University) Levine, Benjamin (The University of Texas Southwestern Medical Center at Dallas) Martin, David (Wyle Laboratories, Inc.) Popovic, Zoran (Cleveland Clinic Foundation)		
Grant/Contract No.:	NCC 9-58-CA02203		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	As astronauts venture farther into space, the impact of long-term microgravity on cardiovascular function may become a critical limitation to mission safety and success. In order to better understand the impact of long-term spaceflight on the structure and function of the heart, this project's principal investigator is already involved in echocardiographic analysis of the most detailed study of the heart in space ever undertaken. Unfortunately, the echocardiograph on the International Space Station is more than a decade old and does not provide contemporary information on cardiac function, such as strain (the best measure of regional and global contraction of the muscle) and torsion (the twisting motion of the heart that links the pumping and filling functions of the ventricle). The first task in this project is to develop and validate methodology to extract strain and torsion from space station echocardiography and then combine it with the numerous pre- and post-flight studies that will be conducted over the next four years. From these data, the researchers will have a comprehensive view of the heart in space. This information will be integrated into evolving mathematical models of the heart developed by Thomas and his collaborators and will be made available to the NASA community via integration into the Digital Astronaut project. Finally, the researchers are involved extensively in the development of next-generation echocardiography machines and have the unique opportunity to develop and validate advanced applications for space use. The project will focus on massively parallelized echocardiography machines capable of real-time 3-D imaging with automated volume measurements and comprehensive 3-D strain and torsion analysis. As these machines become smaller over time, they will provide the ideal diagnostic tool for future space missions, be they to low-Earth orbit, a Lagrangian point, the moon, or even Mars.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2010.
Bibliography Type:	Description: (Last Updated: 04/09/2019)