Fiscal Year:	FY 2016	**Task Last Updated:**	FY 12/29/2017
PI Name:	Mujat, Mircea Ph.D.		
Project Title:	Optical System for Monitoring Net Ocular Blood Flow		
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) **SANS**:Risk of Spaceflight Associated Neuro-ocular Syndrome (SANS)		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	mujat@psicorp.com	**Fax:**	FY
PI Organization Type:	INDUSTRY	**Phone:**	(978) 738-8254
Organization Name:	Physical Sciences, Inc.		
PI Address 1:	20 New England Business Center		
PI Address 2:			
PI Web Page:			
City:	Andover	**State:**	MA
Zip Code:	01810-1077	**Congressional District:**	3
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	SBIR Phase II
Start Date:	06/01/2016	**End Date:**	05/31/2018
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:	Norsk, Peter	**Contact Phone:**	
Contact Email:	Peter.norsk@nasa.gov		
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):			
Grant/Contract No.:	NNX16CC20C		
Performance Goal No.:			
Performance Goal Text:			
Task Description:	Physical Sciences Inc. (PSI) proposes to develop a novel ophthalmic imaging platform for the characterization and monitoring of visual impairment observed in long-duration space flights. This platform will combine non-invasive measurement of retina/choroid structure and ocular blood flow based on Optical Coherence Tomography (OCT) and wide-field semi-quantitative global flow visualization using Line-scanning Doppler Flowmetry (LSDF). During Phase II a system will be fabricated utilizing the most deeply penetrating waveband around 1060 nm which is especially critical for choroidal imaging. Therefore, the PSI's instrument will address the need for accurate 3D measurement of posterior segment layer thicknesses and volumes, and vascular (retinal and choroidal) topology and flow quantification. This novel imaging platform will enable Phase II imaging studies in animals and human subjects in normal and fluid-shift models of micro-gravity conditions, which are in line with the International Space Station (ISS) mission. Prior PSI experience in developing advanced ophthalmic imaging systems and space-qualified hardware will be leveraged to ensure the successful outcome of this important R&D program.		

Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	Potential Non-NASA Commercial Applications: This technology has multiple potential uses in clinical research and healthcare. Understanding normal retinal functions and its alterations is a very active research area. The retina is among the most highly vascularized and metabolically active tissues in the body. It represents the only part of the central nervous system where capillary blood flow is visible and can be measured noninvasively. Like the central nervous system it is susceptible to ischemic (insufficient blood flow) injury. Degenerative neurovascular diseases (e.g., diabetic retinopathy) of the eye often have either hemodynamic consequences or causes, though the mechanisms are poorly understood. In addition to diseases there are other causes that can disturb the hemodynamic activity of the retina. Little is known about the ocular and cerebral blood flow during exposure to increasingly hypoxic conditions (insufficient oxygen supply) or hypercapnia (too much CO2). Blood flow alterations occur under the influence of prolonged hypoxia. There is a close correlation between the regulation of blood supply to the brain and to the retina, due to similar vascular regulatory processes. The auto-regulation of blood flow in the eye is clearly exquisitely sensitive to many neurovascular and metabolic signaling systems. An advanced diagnostic imaging system which can accurately track multiple anatomical and physiological changes in the eye over time is therefore fundamental to understanding and mitigating these effects.
Task Progress:	New project for FY2016. Reporting not required for this SBIR Phase 2 project.
Bibliography Type:	Description: (Last Updated:)