

<b>Fiscal Year:</b>	FY 2009	<b>Task Last Updated:</b>	FY 06/19/2009
<b>PI Name:</b>	Colosky, Paul M.S.		
<b>Project Title:</b>	The Constant Force Resistive Exercise Unit (CFREU) for Multi-Functional Exercise		
<b>Division Name:</b>	Human Research		
<b>Program/Discipline:</b>	HUMAN RESEARCH		
<b>Program/Discipline--Element/Subdiscipline:</b>	HUMAN RESEARCH--Biomedical countermeasures		
<b>Joint Agency Name:</b>	<b>TechPort:</b>	No	
<b>Human Research Program Elements:</b>	(1) <b>HHC</b> :Human Health Countermeasures		
<b>Human Research Program Risks:</b>	(1) <b>Muscle</b> :Risk of Impaired Performance Due to Reduced Muscle Size, Strength and Endurance		
<b>Space Biology Element:</b>	None		
<b>Space Biology Cross-Element Discipline:</b>	None		
<b>Space Biology Special Category:</b>	None		
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<b>Zip Code:</b>	77062-8105	<b>Congressional District:</b>	22
<b>Comments:</b>			
<b>Project Type:</b>	GROUND	<b>Solicitation / Funding Source:</b>	SBIR Phase II
<b>Start Date:</b>	03/06/2009	<b>End Date:</b>	03/05/2011
<b>No. of Post Docs:</b>		<b>No. of PhD Degrees:</b>	
<b>No. of PhD Candidates:</b>		<b>No. of Master' Degrees:</b>	
<b>No. of Master's Candidates:</b>		<b>No. of Bachelor's Degrees:</b>	
<b>No. of Bachelor's Candidates:</b>		<b>Monitoring Center:</b>	NASA JSC
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<b>Flight Program:</b>			
<b>Flight Assignment:</b>			
<b>Key Personnel Changes/Previous PI:</b>			
<b>COI Name (Institution):</b>			
<b>Grant/Contract No.:</b>	NNX08CC17P		
<b>Performance Goal No.:</b>			
<b>Performance Goal Text:</b>			
<b>Task Description:</b>	<p>NASA's vision for future exploration-class missions has made countermeasures for muscle atrophy, bone loss and cardiovascular deconditioning areas of major research design and development within the U.S. space program. Due to restricted volume and mass capabilities within the newly-developing Crew Exploration Vehicle (CEV) and Lunar Surface Access Module (LSAM), there is a need for a multi-functional, compact exercise machine that can incorporate both resistive and aerobic exercise capabilities during lunar sortie missions. The proposed innovation is an exercise device, the multi-functional Constant Force Resistive Exercise Unit (CFREU), that can provide a whole-body workout for aerobic exercise and resistive exercise. The device provides constant force eccentrically and concentrically during multiple exercise configurations, allows resistance selection in 2.5kg increments, requires no power to operate, requires no on-orbit maintenance, and can be stowed in an area of 1 cubic foot. During the Phase II performance period, we propose to develop a fully-functional CFREU, as well as to perform a usability study.</p> <p>POTENTIAL NASA COMMERCIAL APPLICATIONS: Valeo's competitive advantage lies within the CFREU design.</p>		

	<p>The unit is compact, easy to use, requires no power to operate, and requires no on-orbit maintenance or calibration. There is an evident need for a gravity-independent exercise unit that can provide a constant force for resistive exercise with integrated aerobic capability fashioned in a compact and lightweight design that offers familiarity, safety, and comfort during exercise.</p>
<b>Rationale for HRP Directed Research:</b>	
<b>Research Impact/Earth Benefits:</b>	<p>Rehabilitation institutions would benefit from the multi-functional CFREU design. A portable exercise machine that can provide aerobic and constant force resistive capabilities in such a small volume is essential in clinical settings, and would prove especially beneficial in treating patients confined to bed rest. Physiologically, the constant force resistance provided by the CFREU is comparable to a traditional weight stack machine, but without the bulkiness and mass of weight plates.</p> <p>The personal home exercise equipment industry would also benefit from the multi-functional CFREU device. The compact force packs of the CFREU allow the overall unit to be small enough for easy use as a home gym. For the home gym design, future force packs can be designed such that they may be purchased individually by a consumer, and used as portable exercise devices when not in use with the full CFREU. Thus, the force packs replace the need for expensive, heavy, and bulky traditional weight plates, and allow portability.</p>
<b>Task Progress:</b>	New project for FY2009. Reporting not required for this SBIR Phase 2 project.
<b>Bibliography Type:</b>	Description: (Last Updated: )