Fiscal Year:	FY 2011	Task Last Updated:	FY 09/02/2010
PI Name:	O'Banion, Kerry M.D., Ph.D.	-	
Project Title:	Local CNS and Systemic Inflammatory Effects Following Proton and Mixed Particle Exposure		
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Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline Element/Subdiscipline:	HUMAN RESEARCHRadiation health		
Joint Agency Name:	Те	chPort:	No
Human Research Program Elements:	(1) SR:Space Radiation		
Human Research Program Risks:	(1) BMed :Risk of Adverse Cognitive or Behavioral Conditions and	d Psychiatric Disorders	
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	kerry_obanion@urmc.rochester.edu	Fax:	FY 585-756-5334
PI Organization Type:	UNIVERSITY	Phone:	585-275-5185
Organization Name:	University of Rochester		
PI Address 1:	Box 603		
PI Address 2:	601 Elmwood Ave		
PI Web Page:			
City:	Rochester	State:	NY
Zip Code:	14642-0001 C	ongressional District:	25
Comments:			
Project Type:	Ground	Solicitation / Funding Source:	2008 Space Radiobiology NNJ08ZSA001N
Start Date:	11/01/2008	End Date:	10/31/2012
No. of Post Docs:	1	No. of PhD Degrees:	0
No. of PhD Candidates:	1 No	o. of Master' Degrees:	0
No. of Master's Candidates:	0	No. of Bachelor's Degrees:	0
No. of Bachelor's Candidates:	0	Monitoring Center:	NASA JSC
Contact Monitor:	Cucinott1a, Francis	Contact Phone:	281-483-0968
Contact Email:	noaccess@nasa.gov		
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Finkelstein, Jacob (University of Rochester School of Medicine) Williams, Jacqueline (University of Rochester) Olschowka, John (University of Rochester School of Medicine) Hurley, Sean (University of Rochester Medical Center))	
Grant/Contract No.:	NNX08BA09G		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	This proposal continues our investigation of inflammatory responses following exposure to space radiation. In particular, we will explore the effects of protons and mixed particle radiation, at doses and fluences expected during space travel, in the brain and lung as well as the systemic circulation of mice. Dose and time dependent alteration in inflammatory indices will be correlated with brain and lung degenerative changes, including failure of hippocampal neurogenesis and alterations in hippocampal dependent learning. We will also explore whether space radiation influences Alzheimer's disease pathogenesis using a unique transgenic mouse model and lung inflammation following challenge with inhaled lipopolysaccharide. Together these studies will address specific gaps in our current knowledge about the acute and late effects of space radiation on vulnerable tissues.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	In this second year of the grant we have continued to analyze data arising from our first set of irradiations that were conducted in May of last year (2009). This experiment essentially represents Experiment 1.1 of Specific Aim 1 (dose and time effects of protons on neurogenesis and hippocampal dependent learning and memory). The experiment comprises early (6 and 48 h) time points for histological and mRNA measures as well as later time points (1, 6 and 12 months) for neurogenesis and behavioral studies. We completed behavioral analyses for all time points and did not find any effect of radiation in our fear-conditioning paradigm. However, as previously reported, we did find radiation effects on weight gain with doses of 50, 100 and 200 Gy that started 2-3 months after irradiation and persisted to the end of the experiment. There were no adverse outcomes (e.g. animals dying) even out to the 12 month time point. To our surprise, analysis of doublecortin labeled cells as a marker of ongoing neurogenesis, 1 month after irradiation, did not show the expected blunting of this process, even at the highest proton dose studied (200 Gy). Based on RBE values, this is consistent with findings from our DOE/NASA funded studies, which showed decreased doublecortin labeling with HZE particle exposure (56Fe, 1000 MeV/n) at 100 cGy, but not at lower doses. Examination of BrdU incorporation, a more sensitive measure of neurogenesis, is underway. Similarly, RNA and immunohistochemical analyses are still in progress for this large number of samples. A second series of exposures was conducted as part of NSRL Run 09C (November 17-20) and involved nearly 750 mice. These studies comprised experiments 1.2 and 2.2 (Sex Differences) as well as 1.3 and 2.3 (Mixed particle exposure). As mentioned in the previous progress report, this strategy conserved animal humbers since male animals with protons alone are common to bot bparadigms. We have collected tissues from this study through the 6 month time point, but will not be processing them f
Bibliography Type:	Description: (Last Updated: 03/11/2025)