Task Book Report Generated on: 04/30/2024

P. Name:	Fiscal Year:	FY 2020	Task Last Updated:	FY 12/07/2020
Division Name:   Human Research   Program/Discipline:   Program/Discipline:   Program/Discipline-   Element/Studiocpline:	PI Name:	Fornace, Albert M.D.		
Program/Discipline: Program/Discipline- Element/Subdiscipline- Element/Subdiscipline- Element/Subdiscipline- Joint Agency Nume:  TechPort:  No  Human Research Program Elements:  (1) SR.Space Radiation  Human Research Program Riks:  (1) Camerr Risk of Radiation Carcinogenesis  Space Biology Cross-Element  None  Space Biology Cross-Element  Space Biology Cross-Element  None  Pl Emil:  ### Agency Cross-Element  ### Agency Cross-Eleme	Project Title:	Space Radiation-Induced Persistent Estrogenic Response and Risk of Breast Cancer Development		
Program/Discipline: Program/Discipline- Element/Subdiscipline- Element/Subdiscipline- Element/Subdiscipline- Joint Agency Nume:  TechPort:  No  Human Research Program Elements:  (1) SR. Space Radiation  Human Research Program Riks:  (1) Camer-Risk of Radiation Carcinogenesis  Space Biology Cross-Element  None  Space Biology Cross-Element  Space Biology Cross-Element  None  Space Biology Cross-Element  Mone  PI Emnil:  #### Address of Radiation Carcinogenesis  PI Address 1:  Popt of Oncology, Lombardd Comprehensive Cancer Center  PI Address 1:  Popt of Oncology, Lombardd Comprehensive Cancer Center  PI Address 1:  Popt of Oncology, Lombardd Comprehensive Cancer Center  PI Address 2:  Research Building, Room E504, 3970 Reservoir Rd., NW  PI Web Page:  City:  Washington  Many Substitution  Many Substitution  Many Substitution  ROUND  Solicitation / Funding and Proformance (PLAGSHIP).  Solicitation / Funding and Place (PLAGSHIP).  Sol				
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Human Research Program Elements				
Human Research Program Rislas:   Cl) Cancer:Risk of Radiation Carcinogenesis	Joint Agency Name:		TechPort:	No
Space Biology Element: Space Biology Cross-Element Discipline: Space Biology Cross-Element Discipline: Space Biology Special Category: None PI Email: af2946/accorectown eda af2946/acc	<b>Human Research Program Elements:</b>	(1) SR:Space Radiation		
Space Biology Cross-Element Discipline:  None  PI Email: af294@seorgetown edu Fax: FY  PI Organization Type: UNIVERSITY Phone: 202 687-7843  Organization Name: Georgetown University  PI Address 1: Dept. of Oncology, Lombardi Comprehensive Cancer Center  PI Address 2: Research Building, Room E504, 3970 Reservoir Rd., NW  PI Web Page:  City: Washington State: DC  Zip Code: 20007-2126 Congressional District: 1  Comments: Intro//www9.peoraetown.edu/  Project Type: GROUND Solicitation / Funding and Performance (ELAGSHIP. Source)  Sales Date: 01/02/2020 End Date: 01/01/2024  No. of PhD Candidates: No. of Master' Degrees: No. of Master's Candidates: No. of Master' Degrees: No. of Master's Candidates: No. of Master' Degrees: No. of Master's Candidates: Mona. claart@nass.acv  Flight Program:  Flight Assignment: Ed, note December 2020: Original Principal Investigator was Karnal Datta, M.D., who is now affiliated with NIII, as of early 2019. Pl changed to Albert Formace, M.D., before grant was awarded.  COI Name (Institution): USWSC19K1649  Performance Goal No.:	Human Research Program Risks:	(1) Cancer: Risk of Radiation Carcinogenesis		
Discipline:   Note	Space Biology Element:	None		
PI Email:  af204@acoractown.edu PI Organization Type:  UNIVERSITY Phone: 202 687-7843  Organization Name:  Georgetown University PI Address I: Dept. of Oncology, Lombardi Comprehensive Cancer Center PI Address 2: Research Building, Room E504, 3970 Reservoir Rd., NW PI Web Page:  City: Washington State: DC  Zip Code: 20007-2126 Congressional District: I Comments: http://www.9.georgetown.edu/  Project Type: GROUND Solicitation / Funding and Performance (FLAGSHIP), Appendix B-Omnibus  Start Date: No. of Post Does: No. of Post Does: No. of Post Does: No. of Post Does: No. of Master's Candidates: No. of Bachelor's Candidates: No. of		None		
PI Organization Type: UNIVERSITY Phone: 202 687-7843 Organization Name: Georgetown University PI Address 1: Dept. of Oncology, Lombardi Comprehensive Cancer Center PI Address 2: Research Building, Room E504, 3970 Reservoir Rd., NW PI Web Page: City: Washington State: DC Zip Code: 20007-2126 Congressional District: 1 Comments: http://www9.georgetown.edu/ Project Type: GROUND Solicitation / Funding and Performance (FLAGSHIP, Source: ONNIBUS), Appendix A-Flagship, Appen	Space Biology Special Category:	None		
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	Grant/Contract No.:	80NSSC19K1649		
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Task Description:

Breast cancer is the most common malignancy in women worldwide and it is predicted that in the USA, 1 in 8 women will develop invasive breast cancer in her lifetime. Given that there is already high incidence of breast cancer in general population and even low doses of radiation have been established as a breast cancer risk factor, an even small increase in breast cancer after space radiation will have significant impact on health of women astronauts undertaking long duration space missions. Since space radiation is characteristically different than typical terrestrial radiation (gamma-rays and x-rays), it is expected that women astronauts will have higher risk of breast cancer relative to women on Earth. Also, deep space missions such as return trips from Mars due to their long time span have the risk of women astronauts being diagnosed with new mass in breast even during space travel. However, currently, there is large uncertainty in both temporal and spatial breast cancer risk prediction as well as risk management approach due to paucity of in vivo data. The purpose of the proposed studies is to reduce the margins of uncertainty for breast cancer risk prediction and to initiate experiments to understand quantitatively and qualitatively the effects of space radiation dose rates on breast cancer risk including establishing the initial shape of the response curve at low fluence (less than one ion per cell). The proposed project is based on our initial discovery that showed exposing wild type female C57BL/6J mice to a whole-body non-lethal dose of gamma radiation (2 Gy) led to persistent estrogenic response (PER) at the systemic in serum and urine as well as at the tissue level in mammary glands. Our preliminary data in female APCMin/+ mice in C57BL/6J background show increased mammary tumor frequency and grade along with systemic and local PER after exposure to proton radiation relative to gamma-rays. Since estrogen is a key promoter of breast cancer, we will test the hypothesis that space radiation-induced PER will be higher with increased mammary gland tumorigenesis irrespective of dose rates relative to gamma radiation and that blocking radiation-induced PER will lower the risk of mammary gland tumorigenesis. The overall goal of this project is to understand space radiation-induced PER, its mechanisms and relation to mammary gland tumorigenesis, and whether a Food and Drug Administration (FDA) approved selective estrogen receptor modulator (SERM) could be used to block radiation-induced PER to reduce tumorigenic risk. The current proposal will compare the results of priority beams in the current solicitation at different dose rates using? radiation data as the baseline in female APCMin/+ mice to 1) develop breast cancer risk prediction models, 2) identify early markers of breast cancer risk, and 3) test tamoxifen, an FDA approved breast cancer chemoprevention agent, for space radiation-induced breast cancer risk mitigation.

Rationale for HRP Directed Research:

Research Impact/Earth Benefits:

New project for FY2020.

Task Progress:

(Note: project added to Task Book when received information in December 2020.)

Bibliography Type:

Description: (Last Updated: 04/18/2024)