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| **Fiscal Year:** | FY 2019 | **Task Last Updated:** | FY 03/12/2019 |
| **PI Name:** | Rithidech, Kanokporn Ph.D. | | |
| **Project Title:** | Countermeasures Against Adverse Effects of Space Radiation | | |
| **Division Name:** | Human Research | | |
| **Program/Discipline:** | | | |
| **Program/Discipline--Element/Subdiscipline:** | | | |
| **Joint Agency Name:** | | **TechPort:** | No |
| **Human Research Program Elements:** | (1) **SR**:Space Radiation | | |
| **Human Research Program Risks:** | (1) **Cancer**:Risk of Radiation Carcinogenesis | | |
| **Space Biology Element:** | None | | |
| **Space Biology Cross-Element Discipline:** | None | | |
| **Space Biology Special Category:** | None | | |
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| **PI Organization Type:** | UNIVERSITY | **Phone:** | (631) 444-3446 |
| **Organization Name:** | State University New York at Stony Brook | | |
| **PI Address 1:** | Department of Pathology | | |
| **PI Address 2:** | BHS T9 Health Sciences Center | | |
| **PI Web Page:** | | | |
| **City:** | Stony Brook | **State:** | NY |
| **Zip Code:** | 11794-8691 | **Congressional District:** | 1 |
| **Comments:** | | | |
| **Project Type:** | GROUND | **Solicitation / Funding Source:** | 2017-2018 HERO 80JSC017N0001-BPBA Topics in Biological, Physiological, and Behavioral Adaptations to Spaceflight. Appendix C |
| **Start Date:** | 01/31/2019 | **End Date:** | 05/30/2021 |
| **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:** | Simonsen, Lisa | **Contact Phone:** | |
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| **Flight Program:** | | | |
| **Flight Assignment:** | | | |
| **Key Personnel Changes/Previous PI:** | | | |
| **COI Name (Institution):** | | | |
| **Grant/Contract No.:** | 80NSSC19K0435 | | |
| **Performance Goal No.:** | | | |
| **Performance Goal Text:** | | | |

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| | Our primary goal is to test the efficacy of apigenin (AP) for prevention and mitigation of cancer due to space radiation exposure as measured by incidence, aggressiveness, burden, and latency. Our main hypothesis is that AP exhibits its beneficial effects by suppression of radiation-induced inflammation and oxidative stress during the initiation/promotion steps of carcinogenesis. Although the emphasis will be the mitigation of lung cancer and lymphoma/leukemia, other types of cancer will be recorded.<br>Apigenin (AP) is a dietary supplement known to possess potent antioxidant, anti-inflammatory, and anti-cancer activities in various tissues. We are the first to report that AP protects human lymphocytes from exposure to radiation in vitro and that AP attenuates inflammation and oxidative damage in bone marrow cells of mice exposed to radiation. These findings lay the groundwork for this project. |
| **Task Description:** | We will give food containing AP to mice (males and females) before and after exposure to silicon (Si) ions. Subsequently, the mixed-beam (protons + Si) experiment will be designed. Oxidative stress and inflammation are highly relevant not only to carcinogenesis but also to cardiovascular and nervous disorders. Hence, groups of mice from each treatment will be used for a serial sacrifice schedule at 1 week and 3 months post-irradiation. This will test the ability of AP to counteract heavy-ion-induced early- and late-occurring inflammation and oxidative damage in various tissues linked to cancer that are the focus of our study (i.e., bone marrow, lung, thymus, spleen), including the heart and the brain of the same mouse. All remaining mice will be observed for morbidity and mortality until they reach about 800 days of age. Our data enable the evaluation of countermeasure efficacy of AP not only across tissues at risk for cancer but also across risk areas. This multi-tissue approach has not been used in space research. |
| **Rationale for HRP Directed Research:** | |
| **Research Impact/Earth Benefits:** | |
| **Task Progress:** | New project for FY2019. |
| **Bibliography Type:** | Description: (Last Updated: 05/17/2023) |