



## NASA SBIR 2019 Phase I Solicitation

### H12.01 Radioprotectors and Mitigators of Space Radiation-induced Health Risks

Lead Center: JSC

Technology Area: TA6 Human Health, Life Support and Habitation Systems

Space radiation is a significant obstacle to sending humans on long duration missions beyond low earth orbit. NASA is concerned with the health risks to astronauts following exposures to galactic cosmic rays (GCR), the high-energy particles found outside Earth's atmosphere. Astronaut health risks from space radiation exposure are categorized into cancer, late and early central nervous systems (CNS) effects, and degenerative risks, which include cardiovascular diseases (CVD) and premature aging.

This subtopic is for development of biological countermeasures that can target common pathways (e.g., inflammation) across aging, cancer, cardiovascular disease, and neurodegeneration in order to minimize or prevent adverse health effects from space radiation. Drugs that target senolytic agents for anti-aging are the emphasis of this solicitation. The proposed project should focus on repurposing of technology and compounds for NASA applications. Expected TRL for this project is 5 to 8.

In Phase I of the project, the company should test radioprotectors or mitigators using protons or other charged particles at doses simulating exposure to space radiation. This testing can be done with cell models at the location of choice. Deliverables for the Phase I will be data generated from this exposure with the radioprotector selected. After contract award, due to the nature of this research, the contractor should immediately coordinate with their technical monitor for any special considerations for testing. In Phase II of the project, we would expect the company to expand testing radioprotectors or mitigators with combinations of different particles and energies that simulate the space radiation environment.

This subtopic seeks technology development that benefits the Space Radiation Element of the NASA Human Research Program (HRP). Biomedical countermeasures are needed for all of the space radiation risks. Anti-aging drugs are relevant to cancer, degenerative tissue damage and CNS damage.

#### References:

The following references discuss the different health effects NASA has identified in regard to space radiation exposure:

- Evidence report on central nervous systems effects  
- <https://humanresearchroadmap.nasa.gov/evidence/reports/CNS.pdf>.
- Evidence report on degenerative tissue effects  
- <https://humanresearchroadmap.nasa.gov/evidence/reports/Degen.pdf>.
- Evidence report on carcinogenesis - <https://humanresearchroadmap.nasa.gov/evidence/reports/Cancer.pdf>.

