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SPACEFLIGHT-INDUCED EFFECTS ON OCULAR RESPONSE AND BLOOD-RETINA BARRIER FUNCTION

Abstract

The health risk of flight condition-triggered ocular injury and neurodegeneration has long been a concern. Spaceflight mission will likely expose the astronauts and experiment payloads to greater radiation levels compared to those encountered on the Earth. Knowledge about the susceptibility to low doses of radiation and combined exposure to other environmental stressors during space missions is very limited. Our previous study revealed that exposure to low-dose ionizing radiation induced cellular oxidative damage that may alter retina structure and blood-retina barrier (BRB) integrity. Significant changes in retinal endothelial cells occur at doses as low as 1 cGy. Our data for combined exposure of solar particle event (SPE)-like exposures of proton irradiation and simulated microgravity has shown significant impact of spaceflight condition on retinal endothelial cell survival. Recent flight study also showed that spaceflight impacts on photoreceptor integrity and BRB function in the mouse retina. Investigation of the short and long-term effects of spaceflight on ocular structure, neurovascular remodeling and BRB function is important for potential risk assessment on developing spaceflight-induced neuro-ocular syndrome and late retinal degeneration associated with deep space travel.