

NASA-Backed Entity Aims to Combat Ocular Conditions Caused by Space Travel

A public-private partnership was recently formed with the task of addressing the unmet need of safeguarding the eye during and after long-duration space travel.

The National Space Biomedical Research Institute (NSBRI), a NASA-backed entity, reached out to The Magnum Group, an ophthalmic business development firm, to recruit a team of ophthalmologists and business representatives who are leaders in their fields.

The aim of the NSBRI is to address the physical and psychological challenges that men and women face on long-duration space missions. Through its Industry Forum, the NSBRI partners with the private sector to advance and deliver mature medical technologies to the manned space program.

The partnership launched its Vision for Mars challenge with the objective of identifying and funding diagnostic and therapeutic devices that NASA can fly in space. These capabilities are required to better characterize and understand a serious visual impairment syndrome in astronauts.

"NASA needs next-generation clinical diagnostic and research-enabling technologies that will provide critical information about ocular health during spaceflight," Dorit B. Donoviel, PhD, deputy chief scientist and Industry Forum lead of the NSBRI, said in an interview with *Cataract & Refractive Surgery Today*. "These technologies must be small, robust, and easy to use for nonexperts."

Dr. Donoviel said that ophthalmology is a fairly new area of focus for the NSBRI. The Institute has been concentrating on providing NASA with noninvasive medical technologies that can measure pressure on the brain, based on a belief

that it is a principal contributor to the ocular symptoms that astronauts display during space travel.

Recent studies have found that optic nerve and ocular changes during space flights may result from cephalad fluid shifts brought about by prolonged microgravity exposure.¹

"Astronauts are exhibiting very dramatic ocular changes during and after long-duration space flight, including some fairly significant hyperopic refractive error shift," Dr. Donoviel said. "We're seeing optic disc edema, choroidal folds, globe flattening, and cotton wool spots. Optic disc edema and other pathologies are conditions that we are really worried about because some of these changes can cause irreversible damage to the eye."

The NSBRI Industry Forum issues grants and identifies problems that companies can solve. The newly formed Vision for Mars team will be tasked with identifying appropriate diagnostic technologies worthy of support.

"We're acting primarily as the facilitator," said Randy McDonald, managing director and president of The Magnum Group. "This issue was bigger than us, so we put together a team of clinicians and business people that are on the leading edge of technology in ophthalmology that have specific skill sets and understanding of these particular ocular issues. I am confident that we will be able to significantly contribute to the identification and development of both current and future diagnostic and therapeutic solutions for these challenging visual disorders."

1. Mader TH, Gibson CR, Pass AF, et al. Optic disc edema, globe flattening, choroidal folds, and hyperopic shifts observed in astronauts after long-duration space flight. *Ophthalmology*. 2011;118(10):2058-2069.