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DELIVERING OPERATIONALLY-RELEVANT MEDICAL SOLUTIONS FOR SPACEFLIGHT

Abstract

Administering healthcare in space presents many challenges and opportunities. To address these, NASA established the National Space Biomedical Research Institute (NSBRI) and tasked it to lead a research effort to expand knowledge and deliver operationally and clinically-relevant medical solutions for space and Earth. NSBRI, a consortium of prestigious American universities, operates at the interface of academia, industry, and government, both domestically and internationally. The Institute features a team-based research approach and unique advisory groups that safeguard operational relevance and prioritization. The NSBRI User Panel, comprised of current and retired astronauts, flight surgeons and directors, is a forum through which emergent concerns are highlighted. NSBRI's Industry Forum, comprised of med-tech innovators, engages the private sector in space biomedical research. The Industry Forum awards modest but strategic grants to companies developing impactful solutions for space and Earth. These grants are matched 100

The User Panel played a key role in bringing to light the visual impairment/intracranial pressure (VIIP) syndrome associated with spaceflight. Leveraging its academic standing, relationship with NASA, and non-profit status, the Institute was able to quickly address this issue and work with companies (from UK and Lithuania) to assess game-changing devices that gauge intracranial pressure non-invasively. The Industry Forum also funded the development of cerebral physiology monitoring technologies that track eye movements and brain fluid volume. Through its innovative "Vision for Mars Challenge," the Industry Forum convened clinical and business ophthalmology leaders that identified necessary ocular health diagnostic and therapeutic solutions.

To tackle the risk of renal stones in astronauts, highlighted by publications authored by members of the User Panel, the Industry Forum urged the support of an ultrasound-based platform that can both detect and transcutaneously reposition kidney stones. The technology uses directed pulsing of ultrasound waves at low energy levels. Small stones can be expelled from the kidney and large stones can be dislocated to enable urine flow, thereby avoiding emergency surgery. NSBRI supported the first in man FDA-approved clinical trial which demonstrated that the technology safely and painlessly facilitates the natural clearing of stones.

In its seventeenth year, NSBRI now operates in the Consolidated Research Facility in the heart of the Texas Medical Center. Its laboratories enable it to fully leverage resident medical expertise and resources in deftly solving the challenges of human spaceflight while also transforming medicine on Earth.