IAF HUMAN SPACEFLIGHT SYMPOSIUM (B3)
Astronaut Training, Accommodation, and Operations in Space (5)

Author: Dr. Eran Schenker
Israel

Mr. Liran Renert
Israel

NOVEL PORTABLE CARDIAC ULTRASOUND FOR USE DURING SPACEFLIGHT

Abstract

Microgravity and radiation pose a significant risk on the human cardiovascular system. This study evaluates the Israeli OnSight Medical's real-time guidance software, enabling anyone to perform a high-quality ultrasound scan and obtain expert interpretation. The outcomes of a detailed space study conducted during spaceflight will provide insights into the possibility of ultrasound moving out of hospital walls and into underserved communities in far corners of the world and long-duration space flights.

Providing easy access to cardiac diagnostic information is of high value; It allows monitoring of the health of space crew and critical information if immediate intervention is of the essence. On Earth, this technology may serve rural and underserved communities where access to echocardiography labs and more comprehensive medical centers requires a substantial commute. This novel and revolutionary study brings a significant technological and scientific advance in the application of cardiological care in space, allowing for better diagnostics and improved quality of care.

The world's space agencies will need to address the increased risk of cardio-vascular disease (CVD), considering risk assessment and countermeasures. That was the motivation behind our study expansion into zero-G and spaceflight conditions.

On-Earth field studies in extreme environments showed great promise. Investigating new methods for timely diagnosis of cardiac diseases and appropriate intervention during space missions is a priority. OnSight Medical's cardiac ultrasound guidance system utilizes AI to provide real-time adaptive guidance of transducer position and orientation to help novice users acquire diagnostic views of the heart. Thus, the system guides ten standard cardiac ultrasound views, allowing anyone anywhere to acquire diagnostic echocardiographic video clips of the heart to inform immediate clinical decisions.

OnSight Medical's software uses a deep learning and geometric processing algorithm to provide real-time guidance to any user, regardless of their level of ultrasound proficiency, in the process of acquiring cardiac ultrasound images. Its Artificial Intelligence engine has been trained by observing thousands of scans taken by trained sonographers to distinguish between high and low-quality cardiac scans. By understanding the 3D orientation, the software guides inexperienced users on how to maneuver the ultrasound probe on the patient's body to acquire non-inferior images as trained sonographers. Lastly, it recognizes the best images in the sequence and captures them automatically.