



A novel acoustic biomarker for quality of life in LVAD recipients

Unmet Need

Left ventricular devices (LVADs) are surgically implanted pumps that improve survival in patients with advanced heart failure. According to St. Jude's, in the U.S. in 2016, over 7% of LVAD users reported poor quality of life post-LVAD and approximately 6% of patients who received an LVAD required severe pump thrombosis machine replacement. Additionally, 5% of LVAD patients died from an embolic stroke. Due to suboptimal LVAD support, there is a need for optimizing LVAD performance and improving quality of life following LVAD implementation – specifically, reducing recurrent heart failure in LVAD users.

Technology

Duke inventors have identified a novel acoustic feature that identifies patients with optimized LVAD function and can be used to “tune” an LVAD to maximize patient-reported outcomes. This is intended to be a new tool for managing LVAD recipients as acoustic analysis can identify LVAD dysfunctions that are associated with quality-of-life markers. Specifically, the inventors have discovered a novel acoustic biomarker related to quality of life in Heartmate3 LVADs. HM3 LVADs have been found to have a unique acoustic feature in phase with programmed alterations to the pump speed, which can be used to identify patients with optimized LVAD function. Essentially, the authors can link their acoustic predictor to a clinically modifiable intervention, such as pump speed. This has been demonstrated in a study of 24 LVAD recipients over 6 months.

Other Applications

This technology could also be applied to other LVADs with further testing. The ability to extract clinically relevant features from complex sound mixtures and identify an acoustic biomarker of quality of life in LVAD recipients can be applied to various therapeutic solutions, such as implantable cardioverter-defibrillators and pacemakers, with increased testing and sample sizes.

Advantages

- Identification of a novel acoustic biomarker of quality of life in Heartmate3 LVAD patients
- Simple point of care methodology for improving quality of life in Heartmate3 LVAD patients
- Linking an acoustic predictor to a clinically modifiable intervention
- Studies were conducted on patients who had the Heartmate3 LVADs, which is the most commonly implanted LVAD, suggesting findings have broad relevance
- All patients in the study were stable outpatients

Duke File (IDF) Number

IDF #:T-006819 (with 7105)

Patent Information

Patent #: 11,931,562
Patent Title: TECHNIQUES FOR IDENTIFYING ACOUSTIC BIOMARKERS IN LEFT VENTRICULAR ASSIST DEVICE RECIPIENTS
Country United States of America

Meet the Inventors

[Karra, Ravi](#)
[Collins, Leslie](#)
[Mainsah, Boyla "Boyla"](#)
[Patel, Priyesh](#)

Contact For More Info

Krishnan, Shweta
919-681-7541
shweta.krishnan@duke.edu

Department

Department of Medicine (DOM)(Dept. & CRU)

Publication(s)

•

External Link(s)

- [From the lab of Dr. Leslie Collins](#)
- [From the lab of Dr. Boyla Mainsah](#)
- [From the lab of Dr. Ravi Karra](#)
- [From the lab of Dr. Priyesh Patel](#)

