New Diagnostic Helps Prevent Stroke

Stroke is the fifth leading cause of death and the leading cause of serious long-term disability in the United States. Stroke diagnosis often includes long-term telemetric electrocardiography monitoring, however, it is costly and can take months to identify atrial fibrillation, an irregular heartbeat that can cause blood clots and result in stroke.

The Solution

University of Michigan’s Jimo Borjigin, Ph.D., has developed a novel method to evaluate electrocardiography (ECG) signals called the Electrocardiomatrix, an IT tool that analyzes this data collected during a patient’s hospitalization. Borjigin’s team, including engineer Gang Xu, Ph.D., stroke neurologists Devin Brown, M.D. and Michael M. Wang, M.D., Ph.D., and cardiologist Peter Farrehi, M.D., is optimistic that the use of Electrocardiomatrix technology will promote early and accurate atrial fibrillation detection, prevent future strokes in patients, and help avoid the costs of conducting continuous ECG telemetry.

Strokes kill more than 130,000 Americans each year, but up to 80 percent of them are preventable. Electrocardiomatrix would allow fast and accurate atrial fibrillation detection while patients are hospitalized, providing timely prevention of a future stroke and lowering medical costs overall.

DIAGNOSTICS
fast, precise, and easy detection of irregular heart rhythms

IMPACT

GOAL

The University of Michigan Translational Research and Commercialization (MTRAC) for Life Sciences Innovation Hub is supported by the U-M Medical School, U-M Tech Transfer Office, and the Michigan Economic Development Corporation and works to “fast forward” projects that have a high potential for commercial success, with the ultimate goal for positively impacting human health. The Electrocardiomatrix is just one of 11 projects in the 2017 cohort funded by MTRAC.
A utility patent application on the Electrocardiomatrix technology was filed in September 2015.

**Significant Need**
Part of the stroke evaluation often includes long-term telemetric ECG monitoring, specifically to detect the presence of atrial fibrillation. However, this continuous form of diagnosis is costly and can take months to complete.

**Compelling Science**
The display method of the Electrocardiomatrix preserves all features of cardiac electrical signals decipherable from raw ECG data in a compact manner, permitting a single-glance view of time-dependent changes of heart rate and cardiac arrhythmias in a long cardiac recording.

**Competitive Advantage**
This Electrocardiomatrix-based analysis is performed using ECG data that is routinely collected during a patient’s hospitalization and is shown to have atrial fibrillation detection accuracy as good as manual detection by physicians.

**MTRAC Project Key Milestones**
- Build a dedicated system to capture and store all ECG data, and test it for security and reliability
- Solicit professional consultation on FDA issues related to Electrocardiomatrix's use as a diagnostic device
- Perform daily Electrocardiomatrix data processing and weekly consultation with the study team cardiologist on atrial fibrillation identified from patients' ECG data and provide feedback to the study team physicians
- Compare the prevalence of atrial fibrillation identified during telemetry with and without application of Electrocardiomatrix analysis
- Assess the prevalence of atrial fibrillation identified with application of Electrocardiomatrix analysis among stroke patients without a prior history of atrial fibrillation

**Overall Commercialization**
- Option to license to cardiology and/or monitoring companies.
- Demonstrate value proposition and if appropriate, approach investors for development support prior to license.
- To be determined by licensee.

**Innovative technology lowers cost** and allows timely prevention of future stroke.

**MTRAC funding will allow us to conduct studies to determine whether Electrocardiomatrix technology can offer more accurate detection of cardiac abnormalities than existing methods. Ongoing studies will help determine if it will become the preferred analytic tool in electrocardiography laboratories.**

Jimo Borjigin, Ph.D.