Non-Invasive Blood Volume Analysis Method

Many acute and chronic medical and surgical conditions require health care providers to make accurate assessments of the volume of blood in a patient’s circulatory system. But the current non-invasive and invasive standards of care for determining this are not always accurate and can put the patient at risk.

The Solution

University of Michigan faculty Mohamad Hakam Tiba, M.D., Kevin Ward, M.D., Albert Shih, Ph.D., and Barry Belmont, M.S., from the Michigan Center for Integrative Research in Critical Care, have developed Dynamic Respiratory Impedance Volume Evaluations (DRIVE), a non-invasive method that monitors a patient’s circulating blood volume without the risks of a more invasive treatment.

DRIVE is based on the dynamic relationship between venous return, the function of the right ventricle, and its interaction with lung mechanics as key determinants of estimating intravascular volume status.

The team is also developing a small wearable and wireless device that will support the DRIVE method and provide continuous easily interpreted information useful for many levels of intravascular volume management care. These levels range from the home and clinic, to the ambulance, emergency department, ICU, and general wards. Such technology would personalize the diagnosis and treatment plan for volume and fluid management of the individual.

This project was funded by the University of Michigan Translational Research and Commercialization for Life Sciences Program, also known as MTRAC. MTRAC works to “fast forward” projects that have a high potential for commercial success, with the ultimate goal of positively impacting human health. MTRAC has been made possible by the Michigan Economic Development Corporation, the Michigan Institute for Clinical and Health Research, and the generosity of friends of the University of Michigan.
Dynamic Respiratory Impedance Volume Evaluation (DRIVE) is a non-invasive blood volume analysis method and monitoring device which improves patient care with increased accuracy and reduced chance of complications.

**Significant Need**

DRIVE will provide accurate, continuous, easily interpreted information useful for many levels of intravascular volume management care from home and clinic, to ambulance, emergency department, ICU, and general wards.

**Compelling Science**

DRIVE assesses functional volume by utilizing changes in limb blood volume produced by breathing as measured by changes in impedance of the limb.

**Competitive Advantage**

DRIVE makes accurate, continuous, and non-invasive assessments of a patient’s circulating volume status, whether the patient is hypovolemic or hypervolemic and whether the patient will respond favorably to addition or removal of intravenous fluids.

MTRAC support is helping us test DRIVE, and the team is providing excellent business guidance as we speak with investors and technology companies to move our product to market.

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**MTRAC Project Key Milestones**

- Begin enrollment of subjects
- Development of small profile equivalent of Biopac system for DRIVE measurement and reporting to smart devices
- Refinement of algorithm
- Licensing

**Overall Commercialization**

- Intellectual Property: Patent filed
- Commercialization Strategy: Plan to license to third party
- Engage Investors: To be determined by licensee
- Regulatory Pathway: Contract with a technology company to develop a wireless wearable bio-impedance device
- Non-disclosure agreement signed between University of Michigan and a major bioscience company

**Product Launch Strategy**

To be determined by licensee

Mohamad Hakam Tiba, M.D.
Kevin Ward, M.D.
Albert Shih, Ph.D.
Barry Belmont, M.S.