



## Determination of Site of Origin Ventricular Tachycardia

### Summary

Cardiac ablation (CA) is one of three procedures used to treat ventricular tachycardia (VT). CA procedures can take 6 or more hours to complete. The length of the CA procedure is highly dependent on how quickly the surgeon can pinpoint the VT site of origin (VTSO). The University of Maryland, Baltimore (UMB) researchers have developed a patented technology that allows the surgeon to locate the VTSO quickly; reducing the time needed to perform the CA, the stress put on the patient and hospital staff, and medical costs for the procedure.

#### Key Investigator

Magdi M. Saba  
 Stephen R. Shorofsky

#### Field

Cardiology

#### Technology

Cardiac mapping

#### Advantages

Improved patient outcome

Increased speed

Improved location of ventricular tachycardia origin

#### Status

Available for licensing

#### Patent Status

US 8,588,894  
 (11/19/2013)

EP 2 194 860 (12/22/2016)

Trademark (9/23/2014)

#### UMB Docket Reference

MS-2007-102

#### External Reference

Li, A; et al. *Circulation: Arrhythmia & Electrophysiology*. January 2017;10(1):1.

Yoshida K. et. al. *J. Am Coll Cardiol*. 2010. 56:969-979

### Market

Ventricular tachycardia is a life-threatening arrhythmia. Sudden cardiac death is the largest cause of natural death in the United States, causing about 325,000 adult deaths in the United States each year. Most common cause of cardiac deaths is abnormal heart rhythms (ventricular tachycardia (VT) and ventricular fibrillation (VF)). VT is treated by medications, implantable cardioverter-defibrillators (ICD) or cardiac ablation (CA). CA is a treatment option for people who cannot control the arrhythmia through medication or had an adverse reaction to medication; who have types of arrhythmias that respond well to ablation (e.g. WolffParkinson-White syndrome); or have a high risk of sudden cardiac arrest.

According to a recent research report, cardiac ablation systems is a \$2.4 billion business. It is expected to grow to \$4.5 billion by 2020.

### Technology

In catheter ablation, catheters are threaded through the blood vessels to the inner heart. The cardiac ablation procedure can take two to six or more hours to complete. The procedure involves the threading of cardiac catheter probes through the blood vessels to the inner heart. The most time-consuming step in the CA procedure is the identification of ventricular tachycardia source of origin (VTSO). VTSO identification involves stimulating myocardial tissue by applying periodic current pulses via cardiac catheter probes (pacing). Successive pacing is done by the electrophysiologist at different sites until the paced QRS matches the VT QRS on the 12-lead ECG (pace mapping). The length of the procedure depends significantly on how quickly the surgeon can identify the VTSO. One study reported that the mean ablation procedure time was 383 minutes with a mean of 62 pacing points per patient (Yashida K. et. al. *J. Am Coll Cardiol*. 2010. 56:969-979).

The patented technology provides an automated technique for rapidly, reliably and quickly determining the VTSO using the ECG recordings acquired during pace mapping. The invention uses the distance between pacing points and the change in QRS morphology in different regions of the heart to direct the surgeon to the VTSO. The patented technology was used to identify a small and accurate target for CA using only 3 – 5 pacing points (compared to a mean of 62 pacing points reported above).

### Technology Status

The technology has been added to commercial cardiac mapping devices and tested on patients undergoing ablation procedure.

