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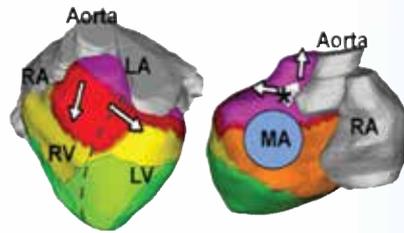
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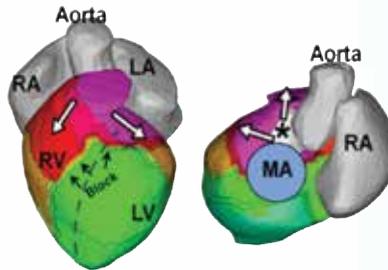
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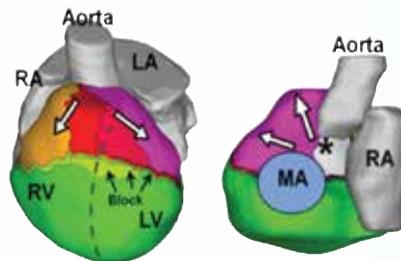
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RCC-LCC commissure PVC

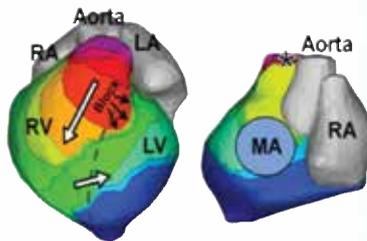


LCC PVC

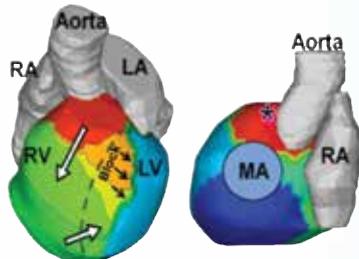


LCC PVC

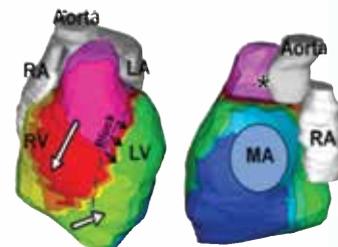
Electrocardiography imaging (ECGI) may make the mapping of ventricular tachycardia faster, safer and less invasive.



Mid-septal RVOT PVC



Mid-septal RVOT PVC



Mid-septal RVOT PVC

# ECGI IMAGING

## BENEFITS ABLATION FOR VENTRICULAR TACHYCARDIA

THE DANGER OF VENTRICULAR TACHYCARDIA (VT) LIES IN ITS ABILITY TO COMPROMISE THE PUMPING FUNCTION OF THE HEART AND ITS PROPENSITY TO LEAD TO VENTRICULAR FIBRILLATION, ASYSTOLE AND SUDDEN DEATH.

UNLIKE ATRIAL TACHYCARDIA OR FIBRILLATION that can be treated with radiofrequency ablation on the inside surface of the atria, ventricular tachycardia can originate on either the outside or the inside of a ventricle and is often centered at sites scarred by heart attacks.

Traditionally, radiofrequency ablation (RFA) is used to treat VT, delivering heat from a high-frequency current to a specific spot on the ventricle. The application of heat creates a minute scar that interrupts the errant signal. RFA is performed under image guidance (such as X-ray or ultrasound) after careful mapping of the source or sources of the errant signal. The mapping process locates and tracks errant pathways via a catheter inserted through a vein and into either the ventricles or the pericardial sac.

This procedure, called three-dimensional electroanatomic mapping, is effective at identifying the target area, but it is invasive and requires a series of ventricular tachycardia beats to isolate the target. Washington University electrophysiologists, who perform more than 100 cases of ablation for VT every year, are now studying a new mapping technology. →



Cardiologist Mitchell Faddis, MD, PhD, head of the Division of Cardiac Electrophysiology, says that electrocardiography imaging, or ECGI, is likely to make mapping of ventricular tachycardia faster, safer and less invasive.

“For ventricular tachycardia, the key to success is being able to map both the inside and outside of the ventricles,” says Mitchell Faddis, MD, PhD, cardiologist and head of the Division of Cardiac Electrophysiology.

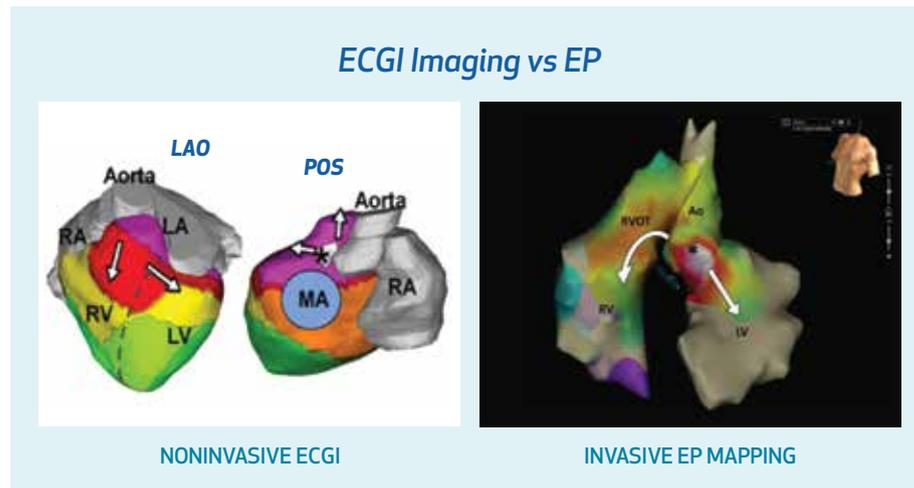
#### ECGI OFFERS NEW OPTIONS

The investigational technique, called electrocardiography imaging (ECGI), may make VT mapping faster, safer and less invasive. Daniel Cooper, MD, cardiovascular

electrophysiologist, is collaborating with Yoram Rudy, PhD, in the use of ECGI to characterize the substrate that generates both VT and premature ventricular contractions (PVCs). Rudy is the Fred Saigh Distinguished Professor of Engineering at Washington University in St. Louis.

ECGI uses strips of electrodes that are placed to surround the patient’s back and chest. “These electrodes obtain electrical data and combine it with a CT scan that defines thoracic anatomy,” says Cooper. The result is a mathematically generated map of both the origin and mechanism of arrhythmia. “This technologic advance requires only a single beat of arrhythmia to generate a complete map and does so noninvasively. ECGI is now recognized as an imaging tool with exciting potential applications for all forms of arrhythmia with clear implications for guiding ablation therapy,” Cooper says. →

The electrodes used in ECGI obtain electrical data and combine it with a CT scan that defines thoracic anatomy. The result is a map of both the origin and mechanism of arrhythmia.



He notes that patients with structurally normal hearts tend to have idiopathic arrhythmias with a focal origin, which allows ablation therapy to be more targeted. In VT patients who have had heart attacks, the scar created by the myocardial infarction provides the substrate for arrhythmia.

“For this patient population, ablations often are more complicated and extensive than the pinpoint ablation of idiopathic VT,” Cooper says.

Faddis adds that, although ablation for VT has been around for two decades, mapping techniques were originally more primitive and worked on the assumption of one point of origin. “We now know it’s not unusual to have up to 10 individual ventricular tachycardia short circuits. That’s why proficiency in mapping is so critical,” he says.



Cardiovascular electrophysiologist Daniel Cooper, MD, is collaborating with Yoram Rudy, PhD, in research that uses ECGI to characterize the substrate that generates both ventricular tachycardia and premature ventricular contractions (PVCs).

#### LVADS: AN ADVANCED-CARE TREATMENT

Marye Gleva, MD, FACC, FHRS, cardiologic electrophysiologist, says the patients with VT she sees usually have advanced heart disease and may have been referred from centers where ablation treatments were not successful. “We see patients for whom the easy solutions are no longer working.



“We see patients for whom the easy solutions are no longer working. Their medications are ineffective, and they are getting frequent shocks from their implanted cardioverter-defibrillators.”  
— Marye Gleva, MD, FACC, FHRS, cardiologic electrophysiologist

Their medications are ineffective, and they are getting frequent shocks from their implanted cardioverter-defibrillators.” Patients like these, Gleva says, may need more advanced care, including placement of left ventricular assist devices (LVADs).

“It’s important that this patient population is treated at a center with extensive experience in all aspects of cardiovascular medicine as well as cardiac anesthesia and cardiothoracic surgery. Our program has a long history of treating ventricular tachycardia ablation, and we have a team with advanced expertise in handling both types of VT issues as well as other cardiac diseases requiring management,” Gleva says. “We are uniquely skilled at being able to provide a full spectrum of care.” ■