

**Methods:** Eligible patients had a prior MI, were not using Class I/III AAD, and presented with: VF arrest (19%), unstable VT (56%), syncope and inducible VT (19%), or prior ICD and a single appropriate shock (6%). Patients were randomized to ICD (n=57) or ICD+ablation (n=55). Patients in the ablation arm underwent electroanatomic mapping to delineate the endocardial infarct margins (CARTO, Biosense-Webster, Inc). Substrate modification was performed targeting the exit sites of induced VTs and/or late potentials within the scar using standard (n=10) or irrigated (n=45) radiofrequency ablation catheters.

**Results:** Study group characteristics: 95M/17F; age 67±9; LVEF 31.4±9.2%; NYHA Class I, II, III & IV in 9%, 69%, 19% & 2%; prior revascularization in 65%; MI location: 44% anterior, 47% inferior/lateral, 9% both.  $\beta$ -blockers were used in 95%, ACE-inhibitors in 90%. During follow-up (439±211days; range 3 - 947), appropriate ICD therapy occurred in 15 control (26.3%), and 7 ablation (12.7%) patients (p=.07). Mortality (control 5, ablation 4) was primarily related to CHF. Complications of ablation included pericardial effusion without tamponade (1), CHF exacerbation (1) and deep vein thrombosis (1). There was no significant change in LVEF or NYHA Class in either group during follow up.

**Conclusions:** These initial results suggest that for high-risk post-MI patients receiving ICDs, adjuvant substrate based catheter ablation is feasible and may decrease ICD therapies. If substantiated by additional follow-up and further studies, a strategy of routine substrate modification may be appropriate in such patients.

11:00 a.m.

### 890-3 Catheter-Based Cryoablation of Ventricular Tachycardia: First Clinical Experience

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**Background:** Catheter-based cryoablation (cryo) for supraventricular tachycardia has shown excellent results. The feasibility and safety of cryo for ventricular tachycardia (VT) has not been previously reported. In animals, cryo has been shown to create large transmural ventricular lesions without perforation and thrombus formation. The aim of this study was to report the first clinical experience with cryo for VT.

**Methods:** Cryo was performed in 10 pts (8 men, 62 ± 17 yrs). VT occurred after an old myocardial infarction (ischemic VT) in 7 pts and was idiopathic (idio VT) in 3 pts. Cryo was performed with a 10 F, 6-mm-tip catheter (CryoCor) using N<sub>2</sub>O as refrigerant. Ablation site was selected using concealed entrainment and presence of mid-diastolic potentials for ischemic VT, and earliest activation time (EAT) with optimal pace mapping for idio VT.

**Results:** Nine ischemic and 3 idio clinical VTs were targeted in 10 pts. All but 1 ischemic VT had a right bundle branch block (RBBB) morphology with a northwest (n=2), intermediate (n=1), left (n=3) or right (n=3) axis and a mean cycle length of 400 ± 61 ms. One idio VT had a left bundle branch block morphology with right axis and two with a RBBB morphology and northwest or right axis. In pts with ischemic VT, concealed entrainment and mid-diastolic potentials (preceding the QRS by -115 ± 59 ms) were obtained at the successful ablation sites. The 3 pts with idio VT had an optimal pace map and a mean EAT of -37 ± 22 ms at the successful ablation site. All but 2 (83%) VTs were successfully treated with a mean of 5 ± 4 (range 1 to 12) applications. Mean catheter-tip temperature was -81 ± 2 (-76 to -83) °C. Mean fluoroscopy and procedure time were 63 ± 29 (range 26 to 132) and 237 ± 53 (range 165 to 340) min. The 2 unsuccessfully treated VTs occurred in a patient with ischemic VT and aortic stenosis (transseptal approach). One pt had a pericardial effusion post-procedure. After a follow-up of 9 ± 5 months, 1 pt with ischemic VT had a recurrence with another morphology than the ablated VT. The pt with idio RBBB-VT with northwest axis continued to have non-sustained VT episodes with a lower frequency.

**Conclusion:** Cryo for VT is feasible and effective. When used for ischemic or idiopathic VT, it is also safe.

11:15 a.m.

### 890-4 Identification and Characterization During Sinus Rhythm of a Mitral Isthmus in Patients With Inferior Myocardial Infarction and Monomorphic Ventricular Tachycardia

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**Background:** Previous studies have suggested that an isthmus of surviving fiber between the mitral valve and the scar border is a critical component of the slow conducting zone in some ventricular tachycardias (VT) associated to remote inferior myocardial infarction. These VT are characterized by 2 typical morphologies: 1) Right bundle (monophasic R waves in lead V1 and QS or Rs configurations in V6) with right superior axis (RSA) and tall R waves in lead AVR, and 2) Left bundle (rS configuration in lead V1 and a monophasic R wave in V6) with left superior axis (LSA) and tall R in AVL.

**Methods:** We investigated the feasibility of identify Mitral Isthmus (MI) in voltage maps obtained during sinus rhythm. Left ventricle electro-anatomical maps (Carto System, Biosense) obtained during right ventricular apex (RVA) pacing in 12 patients with chronic inferior myocardial infarction referred for VT RF ablation were analyzed. A MI was defined by the presence of a corridor of consecutive electrograms differentiated by a higher voltage amplitude than the surrounding area in the scar tissue. The effect of several voltage levels of scar definition from 0.5 to 0.1mV were compared.

A MI extending from the septum to lateral wall was identified in 5 patients (72±6 years, LVEF 31±8 %). The clinical VT morphology was left bundle LSA in 4 patients and right bundle RSA in 1 patient. MI electrogram showed multiple component and the activation sequence was from the entrances to the inner part. During pacing from the inner part of

the MI sudden change from left to right bundle morphology were observed, the stimulus-QRS interval was always > 50 ms. At least one VT related to the MI was induced in each patient, 5 left bundle LSA and 1 right bundle RSA. Radiofrequency ablation of MI suppressed VT inducibility in all patients. No VT recurrences were observed during the follow-up (median 7 months).

**Conclusions:** 1)MI can be identified prior to VT induction in all patients with the typical described VT morphology 2)MI multicomponent electrograms suggest this area are surviving fibers imbedded in scar than normal tissue bounded by scar and the mitral annulus 3)This information is useful to treat non inducible non tolerated VT.

11:30 a.m.

### 890-5 Infarct Age and Electrogram Characteristics in Patients With Postinfarction Ventricular Tachycardia

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**Background:** Replacement and reactive fibrosis resulting in scar formation is part of the healing process after myocardial infarction (MI). Deposition of fibrous tissue results in separation of myocardial muscle strands in the healed endocardial infarct zone. Delayed activation of these muscle strands may be arrhythmogenic. In experiments with superfused canine infarct hearts, the infarct age impacted on the duration of left ventricular (LV) electrograms (EGM) and the separation of isolated potentials (IP). Systematic assessment of MI age with respect to local EGM characteristics is lacking in humans. The purpose of this study was to assess the relation between MI age and EGM characteristics during sinus rhythm (SR) in patients with a history of ventricular tachycardia (VT).

**Methods:** In a consecutive series of 16 patients (age: 68±7 years, ejection fraction: 0.23±0.11) with a history of remote MI (range 1-31years) and VT, mapping of the LV was performed with an electroanatomic mapping system (CARTO) during SR. Careful analysis of EGM morphology and EGM width -as defined from EGM onset to the latest local activation- was performed and correlation between characteristics of the local bipolar EGM of the infarct-zone and MI age were made. Characterization of the VT isthmus site was determined with entrainment mapping and the location of the isthmus was correlated with substrate mapping.

**Results:** The MI age correlated significantly with the width of the local endocardial EGM during SR in the perinfarct zone (R=0.83; p<0.001) as well as with the local activation delay in this area after the QRS complex (R=0.84; p=0.001). IPs separated by an isoelectric line were spaced further apart the older the MI. In the majority of cases a critical isthmus was found in areas with the latest endocardial activation.

**Conclusion:** Postinfarction remodeling results in the deposition of fibrous tissue between surviving muscle bundles. The development of broad, fractionated EGMs and IPs is time dependent and is a reflection of the remodeling process. Our findings suggest that remodeling plays an important role in the development of complex anisotropy that is necessary for postinfarction VT.

11:45 a.m.

### 890-6 Ablation of Postinfarction Ventricular Tachycardias Targeting Delayed Local Potentials Guided by Electroanatomical Mapping

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**Background:** Linear ablation connecting scars or separating ventricular tachycardia (VT) exit points have been suggested for catheter ablation of ischemic VTs. However, linear ablation in the ventricle is technically challenging and a clear validation is lacking. Therefore, we investigated a simplified anatomically based method for ablation of post infarction VT by targeting all delayed local potentials in the scar area of interest.

**Methods:** We investigated 35 patients with frequent and drug refractory ischemic VT (age 66±10 years, 32 men, ejection fraction 32±14%). Thirty patients had already received an implantable cardioverter defibrillator (ICD) and presented with frequent shocks deliveries or frequent hemodynamically compromising VTs. All patients underwent programmed stimulation to define the number, morphology and hemodynamic stability of induced VTs. A mean of 2.7±1.7 VTs were induced and 18 patients (51%) had at least one unstable VT. Electroanatomical voltage mapping (CARTO, Biosense Webster) in the left ventricle during sinus rhythm was used to identify myocardial scar areas (sites with bipolar voltage less than 1.5 mV). Pace-mapping was performed around the scar border to identify VT exit points of induced or documented spontaneous VTs. Multiple radiofrequency energy applications (37±28) with large-tip or cooled-tip catheters were used to ablate all delayed local fractionated potentials in the scar area around all pace-mapping match sites up to a distance of 1.5 cm. If the clinically documented VTs were still inducible, more distant delayed local potentials were ablated. All except two patients had an ICD during follow-up.

**Results:** In all patients clinically documented VTs were not inducible any more after ablation, and 19 patients had no inducible VT at all. Seven patients underwent two ablation sessions. During a mean follow-up of 20±12 months, 24 patients (68.6%) remained free of any VT recurrence, and 31 patients (88.6%) had a more than 90% reduction of VT episodes. **Conclusion:** Segmental ablation targeting only delayed local fractionated potentials in scar areas around VT exit points is an effective alternative to strictly linear lesions for ablation of post infarction VT.