

the earliest DPs towards the site of VT origin were obtained in 19 VTs and we hypothesized such consecutive DPs as a return pathway. DP with low amplitude and prolonged LE which preceded the QRS (*type A-1*) were always found at just or within 10 mm of VT origin. DP with similar LE following the QRS (*type A-2*) whose DP-QRS interval were less than 60 ms, were found within 15 mm of VT origin. *Type A-2* showing DP-QRS interval > 60 ms, DP with high amplitude and fractionated LE (*type B*) and DP with normal LE (*type C*) were located at far sites from VT origin. The remainder LEs with DP in 11 VTs were *type B* or *type C* and also found at far sites from VT origin of monoregional VT. The successful ablation sites in Pt 1 and Pt 2 showed *type A-1* and *type A-2* with DP-QRS interval  $\leq$  60 ms, respectively. In Pt 3, the successful ablation site showed *type B* with excellent pace map, however it took long time to terminate VT. *Implications: Type A-1* and *type A-2* electrogram showing short DP-QRS interval should indicate the critical site of VT. A site showing *type B* electrogram may be suitable for ablation, if the return pathway is small.

4:45

### 727-4 Impact of Underlying Heart Disease on Longterm Outcome Following Catheter Ablation of Ventricular Tachycardia

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Long-term follow up (FU) was assessed in 88 patients (pts) (65 m; 23 f; 53  $\pm$  17 yrs.) after radiofrequency current catheter ablation (RFC) of documented ventricular tachycardia (VT). Inclusion criteria for RFC were inducibility of hemodynamically stable clinical VT by programmed stimulation. RFC was guided by entrainment, activation- and/or pace mapping. Acute success was assumed when clinical VT was rendered non inducible 5 days after RFC. During FU all types of sustained VT were analyzed. The underlying heart disease was coronary artery disease (CAD) in 38 pts (remote myocardial infarction in 34/38 cases; EF 37%  $\pm$  13), cardiomyopathy (CM) in 7 pts (dilatative in 6; hypertrophic in 1; EF 32  $\pm$  18%), arrhythmogenic right ventricular dysplasia (ARVD) in 6 pts and congenital (CHD) or valvular heart disease (VHD) in 8 pts. No organic heart disease (NHD) was present in 29 pts. Results:

	CAD (n = 38)	CM (n = 7)	ARVD (n = 6)	NHD (n = 29)	CHD/VHD (n = 8)
Acute success	24 (63%)	2 (17%)	4 (75%)	24 (82%)	6 (75%)
FU (months)	31 $\pm$ 17	25 $\pm$ 14	21 $\pm$ 10	21 $\pm$ 13	25 $\pm$ 17
Recurrences	18/24 (75%)	1/2 (50%)	2/4 (50%)	7/24 (30%)	2/8 (33%)
Deaths	4/38	3/7	0	1/29	1/8

2 pts with CAD and 1 pt with NHD died suddenly. In CAD patients 16/18 VT recurrences showed different morphology compared to the prior targeted VT. *Conclusions:* 1. Acute success for RFC of VT as well as long-term FU is highly dependent on underlying heart disease. 2. Pts with no underlying heart disease have the best acute and long-term outcome. 3. RFC for VT in DCM pts seems not to be the adequate therapeutic approach. 4. Despite the acute success of RFC in CAD pts, the recurrence rate is very high and mostly due to VT of new morphology.

5:00

### 727-5 Resetting of Mid-Diastolic Potentials Localises Successful Sites for Radiofrequency Ablation in Patients With Ventricular Tachycardia Due to Coronary Artery Disease

Peter A. O'Callaghan, Jeremy N. Ruskin, Brian A. McGovern, Hasan Garan. Massachusetts General Hospital, Boston, Massachusetts

We analysed 28 distinct sites at which radiofrequency (RF) energy was applied during 13 radiofrequency ablations (RFA) for ventricular tachycardia (VT) in 9 patients with coronary artery disease (CAD) to determine if mid-diastolic potentials (MDP) manifesting specific characteristics were predictive of success. Sites for ablation were localised by activation sequence mapping, pace-mapping and by electrophysiologic maneuvers including resetting (advancing) and entrainment. A site was defined as successful if application of RF energy terminated VT.

MDPs were found at 18 sites during 12 of 13 RFAs. At 13 of these sites resetting of the MDP by a single extrastimulus, stimulus train or isolated PVC was searched for prior to the application of RF energy. Simultaneous resetting of both a MDP and VT such that the temporal relationship between the MDP and the surface QRS is unchanged was found at 6 sites, all of which were successful. Of the 7 sites which did not demonstrate resetting only one was successful.

	MDP Reset	MDP not reset
Success	6	1
Failure	0	6

*Conclusions:* MDP sites can be recorded in the majority of VTs mapped for RFA in patients with CAD. MDP resetting was highly effective in differentiating successful from unsuccessful target sites.

5:15

### 727-6 Effect of Ablation Catheter Tip/Endocardial Surface Orientation on Radiofrequency Lesion Size in the Canine Ventricle

Rodrigo C. Chan, Susan B. Johnson, James B. Seward, Douglas L. Packer. Mayo Foundation, Rochester, MN

Although lesion size has been shown to be a function of ablation electrode length, the effect of catheter tip/tissue orientation has never been explored. Therefore, to determine the impact of catheter tip/tissue orientation on radiofrequency lesion size, 85 lesions in 20 dogs were created using 4–12 mm catheter tip electrodes. The orientation of the tip in relationship to the endocardial surface [parallel (PAR) vs perpendicular (PER)] was determined fluoroscopically and with a 7.5 MHz intracardiac ultrasound probe, producing long axis images with tissue penetration to a depth of 6–7 cm. Lesion areas (mm<sup>2</sup>) and volumes (mm<sup>3</sup>) were:

Electrode Length	Lesion Area		Lesion Volume	
	PER	PAR	PER	PAR
4	73 $\pm$ 31	84 $\pm$ 43	376 $\pm$ 67	479 $\pm$ 226
6	85 $\pm$ 36	99 $\pm$ 29	387 $\pm$ 154	494 $\pm$ 167
8	101 $\pm$ 43	117 $\pm$ 35	460 $\pm$ 113	635 $\pm$ 244
10	74 $\pm$ 41	113 $\pm$ 52	398 $\pm$ 202	747 $\pm$ 294
12	64 $\pm$ 25	120 $\pm$ 80	516 $\pm$ 77	649 $\pm$ 194

Lesion areas and volumes at all tip lengths were significantly greater with the catheter tip positioned parallel to the endocardial surface ( $p > 0.0001$ ). Lesion area and volume also peaked with 8 mm PER electrode tips, with a subsequent decrease in lesion size with both 10 and 12 mm tip lengths. In contrast, while lesion areas created by PAR tips plateaued at 8 mm electrode lengths, volumes were optimized with a 10 mm length, with no drop off in lesion dimensions with 12 mm tips. Based on this, we conclude that parallel catheter tip orientation is critical for the production of the largest possible ventricular lesions as needed for VT ablation. This study also suggests that intracardiac ultrasound is useful in insuring both appropriate catheter tip/tissue contact and orientation.

### 728 Contrast Echocardiography: New Techniques and Application

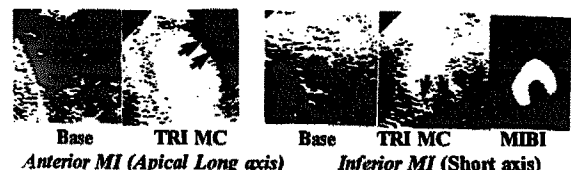
Monday, March 25, 1996, 4:00 p.m.–5:30 p.m.  
Orange County Convention Center, Room 414C

4:00

### 728-1 Second Harmonic Transient Response Imaging With Intravenous Perfluorocarbon-Exposed Sonicated Dextrose Albumin in Patients With Previous Myocardial Infarction: Initial Clinical Experience

Thomas Porter, Robert Ambruster, Karen Holdeman, Feng Xie. University of Nebraska Medical Center, Omaha, NE

We have discovered in humans that if ultrasound is briefly interrupted (transient response imaging (TRI)) after a small intravenous injection (IVI) of perfluorocarbon-exposed sonicated dextrose albumin (PESDA), the amount of myocardial contrast (MC) produced is dramatically increased. It is unknown, however, whether TRI can detect myocardial perfusion abnormalities in humans. Therefore, we compared the MC produced by a 0.0025–0.005 ml/kg IVI of PESDA in 8 patients with previous myocardial infarction (four



Anterior MI (Apical Long axis)

Inferior MI (Short axis)