

Fifteen patients with successful primary angioplasty were compared with eighteen patients who had no reperfusion therapy. A 24-hour digitized 3-lead ECG was recorded 5 to 6 days after the acute MI. Mean RR interval, global heart rate variability (SDNN), and beat-to-beat heart rate variability (RMSSD) were calculated. The QT intervals (QT apex and QT end) were measured automatically with a validated computerized Holter system. The QT intervals/RR slopes were calculated over the 24 hours.

Results are displayed in the following table:

	Reperfusion	No Reperfusion	p value
Mean RR interval (ms)	987 ± 95	866 ± 151	0.03
SDNN (ms)	79 ± 23	71 ± 30	NS
RMSSD (ms)	30 ± 15	26 ± 16	NS
QT end/RR slope	0.14 ± 0.04	0.21 ± 0.10	0.03
QT apex/RR slope	0.11 ± 0.06	0.20 ± 0.10	0.02

These results show that the pattern of QT adaptation to heart rate may differ between patients successfully treated with angioplasty at the acute phase of MI and patients not reperfused. They suggest that QT/RR slopes may have prognostic implications in post-MI patients.

### 1088-154 Patterns and Prognostic Significance of Ventricular Ectopy in an Unselected and Unreferred Patient Population with Hypertrophic Cardiomyopathy

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Hypertrophic cardiomyopathy (HCM) is associated with arrhythmia-related consequences, including sudden death. Ventricular tachyarrhythmias identified on Holter ECG, such as nonsustained ventricular tachycardia (NSVT), have been incriminated as markers for sudden death in highly selected HCM populations. To assess the range and significance of ventricular arrhythmias in an unselected patient (pt) population, we developed a profile of ventricular ectopy on 24-hour Holter ECGs in 75 HCM pts followed at the Minneapolis Heart Institute, free of tertiary referral bias and more closely resembling the true disease state. Ages were 56 ± 15 years and 63% were male; 65% were taking  $\beta$ -blockers or verapamil and 8% were on anti-arrhythmic drugs. Of the 75 pts, 71 (95%) had ventricular ectopy; 33 (44%) had ventricular premature depolarizations (VPDs) only (range 1-348), 34 (45%) had couplets, and 25 (33%) had  $\geq 1$  burst of NSVT (range 1-7). Over an average follow-up of 2.6 years from the last Holter ECG, 4 pts died of HCM. Only 2 pts had sudden/unexpected death (ages 43 and 48; annual mortality = 1.0%); 1 of these pts had NSVT and 1 had only a single VPD. Specificity and sensitivity of NSVT for sudden death were 67% and 50%. In conclusion, in a stable, unselected and non-referred pt population with HCM: 1) ventricular ectopy of all forms, including NSVT, was frequent; 2) despite frequent arrhythmias, sudden cardiac death was particularly uncommon; and 3) the low event rate severely limits the usefulness of the Holter ECG to assess risk in HCM pts.

### 1089 Advances in Cardiac Pacing

Wednesday, March 19, 1997, 3:00 p.m.-5:00 p.m.  
Anaheim Convention Center, Hall E  
Presentation Hour: 4:00 p.m.-4:00 p.m.

### 1089-129 Contrast Venography is a Safe and Effective Approach to Implantation of Pacemaker and ICD Leads Via the Axillary Vein

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Despite compelling data demonstrating that the standard subclavian approach to placement of pacemaker and ICD leads is associated with lead fracture and has the potential to cause a pneumothorax, it remains the dominant approach. Alternative techniques to avoid these complications by accessing the axillary vein guided by anatomic landmarks or ultrasound have been proposed but have not gained widespread acceptance. The purpose of this study was to prospectively evaluate the safety and efficacy of an alternative method for lead placement into the axillary vein that employs contrast guided venipuncture with a 5 Fr micropuncture introducer set. The study population included 50 patients undergoing pacemaker or ICD lead placement, and pts were randomized to placement either medial or lateral to the rib cage border.

**Results:** Lead placement was successfully accomplished using either the medial or lateral approach to the axillary vein. In all patients in whom the lateral approach was initially attempted, successful lead placement was accomplished in 19 (76%). In each of the 6 failed patients, success was achieved with the medial approach. Initial success was achieved in 100% of the 25 pts undergoing the medial approach. The time to position leads in the heart was shorter (17 vs 24 min) using the medial approach.

**Conclusion:** Contrast guided venipuncture represents a safe and highly effective approach to placement of endocardial leads via the axillary vein. Initial entry into the axillary vein medial to the rib margin appears to be an optimal approach.

### 1089-130 Do Pacemakers in Women Hinder the Interpretation of Routine Mammography?

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Mammography is currently recommended every 1-2 years for women aged 40-50 years and yearly thereafter. In women with pacemakers, it is possible that the pulse generator may obscure a portion of the mammogram, especially if the device has dropped toward the breast over time. To investigate this issue, we obtained mammogram reports from the primary care physicians of 74 women from 2 sources: an urban Pacemaker Center (53) and a suburban cardiology office (21). Mammograms from 17 women pre-dated pacemaker implantation, leaving 57 available for analysis. Of these, 28 (49%) made no reference to the pacemaker, 22 (39%) noted the presence and location of a pacemaker but did not describe it as influencing mammogram interpretation, and in 7 (12%) the pulse generator obscured a portion of the mammogram. In one patient, interpretation of a suspicious mammogram was dubious enough to prompt repositioning of the pulse generator.

**Conclusion:** In approximately 10% of women with pacemakers, the pulse generator may hinder mammogram interpretation. Therefore, prior to pacemaker implantation in women, it may be prudent to obtain baseline mammography (if not previously performed) and to consider implanting the device contralateral to an area which appears suspicious on mammography. During surgery, some thought should be given to how the placement of the pulse generator may impact on the interpretation of future mammograms.

### 1089-131 Ventricular Stimulation Threshold Variations During Daily Life

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Daily life changes in ventricular stimulation thresholds were studied through a special software temporarily installed into the pulse generator (Relay/Dash, Intermedics) of 10 chronically implanted pacemaker patients (pts). None were either pacemaker dependent or treated by antiarrhythmic drug.

**Method:** After a 20-minute rest period, unipolar ventricular rheobase and chronaxie were individually measured. The software was activated to deliver 10 stimuli of decreasing pulse width (from 200% to 50% chronaxie) every 10 minutes (90 bpm). Any sensed event reset the sequence and the interval times. After Holter hook up, patients went back home, keeping a detailed diary of activities. On day 2, the special software was deactivated. Rheobase-chronaxie was measured again, after a 20-minute rest period.

**Results:** Using paired student t-test, no significant difference could be shown between chronaxie/rheobase measurements on days 1 and 2. Both Goldsmith's cusum and t-tests disclosed significant changes in time of the measured thresholds. Those changes corresponded to changes of activity levels as defined by patients' log: sleep versus active periods ( $p < 0.01$ ), sleep versus inactive wake ( $p < 0.01$ ), inactive versus active wake periods ( $p < 0.01$ ). The overall threshold average was 92.6% ± 22.5% of reference resting value (range 50%-140%).

**Conclusions:** Significant ventricular stimulation threshold variations during daily life activities were disclosed. Those changes not only corresponded to changes in activity levels but also were significantly related to sleep periods. In our study, in the daily life of typical pacemaker patients, ventricular stimulation threshold never exceeded 150% of the chronaxie measured after a prolonged rest period.

### 1089-132 Safety of Transcutaneous Electrical Nerve Stimulation in Pacemaker Patients

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Based on a previous study, transcutaneous electrical nerve stimulation