technique has raised concerns regarding the incidence of ventricular tachyarrhythmias been proposed as treatment for congestive heart failure (CHF). Early clinical use of this technique has raised concerns regarding the incidence of ventricular tachyarrhythmias and sudden death. We performed ambulatory monitoring in dogs with CHF after receiving ASM injections.

Methods: 15 dogs underwent coronary occlusion or ligation by coronary microembolization. After a 4-weeks injections of ASM (200-700 million cells) or saline were delivered by either open-chest epicardial (EPI) or transseptal endoventricular (ENDO) methods. Multiple 24 hour ambulatory ECGs (AECG) were recorded at baseline (pretreatment) and at weeks 4, 8 and 10 after injection. AECGs were reviewed for VT. Unexpected terminal events were tabulated.

Results: Four groups of dogs were identified: ASM/EPI (5), ASM/ENDO (4), saline/EPI (3), and saline/ENDO (3). Three interpretable AECG were evaluated. Occurrences of ventricular tachycardia (VT) or death (D) are as below. The majority of events were observed in 5 of 15 dogs. There was no relationship between VT and resected or injected per dog.

Conclusion: In this model of myocardial dysfunction and cellular cardiomyoplasty, the injection of ASM did not result in an increase in death or ventricular tachycardia during the monitored periods.

### 1110-78

**Ventricular Arrhythmias Following Autologous Skeletal Myoblast Implantation**

Warren Sherman, Kun-Lun He, Gang-Hu Yi, Hua Zhou, Angou Gu, Eva M. Becker, Gang Zhang, Jack Harney, Race Kao, Myung J. Lee, Je Wang, Howard Haines, Daniel Burkhoff, Mount Sinai School of Medicine, New York, NY, Columbia University School of Medicine, New York, NY

**Background:** Cellular cardiomyoplasty using autologous skeletal myoblasts (ASM) has been proposed as treatment for congestive heart failure (CHF). Early clinical use of this technique has raised concerns regarding the incidence of ventricular tachyarrhythmias and sudden death. We performed ambulatory monitoring in dogs with CHF after receiving ASM injections.

Methods: 15 dogs underwent coronary occlusion or ligation by coronary microembolization. After a 4-weeks injections of ASM (200-700 million cells) or saline were delivered by either open-chest epicardial (EPI) or transseptal endoventricular (ENDO) methods. Multiple 24 hour ambulatory ECGs (AECG) were recorded at baseline (pretreatment) and at weeks 4, 8, and 10 after injection. AECGs were reviewed for VT. Unexpected terminal events were tabulated.

Results: Four groups of dogs were identified: ASM/EPI (5), ASM/ENDO (4), saline/EPI (3), and saline/ENDO (3). Three interpretable AECG were evaluated. Occurrences of ventricular tachycardia (VT) or death (D) are as below. The majority of events were observed in 5 of 15 dogs. There was no relationship between VT and resected or injected per dog.

Conclusion: In this model of myocardial dysfunction and cellular cardiomyoplasty, the injection of ASM did not result in an increase in death or ventricular tachycardia during the monitored periods.

### 1110-79

**Contractile Response and Mitral Regurgitation After Late Withdrawal of Biventricular Pacing**

Roland R. Brandt, Christian Reiner, Johannes Sperzel, Heinz F. Pilchters, Christian W. Hamm, Kerchoff Heart Center, Bad Nauheim, Germany

**Background:** Biventricular pacing (BVP) is a promising treatment modality for patients with symptomatic heart failure (HF) and mechanical dysynchrony. In the setting of left bundle branch block or intraventricular conduction delay, clinical studies have shown short-term improvement in contractile function and long-term improvement in clinical status in association with reverse left ventricular (LV) remodeling. The aim of this study was to investigate the hemodynamic consequences of late biventricular pacing (BVP) withdrawal.

Methods: Eleven patients (64±9 years) received a BVP system because of severe HF (New York Heart Association functional class III due to idiopathic (1x6) or ischemic (n=3) LV dysfunction and a QRS duration > 120 ms). Patients were men with moderate to severe heart failure symptoms at baseline (New York Heart Association functional class III and IV) and prolonged QRS intervals. Pooled data showed that progressive heart failure mortality was 1.7% for cardiac resynchronization therapy patients and 3.5% for controls over three to six months of follow-up. Cardiac resynchronization reduced death from progressive heart failure by 51% relative to controls (PV <0.003). There was not evidence of quantitative heterogeneity by a chi-square test (p=0.85), suggesting a consistent effect across trials.

Conclusions: Cardiac resynchronization appears to reduce mortality from progressive heart failure over three to six months of follow-up in patients with displaced left ventricular dysfunction and prolonged QRS intervals. This finding suggests that cardiac resynchronization may have a positive impact on the most common mechanism of death among patients with advanced heart failure.

### 1110-81

**Acute Hemodynamic Effects of Pacing Therapy on Left Ventricular Function in Patients With Heart Failure and Atrial Fibrillation:**

Taro Okada, Yukihiro Yoshida, Makoto Kondo, Kosuke Watanabe, Masahiro Mutoh, Takanori Yoshida, Tatsuhito Tani, Choji Yamashita, Kazu Iwata, Yoshinobu Murakami, Toyoshi Matsuoka, Mitsuhiro Okamoto, Naoya Tsuboi, Haruo Hirayama, Teruo Itoh, Junji Toyama, Owari Hospital, Ichinomiya City, Japan, Nagoya Daini Red-Cross Hospital, Nagoya City, Japan

**Background:** It has been reported that both biventricular pacing (BVP) and left ventricular pacing (LVP) improve left ventricular (LV) function in patients with heart failure and sinus rhythm (S). However, it is not clear which pacing mode may be preferable in patients with heart failure and atrial fibrillation (AF).

Methods: Hemodynamic parameters were studied in 18 patients (9 male, 9 female) with NYHA class III to IV and sinus rhythm (±atrial fibrillation) and LV dysfunction. The patients were stimulated in either the VVI mode (7 patients) or DDD mode (11 patients) at a rate of 90 bpm. Hemodynamic parameters were measured at baseline and during pacing in the right ventricular apex, LV lateral free wall, coronary sinus, and both atria simultaneously. In patients with AF, data under baseline rhythm were compared with pacing at varying ventricular sites. In patients with spontaneous atrioventricular interval was decreased by 20ms from 200 to 300 ms for 3 minutes each and optimal atrioventricular interval with the largest dp/dtmax was determined at varying pacing sites. Data under AAI pacing at 90 bpm were compared with DDD pacing at varying ventricular sites with each optimal atrioventricular interval.

Results: In patients with AF, right ventricular pacing (RVP) had negligible contractile effects. However, LVP and BVP showed dp/dtmax and LVEF increase compared with RVP (P<0.01 and P<0.001, respectively). The data was similar in patients with S (LVP vs RVP; LVEF increase, RVP vs RVP, RVP vs AAI). With regard to LVEF contractile function, there was no improvement during BVP and LVP, however significant improvement was observed during BVP in patients with AF. BVP improved dp/dtmax by 19.1±1.9% (P<0.001 versus RVP, 6.1±3.2% and LVP, 2.6±1.2%), and pressure half time by 20.1±2.9% (P<0.01 versus RVP, 7.2±1.2% and LVP, 1.2±1.9%).
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POSTER SESSION

1111 Exercise Testing: Cardiac Rehabilitation

Monday, March 31, 2003, Noon-2:00 p.m.
McCormick Place, Hall A
Presentation Hour: 1:00 p.m.-2:00 p.m.

1111-69 Predictors of Negative Exercise Echocardiography in Women With Positive Exercise Electrocardiograms

Amit J. Desai, Amogh Bhat, Daljit Bagha, Mudula Guthikonda, Ezra A. Amsterdam, University of California, Davis Medical Center, Sacramento, CA

BACKGROUND: Exercise (Ex) electrocardiography (ECG) is the most widely used non-invasive test for evaluating symptoms suggestive of coronary artery disease (CAD). In women, however, Ex ECG has limited reliability due to an increased rate of false positive results. Therefore, a stress-imaging study is frequently the initial test for evaluation of chest pain in women. We have previously reported that certain exercise test variables predict a negative Ex echocardiogram (Echo). To further enhance this predictive value, we report additional exercise test variables predictive of negative Ex Echo.

METHODS: We analyzed the results of simultaneous Ex Echo and Ex ECG in women with no known cardiac disease as part of the initial evaluation for chest pain suggestive of CAD. All patients (Pts) had a normal resting ECG and adequate exercise capacity by history. All tests were symptom-limited utilizing a Bruce Protocol. A positive Ex Echo was defined as Ex-induced ≥1.0 mm ST segment depression 60-80 msec after the J point. RESULTS: The study group comprised 415 consecutive women (mean age 54 years [31-90]) evaluated by simultaneous Ex Echo and Ex ECG. Ex Echo was positive in 11% (48/415) and negative in 88% (367/415) of the Pts. Ex ECG was positive in 26% (108/415) and negative in 74% (307/415). In 64% (69/108) Pts with a positive Ex ECG, Ex Echo was negative, suggesting a false positive Ex ECG. In this group of 69 Pts, non-Ex Echo test data associated with a negative Ex Echo included: ≥7 METS, double product >2,500, ST depression ≥1.5 mm, no Ex-induced chest pain, ST segment resolution <1 minute into recovery, <3 leads with ST depression. Four or more of these factors were present in 86% (53/69) of the Pts with a positive Ex ECG and a negative Ex Echo.

CONCLUSIONS: These results indicate that (1) Ex ECG was negative and concordant with Ex Echo in a majority of women; and (2) >85% of positive Ex ECG associated with negative Ex Echo were characterized by multiple indicators consistent with a false positive or low risk result. The evaluation of chest pain in women can be simple and cost effective utilizing Ex ECG in those with a normal baseline ECG and adequate exercise capacity.

1111-60 Abnormal Peripheral Theremoregulatory Response to Exercise Substantially Impairs Exercise Tolerance Among Patients With and Without Ischemia on Myocardial Perfusion Single-Photon Emission Computed Tomography

Emiljan A. Jevremovic, Vereannna Meria, Herve Charroux, Umer Surhan, Amy T. Armenia, George Reed, George Diamond, Allan Rozanski, St. Luke's-Roosevelt Hospital Center, New York, NY

Background: Whereas myocardial ischemia predicts patients' (pts) outcome, exercise (EX) duration generally adds substantial incremental information to event prediction. The pathophysiological factors mediating this association are unclear. Paradoxical vasodilatation in finger blood flow during EX has recently been demonstrated, using peripheral arterial tonometry (PAT), among CAD patients. The relation between such vasoconstriction and EX duration is not known. Methods: We employed PAT to assess finger pulsewave amplitude (PWA) at rest and continuously during EX SPECT testing in 463 CAD pts (mean age 58 ± 10 years, 96% males) divided into 276 pts with ischemia and 193 pts with non-ischemic SPECT studies. PWA patterns during EX were compared to previous normal limit values for EX PWA response; with values <90% confidence intervals (CI) constituting abnormality. Results: Abnormal finger blood flow response to EX was associated with a substantial reduction in EX duration and achieved EX METs (table). Notably, this association was equally significant among patients with and without SPECT evidence of ischemia. Conclusions: Paradoxical reduction in finger blood flow during exercise is associated with significantly reduced exercise duration among CAD patients. Accordingly, the abnormal peripheral vasomotor response may represent a potential, exercise-dependent, pathophysiological mechanism linking exercise duration to cardiac events.

1111-61 Using Estimated Functional Capacity to Optimize Stress Testing for Diagnosis and Prognosis of Cardiovascular Disease in Women: The NHLBI-sponsored WISE Study

Leslie J. Shaw, Marian Oleon, Shervin Tavakoli, Bernard R. Chaitman, George Sopko, C. Noel Broyler, WISE Study Group, Atlantic Cardiovascular Research Institute, Atlanta, GA, University of Pittsburgh, Pittsburgh, PA

Background: Functional capacity, measured in METS, is an important component that affects the diagnostic and prognostic value of exercise stress testing. The aim of this study was to compare the prognostic value of predicted functional capacity based on the Duke Activity Status Index (DASI) compared with peak exercise METS. Methods: From the NHLBI-sponsored WISE study, a total of 2,859 women with chest pain (mean age 56±9 years) underwent exercise testing and completed the 12-item DASI questionnaire. Results: Average exercise time was 5.1±2.5 minutes on the modified Bruce or ACIP protocols and average DASI functional capacity was 6 METS. 2.3-year cardiovascular events (unstable angina, death, myocardial infarction, heart failure, or stroke) were reported in 47% of women. Exercise ischemia occurred in 98% and 25% had a cumulative stenosis ≥50%. In women with DASI-predicted METs < and ≥4.7, no inducible ischemia occurred more (71% vs. 40%), with ≥60% predicted maximum heart rate more (24% vs. 5%) often in functionally impaired women (p=0.005), despite similar disease prevalence. In conclusion, among women referred for coronary angiography for suspected myocardial ischemia, marked functional impairment estimated by a simple estimate of functional capacity is associated with an adverse prognosis. Use of the DASI prior to exercise stress testing may stratify candidates for exercise testing or pharmacologic stress.

1111-62 High Treadmill Workload in Patients With Exercise-Induced ST Depression Predicts a Negative Result on Exercise Echocardiography

Amith J. Desai, Amogh Bhat, Daljit Bagha, Mudula Guthikonda, Ezra A. Amsterdam, University of California, Davis Medical Center, Sacramento, CA

BACKGROUND: Although exercise (Ex) electrocardiography (ECG) is the most commonly employed initial test to assess patients with symptoms suggestive of coronary artery disease (CAD), it has limited diagnostic accuracy. Therefore, patients (Pts) with positive tests for myocardial ischemia are frequently referred for further evaluation by noninvasive stress imaging such as Ex echocardiography (Echo). A negative Ex Echo is construed evidence of absence of high risk CAD and of low clinical risk. It has recently been shown that functional capacity is a strong predictor of prognosis. Thus, in a group of Pts with positive Ex ECG but high treadmill workload, we investigated the results of secondary evaluation by ex echo. METHODS: We analyzed the results of 140 consecutive pts (110 males, 30 females; mean age 51 yrs [30-82]) referred for Ex Echo after a positive Ex ECG and a treadmill workload of ≥210 METS. All Pts had a normal resting ECG. Exercise tests utilized a Bruce protocol and were symptom-limited. We investigated the results of secondary evaluation by ex echo. RESULTS: We analyzed the results of 140 consecutive pts (110 males, 30 females; mean age 51 yrs [30-82]) referred for Ex Echo after a positive Ex ECG and a treadmill workload of ≥210 METS. All Pts had a normal resting ECG. Exercise tests utilized a Bruce protocol and were symptom-limited. We investigated the results of secondary evaluation by ex echo. RESULTS: We analyzed the results of 140 consecutive pts (110 males, 30 females; mean age 51 yrs [30-82]) referred for Ex Echo after a positive Ex ECG and a treadmill workload of ≥210 METS. All Pts had a normal resting ECG. Exercise tests utilized a Bruce protocol and were symptom-limited. We investigated the results of secondary evaluation by ex echo. RESULTS: We analyzed the results of 140 consecutive pts (110 males, 30 females; mean age 51 yrs [30-82]) referred for Ex Echo after a positive Ex ECG and a treadmill workload of ≥210 METS. All Pts had a normal resting ECG. Exercise tests utilized a Bruce protocol and were symptom-limited. We investigated the results of secondary evaluation by ex echo.

CONCLUSIONS: Exercise-induced ST depression predicts a negative result on exercise echocardiography.

1111-63 Impact of Obesity on Inflammation and Metabolic Syndrome in Coronary Patients and Effects of Cardiac Rehabilitation

Cari J. Lavie, Richard V. Milani, Al Whedon, Ochsner Clinic Foundation, New Orleans, LA

Background: Obesity is epidemic in the US and represents a major risk factor for CAD and type 2 diabetes. Limited data, however, exist on the effects of obesity on such risk factors as inflammation and components of the metabolic syndrome (MS) as defined by ATP III in CAD patients, and the effects of cardiac rehabilitation and exercise training programs (CRET) in these patients.

1111-64 Exercise Stress Testing: Cardiac Rehabilitation

1111-65 Exercise-Induced ST Depression Predicts a Negative Result on Exercise Echocardiography

1111-66 Impact of Obesity on Inflammation and Metabolic Syndrome in Coronary Patients and Effects of Cardiac Rehabilitation

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1111-69 Predictors of Negative Exercise Echocardiography in Women With Positive Exercise Electrocardiograms

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