significantly depressed global function (Langendorff LV developed pressure 46 Vs 113 mm Hg, $p < 0.05$).

| % Shortening | 1 cp | 15 cp | 200 cp | 300 cp |
|---|---|---|---|---|
| Sham | 9.7 ± 0.5$^{ns}$ | 7.4 ± 0.5$^{ns}$ | 5.7 ± 0.3$^{ns}$ | 2.4 ± 0.2$^{*}$ |
| MI | 8.7 ± 0.3 | 7.0 ± 0.3 | 5.7 ± 0.3 | 3.6 ± 0.3 |
| V Shortening$^{\dagger}$ | | | | |
| Sham | 63 ± 4$^{*}$ | 20 ± 2$^{ns}$ | 22 ± 1$^{ns}$ | 12 ± 1$^{*}$ |
| MI | 78 ± 4 | 22 ± 1 | 22 ± 1 | 20 ± 1 |

$^{ns}$ Not significant. $^{*}$ $p < 0.05$. Unpaired t-test Sham Vs MI. $^{\dagger}$ velocity of shortening uM/sec.

Basal % myocyte shortening (1 cp) was not significantly different between Sham and MI cells ($p = 0.08$). A viscosity-dependent decrease was seen in % shortening and velocity of shortening in Sham and MI ($p < 0.001$, ANOVA). There was no difference in the myocyte % shortening between Sham and MI at 15 cp & 200 cp ($p = 0.37$ & 0.96). At 300 cp, MI myocyte contractile response was greater than Sham cells ($p < 0.01$). While viscous loading significantly decreases myocyte shortening in both Sham & MI, it does not affect the MI cells more adversely. Therefore, the global LV dysfunction seen in the remodeled rat infarct model may not be explained by diminished contractile response of the individual myocytes from the remodeled myocardium.

11:45

### 887-6 Inhibition of Carnitine Synthesis Modulates Alterations in Protein Levels of Sarcoplasmic Reticulum $Ca^{2+}$-ATPase and Enzymes Related With Glucose Utilization in Rat Myocardial Infarction

K. Yonekura[1], Y. Eto[1], T. Aoyagi[1], S. Momomura[1], T. Kimoto[2], Y. Hayashi[2]. [1]*The Second Department of Internal Medicine, University of Tokyo, Tokyo, Japan;* [2]*Taiho Pharmaceutical Co., Ltd. Tokushima, Japan*

*Background:* Decrease in $Ca^{2+}$ uptake of sarcoplasmic reticulum (SR) and decrease in SR $Ca^{2+}$-ATPase (SERCA2) protein and mRNA levels have been reported in patients with congestive heart failure (CHF) due to various cardiac disorders. We previously showed that inhibition of carnitine synthesis by 3-(2,2,2-trymethyl hydrazinium) propionate (MET-88) protected left ventricular (LV) systolic and diastolic functions in rats with myocardial infarction (MI). In the current study we evaluated effects of inhibition of carnitine synthesis on protein levels of SERCA2 and several enzymes related with glucose utilization.

*Methods:* We induced MI in rats by ligating left anterior descending coronary artery, and administered 100 mg/kg/day of MET-88 (MET-88 group) or placebo (MI group) for 20 days. Sham group underwent only cardiac exposure and received placebo. We measured protein levels of SERCA2 and enzymes related with glucose utilization in crude LV myocardial homogenates by Western blotting.

*Results:* In crude LV myocardial homogenate, SERCA2 protein level was reduced by 32% ($p < 0.05$) in MI group compared with Sham group. In contrast, it was maintain normal in MET-88 group. Among the enzymes related with glucose utilization, glycogen syntase and hexokinase decrased by 41% and by 29% respectively in MI ($p < 0.05$). The reduction were attenuated by the MET-88 treatment. SR fraction showed qualitatively similar results.

*Conclusion:* Inhibition of carnitine synthesis attenuated depressed protein level of SERCA2. It modulated those of enzymes related with glucose utilization, which may be favorable for glucose utilization and glycogen storage under ischemic condition.

## 888 Electrophysiologic and Surgical Intervention in Cardiomyopathy

Wednesday, April 1, 1998, 10:30 a.m.–Noon
Georgia World Congress Center, Auditorium

10:30

### 888-1 The Prevalence of Viable Myocardium in 288 Patients With Congestive Heart Failure

M. Allen Auerbach, S. Yagoubi, S. Gambhir, T. Simantov, M. Phelps, H. Schelbert, J. Czernin. *UCLA School of Medicine, Los Angeles, California, USA*

*Background:* The detection of myocardial viability is clinically important for managing patients (pts) with congestive heart failure (CHF). Extensive areas of blood flow-metabolism mismatch (MM) by PET predict the recovery of dysfunctional myocardium following revascularization (CABG; functionally significant MM), while small areas of MM are associated with an increased risk for cardiac death (prognostically significant MM). Yet, the prevalence of myocardial viability in CHF pts remains unknown.

*Methods:* To determine prevalence of myocardial viability clinical N-13 ammonia/F-18 deoxyglucose PET studies obtained in 288 CHF patients (mean age: 62 ± 10 years; mean LVEF 26 ± 9%) were visually analyzed for presence of MM and match (M). The myocardium was divided into 19 segments: proximal, mid- and distal portions of the anterior septum, anterior, anterolateral, inferolateral, inferior and inferoseptal walls and apex. The LV chamber size was graded as severely, moderately, mildly enlarged or normal. MM was considered "functionally" significant if ≥5 segments (approx. 25% of LV-myocardium) and "prognostically" significant if ≥5 segments were involved.

*Results:* Functionally significant MM occurred in 26% of pts with severely, 26% with moderately, 30% with mildly enlarged and 23% with normal LV size. Prognostically significant MM occurred in 26% pts with severely, 26% with moderately, 30% with mildly enlarged and 33% with normal LV size.

*Conclusions:* Functionally and prognostically significant amounts of viable myocardium occur in 26% and 28% of unselected CHF pts referred for the assessment of myocardial viability and functional improvement following CABG can be expected in about 25% of CHF pts. Those with smaller amounts of viability might benefit prognostically from undergoing revascularization.

10:45

### 888-2 Revascularization of Viable Myocardium Favourably Influences Long Term Outcome of Patients With Severe but Not Moderate Ischemic Left Ventricular Dysfunction

P. Marzullo. *CNR Institute of Clinical Physiology, Pisa; On behalf of the VIP study, Working Group Nuclear Cardiology and Magnetic Resonance Imaging, European Society of Cardiology, Italy*

*Background:* In patients with various degrees of ischemic left ventricular dysfunction, little is know about the differential effect of coronary revascularization.

*Methods:* To this aim, 228 patients (mean age 60 ± 7 yrs) with previous myocardial infarction, documented coronary artery disease and maintained viability underwent coronary revascularization either by angioplasty or surgery and long term follow-up evaluation. Dominance of tissue viability was defined as a maintained Thallium-201 uptake in more than 50% of dyssynergic segments at rest evaluated in an anatomical 11-segment model. Of these patients, 174 had a preoperative angiographic ejection fraction in the range 45–26% (Group 1) and 54 showed an ejection fraction ≤25% (Group 2). Two matched group of patients (group 3, 156 patients and group 4, 62 patients) with the same ejection fraction ranges and viability/dysfunction ratio were treated medically. The 4 groups did not differ with respect to known determinants of postinfarction prognosis: age, ejection fraction, number of diseased vessels and number of dyssynergic segments at rest.

*Results:* Intraoperative mortality was 5% and 3% in group 1 and 2, respectively (p ns). The 48-month survival rates were not statistically different in groups 1 and 3 characterized by an intermediate reduction of ejection fraction. On the contrary, the 48-month survival rates were 92% and 72% in group 2 and 4 characterized by severe dysfunction, respectively ($p < 0.01$).

*Conclusions:* In patients with advanced ischemic left ventricular dysfunction and dominance of tissue viability, coronary revascularization significantly improves long-term outcome and may represent a reliable alternative to heart transplantation. In patients with moderate dysfunction, medical therapy and coronary revascularization are associated with similar annual survival rates.

11:00

### 888-3 Improved Exercise Performance and Quality of Life in Patients With Symptomatic Hypertensive Left Ventricular Hypertrophy by VDD Pacing: A Double-Blind Randomized Cross-over Trial

D.A. Kass, C.-H. Chen, M. Talbot, M. Nakayama, R.S. Kieval, J. Lima. *Johns Hopkins University, Baltimore MD, USA*

*Background:* Left ventricular hypertrophy (LVH) with chronic hypertension may lead to exertional intolerance and congestive heart failure. We tested the efficacy of chronic VDD pacing, a proposed treatment for obstructive HCM, on this secondary form of LVH.

*Methods:* Patients with LVH (NYHA-III, 4-m, 5-f, arterial pressure: 160/92) on chronic $\beta$ and/or $Ca^{2+}$-blocker and diuretic therapy, received VDD pacing with short AV delay to maintain continuous RV apical preexcitation. All had concentric LVH (19 ± 0.6 mm wall thickness), and cavity obliteration at rest or with dobutamine or Valsalva provocation. Pacing was on or off for the first 3 mos, then switched for the next 3 mos in a randomized double-blind design. Exercise was studied by treadmill-ergometry.

*Results:* Maximal $O_2$ consumption (14.1 ± 1.0 BASE vs 16.7 ± 1.2 pace-ON, $p = 0.04$, $mlO_2/min/kg$). O2 consumption at anaerobic threshold

(9.2 ± 0.7 vs 11.3 ± 0.8, $p < 0.001$), and exercise time (375 ± 65 vs 571 ± 88 sec, $p = 0.003$) all improved during pacing-ON, but not pacing-OFF periods. Quality of life (QOL, Minnesota Living with Heart Failure) improved at 3 mos regardless of pacing mode ($p < 0.01$), indicating a placebo effect. However, by multiple comparisons test, QOL differed from baseline only during pacing-ON. LV dimensions and wall thickness did not significantly change. In 5 pts studied thus far after 6-mos of additional pacing, inducible cavity gradients by Doppler fell from 22 to 11 mmHg, exercise time remained longer (569 ± 124 sec, $p = 0.01$) and QOL improved ($p = 0.02$).

*Conclusions:* In a randomized blinded-study, VDD pacing improves exercise performance and QOL in symptomatic patients with hypertensive LVH receiving standard medical therapy.

11:15

### 888-4 Intermediate Results of Partial Left Ventriculectomy for Dilated Cardiomyopathy

R.C. Starling, J.B. Young, T. Buda, N. Smedira, M. Goormastic, P.M. McCarthy. *Cleveland Clinic Foundation, Cleveland, OH, USA*

*Background:* Partial left ventriculectomy (PLV) reduces left ventricular (LV) volume and increases ejection fraction (EF) but has been associated with high short term mortality in the U.S. and Brazil.

*Methods:* Since May 1996 we have performed PLV in 57 pts., 42 M 15 F, mean age 53 ± 14 years. Etiology was: 54 dilated cardiomyopathy, 1 familial, 1 valvular, and 1 ischemic. Pre-op the mean LV EF was 13.6 ± 6%, LVID 8.1 ± 1.0 cm, cardiac index 2.1 ± 0.6 l-min-sq m, and peak exercise oxygen consumption ($MVO_2$) 10.6 ± 4.0 ml/kg/min. 54 of 57 pts were listed for cardiac transplant and 40.4% were UNOS Status I, 61.4% were NYHA class 4 and 38.6% class 3.

*Results:* Mean weight of resected LV was 95 gm. The mitral valve was repaired in 55 and replaced in 2 pts. One year Kaplan-Meier survival is 82.1%. One year survival after cardiac transplant in a cohort of 175 pts with dilated cardiomyopathy at our institution was similar (87.3% p = 0.4). One year event free survival (freedom from death, mechanical support and/or transplant relisting) is 57.5%. MVO2, NYHA class, and LV EF improved significantly in event free survivors.

*Conclusion:* PLV provided event free survival in 58% of pts, improved their clinical status, and averted the need for transplant.

11:30

### 888-5 Partial Left Ventriculectomy: A Casuistry of 38 Cases

F.A. Lucchese, J.D. Frota Filho, C. Blacher, W. Pereira, J.A. Rosa, P. Leães, E. Lúcio, R. Batista. *Hospital São Francisco - Santa Casa de Porto Alegre, Brazil*

Partial Left Ventriculectomy (PLV) is a current surgical option in treating Refractory Heart Failure. In order to evaluate survival, quality of life and changes in cardiac dynamics 38 patients were operated on from december 94 to july 97. Mean age of 49 ± 14.7 years old, 25 males (65.7%) and 13 females (34.3%) were included according to the following criteria:dilated cardiomyopathy, NYHA functional class IV, contraindication for heart TX and poor quality of life. Additional procedures were: mitral bioprosthesis - 21 (61.7%), tricuspid annuloplasty - 12 (31.5%), mitral repair - 6 (15.7%) and CABG - 4 (10.8%). Associated conditions such as atrial fibrillation, tricuspid regurgitation, right sided failure and mitral regurgitation were present in a significant number of patients. At six months follow-up the decrease in cardiac dimensions, as measured in 14 consecutive patients, were consistent - diastolic (73.84 ± 8.25 to 65.33 ± 5.72 with p = 0.009) and systolic (65.50 ± 8.3 to 56.83 ± 5.74 with p = 0.007). Ejection Fraction increased but did not reach statistical significance. Left ventricular volumes decreased immediately -systolic (170.9 ± 36 to 74.9 ± 30.5 with p = 0.0002) and diastolic (254.9 ± 75.4 to 110.8 ± 43.9 with p = 0.0012). Early and late mortality were 21.5% and 42.1% respectively. Quality of Life and functional class improved (78.9% in NYHA class IV preoperatively versus 35.7% at six months postoperatively).

*Conclusions:* PLV results in better quality of life and survival is encouraging considering the graveness of this cohort.

11:45

### 888-6 Mitral Regurgitation Redilates the Left Ventricle After Partial Left Ventriculectomy (Batista Operation)

A.T. Kawaguchi[1], L. Bocchino[2], N. Takeshita[2], P.N. Lima[2], J.L. Verde[2], S. Koide[1], R.J. Batista[2]. [1]*Tokai University; Isehara, Japan;* [2]*Centro Medico Caron, Curitiba, Brazil*

*Background:* It remains unclear whether effects of Batista operation are attributable to volume reduction or to regained mitral competence.

*Methods:* Among patients undergoing Batista operation, 32 had Doppler echocardiography preoperatively, early (<3 months) and late after surgery (8 to 14 months). These patients were divided into groups with (MR+, n = 15) and without early postoperative MR (MR−, n = 17) and were compared for ventricular size and performance.

*Results:* Although MR+ group reduced LV end-diastolic dimensions (DD) similar to MR− group early after surgery (early-DD), they had the dimension dilated back to the preoperative level by the time of late study (Late-DD) while MR− group kept the dimension reduced (Table). Occurrence and severity of MR early after surgery (<3 months) did not appear to be related to severity of pre-existing MR, (Pre-MR; moderate = 2 mild = 1, none = 0), underlying pathology (%Myopathy), or performance of mitral valvuloplasty (%MVP) except for patients with papillary muscle resection followed by mitral valve replacement (%MVR), who had better postoperative mitral competence but poorer survival.

| | Pre-DD | Early-DD | Late-DD | Pre-MR | %MVP | %Myopathy | %MVR |
|---|---|---|---|---|---|---|---|
| MR+ | 72.0 | 64.0 | 72.0 | 0.97 | 65.6 | 66.7 | 6.2 |
| MR− | 76.1 | 64.2 | 63.6 | 0.63 | 46.3 | 52.9 | 31.3 |
| p = | NS | NS | 0.05 | NS | NS | NS | 0.05 |

*Conclusion:* Early postoperative MR, residual or new, appeared to be playing an important role dictating early hemodynamics and late outcome in patients undergoing Batistaoperation. The results suggest an aggressive simultaneous approach to repair MR. Role of papillary muscle-mitral apparatus remains unclear and needs further studies.

## 889 Effects of Hypertension in the Left Ventricle

**Wednesday, April 1, 1998, 2:00 p.m.–3:30 p.m.**
**Georgia World Congress Center, Room 255W**

2:00

### 889-1 Left Ventricular Geometry and Function in Hypertensive Patients With ECG Left Ventricular Hypertrophy: The LIFE Trial

R.B. Devereux, J.N. Bella, B. Dahlof, E. Gerdts, M. Niemenen, J. Nielsen, V. Papademetriou. *For the LIFE Study Group; Cornell Medical Center, New York, NY, USA*

*Background:* Detection of LV hypertrophy (LVH) by ECG is inexpensive but its accuracy is controversial because of concerns about low ECG sensitivity.

*Methods:* Echocardiography was used to assess LV structure and function in 625 participants in the LIFE (Losartan Intervention For Endpoint reduction in hypertension) study with ECG LVH (Cornell voltage × duration >= 2,440 mm msec or SV1 + V5 or V6 >38 mm) (average BP 172/95, 39% women, 15% U.S., 85% European) and in comparison groups of 284 hypertensives from a population sample (NY-HTN) and 413 normal adults.

*Results:* LIFE patients had substantially higher LV wall thickness (1.10 vs 0.94 vs 0.78 cm), LV mass index (123 vs 94 vs 74 g/m$^2$), relative wall thickness (0.43 vs 0.38 vs 0.33), end-systolic stress (156 vs 149 vs 127 kdyne/cm$^2$) and pulse pressure/stroke volume (1.07 vs 0.80 vs. 67 ml/mmHg), and lower fractional shortening (0.34 vs 0.38 vs 0.36) and midwall shortening (0.15 vs 0.17 vs 0.18) than the NY-HTN and normals (all p < 0.01). Isovolumic relaxation time exceeded 100 msec – indicative of impaired diastolic relaxation – in 72%.

*Conclusion* Thus, simple ECG criteria for LVH identify hypertensive patients with substantial abnormalities of LV structure and function as verified by echocardiography.

2:15

### 889-2 Doppler-Echocardiographic Parameters of Left Ventricular Diastolic Function in Patients With Mild Arterial Hypertension

C.M. Schannwell, F.C. Schoebel, M. Badiian, R. Marx, T.W. Jax, G. Plehn, M. Leschke, B.E. Strauer. *Clinic of Cardiology, Heinrich Heine University, Dusseldorf, Germany*

*Background:* The high risk of morbidity and mortality for the cardiac complications relating to hypertension leads to the conclusion, that the early determination of myocardial manifestation is of considerable importance in patients (P) with arterial hypertension. About half of the patients with arterial hypertension have normal ECG's and are asymptomatic. The aim of the study was to investigate, whether asymptomatic P with arterial hypertension and normal systolic left ventricular (LV) function already show a diastolic LV dysfunction.

*Methods:* In 23 P with arterial hypertension (age 50 ± 12 years; systolic blood pressure 178 ± 13 mmHg; diastolic blood pressure 98 ± 6 mmHg) and 18 control persons (C), age and sex matched, the following parameters of