–dP/dt were monitored. MBF (ml/min/g) and coronary vascular resistance (CVR) was determined by fluorescent microspheres. Myocardial iNOS activity (fmol/μg) was assayed by conversion of L-14C-arginine to L-14C-citrulline and NO. Infarcted rabbits developed left ventricular dysfunction; MBF in the surviving myocardium was significantly reduced. iNOS inhibition by SMT and AG significantly improved myocardial performance and increased MBF in infarcted rabbits but not in sham animals.

In conclusion the present study provides evidence that increased iNOS formation in MI contributes to myocardial dysfunction; selective modulation of this isozyme improves cardiac performance and increases MBF in the surviving myocardium and may be beneficial in the treatment of the disease.

5:15

764-6 Medical Treatment With ACE-Inhibitors Prevents the Ischemia-Induced Activation of Protein Kinase C in Acute Myocardial Infarction

Ruth H. Strasser, Markus Dahlem, Martin Braun, Ulrike Oehl, Rainer Marquetant. *University of Heidelberg, Germany*

In early myocardial ischemia ACE-inhibitors have been shown to reduce compensatory cardiac hypertrophy and possibly to prevent myocardial remodeling. An enzyme which may contribute to these processes might be protein kinase C (PKC). Early myocardial ischemia has been shown to induce an activation of PKC. The mechanisms leading to this activation are not known.

To investigate, if ACE-inhibitors might modulate the ischemia-induced activation of PKC, isolated perfused rat hearts according to the method of Langendorff were subjected to myocardial ischemia by stop of perfusion for 2.5 min. In the ischemic hearts PKC activity increased in the plasma membranes (310 ± 29 to 381 ± 18 pmol/min/mg protein) with a concomitant reduction of the cytosolic PKC activity. This translocation of PKC is suggestive of a rapid activation of PKC in myocardial ischemia. Preperfusion for 20 min. with two different ACE-inhibitors, Enalaprilat and Ramiprilat (each 10 μg/ml), followed by a 2.5 min. episode of ischemia was able to completely prevent the ischemia-induced translocation and activation of PKC. PKC activity both in the particulate and in the cytosolic fraction remained completely unaltered after brief periods of ischemia in the precence of an effective ACE-inhibition. Similarly, pretreatment with Enalaprilat (25–50 μg/kg i.p.) for one week was also able to completely prevent an activation of PKC in acute myocardial infarction.

These data demonstrate for the first time that ACE-inhibition prior to myocardial ischemia can effectively prevent the ischemia-induce activation of PKC. Further studies have to show, if ACE-inhibitors mediate part of their protective effects via this newly characterized blockade of protein kinase C activation in the infarcted heart.

765 Assisted Circulation

Tuesday, March 26, 1996, 4:00 p.m.–5:30 p.m.
Orange County Convention Center, Room 222

4:00

765-1 Exercise Hemodynamics in Patients Chronically Supported With a Left Ventricular Device: Results of the EVADE Pilot Trial

Brian Jaski, Kelley Branch, John Gordon, Robert Adamson, Peter Hoagland, Larry Favrot, Richard Maly, Walter Dembitsky. *Sharp Memorial Hospital, San Diego, CA 92123*

As a pilot for the Experience with LVAD with Exercise (EVADE) trial, 10 patients implanted with the Thermo Cardiosystems LVAD (8 pneumatic, 2 vented electric) were assessed (mn ± SD) 46 ± 25 days post-implant with supine bicycle exercise. VAD rate (VR), Fick cardiac (CO) and VAD (VO) output, right atrial (RA), pulmonary artery (PA), wedge (PCW), and radial arterial (BP) pressures (mm Hg), mixed venous O_2 content (PAsat), and O_2 consumption (O_2) were:

	HR	VR	BP	RA	PA
Rest	87 ± 12	82 ± 18	94 ± 13	6 ± 4	17 ± 3
Exercise	108 ± 17	107 ± 21	103 ± 13	12 ± 5	31 ± 7
	PCW	CO (l/m)	VO (l/m)	PAsat (%)	O_2 (cc/kg/m)
Rest	5 ± 3	5.0 ± 1.2	5.4 ± 0.9	67 ± 5	2.8 ± 0.4
Exercise	14 ± 8	7.8 ± 2.5	7.0 ± 1.4	39 ± 10	8.2 ± 1.7

With exercise, CO increased more than VO ($p < 0.05$) and Doppler-echo showed LV ejection through the native aortic valve. Peak upright treadmill exercise O_2 was 14.6 ± 2.9 ($p < 0.005$ vs. supine bike). Hemoglobin (Hgb) was 10.5 ± 1.2. Plasma free Hgb was not elevated in any patient.

Thus: 1) Despite postoperative anemia, circulatory reserve allowed exercise compatible with activities of daily life associated with moderate elevations in right and left heart filing pressures. 2) The LV and LVAD operate as series pumps at rest, but as parallel pumps at peak exercise when increased left heart filling pressure permits LV ejection through the native aortic valve. 3) O_2 consumption was higher with upright treadmill compared to supine bike exercise.

4:15

765-2 Effect of Percutaneous Cardiopulmonary Support on Coronary Artery Flow Velocity

Toyoji Nemoto, Kazuo Kimura, Tomoaki Shimizu, Yasuyuki Mochida, Masami Kosuge, Naomitsu Kuji, Toshiyuki Ishikawa, Naomichi Miyazaki, Osamu Tochikubo, Masao Ishii. *Yokohama City University, Yokohama, Japan*

Purpose of this study was to assess the effect of PCPS on coronary artery flow velocity (CAFV) and its waveform, using intravascular Doppler guide wire. PCPS were performed as circulatory support for left main trunk (LMT) stenting in two patients and as resustation measures for bystander Cardiopulmonary arrest in six patients with acute myocardial infarction. The CAFV was recorded in normal coronary artery without stenosis (> 25%) during pump on and off, or during stepwise decrease in pump flow. In the patients (n = 2) with normal sinus rhythm after successful LMT stenting, the CAFV was normal during pump off, and PCPS increased it without changes in its waveform pattern. In the patient (n = 1) with ventricular standstill, PCPS increased mean CAFV from zero to 55 cm/sec with non-pulsatile flow. In the patients (n = 5) undergoing circulatory-pulmonary resustation, native coronary flow under ventricular rhythm during pump off indicated characteristic findings, such as marked decrease in systolic antegrade flow, appearance of abnormal broad systolic retrograde flow (SRF) and rapid deceleration of diastolic antegrade flow (DAF). Circulatory assist of PCPS increased mean CAFV and improved the efficient coronary circulation, which was indicated by DAF minus SRF. In conclusion, PCPS may increase coronary artery flow and improve abnormal CAFV waveform impaired by cardiac deterioration.

4:30

765-3 Temporary Mechanical Support With the BVS 5000 Assist Device During Treatment of Acute Viral Myocarditis

Daniel Marelli, Hillel Laks, Abbas Ardehali, Bram Amsel, Gregory Couper, G. Kimble Jett, Alvaro Galindo, Davis C. Drinkwater. *UCLA Medical Center, Los Angeles, California*

Ventricular support with the BVS 5000 (Abiomed) has been used as temporary circulatory assist for the failing heart. Our purpose is to summarize four cases illustrating the role of mechanical unloading in acute myocarditis.

Four patients aged 16–33 y.o. presented with CHF 4–20 days after a flu-like syndrome. All patients were in severe cardiogenic shock ± renal and liver dysfunction. EF ranged from 5–26%. Indications for ventricular assist were failure of maximal medical treatment with ≥ two inotropes ± IABP. Myocardial biopsy revealed acute myocarditis in three patients and severe edema in one despite a characteristic clinical course. Two patients received immunotherapy with OKT3. Biventricular assist was used in three patients and left ventricular assist only was used in one. Mean support time was 8.3 days (7–11). All patients had recovery of myocardial function and were discharged from the hospital in good condition.

Conclusion: The BVS 5000 device provides a safe, simple, and effective method to support the circulation during acute myocarditis. We hypothesize that this may facilitate myocardial recovery by decompressing the distended ventricle. Ventricular assist devices should be used early in the presence of deterioration on maximal medical therapy.

4:45

765-4 Computer Model Predicts Alterations in Stroke Volume After Cardiomyoplasty

Rashid M. Ahmad, Brian J. DeGuzman, David B. Lautz, Frederick Y. Chen, Rita G. Laurence, Lawrence H. Cohn. *Brigham & Women's Hospital, Boston, MA 02115*

We developed a computer model to predict alterations in SV following dynamic cardiomyoplasty (DCM). The model examined the effects of LV size and shape, and degree of latissimus dorsi muscle fiber shortening (LDMFS) to predict changes in SV. The model provides an explanation as to why significant augmentation in SV has not been seen clinically after DCM. Input