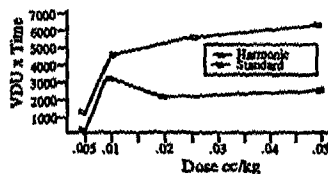


and FS069 (0.6–0.7 ml) were given. Percent change in intensity compared to baseline was measured in the septal myocardium during FS069 and the left ventricular (LV) cavity during Albunex. Imaging was performed at various power levels. The HARM myocardial intensity increased by $206 \pm 44\%$ compared to $110 \pm 42\%$ increase noted with CONV imaging ($p < 0.01$). These differences were noted throughout the range of transmit levels. With Albunex, no significant increase in myocardial intensity was noted although septal perforating vessels were seen to fill with contrast in HARM mode. At low transmit levels, there was an 8x increase in LV intensity in HARM mode compared with a 2–3x increase in CONV mode. This difference was abolished at 100% transmit, however, duration of LV contrast at 100% transmit was diminished in CONV mode. Harmonic imaging enhances the ability of albumin shell microspheres to produce both LV and myocardial opacification and should prove useful in clinical applications of contrast ultrasound.

931-122 Echocardiographic Imaging of Myocardial Opacification With Second Harmonic Imaging of Peripherally Injected Aerosome® Echocontrast Yields Improved Quantitation

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Second harmonic imaging yields an improved signal-to-noise ratio for imaging suitable echocontrast bubbles. In our study, six anesthetized Rhesus monkeys underwent transthoracic ultrasound imaging in the short axis view with a 5 MHz transducer and an ATL HDI system capable of standard imaging, or solving for the second harmonic in the backscatter signal. Aerosome® echocontrast was injected through an 18 gauge angiocath in the right brachial vein. In doses from 0.005 to 0.05 ml/kg, myocardial opacification was determined off-line by analysis of the videodensity of the septum, computing the area under the videodensity/time curve after subtracting baseline values. Detection of contrast passage through the septal myocardium was improved at all doses by harmonic imaging even when it was barely detectable (at the lowest dose) by standard imaging. Further, with harmonic imaging the videointensity \times time integrals continued to rise (in a curvilinear fashion) with increasing doses; whereas, with standard mode, a plateau was reached at higher doses.



Our results suggest that the enhanced sensitivity for detection of myocardial contrast provided by harmonic imaging may improve detectability as well as applicability for using suitable echo-contrast agents in low doses as tracers of myocardial perfusion and possibly of myocardial blood flow.

932 Hypertension: Basic

Monday, March 25, 1996, 3:00 p.m.–5:00 p.m.
Orange County Convention Center, Hall E
Presentation Hour: 4:00 p.m.–5:00 p.m.

932-93 Incremental Value of the ECG in Dobutamine Stress Echo

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The diagnostic value of dobutamine stress echocardiography (DSE) has been well established but the incremental predictive benefit of ECG changes has been debated. Hence, we reviewed 311 consecutive DSEs performed over the last 16 months. Of 54 patients who underwent coronary angiography without revascularization within 6 months, 39 had interpretable ECGs and formed the study group. A positive DSE was defined as resting, new or worsening RWMA, while 1 mm ST segment depression was considered an ischemic ECG response. Coronary artery disease was defined by $\geq 50\%$ stenosis at angiography. **Results:** 1) The prevalence of coronary artery disease in our population was 79%. The prevalence of one, two and three vessel disease was 23%, 18% and 38% respectively. 2) The sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of DSE was 84%, 50%, 87% and 44% respectively. The sensitivity and

specificity of dobutamine ECG alone was 48% and 50%. 3) The sensitivity, specificity, PPV and NPV of combined DSE with ECG was 84%, 38%, 84% and 38% respectively. The ECG was negative in all five false negative DSEs. 4) By redefining a positive DSE as only new or worsening RWMA, the sensitivity is decreased to 61%, specificity is minimally increased to 57%, PPV is 90%, and NPV 20%. **Conclusions:** 1) ECG changes during DSE are neither sensitive nor specific and may reduce the diagnostic accuracy of the test. The ECG provided no additive benefit for diagnosing coronary artery disease in this population. 2) The presence of resting RWMAs increases the diagnostic accuracy of DSE without significantly reducing its specificity.

932-94 Impact of Exercise Training Cardiac Rehabilitation on QTc and QT Dispersion in Post Myocardial Infarction Patients

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Cardiac rehabilitation improves quality of life in post myocardial infarction (MI) patients and decreases the incidence of arrhythmias. The mechanism of this benefit is unclear. We sought to determine whether exercise training in post MI patients has an impact on QTc-interval and QT dispersion (QTd). 14 consecutive MI patients underwent an exercise training program from 1 week after hospital discharge for 3 months. A control group consisted of 16 MI patients matched for age, sex, site of infarction and treadmill exercise capacity who did not take part in the formal rehabilitation program. QTc and QTd were measured from 12 lead ECGs taken at rest and maximum treadmill exercise, 1 week and 3 months after discharge. The changes in QTc and QTd over the 3 month period were compared between the two groups using Student's t test.

Results: In the rehabilitation group QTc at rest and QTd at rest and at maximum exercise fell significantly compared to the controls.

	Control	Study	
<i>At rest</i>			
Δ QTc (ms)	+8.6 \pm 36.1	-16.3 \pm 22.9	$p > 0.05$
Δ QTd (ms)	-14.1 \pm 31.7	-21.4 \pm 31.0	$p < 0.005$
<i>At maximum exercise</i>			
Δ QTc (ms)	+17.2 \pm 34.1	-16.7 \pm 28.1	$p < 0.007$
Δ QTd (ms)	+3.0 \pm 18.6	-25.7 \pm 21.4	$p < 0.002$

Conclusion: exercise rehabilitation post MI significantly reduces QTc interval and QT dispersion. Reduction of arrhythmogenic risk may be a mechanism of benefit of cardiac rehabilitation.

932-95 Outcome of Exercise Testing Depends on Time of Day

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Circadian variations in the occurrence of several cardiovascular have been documented. If a daily variation of exercise parameters exists is unknown therefore this study was undertaken.

The bicycle exercise tolerance tests (ETT) of 6674 patients were analyzed. Inclusion criteria were age between 40 and 80 years and sinus rhythm. The standardized bicycle ETT protocol used started with a gradual increase up to 50 Watts in the first min., followed by an increase of 10 Watts every 30 sec. Data were grouped in 2 hour periods from 9 a.m. till 4 p.m. Analysis of variance and logistic regression was used for statistical comparisons.

Significant time of the day differences were found both at rest and in their changes to peak exercise for heart rate ($p < 0.0001$ and $p < 0.0004$), systolic bloodpressure ($p < 0.0001$ and $p < 0.0003$) and diastolic blood pressure ($p < 0.004$ and $p < 0.0001$). Furthermore ischemia occurred significantly more frequently during the afternoon intervals ($p = 0.009$). No time of the day differences were seen in age, sex, concomitant medication or maximum workload. In the logistic regression analysis time of day was an independent predictor for the occurrence of ischemia during an ETT.

Our data show that the chance to find ischemia during an ETT may be up to 20% higher in the afternoon. Furthermore significant effects, albeit of no direct clinical importance, of the time of the day on heart rate and blood pressure both at rest and their changes during ETT were observed. This study exemplifies the importance of accounting for the effects of time of day when interpreting ETT results which may be of special value in clinical research when evaluating therapeutical strategies.

MONDAY AFTERNOON