Coronary Artery Magnetic Resonance Angiography
Effect of Serum Cholesterol Levels on Coronary
Results of Four Multicenter, Phase III, Magnetic
Noninvasive Imaging

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Background: Cardiac MRI examinations are currently performed at 1.5T. Y et, 3T MRI systems have recently been approved for human use by the FDA. We compared objective and subjective parameters for coronary MRA image performance at both 1.5T and 3T.

Methods: Twelve healthy adult subjects were scanned within one week on both a 1.5T and 3T whole body scanner (Philips Intera) with an ECG and navigator gated fat suppressed T2 prep 3D gradient coronary MRA (TR=6.02ms; TE=2.4ms, FOV=360, 512 matrix, 20 slices a 1.5mm, voxel-size: 0.71x0.71x0.33 mm) sequence. LAD and RCA vessel sharpness / diameters were analyzed semi-automatically. Fat saturation, image quality and motion artefacts were assessed via consensus reading (1-4= poor to excellent image quality) and evaluated using a two-tailed paired Student’s t-test.

Results: On both scanners LAD and RCA coronary MRA could be successfully obtained. Vessel sharpness was significantly improved at 3T (RCA: 63.24±0.24 vs. 40.77±0.04; LAD: 52.50±0.27 vs. 2.81±0.25 at 3T). Fat saturation, image quality and motion artefacts were not significantly different.

Discussion: Three Tesla Coronary MRA results in an objectively improved vessel sharpness and diameter assessment when compared to 1.5T, while subjective parameters as navigator and fat saturation performance were not affected by using higher magnetic field strength.

Methods: 20 consecutive patients were referred for pulmonary hypertension evaluation with CMR. Right ventricle ejection fraction was assessed by prospective triggered fast imaging with steady-state precession sequence (PVM of PA was acquired in a 16.4%, 14.6%, and 13.9%, respectively with the application of MS-325. Each reader showed improved vessel sharpness, diameter and flow velocity when compared to 1.5T, while subjective parameters as navigator and fat saturation performance were not affected by using higher magnetic field strength.

Results: Average PA flow velocity (APV, cm/s) by PVM showed very good correlation with PA pressure (r=0.86). APV values under 10 were found in patients with MPAP under 25 (n=5). None of APV between 10-15 except one with an APV of 9.85. APV values under 10 were found in all patients (n=9) with MPAW≥45 except one in an APV of 10.03. APV value also showed good correlation with PA vascular resistance index (r=0.87), right ejection fraction (r=0.83) and PA saturation (r=0.61). No significant correlations were observed for peak PA flow velocity and forward volume by PVM with PAH in all patients (n=10, r=0.45). The use of background suppression does not affect the results significantly.

Conclusion: PVM can be clinical useful in the initial and follow-up evaluation of patients with pulmonary hypertension. PVM shows good correlation with most RH data and may be used as a non-invasive parameter in these patients.
mg/dl, CRP 4.7 ± 3 mg/dl, insulin 12 ± 3 mg/dl, H-A1c 7 ± 1%, WVF = 109 ± 57%, L-alb 23 ± 32 mg/dl.

Baseline relative upslope= 9.6 ± 3.4, CPT relative upslope=11.8 ± 3.5 (p = 0.01 for CPT
vs baseline relative upslope). MPIR = 1.24 ± 0.36.Of the variables tested, the significant correlates of MPIR were: total cholesterol : r = - 0.77 (p = 0.005)and LDL: r = - 0.73, p = 0.01).

Conclusion: The magnitude of the vasodilatory response to cold-pressor stimulation in patients with DM is approximately 24% and it is inversely related to serum total cholesterol and LDL-cholesterol levels.

**T133-158** Evaluation of Myocardial Ischemia by Magnetic
Resonance Myocardial Stress Perfusion in Renal Transplant Candidates: Comparison With SPECT and Coronary Angiography

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Introduction: Myocardial first-pass perfusion imaging by magnetic resonance (MPI) dur-
ing pharmacological stress has been shown to detect CAD and to have good correlation with coronary angiography (CA) and nuclear medicine (NM). However, there are few data on MPI in specific subgroups of pts, as renal transplant candidates (RTC). In this pts, noninvasive diagnosis of CAD has been shown to be a challenge by traditional methods. The aim of this study was to determine the efficacy of stress MPI in the detection of significant CAD in high-risk RTC.

Methods: Fifty-two pts, 41 males, mean age 58.1 years, were studied with stress SPECT sestamib-Tc99m and MPI. Pts were referred for CA as pre-surgical evaluation. High-risk for CAD was defined by at least one of the criteria: insulin-dependent DM; age > 50 years; history of angina or congestive heart failure; and abnormal ECG (excluding L hypertrophy). MPI was performed on a 1.5T Signa CV/G.E system with parameters: TR 6.3ms, TE 1.2ms, matrix 128×128, and FOV 34-38 cm. Dipyridamole dose was 0.56mg/kg/min IV. Gadolinium dose was 0.05mmol/kg IV, injected at a 5ml/sec rate. MPI was analyzed visually by 2 observers blinded to the CA and SPECT results. Abnormal MPI was based on the presence of myocardial perfusion defect. Significant CAD was defined as CA with at least one main coronary artery branch with an obstructive lesion > 50%.

Results: Prevalence of significant CAD by CA was 63.5% (33/52). NM showed a sensi-
tivity, specificity, accuracy, positive and negative predictive values of 50.0%, 84.2%, 62.7%, 84.2%, and 50.0%, respectively. MPI had a sensitivity, specificity, accuracy, posi-
tive and negative predictive values of 69.7%, 84.2%, 75.0%, 88.5%, and 61.5%, respec-
tively. Although, the results confirm that noninvasive diagnosis of CAD on this group of pts remains a difficult task, MPI sensitivity and accuracy for detection of significant CAD was better than SPECT.

Conclusions: This is the first investigation comparing MPI and SPECT in high-risk RTC. MPI is a useful alternative to evaluate high-risk RTC and can contribute to the pre-surgi-
cal evaluation of RTC.

**T133-159** Comparison of Individually Adapted Breath-Hold and
Free-breathing Coronary Magnetic Resonance
Angiography Using Static State Free Precession

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Background: Flow independent steady state free precession (SSFP) sequences improve coronary artery visualization in comparison to previous techniques. We assessed the influence of free-breathing, navigator-gated (NAV) versus breath-hold (BH) technique on the image quality of SSFP coronary MRA using an identical spatial resolution. Methods: 40 patients with suspected coronary artery disease underwent SSFP imaging of the left or right coronary artery using SSFP (TR/TE/flip: 4.5ms/2.3ms/90°); Philips Intera CV 1.5T) twice. Correction of breathing motion was done once with real time prospective navigator and again with BH. The patients BH capability was individually determined and the duration of data acquisition was adapted using different SSFP-factors. The follow-
ing quantitative parameters were determined: visual score, vessel sharpness, visible ves-
sel length, number of visible side branches. Diagnostic accuracy was calculated in comparison to invasive coronary angiography.

Results: With NAV more coronary artery segments yielded interpretable results (84% vs 62%) and 13% more coronary segments were correctly diagnosed resulting in a signifi-
cantly higher diagnostic accuracy (89.0% vs 79.7%). In addition, the quantitative param-
eters for image quality showed a significant superiority of the NAV approach (*p<0.05). Conclusions: Free-breathing, navigator corrected coronary MRA is superior to breath-
holding regarding image quality and diagnostic accuracy of stenosis detection.

**ORAL CONTRIBUTIONS**

**836FO Featured Oral Session...Clinical Utilization of Magnetic Resonance Imaging Perfusion and Viability**

Tuesday, March 09, 2004, 10:30 a.m.-Noon

Morial Convention Center, La Nouvelle Orleans C

**Abstracts - Noninvasive Imaging**

**353A**

**ABSTRACTS - Noninvasive Imaging**

**ORAL CONTRIBUTIONS**

**353A**

**836-7** Diagnostic Utility of Contrast Enhanced Magnetic
Resonance Imaging for Screening Patients at Risk for
Sudden Cardiac Death

Igger Kien, Jonathan Weinsaft, John F. Heitner, Manesh Patel, Annalisa Crowley, Tristram Bahnson, Robert M. Judd, Raymond J. Kim, Duke University Medical Center, Durham, NC

Background: Invasive electrophysiologic study (EPS) is used to risk stratify patients (pts) for sudden cardiac death (SCD). Myocardial scar provides an anatomic substrate for monomorphic ventricular tachycardia (MVT). We evaluated whether the absence of myo-
cardial scar on contrast enhanced MRI (ceMRI) could risk stratify pts by identifying those without inducible MVT on EPS.

Methods: Cine and ceMRI were performed in pts undergoing clinical EPS to determine SCD risk. Hyperenoughancement on ceMRI was interpreted as scar tissue. EPS results were classified as high risk if sustained MVT was inducible.

Results: MRI was performed in 56 consecutive pts (29 with known CAD, age 61.5+/-
15.5%, 64% male). EPS identified 18 pts at high risk for SCD (MVT, cycle length 290 +/-
49 msec). 27 pts were non-inducible. 10 had polymorphic ventricular tachycardia, 3 had idopathic ventricular tachycardia. ceMRI identified 22 pts (38%) without myocardial scar, none of these pts had inducible MVT. All patients with inducible MVT demonstrated MRI evidence of scar. Multivariate regression analysis found that scar size was the strongest independent predictor of MVT inducibility (p<0.03), and that LV ejection fraction showed a trend towards significance (p=0.07) (see table).

Conclusions: Patients undergoing EPS often do not have myocardial scar on ceMRI. ceMRI demonstrates high negative predictive value for inducible MVT and should be con-
sidered as a screening test in the diagnostic work-up of pts at risk for SCD prior to inva-
sive EPS.

**Predictors of MVT Inducibility**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Univariate Coefficient +/- S.E.</th>
<th>p value</th>
<th>Multivariate Coefficient +/- S.E.</th>
<th>p value</th>
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<tbody>
<tr>
<td>Age</td>
<td>0.03 +/- 0.02</td>
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<td>0.13</td>
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<tr>
<td>Male</td>
<td>0.55 +/- 0.62</td>
<td>0.33</td>
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<td>CAD</td>
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<td>Aneurysm</td>
<td>2.41 +/- 1.16</td>
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<td>GRS Duration</td>
<td>0.02 +/- 0.01</td>
<td>0.07</td>
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<tr>
<td>LV EF</td>
<td>-0.08 +/- 0.02</td>
<td>0.001</td>
<td>-0.05 +/- 0.03</td>
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<tr>
<td>% LV Hyoperenhancement</td>
<td>0.10 +/- 0.03</td>
<td>0.001</td>
<td>0.07 +/- 0.03</td>
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</table>

11:00 a.m.

**836-8** The Limits of Quantifiable Differences in Dipyridamole Stress Magnetic Resonance Imaging Perfusion Defects in Human Subjects With Coronary Artery Disease

Kenneth L. Rhoads, Li-yueh Hsu, Patricia Ingkanisorn, Christopher K. Dyke, Mushabazz A. Syed, Preeti Kansali, Anthony H. Aletas, Andrew E. Arai, National Institutes of Health, Bethesda, MD

Background: A dual-bolus first-pass MRI quantitative perfusion technique can evaluate absolute myocardial blood flow where a low concentration bolus defines the input func-
tion and a high concentration bolus provides strong myocardial enhancement. We deter-
mined the limits with which MRI myocardial perfusion can be quantified and evaluated the feasibility of dual-bolus perfusion analysis in humans.

Methods: Perfusion analysis limits were tested: 1) by measuring the coefficient of varia-
tion of myocardial blood flow (MBF) in 10 normal volunteers; and 2) by measuring perfu-
sion in 20 patients in: a) normal myocardium; b) regions with >70% stenosis by quantita-
tive coronary angiography but without infarction (MI); c) regions of MI with >70% stenosis; and d) regions of MI without stenosis. Feasibility was tested in 64 patients and 10 normal subjects by assessing time intensity curve quality. Dipyridamole (0.56 mg/kg) stress utilized a dual-bolus first pass perfusion technique [Gadolinium-DTPA 0.005 and 0.1 mmol/kg] on a GE 1.5 T CVI scanner and Fermi function deconvolution. Cine MRI and delayed hyperenhancement imaging were also performed.

Results: Limits in Normal Volunteers: Perfusion averaged 4.45+/-1.12 ml/min/g with stress and 2.06+-0.56 ml/min/g at rest (p<0.001). The coefficient of variation for six seg-
ments averaged 8% during stress and 7% at rest. Limits in Patients: Relative to a normal
segment, infarcted segments without residual stenosis had 75% as much MBF (p<0.01), segments with stenosis but no MI had 61% as much MBF (p<0.001), and segments with both stenosis and MI had 44% as much MBF (p<0.001). The sensitivity for a >70%