

858-3

Comparison of Adenosine and Dipyridamole in Detecting Coronary Artery Disease Using Tc-99m Sestamibi Single-Photon Emission Computed Tomography Imaging: A Randomized, Prospective Clinical Study

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Background: Although both vasodilators Dipyridamole (DIP) and Adenosine (AD) are used in myocardial perfusion imaging (MPI), diagnostic superiority of either has not been demonstrated. We compared diagnostic accuracy in a randomized population for detecting coronary artery disease (CAD).

Methods: A total of 1139 consecutive patients referred for vasodilator stress MPI were randomized to receive either AD (47.8%) or DIP (52.2%), followed by Tc-99m Sestamibi SPECT imaging. Of these, 129 patient (11.3%) underwent coronary angiography within 6 months of stress MPI. Patients with prior bypass surgery were excluded. SPECT images were read blindly by a consensus of 3 nuclear cardiologists, and were classified as abnormal if fixed or reversible defects were present. Coronary angiograms were classified as positive for obstructive CAD if a $\geq 70\%$ stenosis was present in a major coronary vessel. Severity of CAD was quantified using the Calif model. Calif scores of 23-37 were classified as mild to moderate CAD, while scores of 42-100 as moderate to severe CAD.

Results: For all CAD patients, the sensitivity of AD and DIP was 88% and 75% ($p=0.07$), with specificity of 63% and 61%, respectively. While the sensitivity for moderate to severe CAD was similar, the sensitivity for mild to moderate CAD was significantly greater with AD than with DIP (Table).

| CAD Severity | Adenosine | Dipyridamole | p Value |
|------------------------|-------------|--------------|---------|
| Mild to Moderate CAD | 90% (18/20) | 62% (18/29) | 0.035 |
| Moderate to Severe CAD | 87% (20/23) | 91% (21/23) | 0.48 |

Conclusion: Adenosine is significantly superior to Dipyridamole as a pharmacologic stressor in detecting mild to moderate CAD with nuclear myocardial perfusion imaging.

2:45 p.m.

858-4

Effects of a New Selective A2a Adenosine Receptor Agonist on Thallium-201 and Tcm99-MIBI Biodistribution and Clearance: Implications for Optimizing Vasodilator Stress Perfusion Imaging

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CVT-3146 (CVT) is a novel selective A2a adenosine (ADO) agonist, with coronary vasodilator effects comparable to ADO, and less effects on peripheral and renal vasculature, which may result in a more favorable biodistribution and kinetics for stress perfusion imaging. Accordingly, we evaluated biodistribution, and clearance of Thallium-201 (TL) and Tc99m-sestamibi (MIBI) with CVT and ADO in a chronic canine model. **Methods:** Anesthetized close chest dogs ($n=6$) were instrumented for hemodynamic monitoring and blood sampling. Each dog received CVT (2.5 mcg/kg) over 30 sec, 10 sec later TL (1.5 mCi) was injected, and dynamic planar imaging performed over 10 min. Serial blood samples were obtained for gamma well counting to determine clearance half-times. Protocol was repeated on same day with injection of MIBI (25mCi). 1 week later, same protocol was repeated using ADO (280 mcg/kg/min, for 4.5 min). Regions of interest were drawn on heart (H) and liver (L) and H/L ratios calculated. Heart uptake (% injected dose) was determined using an external reference. **Results:** CVT and ADO produced comparable hemodynamic effects, heart uptakes and H/L ratios. Blood clearance of TL and MIBI was mono-exponential for both stressors, although MIBI clearance was significantly faster than TL, and faster with CVT. **Conclusion:** CVT stress produced comparable images to ADO. Given the observed faster blood clearance of MIBI, a shorter period of hyperemia might be sufficient for MIBI perfusion imaging, particularly for CVT stress.>

* $p < 0.01$ vs TL; † $p < 0.05$ vs ADO

| | Clearance Half-time (min) | Heart Uptake (% injected dose) | H/L Ratio |
|----------|------------------------------|-----------------------------------|---------------|
| ADO TL | 2.69 ± 0.06 | 4.43 ± 1.01 | 1.41 ± 0.21 |
| ADO MIBI | 1.59 ± 0.07 * | 2.47 ± 0.61 | 0.60 ± 0.07 * |
| CVT TL | 2.51 ± 0.17 | 5.50 ± 1.39 | 1.27 ± 0.14 |
| CVT MIBI | 1.35 ± 0.04 *† | 3.33 ± 1.04 | 0.59 ± 0.07 * |

858-5

Nuclear Perfusion Scintigraphy as a Gatekeeper for Implantable Cardioverter Defibrillation Implantation

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Introduction: Survivors of sudden cardiac death (SCD) due to ventricular tachycardia (VT)/ ventricular fibrillation (VF) are at risk for recurrences. The impact of revascularization in survivors of SCD with coronary artery disease (CAD) is of interest as ischemia may serve as a trigger for VT/VF.

Methods: Survivors of SCD with CAD were evaluated according to a standardized protocol in which detection of ischemia plays a key role. All pts underwent 2D echocardiography, myocardial perfusion scintigraphy and coronary angiography. Subsequently, revascularization of ischemic myocardial regions was performed in all pts with scintigraphically-documented ischemia. The second step in the protocol is electrophysiological (EP) testing in all pts. Pts with ischemia underwent EP tests after revascularization. Non-inducible and revascularized pts were discharged without ICD, whereas inducible revascularized and nonrevascularized pts were discharged after ICD implantation, VT ablation or with antiarrhythmic drugs (AAD). Furthermore, noninducible nonrevascularized pts underwent ICD implantation.

Results: Of the 142 pts, 44 (31%) pts had myocardial ischemia and were completely revascularized. Four-year survival rates were 100% for revascularized non-inducible patients, 84% for revascularized inducible patients, 91% for non-revascularized non-inducible patients and 72% for non-revascularized inducible patients. Only 1 patient (<1% of study population) died suddenly. Recurrences were much more frequent in patients without revascularization (38% versus 7%, $P<0.001$) and the recurrence rate was 0% in the revascularized non-inducible patients.

Conclusion: As a result of sequential evaluation aimed at detection of ischemia and subsequent revascularization outcome in survivors of SCD is excellent. Revascularized and non-inducible pts had a 4-year survival of 100% with a 0% recurrence rate. Only 71% of the pts received an ICD. Nuclear perfusion scintigraphy serves as a gatekeeper for ICD implantation.

3:15 p.m.

858-6

Single-Photon Emission Computed Tomography Myocardial Perfusion Imaging in Women: A Multicenter Reappraisal in the Era of ECG-Gating

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Introduction: There is limited information about contemporary performance of SPECT myocardial perfusion imaging in women, especially in regard to certainty of interpretations and the contribution of ECG-gating.

Methods: Randomly presented gated and non-gated SPECT scans (total 636) of 318 women (209 with cath < 60 days - 43 OVD, 58 1VD, 60 2VD, 48 3VD; 109 <5% CAD likelihood) acquired at 3 different centers were read blindly by consensus of 3 experienced readers. The studies (159 Tl-201, 159 MIBI) were assessed for quality (good, average, poor), diagnosis (definitely normal or abnormal; probably normal or abnormal; or equivocal), and interpretation for each coronary territory (normal, reversible or partially reversible, fixed perfusion defect). Studies were acquired from 1997 - 2002 using ASNC standard procedures. 56% were performed with exercise and 44% with pharmacologic stress. Exclusionary criteria were prior CABG or transplant or recent PCI. **Results:** Mean height and weight was 64" and 170 lbs. Image quality was graded good in 92%. Diagnostically certain (DC) interpretations (definitely normal or abnormal) were made for 76% of non-gated vs 89% of gated images. Using only DC interpretations for calculations, respective sensitivity, specificity and accuracy in the cath population for any CAD was 91%, 46% and 84% for non-gated, and 86%, 56%, and 82% for gated data. Normalcy rates were 71% (nongated) and 91% (gated). Accurate identification of multivessel CAD was 78% for non-gated and 81% for gated images. DCA for LAD, RCA, and LCX were 70%, 69%, and 69% for both non-gated and gated images. **Conclusions:** This blinded interpretation study demonstrates that contemporary SPECT myocardial perfusion imaging performs extremely well in women, even when diagnostic criteria are predefined for only definite interpretations; that diagnostic certainty is very high; and that ECG-gating is especially useful in strengthening certainty of interpretation and reducing "false positives".