ADENOSINE-INDUCED ST-SEGMENT DEPRESSION DURING THALLIUM-201 SCINTIGRAPHY IN CORONARY ARTERY DISEASE: ANGIOGRAPHIC AND HEMODYNAMIC DETERMINANTS
Shigeyuki Nishimura, John J. Mahmartian, and Mario S. Verani, Baylor College of Medicine, Houston, Texas

To examine the angiographic and hemodynamic determinants of adenosine (AD)-induced ST-segment depression during coronary artery disease, 95 patients with angiographically documented coronary artery disease who underwent AD infusion (140 μg/kg/min for 6 min) thallium (Tl-201) myocardial scintigraphy were studied. Patients with prior myocardial infarction were excluded. AD-induced ST-DEP occurred in 22 patients, 14 of whom had chest pain. The onset of ST-DEP was at 3.9 ± 1.1 min after the beginning of AD infusion. Systolic blood pressure was higher in patients with than those without ST-DEP, both at baseline (152 ± 28 and 135 ± 23, respectively, p < 0.05) and during AD infusion (141 ± 27 and 126 ± 22 mmHg, respectively, p < 0.05). Rate-pressure product during AD infusion was significantly higher in patients with than in those without ST-DEP (13093 ± 3456 and 10228 ± 3035, respectively, p < 0.05). The angiographic and scintigraphic results were as follows:

ST-DEP
N = 23
No ST-DEP
N = 43
P
Multivessel disease 14 (64%) 25 (58%) NS
Collateral vessels 18 (82%) 16 (38%) 0.0001
Tl-201 defect size (%) 16 ± 16 NS
Tl-201 lowest count (%) 54 ± 14 52 ± 11 NS
Tl-201 lung/heart ratio 0.37 ± 0.08 0.31 ± 0.08 NS

Thus, AD-induced ST-DEP is related to 1) increase in rate-pressure product, reflecting myocardial oxygen demand, and 2) the presence of angiographic collateral circulation, which may predispose to coronary steal.

REINJECTION OF THALLIUM AFTER STRESS-REDISTRIBUTION IMAGING IS NOT THE SAME AS REST INJECTED THALLIUM STUDY
Yassen Diplaziou, Nanette M.T. Freedman, Wendy R. Smeltzer, Arshed A. Quyyumi, Robert O. Bonow, M.D., NHLBI, Bethesda, Maryland

Thallium (Tl) reinjection (RI) immediately following 3-4 hr redistribution (RD) images results in enhanced Tl uptake in apparently irreversible Tl defects, compatible with viable myocardium. To determine whether Tl injected at rest (without exercise) provides the same information as Tl RI, we studied 18 pts with chronic stable coronary artery disease who underwent both stress-RD-RI and rest-distributed Tl SPECT studies. Images were interpreted by visual and quantitative analysis (Interpolative background subtraction and circumferential count distribution profiles compared to normal data base). The pt with interosseous hypokinesia had a fixed interosseous PD, which was identical with RA and RV pacing. The remaining 6 pts had normal quantitative stress/delayed Tl-201 images with RV pacing. We identified 8 additional regions to be reversible. Hence, the presence of angiographic collateral circulation, which may predispose to coronary steal.

ALTERNATE LEFT VENTRICULAR DEPOLARIZATION SEQUENCE IN LEFT BUNDLE BRANCH BLOCK IS NOT A CAUSIS FOR FALSE-POSITIVE THALLIUM-201 DEFECTS

False-positive myocardial perfusion defects (PD) are occasionally observed on exercise Tl-201 images in pts with complete left bundle branch block (LBBB) and normal coronary arteries. The cause for these artifacts is not well understood. Experimental animal data suggested that altered LV depolarization sequence reduces septal myocardial blood flow. We tested this hypothesis by comparing quantitatively myocardial distribution of Tl-201 during rapid RA pacing (normal depolarization) with that during rapid RV pacing (electrical LBBB) in 7 pts. who were 17±7 months after cardiac transplantation. Six of 7 pts had angiocraphic normal coronary arteries and normal LV wall motion. One pt. with normal conduction on ECG, had 30-40% coronary stenosis and interoseous hypokinecis. During right heart catheterization for cardiac biopsies, RA pacing was performed at a mean peak heart rate of 140±14 bpm and Tl-201 was injected. During RV pacing again all 6 Pts had normal quantitative stress/delayed Tl-201 images. Thus, Tl-201 myocardial distribution during pacing stress and electrically induced LBBB is normal. Therefore, it seems unlikely that altered sequential LV depolarization itself can account for false-positive PD in pts with LBBB.

ASSESSMENT OF LEFT VENTRICULAR FUNCTION FROM SPECT Tl-201 MYOCARDIAL PERFUSION IMAGING
Roberto R. Roberti, Mitchell A. Banchian, Andrew Van Toeh, Steven F. Horowitz. Beth Israel Medical Center, New York.

Estimation of LV function and perfusion from a single radiolabeled imaging study is an attractive clinical tool. We observed that patients with count poor LV cavities seen on SPECT Tl-201 imaging have reduced LV function. We postulated that a cavity/myocardium count ratio (C/M) derived from exercise SPECT Tl-201 scintigraphy, could be related to LV EF. Seventy-seven patients who had exercise SPECT Tl-201 imaging and cardiac catheterization were studied. There were 58 men and 19 women, mean age 63 (range 38-82). 53 pts had C/M and 14 were normal. The mid LV slice in the short axis view was identified on post-exercise and 4 hour images. Using a 2x2 pixel region of interest, the number of counts in the center of the LV cavity was divided by the counts in the hittest region of myocardium to create a C/M ratio. This was compared with LV EF obtained from contrast left ventriculography.

Results: There was a significant positive linear correlation between LV EF and C/M ratio post-exercise (r=0.72) and at 4hr (r=0.77), p≤0.0001. In addition, 23/25 pts with EF≤50 had C/M≥40, and 43/52 with EF>50 had C/M<40.

C/M ≤40 23 9 0.0001
C/M >40 43 26

( Sensitivity for EF≤50 = 92%, specificity 93%)

Conclusion: There is a direct relationship between resting LV function and C/M ratio derived from standard exercise and rest SPECT Tl-201 imaging. Patients with reduced LV function can be accurately identified by a C/M ratio g 40.