5.1 The influence of combined therapy with perindopril and trimetazidine on the silent myocardial ischemia and on left ventricular remodeling in essential hypertension. S.V. Svetlana Gurgenyantz1, S.K.R. Vatinyan2, K.G. Nikogosyan1, L. Alonso2, H.E. Cha7, J.K. Chung7, C. Gutierrez1, L. Knopp5, C. Onsel6, I. Silvis1, L. Llerena1, A.K. Padhy,3 Institute of Cardiology, Arterial hypertension, Yerevan, Armenia, Institute of Cardiology, Arterial Hypertension, Yerevan, Armenia

Objective: To assess the effects combined therapy of inhibitor ACE, perindopril (P) and metabolic anti-ischaemic agent, trimetazidine MR (T) on the parameters of myocardial ischemia and on dynamic of left ventricular (LV) remodeling in hypertensive patients (pts).

Design and Methods: We studied 36 pts with BP ≥160/100 mm Hg (22 male and 14 female, average age 51.3 ± 3.7years) and with LV hypertrophy and silent myocardial ischemia estimated by changes in wall motion score index (WMSI) at rest and at peak of the dobutamine stress-echocardiography (SE). The pts were randomized into two groups by 18 in each: I was administered P (4.8 mg od.) and T (35 mg id.); II - P in same dose and placebo. Echocardiography and SE were performed at baseline and after 6 mounts of treatment.

Results: BP fell less than 140/90 mm Hg in all groups. LV hypertrophy regression was observed in I and II groups by 83.5% and 77.8% accordingly. The WMSI was substantially improved at rest and at peak of the SE in the responders to regression and more pronounced in I group compared with II group: I-from 1.44.0 ± 0.2 to 1.29 ± 0.1 at rest and from 1.72.0 ± 0.2 to 1.52 ± 0.1 at peak of SE (p < 0.001, for each); II-from 1.41 ± 0.3 to 1.31 ± 0.2 at rest and from 1.69 ± 0.4 to 1.58 ± 0.03 at peak of SE (p < 0.05). Simultaneously with LV hypertrophy regression and reduction of myocardial ischemia parameters there was observed the improvement of diastolic function more expressed in I group compare with II group: peak of velocity of early and late filling ratio (E/A) was increased in I-from 0.95 ± 0.3 to 1.26 ± 0.02 (p < 0.001); in II-from 0.94 ± 0.2 to 1.16 ± 0.03 (p < 0.05); the isovolumetric relaxation time was decreased in all groups: I-from 137.5 ± 5.03 to 103.1 ± 3.08 msec (p < 0.0002); II-from 136.1 ± 5.10 to 131.1 ± 3.08 msec (p < 0.05).

Conclusion: Despite identical fall of BP and LV hypertrophy regression the combined therapy with P and T produces more pronounced reduction of myocardial ischemia and restoration of LV function compared with monotherapy of P in hypertensive pts.

5.2 Detection and quantification of silent ischemia in essential hypertensives without or with type 2 diabetes mellitus by dipyridamole sestamibi myocardial imaging. Y. Lacourcière1, M. Marcel Dumont1, J. Lefebre2, L. Poirier2, C. Côté1. CHUQ, Nuclear Medicine, Quebec City, Canada, CHUL, Hypertension Division, Quebec, Canada

AIM Coronary artery disease (CAD) is the leading cause of morbidity and mortality in hypertensive and hypertensive diabetic patients (pts). Early diagnosis of CAD and identification of high risk subgroups followed by appropriate therapy may therefore enhance survival. The purpose of this prospective study was to establish to what extent a standard perfusion imaging protocol with physical and by mental stress, as well as between mental stress-induced ischemia detected by echocardiography and myocardial scintigraphy has been induced with mental stress testing.

Aim: To evaluate if mental stress can induce ischemia in women with typical angina and normal coronary arteriograms.

A. Amelia Peix1, D. Garcia-Barreno1, A. Truppa2, L. Are2, O. Infante3, F. Ponce1, L.G. Cabrera1, J. Valiente1, F. Torrus1, J. Guerrero.1 Institute of Cardiology, Nuclear Medicine, La Habana, Cuba, 2Policlinic Plaza, Dept. of Psychology, La Habana, Cuba

Coronary heart disease (CHD) is frequent in postmenopausal women. Mental stress is associated with adverse events in patients with CHD, as well as with silent myocardial ischemia detected by echocardiography and myocardial scintigraphy that has been induced with mental stress testing.

Methods: Sixteen patients were studied. All underwent technetium-99m methoxyisobutylisonitrile myocardial scintigraphy (protocol physical stress-rest-mental stress); endothelial function measured by ultrasound at brachial artery and 24 hours ambulatory electrocardiographic recording (Holter).

Results: During mental stress testing, 5 patients (31%), mean age 54 ±4 years (Group I) had perfusion defects in the myocardial scintigraphy, while the other 11 patients (69%), mean age 56 ±8 years (Group II) did not. There was no significant difference regarding presence of hypertension or rest angina. Group I patients had more diabetes mellitus (40 vs 27%), stress angina (40 vs 9%) and endothelial dysfunction (80 vs 27%) than Group II. There was a concordance between perfusion defects induced by physical and by mental stress. Myocardial scintigraphy showed anteroapical / septal ischemia in four patients and inferioropical in one. Among Group II patients, only one patient had an anteriopical perfusion defect with physical stress, but not with mental stress. In 60% of cases the Holter recording was normal in Group I patients, while in Group II only two patients had alterations suggestive of ischemia.

Conclusions: In postmenopausal women with typical angina and normal coronary arteriograms, there is an appropriate decrease between the detection of ischemia induced by physical and by mental stress, as well as between mental stress-induced ischemia and presence of endothelial dysfunction.

Poster Display II 14:00-18:00

Clinical General

S80

Journal of Nuclear Cardiology

Monday, May 9, 2005
Nuclear cardiology in cardiac resynchronization therapy assessment.

A. Amalia Pérez, R. Zayas, MA. Quiñones, P. Ponce, F. Tomese, J. Castro, Y. Fayad, I.O. Cabrera, R. Carillo, & A. De Paz. 1 Institute of Cardiology, Nuclear Medicine, La Habana, Cuba, 2Institute of Cardiology, Electrophysiology, La Habana, Cuba

Introduction: Cardiac resynchronization therapy (CRT) by biventricular pacing is indicated in patients with severe heart failure and left bundle branch block who remain asymptomatic despite optimal medical therapy.

Methods: To assess the behaviour of rest perfusion pattern and temporal parameters of ventricular synchronization baseline and after CRT using nuclear cardiology techniques, fifteen patients (mean age: 58±5.3 years, 56% women) were included. All underwent radionuclide angiography (RNA) and resting gated single-photon emission computed tomography perfusion scan with technetium-99m methoxy-iodobutyl-isobutirile before CRT and at 6-months follow-up. Left ventricular ejection fraction (LVEF), ventricular volumes and regurgitation index were calculated. In the RNA, the onset (To); mean time (Tm); total contraction time (Tt); final time (Tf) and propagation time (Tp); interventricular time (TRV-LV), base-apex (TB-A) and septum-lateral wall (TS-LW) conduction times were measured on the 3H Fourier histogram of the time activity curve.

Results: One patient died before follow-up. In the remaining 14 patients there was a significant LVEF and RVEF increase after 6-months CRT (from 22±5 to 38±7% and from 34±9 to 43±10%, respectively). Diastolic function also improved and ventricular volumes decreased, but not significantly. Regurgitation index decreased from 1.91±0.1 to 1.50±0.1. LV started its contraction 52 ms before than baseline and the interven- tricular asynchronism reduced from 97±6 to 48±7 ms. Intraventricular asynchrony (septum-lateral wall and apex-base) also decreased. This coincided with the clinical improvement. Regarding myocardial perfusion, although the coronary angiography was normal in all these patients, resting perfusion scoring decreased from 41 to 1.5

Conclusion: Nuclear cardiology tests are reliable methods for cardiac resynchroni-
tization therapy assessment.

5.6

Left ventricular volumes in denervated human hearts. Is ejection fraction dependent on pre- and/or afterload?

J. Jesper Mehlson, C. Hiderdal. Frederiksberg Hospital, Clinical Physiology, Fred- eriksberg, Denmark

The present study was aimed at investigating the relation between left ventricular preload, afterload, and contractility in patients autonomic dysfunction causing denervation of the heart and the arterial system. Seven patients aged 69 years (49-84) with autonomic failure caused by multiple system atrophy, Parkinson’s disease or progressive autonomic failure were included. Intraar- terial blood pressure and the electrocardiogram were recorded continuously and left ventricular ejection fraction remained unchanged at 0.66, 0.71, and 0.68 (p = 0.607). Heart rates were 79, 85, and 90 bpm (p = 0.006) resulting in cardiac outputs of 4.6, 3.5, and 2.4 liter (p = 0.002). Systemic vascular resistances remained unchanged (p = 0.311). Systolic blood pressures correlated with LVEDV both for the group of patients (r = 0.40) and for the individual cases (mean value of r² = 0.96). This study shows that in patients with autonomic denervated hearts, ejection fractions remain unchanged in spite of profound changes in both pre- and afterload. It also shows that without autonomic innervation there is a close relationship between cardiac filling and arterial blood pressure.

5.7

Comparative value of planar versus tomographic acquisitions for the calculation of left ventricular volume with ECG gated equilibrium radionuclide angiography.

D. Doumit Daoui1, C. Coaguila1, A. Benada1, A. Lehtia, I. Idy-Peretti2, D. Le Guleduc2. 1 Lariboisiere Hospital, AP-HP, Nuclear Medicine Dept, Paris, France, 2Bichat Hospital, AP-HP, Nuclear Medicine Dept, Paris, France

Aim: Planar-RNA is a simple method for the calculation of left ventricular (LV) ejection fraction. With planar radionuclide angiography (planar-RNA), different meth-
ods with variable complexities have been reported for the calculation of LV end diastolic volume (EDV). One of these methods, the Massardo method is interesting because of its simplicity. It needs no additional images to be acquired, no blood counting, no attenuation nor decay correction. Similarly, SPECT RNA is a simple method that provides both EDV and end-systolic LV volumes and LV ejection fraction. We have previously validated its use for both LVEF and LV volume. We aimed to compare the accuracy of the Massardo method applied to planar-RNA to the maximum activity threshold method applied to SPECT RNA for the measurement of LV EDV.

Methods: Our population included 37 consecutive patients with CAD having planar-
RNA (best septal view) followed by SPECT-RNA, and conventional contrast X-rays LV angiography within 1±3 days. Conventional contrast X-rays LV angiography (Dodge method) was used as the reference method for EDV. The Massardo method applied to planar-RNA to the maximum activity threshold method applied to SPECT RNA for the measurement of LV EDV.

Results: EDV calculated with X-rays, SPECT-RNA, and planar-RNA were respecti-
vely 207±60%, 204±65%, and 184±63%, t: p = 0.021 and : p = 0.004. EDV calculated with SPECT-RNA was better correlated than planar-RNA with X-rays EDV: X-rays = 0.82±SPECT-RNA (r = 0.78; ser = 44 ml; p = 0.001) and X-rays = 79±0.70 planar-RNA (r = 0.64; ser = 54 ml; p = 0.001). On Bland Altman analysis, the absolute paired difference (mean±SD) for the SPECT-RNA and planar-RNA versus the X-rays reference method were respectively 3±45 ml and 2±56. As compared to the X-rays reference method, planar-RNA underestimated EDV. This underestimation was constant over the wide range of EDV evaluated. And there was no over or under estimation of EDV with SPECT RNA over the wide range of EDV evaluated. Note that the limits of agreement were wider with the planar-RNA than SPECT RNA.

Conclusion: As compared to planar-RNA (Massardo method), SPECT RNA (maxi-
mum activity threshold method) is more accurate for the calculation of EDV. Moreover, it provides EDV concordant with those of absolute X-rays EDV.

5.8

Feasibility of gated SPECT radionuclide angiography for the assessment of inter and intra ventricular mechanical synchrony in biventricular stimulation.

D. Doumit Daoui1, C. Coaguila1, D. Vilain1, A. Benada1, A. Leenthard1, I. Idy-Peretti1, D. Le Guleduc2, 3. 1 Lariboisiere Hospital, AP-HP, Nuclear Medicine Dept, Paris, France, 2Foch Hospital, Nuclear Medicine Dept, Suresnes, France, 3Lariboisiere Hospital, AP-HP, Cardiology Dept, Paris, France

Aim: In chronic heart failure, the primary decrease in myocardial contractility is frequently combined to an abnormality in the sequence of myocardial electrical activation. This leads to dys synchronism (D) in myocardial contraction (mechanical D). This latter combines to the primary decrease in myocardial contractility and deteriorates further cardiac function. Biventricular stimulation has been proposed as a treatment of advanced heart failure. Planar radionuclide angiography (RNA) with Fourier phase analysis (FPA) has been proposed for the evaluation of mechanical D. But, planar RNA suffers from its 2D nature imposing some difficulty in individualizing myocardial segments. SPECT RNA can obviate this limitation. We aimed to describe the potential applicability of FPA to SPECT RNA for the evaluation of mechanical D.

Methods: Our study included a control population (n = 8 normal patients) to define normal limits of FPA for SPECT RNA, and one patient with primary dilated cardiomyopathy having a DD pacemaker implanted 3 months earlier. This patient was well ameliorated by pacemaker implantation with FPA SPECT RNA is feasible. It is characterized by the objectiveness of its semi-automatic processing method.

Results: The control population, LV mean phase was 167±14° and LV SD phase was 5±3°. For the RV, these were 160±12° and 13±6°. LRVY delay was 7±9° and LV SYL delay was 1±7°. In the patient with cardiacophatyomy, we found for the LV in the AAI versus DDD mode respectively 171° versus 189° for the mean and 63° versus 71° for the SD. For the RV, these were 234° versus 213° for the mean and 75° versus 117° for the SD. For the LRVY phase delay, these were 63° versus 88°. For the SL phase delay, these were –41° versus 88°. Note the reduction in SL phase delay and feasibility of quantifying the mechanical D of the LV and RV globally and between any LV and RV segments.

Conclusion: Quantification of intra and inter ventricular mechanical D before and after pacemaker implantation with FPA SPECT RNA is feasible. It is characterized by the objectiveness of its semi-automatic processing method.
5.10

The combination of TI-201 scintigraphy and dobutamine stress echocardiography, increases the sensitivity for detection of viable myocardial tissue after myocardial infarction. N.T. Nikos Kounis1, D.D. Kontogianni2, G.S. Gerominoti2, M.D. Sifaki3, E.M. Kalland2, H.E. Grassos2, E. Papoulia2, D.K. Babalis.21 Athens, Greece, 2Western Attica General Hospital, Cardiology Dept, Athens, Greece

TI 201 scintigraphy (TI) with reinfusion and dynamic stress echocardiography (DSE) with dobutamine are both characterized by satisfactory sensitivity and specificity when used for the detection of viable myocardium after myocardial infarction (MI). The aim of our study was to clarify whether the sequential performance of both methods in the same patients (pts) provides additional information, capable of changing our therapeutic decisions as far as revascularization is concerned.

Patients and methods: Fifteen consecutive pts (12 male, 3 female), mean age 65±9 years and with a history of MI during the previous 15 months, underwent DSE for the detection of myocardial viability, followed by TI the day after. DSE was performed in two 3-min acquisitions using low-dose dobutamine (5 and 10 μg/kg/min respectively), while TI study consisted of 3 stages (i.e. exercise, rest and redistribution phases, following reinfusion of 1mCi of TI-201). Left ventricle was divided in 16 segments for the evaluation of wall motion abnormalities and perfusion defects. These segments were identical and comparable in the standard manner, using a previously validated methodology. The combination method and TI alone.

Results: We studied a total of 240 myocardial segments (15 pts, 16 segments each): 108 segments (45%) demonstrated regional wall motion abnormalities (RWMAs) on DSE; 27 of them (25%) of the dysfunctional segments (ds) were viable (V). On TI SPECT 112 out of 240 segments (47%) had a perfusion defect; 39 of these defects (34% of ds) were V. When both methods were performed, 49 V segments were detected (36% of ds). Results were evaluated by the ANOVA test for repeated measurements. The percentage of viable segments detected by the combination of the two methods was found to be significantly higher than the percentage detected by DSE alone (p=0.025). On the contrary, no difference was found in the number of segments detected by the combination method and TI alone.

Conclusion: The sequential performance of DSE and TI SPECT is feasible and seems to increase the likelihood for the detection of myocardial viability after MI, particularly in cases that DSE alone fails to detect a satisfactory number of viable segments, capable of providing an indication for revascularization.

Table 1.

Groups n LVEF (%) RVEF (%)

CAD 31 57 (12) 46 (6)
CABG 113 56 (11) 43 (6)
AMI 211 52 (14) 46 (8)
AMI + CABG 39 47 (15) 42 (6)

5.11

LVEF by TI-201 Gated SPECT: Limits of normalcy and reproducibility. E. Elistratos Meralidis1, T. Spyridomidas1, G. Arso1, K. Karatza1, K. Karakatsanis.1 Hippokration Hospital, Thessaloniki, Greece, 2Rio Hospital, Patras, Greece

Aim: TI-201 Gated SPECT (TI-GSP) may be used in the calculation of left ventricular ejection fraction (LVEF). This study investigates the normal lower limits of LVEF by TI-GSP. In addition, the limits of reproducibility of TI-GSP LVEF from two independent acquisitions per patient are assessed.

Methods: Twenty-nine consecutive patients (23 male, 6 female), aged 55 ± 10 years, with low pre-test probability of coronary artery disease, with no history of other cardiovascular disease, and unequivocally normal TI-201 scans, were enrolled. Patients were submitted to routine symptom limited exercise myocardial perfusion imaging. 1.2 MBq/kg Ti-201 (range 80-110 MBq) was injected at stress followed by gated SPECT acquisitions 15 minutes and 3 hours later. Cedars-Sinai software package was used to calculate LVEF from early and delayed acquisitions (sGSP-LVEF and rGSP-LVEF, respectively). Each LVEF calculation was performed by two independent observers and the mean value was entered in analysis. The standard deviation (SD) of the difference between sGSP-LVEF and rGSP-LVEF was used to define the limits of reproducibility.

Results: sGSP-LVEF = 60.5 ± 8.3 %

rGSP-LVEF = 58.8 ± 8.0 %
sGSP-LVEF + rGSP-LVEF) 2 = 59.6 ± 7.2 %
sGSP-LVEF − rGSP-LVEF = 1.7 ± 7.8 %

There was no significant difference between sGSP-LVEF and rGSP-LVEF (paired t-test). However, in 8 cases (27%) a difference of > 10% between sGSP-LVEF and rGSP-LVEF was found.

Conclusion: (1) The normal lower limit of TI-GSP LVEF may be set at 43%. (2) Given the reproducibility limits from two independent acquisitions, a TI-GSP LVEF difference of at least 15% may be clinically valid.
5.13
Post-stress stunning in gated SPECT MIBI: comparison between different modalities of stress and the prognostic implication.
R.V. Ramannathapuram Parameswaran. Manipal Hospital, Nuclear Medicine, Bangalore, India

Introduction: Post-stress stunning (PSS) is often seen in MPI as regional contractility dysfunction on post-exercise images, which reverses in resting images. This prospective study was undertaken to see if the same type of stunning was observed in pharmacological stress and whether there was any prognostic implication of this coupled with other parameters like lung uptake and TID.

Materials & Methods: 210 subjects underwent MPI with 99mTc-Sestamibi. Of this, 120 were subjected to TMT, 72 underwent Adenosine stress and the remaining 18 with Dobutamine. The criteria for PSS was defined when there was a decrease of more than 10% of EF during post-stress images, associated with or without RWMA.

Results: Semi-quantitative analysis was performed and segments were classified into normal, ischemic, infarct with ischemia and fixed defects. The presence of lung uptake and TID was also noted. Of the total 210 subjects, 58 subjects showed PSS, out of which 40 were subjects with TMT, 15 with Adenosine and the remaining 3 were with Dobutamine. The distribution of PSS subjects with ischemia, infarct with ischemia and fixed defects for each type of stress is mentioned in Table 1. The change in EF was also noted in all the three types of stress and the maximum range of change was seen on TMT followed by Dobutamine. This is more in subjects who had infarct with ischemia, followed by subjects with fixed defects and subjects with only ischemia. When correlated with the Lung uptake and TID, findings amongst the 58 PSS subjects, 63.79%(37/58) of patients who had infarct also had lung uptake and/or TID, 13.79%(8/58) had fixed defects along with Lung uptake and/or TID and finally 17.24%(10/58) had ischemia along with lung uptake and/or TID.

Conclusion: The use of semi-quantitative analysis of PSS in SPECT MIBI is more seen in areas which has a mixture of infarct and ischemic segments. It is also more commonly seen in routine exercise and along with Lung uptake and TID, also may have prognostic importance of future cardiac events, which needs to be further validated.

Table 1. PSS in different types of stress(Table1)

<table>
<thead>
<tr>
<th>Stress</th>
<th>Ischemic with ischemia</th>
<th>Infarct with ischemia</th>
<th>Fixed Defects</th>
<th>Total</th>
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<tbody>
<tr>
<td>TMT</td>
<td>29(72%)</td>
<td>9(22%)</td>
<td>40</td>
<td></td>
</tr>
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<td>Adenosine</td>
<td>36(66%)</td>
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</tr>
<tr>
<td>Dobutamine</td>
<td>0</td>
<td>2(66%)</td>
<td>3(33.3%)</td>
<td>0</td>
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</tbody>
</table>

5.15
FDG PET semiquantitative analysis in patients with severe ischemic left ventricular dysfunction: prediction of functional recovery after coronary revascularization.
M. Matro Fesal1, G. Leonard1, S. Peano2, A. Bianchi2, P. Datto2, E. Guala2, A. Biggi2, E. Uslenghi1, I. Santa Croce Hospital, Cardiology Dept., Cuneo, Italy, “Ospedale S. Croce, Nuclear Medicine Dept., Cuneo, Italy

Functional recovery after coronary revascularization might be predicted by quantitative analysis of fluorine F18 fluorodeoxyglucose (FDG) positron emission tomography (PET). The objective of this study was to demonstrate the usefulness of PET FDG visual semiquantitative analysis predicting functional recovery after revascularization in severe ischemic left ventricular dysfunction.

Methods: All patients had previous myocardial infarction (MI) (>6 months) and left ventricular systolic dysfunction (LVEF<40%). FDG PET, transthoracic echocardiography and coronary angiography were provided for all pts. All subjects underwent euglycemic hyperinsulinenic clamp before the injection of FDG. The results of PET scans and echocardiograms were analysed semiquantitatively (dividing the left ventricle in 17 segments; score from 0=normal to 4=absence of detectable tracer uptake in one segment for PET and score from 1=normal to 4=diskentric segments) by two operators. The 1-year follow-up was clinical and echocardiographic in the available pts.

Results: Thirty-three consecutive patients (25 males, mean age 63 yrs) were studied. The mean LVEF was 30±2.6±6.9%; 15 suffered an anterior MI, 13 non-q MI and 5 inferior MI.

Conclusions: Functional recovery after coronary revascularization of the FDG PET was calculated according to different degree of reduction of FDG uptake (normal/moderately reduction (score 0-2) or normal/severely reduction (score 0-3)). Sensitivity, specificity, positive predictive value and negative predictive value of FDG PET were calculated according to score 0-2 or score 0-3.

5.14
Is chronic ST elevation a marker of myocardial non viability in patients with Q wave anteroseptal MI? Correlation with myocardial perfusion SPECT.
P.S. Palanisamy Shanmug Sundaram1, S. Padman1, K.K. Haridas1, M. Zacharias1, S. Kumar1, 1Amrita Institute of medical sciences, Nuclear Medicine, Cochin, India, 2Amrita Institute of Medical Sciences, Adult Cardiology, Cochin, India

Persistence of ST elevation for more than 2-4 weeks in pts with acute anteroseptal myocardial infarction (AMI) is considered to be a specific marker of left ventricular aneurysm.

Aim: We attempted to assess the face value of this statement by correlating the findings of 99mTc Sestamibi Myocardial perfusion SPECT (MPSPECT) & resting 12 lead ECG.

Methods: 240 AMI patients (192±48 Male; Female pts, age range 36-71 yrs, Mean 51±8 yrs) referred for risk stratification between Jan 02-Jan 04 were retrospectively analysed.

Demographic details & LV systolic function parameters were same for all these pts. The mean LV EF at rest was 40±6.

Inclusion criteria were patients with Q Wave AMI > 1 month old & ECG at rest showing sinus rhythm, QRS < 120 ms, Q waves in 2 contiguous leads from V1 to V3 & with or without ST segment elevation > 1.5 mm. Pts with atrial arrhythmias & branch block were excluded.

Pts underwent same day stress gated MPSPECT on a dual head variable angle gamma camera. Pts performed either conventional treadmill stress or taken up for pharmacological stress. 0.2 MBq Tc-99m MIBI were administered 3 minutes prior to stress & 1 minute during stress. Pts underwent gated MPSPECT on a dual head variable angle gamma camera. Pts performed either conventional treadmill stress or taken up for pharmacological stress. 0.2 MBq Tc-99m MIBI were administered 3 minutes prior to stress & 1 minute during stress.

Presence of reversible perfusion defects, >40% uptake of MIBI at rest and myocardial systolic wall thinning in gated images (count increase by at least 10% during systole) were considered as markers of viability.

Results: Patients were categorized into two groups. ST elevation positive i.e. patients with rest ST elevation > 1.5 mm (137 pts 57%) & ST elevation negative (103 pts 37%) by the Semiquantitative analysis was performed and segments were classified into normal, ischemic, infarct with ischemia and fixed defects. The presence of lung uptake and TID was also noted. Of the total 210 subjects, 58 subjects showed PSS, out of which 40 were subjects with TMT, 15 with Adenosine and the remaining 3 were with Dobutamine. The distribution of PSS subjects with ischemia, infarct with ischemia and fixed defects for each type of stress is mentioned in Table 1. The change in EF was also noted in all the three types of stress and the maximum range of change was seen on TMT followed by Dobutamine. This is more in subjects who had infarct with ischemia, followed by subjects with fixed defects and subjects with only ischemia. When correlated with the Lung uptake and TID, findings amongst the 58 PSS subjects, 63.79%(37/58) of patients who had infarct also had lung uptake and/or TID, 13.79%(8/58) had fixed defects along with Lung uptake and/or TID and finally 17.24%(10/58) had ischemia along with lung uptake and/or TID.

Conclusion: The use of semi-quantitative analysis of PSS in SPECT MIBI is more seen in areas which has a mixture of infarct and ischemic segments. It is also more commonly seen in routine exercise and along with Lung uptake and TID, also may have prognostic importance of future cardiac events, which needs to be further validated.

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</table>

5.16
Prognostic value of rest-redistribution 201-thallium imaging in patients with chronic coronary artery disease and left ventricular dysfunction.
F. Pasquale Perrone Filadelfo1, L. Pace1, S. Dellegrottaglie2, L. Corrado3, M. Catalleri1, F. Camerino1, A. Maglione1, M. Polimeno1, A. Zarrilli1, M. Chiarlello1. 1Federico II University, University, Nuclear Medicine, Naples, Italy, 2“Federico II” University, Nuclear Medicine, Naples, Italy

Scintigraphic 201-Thallium (201TI) stress imaging has been proven to provide relevant prognostic information in patients with ischemic left ventricular dysfunction. In contrast, studies using rest-redistribution 201TI imaging reported discordant results regarding the prognostic value of major adverse cardiac events.

Aim: To evaluate the prognostic role of rest-redistribution 201TI SPECT imaging in patients with chronic coronary artery disease and impaired left ventricular function.

Methods: One-hundred twenty-six patients with chronic coronary artery disease and mean left ventricular ejection fraction 39±11% were followed-up for 30±17 months after a rest-redistribution 201TI imaging. Cardiac death and non-fatal myocardial infarction were considered as major cardiac events.

Results: A total of 20 events (11 deaths and 9 myocardial infarctions) were recorded during follow-up. By Cox multivariate analysis the number of severe irreversible SPECT defects was the only variable associated with outcome (chi-square=5.06; p=0.024 for death + myocardial infarction; and chi-square=10.46; p<0.001 for death alone). By Kaplan-Meyer analysis mortality was significantly different among patients with ≥3 (2%) severe defects as compared to patients with >3 severe defects (17%; log rank 8.68; p=0.0032). Death or myocardial infarction occurred in 62% of patients with >3 severe defects compared to 13% of patients with ≥3 severe defects (chi-square=18.04; p<0.0001). Event-free survival was longer among patients with ≥3 severe defects than among patients with >3 severe defects (58.2±16.3± months; p=0.001).

Conclusions: The number of severe irreversible defects using rest-redistribution 201TI SPECT is a powerful predictor of major cardiac events among patients with moderate ischemic left ventricular dysfunction.
In the image, there is no clear evidence of any specific question or task related to the text provided. The text appears to be a continuation of a scientific or medical study, discussing various aspects related to cardiac resynchronization therapy (CRT). However, without a clear context or question from the text, it is challenging to provide a meaningful response or understanding of its content. The text seems to be discussing the impact of CRT on myocardial perfusion and volumetric changes, particularly in the context of idiopathic cardiomyopathy. It mentions the use of gated SPECT and PET imaging to evaluate perfusion and metabolism, and discusses the role of perfusion abnormalities in predicting CRT response.

To better understand the content, it would be helpful to have a clear question or context provided, such as a specific inquiry about the study's findings, the methodology used, or the implications of the research for clinical practice. Without this, the text remains largely descriptive and informative on its own, but lacks the clarity needed for a comprehensive answer in its current form.
Cardiotoxicity after anthracycline chemotheraphy in breast carcinoma: effects on left ventricular ejection fraction, troponin I and neurohormonal assessment.

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The incidence of congestive heart failure (CHF) after anthracycline chemotherapy in patients affected by breast carcinoma varied from 2% to 26% according to the dosage of the drug. The incidence of asymptomatic left ventricular dysfunction is certainly higher and the cytotoxic damage could be revealed early. The aims of this study were:

a) to evaluate the early modification of left ventricular ejection fraction (LVEF) obtained with multiple gated radionuclide ventriculography after the first 6 cycles of chemotherapy and

b) to analyse the effects of chemotheraphy on troponin I and neurohormonal assessment.

Methods. Patients with early breast cancer that underwent surgical treatment followed by chemotherapy were enrolled. The chemotherapy consisted in a single bolus infusion of epirubicin 90 mg/mq, cyclophosphamide 600 mg/mq, fluorouracil 600 mg/mq repeated every three weeks for 6 cycles. The presence of coronary artery disease, valvular disease, left ventricular dysfunction (LVEF <70% after the last chemotherapy cycle LVEF was performed by radionuclide ventriculography using multipled ECG triggered sampling with at least 32 frames each RR interval.

Results. 30 pts (29 females, age 60±12.4 yrs) were included. At follow-up none developed overt CHF. A significant reduction LVEF was demonstrated at radionuclide ventriculography (62.5±8.6 vs 52.7±7.3%, p=0.01). The BNP plasma level increased (from 36.7±49.1 pg/ml to 76±114.4 pg/ml, p=0.01) so as the level of troponin I (from 0.01±0.01 ng/ml to 0.07±0.04 ng/ml, p=0.0001). No significant differences were obtained in the dosage of E1 (from 0.62±1.41 fmol/ml to 0.27±0.3 fmol/ml, p=0.1) or rest plasma aldosterone (from 90.9±42.5 pg/ml to 79±35.9 pg/ml, p=0.2).

Conclusions. Radionuclide ventriculography revealed early reduction of LVEF after anthracycline chemotheraphy. BNP and troponin I might be considered promising tests for early detection of induced cardiotoxicity.

5.22

Role of myocardial perfusion SPET in the new era of active stent.

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Introduction. Sirolimus-eluting stent implantation (SESI) is a novel effective approach in treating patients with significant and complex coronary disease. In facts, Sirolimus, a potent immunosuppressive agent, demonstrated itself to be able to inhibit the progression of left ventricular dysfunction.

Aim. Since the physio-pathologic mechanism which occurs in the arterial wall, the homodynamic repercussions and the long term efficacy are still under investigation, we need to verify the accuracy of myocardial perfusion SPET in re-evaluating patients treated with SESI.

Methods. Forty-three (11F; 32M) consecutive patients (mean age: 56y) underwent SESI. 5pts SESI allowed complete revascularization, while in 8 patients a further bare-metal stent implantation was performed in another territory during the same session. In the remaining 15 pts a partial revascularization was performed.

Q or notQ wave infarction in target vessels was present in 20 pts. In 22 patients angiography was performed in addition to the clinical follow-up within 6 months of SESI. Stent restenosis was defined as a greater than 70% luminal diameter stenosis at the stented site or at proximal/distal adjacent site. A SPET visual analysis, using a 20-segments scoring model, was considered indicative of restenosis when at least 2 contiguous reversible perfusion defects in the stented territory were present.

Results. In detecting restenosis, coronary angiography and SPET were concordant in 20 SESI territories (STP, 17TN), while in 2 territories were discordant (SESI positive for ischemia with a normal angiography). These data lead to the following results: sensitivity=100%, specificity=89%, accuracy=91%, PPV=60%, NPV=100%. If we include the in the SPET vs angiography analysis the non-SESI vessels too, in order to evaluate the progression of disease or previous incomplete revascularization, SPET showed stress-induced perfusion defects in 18/66 (14TP; 4FP) vascular territories and normal districts in 48/66 (40TN; 2FN). So, the overall results on 66 vascular territories showed sensitivity and specificity of 88% and 92% respectively. The accuracy, PPV and NPV were 91%, 78% and 96%

Conclusions. These results indicate that SPET visual analysis has high accuracy in detecting SESI restenosis, and they are in good agreement with literature. Aim of the study was to assess prognostic implications of normal Single Photon Emission Tomography (SPECT) in patients with equivocal exercise testing after PTCA. Methods: 128 patients were evaluated. All patients had a telephone interview over a period of observation of 18 months after SPECT. Prognostic accuracy was evaluated according to the receiver operating characteristics curve. Results: 9 patients experienced soft events: 15/56 (15%) associated with normal (N) and 14/30 (46%) with abnormal (A) Single Photon Emission Tomography perfusion pattern in the territory of the dilated vessel (c2 = 11.164, p < 0.001). Hospitalization for recurrent angina was required in 16 patients (6/30 with A and 10/98 with N SPECT; c2 = 1.219, p = N.S.) and 13 patients underwent myocardial revascularization (9/90 with A and 5/96 with N SPECT; c2 < 9.462; p = 0.05). 11/15 (73%) patients who experienced soft events in the presence of N SPECT in the territory of the dilated vessels had evidence of reversible perfusion defects in remote areas. Event free curves were significantly different (c2 = 12.96; p = 0.002) in group with N and A SPECT perfusion pattern in the territory of the revascularized vessel. Only the presence of reversible defects at SPECT in the territory of the dilated vessel showed significant independent prognostic value on multivariate analysis (b = 1.549, p = 0.002). Conclusions: SPECT has a high prognostic value in patients with equivocal stress testing after PTCA.
5.25
Role of gated-SPECT imaging for risk stratifications over score charts in predicting silent myocardial ischaemia in hypertensive patients.

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Objectives: It is well known about the lower specificity of stress test to show myocardial ischemia in hypertensive population with ECG evidence of left ventricular hypertrophy. In this study we tried to estimate the additive value of stress/rest gated-SPECT imaging in predicting the prevalence of silent myocardial ischemia (SMI) in asymptomatic hypertensive patients. All pts at moderate-to-increased risk and without known coronary artery disease (CAD).

Methods: The study group consisted of 316 (217 pts (140 male, 176 female, mean age 58.9 ± 5 years) with uncomplicated essential hypertension. Mean duration of hypertension was 6.4 ± 4 years. After physical and laboratory examination, the ten years absolute risk was estimated using Italian Ministry of Health SCORE risk chart based on the European standard charts. All pts had evidence of left ventricular hypertrophy at 12-leads surface EKG. SMI was detected by stress/rest Tc-99m tetrofosmin gated-SPECT scintigraphy.

To perform gated-SPECT study we adopted a dual-day stress/rest protocol. Both post-exercise and resting images were gated and acquired 20-30 minutes after injection of technetium 99m-tetrofosmin at peak of exercise using a dual-head camera. Perfusion quantitation (SSS, SRS, SDS), left ventricular volumes (EDV, ESV) and global ejection fraction (LVEF) were automatically calculated with the use of Autoquant® software package. All patients with definite amount of SMI, that is SSS ≥8 at gated-SPECT imaging underwent coronary angiography.

Results: According to SCORE charts risk stratification, 78 of the cases (25%) were in high, 238 (75%) in moderate risk groups. SMI was detected in 82 pts (26%), 38 of high and 44 of moderate groups and of whom 75 (91%) had angiographically confirmed CAD. The remaining 7 pts had normal coronary arteries. The majority of pts showed one-vessel disease (64, 78%), 15 (18%) pts revealed double-vessel disease and the remaining 3 pts (4%) triple-vessel disease. SDS score in the ischemic group resulted 9.5 ± 0.00001, with SSS of 10.2 ± 0.00001. 12 pts (14%) demonstrated post-stress left ventricular dysfunction with lowering of LVEF vs resting values. All these pts had multi-vessel disease. Thus the specificity and positive predictive value were 97% and 91% respectively.

Conclusion: In addition to International SCORE charts, a risk stratification based on stress gated-SPECT imaging is a sensitive method to detect SMI in selected hypertensive individuals at moderate-to-high risk. It also has a high positive predictivity to confirm CAD in SMI patients.

5.26
Hemodynamic effects of dual-chamber pacing versus ventricular pacing during walking test in patients with heart block and depressed or normal left ventricular function.

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Aim: Dual-chamber rate-modulated pacing provides hemodynamic benefits over ventricular pacing at rest, but it is unclear if this effect also occurs during physical exercise. This study assessed the hemodynamic response to walk test during dual-chamber pacing and ventricular pacing in patients with depressed or normal left ventricular function.

Methods: Nineteen patients with dual-chamber rate-modulated pacemaker implanted for complete atioventricular block were studied. Patients were divided into 2 groups: 10 patients with ejection fraction ≤50% (group A) and 9 with ejection fraction >50% (group B). LV function was monitored by a radionuclide ambulatory system. Baseline measurements were made with patients in seated position over a period of 10 min; thereafter all of them performed 2 walk tests. Each walk test (6 min at the optimal speed) was randomly performed during either ventricular-only backup pacing (70 beats/min: fixed rate) or dual-chamber rate-modulated pacing according to a randomized crossover design. The change of pacing mode was performed after 10 min recovery, when blood pressure, symptoms and cardiac volumes recovered. Each pacing mode was maintained for at least 5 min under the 2 resting conditions before the respective walk tests.

Results: All patients were able to complete the two walk tests without breaks in continuity. Patients of group A complained of mild dyspnea and fatigue at the end of the two walk tests without difference in symptoms between the two tests. Conversely, patients of group B did not develop any symptoms during the two tests. In group A, no difference in all parameters between the two pacing modes was found at rest, whereas at peak of walk test end-systolic volume was lower during ventricular pacing compared to dual-chamber pacing (P<0.005). Consequently, ejection fraction and stroke volume showed higher increase at peak of walk test during ventricular pacing compared to dual-chamber pacing (both P<0.01). In group B, the change from dual-chamber pacing to ventricular pacing induced a decrease of cardiac output at rest and a lesser decrease at walk test (both P<0.05).

Conclusion: In patients with heart block and depressed LV function ventricular pacing at fixed rate improves cardiac contractility and does not affect cardiac output compared to dual-chamber rate-modulated pacing during moderate physical activity. The benefit of long term rate-responsive function of ventricular devices may also mitigate the benefit of atrioventricular synchrony, may explain these findings.

5.27
Intra ed interobserver reproducibility of EF by gated-SPECT.

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Background: the diagnostic accuracy of quantitative gated-SPECT (QGS) and the potential limitations for estimation of left ventricular ejection fraction (LVEF) have been extensively evaluated. However, few studies have focused on test reproducibility. High reproducibility is mandatory in follow-up studies especially in the evaluation of LV performance in pts under aggressive medical treatment for heart failure. Aim: this study was conducted to assess QGS variability for LVEF determination between studies processed by three independent readers (technologist (TCH), senior attending physician (AP) and fellow (F)) and between two sequential Sestamibi-gated SPECT Methods: acquisitions were performed at 1 and 2 h after a single injection of 1100 MBq of Tc99m-Sestamibi at rest. No attenuation correction was adopted. 29 pts with congestive heart failure were examined. Results: no significant differences were observed between the three readers in both acquisitions by analysis of variance. However significant differences were observed by all three readers between acquisition 1 and 2 (see tables). The correlation between EF1 and EF2 of pooled data was (r = 0.8193, SE = 3.65). The mean serial variability of EF of pooled data was 2.2 ± 4.2. Conclusion: QGS is sufficiently robust to minimize reporting differences between readers, independently of their experience. The EF measured after a time interval of 2 hours from injection seems to be significantly lower than that obtained after 1 hour. It is not clear if the differences are related to technical or physiopathologic changes (EF may be altered by pre-load, after-load, contraction rate, autonomic nerves, hormones and drug Kinetics). In follow-up studies the time delay between tracer injection and acquisition should be always the same.

<table>
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<th>EF differences between acquisition 1 &amp; 2</th>
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TCH = technologist AP = expert attending physician F = fellow

5.28
The utility of SPECT/CT for the detection of cardiac sarcoidosis on Gallium-67 scintigraphy.

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For patients with sarcoidosis, the early detection of myocardial involvement is very important. Gallium-67 Ga scintigraphy is commonly used for the detection of sarcoidosis, including the evaluation of myocardium. However, Ga planar imaging has some limitations especially in spacial resolution. Single photon emission computed tomography (SPECT) should overcome some of these limitations, but precise localization of abnormalities is still difficult. Recently SPECT/CT became available, and attenuation correction (AC) and fusion image techniques have been developed. These advances have a possibility to detect myocardial sarcoidosis more precisely.

Aim: To explore the utility of SPECT/CT using attenuation correction and image fusion techniques for the detection of abnormal Ga uptake in myocardium.

Methods: Between January 2003 and August 2004, we enrolled 7 patients before steroid therapy into the study. All patients are diagnosed cardiac sarcoidosis clinically or pathologically. Ga scintigraphy was performed at 72 hours after the injection of either 74 MBq of Ga-67 citrate with a dual-head gamma camera equipped with a low-power x-ray system (Millennium VG & Hawkeye; General Electric Medical Systems, Milwakee, WI). We evaluated myocardial Ga uptake on planar images, SPECT and SPECT/CT (using AC and fusion image techniques). Images were interpreted as positive if myocardial uptake was higher than mediastinal uptake.

Result: The detection rate of myocardial abnormal uptake by planar images, SPECT and SPECT/CT was 28.6% (7/24), 71.4% (5/7) and 100% (7/7), respectively. The detection rate of SPECT/CT is apparently higher than planar images, but lower than SPECT/CT. CT-based AC makes lung uptake lower and myocardial uptake higher. Moreover, CT fusion technique makes it clear whether the abnormal uptake locates in the myocardium or not.

Conclusion: Our results showed higher detection rate of SPECT/CT than planar images or SPECT. For the detection of cardiac sarcoidosis using Ga scintigraphy, SPECT/CT is at least required. SPECT/CT is thought to be more desirable.
5.29

Prognostic value of stress myocardial perfusion imaging in patients with mildly or moderately impaired left ventricular function who had no chest pain and were suspected for coronary artery disease.

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Left ventricular ejection fraction (LVEF) is generally useful for predicting cardiac events in patients with heart disease. However, it may not be suitable for predicting prognosis in patients with mildly or moderately impaired LV function.

Aim: We investigated prognostic value of myocardial perfusion imaging (MPI) in patients with mildly or moderately impaired LV function who had no chest pain but were suspected for coronary artery disease (CAD).

Methods: Consecutive patients (n=70, mean age =68, diabetes =27, non-diabetes =39) who had no chest pain but mildly or moderately impaired LV function (mean LVEF=53%) and were suspected for CAD were followed-up for 2.4 years after stress MPI. Primary endpoints were defined as cardiac death, hospitalization for congestive heart failure (CHF), acute coronary syndromes (ACS) and revascularization. Images were scored using a 20-segment model and a 0-4 scale, and then summed stress, rest and difference scores (SSS, SRS, SDS were calculated).

Results: During follow-up, cardiac death in 3 patients, hospitalization for CHF in 8 patients, ACS in 1 patient and revascularization in 7 patients occurred. Multivariate Cox regression analysis demonstrated that SDS−7 was the best predictor of cardiac events especially in diabetic patients as shown in Table. LVEF was not a predictor of cardiac events.

Conclusion: Stress MPI is useful for predicting cardiac events in patients with no chest pain if they showed mildly or moderately impaired LV function, especially in diabetic patients.

Multivariate Cox regression analysis

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<th>Patients Predictors Hazard ratio 95%CI P value</th>
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<td>Overall SDS−7</td>
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<td>Overall SSS−7</td>
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<td>Overall SRS−7</td>
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<td>Overall EF &lt; 50%</td>
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<td>Diabetes SDS−7</td>
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5.30

Mismatch area within non-infarcted myocardium using 123I-BMIPP/Tl-201 images might have improved left ventricular functional outcome after acute myocardial infarction.

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The aim of this study was to assess the left ventricular functional outcome of the amount of perfusion-metabolic mismatch within non-infarcted myocardium in non-infarcted myocardium using BMIPP/Tl images.

Conclusion This study demonstrated that mismatch area within non-infarcted myocardium might have association with ischemic preconditioning.

5.31

123I-MIBG myocardial scintigraphy in patients with reversible ventricular dysfunction Takotsubo cardiomyopathy.

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Background: There have been a number of reports on a reversible form of left ventricular (LV) dysfunction with symptoms similar to those of acute myocardial infarction, but without coronary artery lesions even during the acute phase with ST-segment elevation. This type of ventricular dysfunction manifests abnormalities of the left ventricular wall motion, with apical akinesis and basal hypokinesis. Another name for the disease in Japan, takotsubo cardiomyopathy (TC), describes the characteristic shape of the left ventricular asynergy. This study was designed to clarify the use of 123I-MIBG myocardial scintigraphy in patients with TC.

Methods: Eleven consecutive patients with TC underwent cardiac catheterization on their first hospital day. The LV ejection fraction (EF) was calculated by the Simpson method. The left ventricular wall motion was monitored using echocardiography until the asynergy disappeared. The day after the wall motion was normalized, cardiac catheterization was performed again to provoke coronary vasospasm and calculate the normalized LVEF. Using 123I-MIBG, scintigraphic images were obtained at the early phase (15min. after RI injection) and late phase (1hr) in patients with TC. The heart to mediastinum ratio (H/M) and washout rate (WR) were calculated. The scintigraphy was performed within three days of the hospital admission (0M) and 3 month after the hospital discharge (3M).

Results: Coronary angiography revealed no significant stenosis in any of the patients. Although provocation tests for coronary spasm were performed after normalization of the wall motion, all cases were negative. Initial EF was 45.8±9.1%, LV contraction and EF were normalized in 21.3±5.8 hospital days. Improved EF was 68.5±7.9% (p<0.0001). The decrease from early to late H/T was significant at 0M (2.10±0.33 to 1.82±0.29, p<0.001), but not at 3M. Late H/T improved significantly from 0M to 3M (1.82±0.29 to 2.10±0.28, p<0.001). WR was accelerated significantly at 0M rather than 3M (43.3±7.9% vs. 29.5±10.0%, p<0.01).

Conclusion: The initial 123I-MIBG myocardial scintigraphy in patients with TC effectively depicted the cardiac asynergy and had the potential to indicate the degree of cardiac sympathetic hyperactivity even when the coronary blood flow was maintained. These findings strongly suggested TC could be a consequence of neurogenic stunned myocardium.

5.32

Do serum post-stress B-type natriuretic peptide levels correspond to left ventricular remodeling in myocardial infarction determined by gated myocardial SPECT?

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Background: B-type natriuretic peptide (BNP) is a neurohormone released from the ventricles of the heart in response to myocardial dysfunction. The goal of this study was to examine the relationship between left ventricular remodeling in anterior myocardial infarction using the analysis of stress-rest gated sestamibi myocardial perfusion SPECT (MPS) and the serum levels of BNP in pre-discharge stress test. Methods: 42 patients (32 males, mean age 67 ± 11, myocardial infarction patients) were divided according to their post-stress serum BNP level and their post-stress SPECT and the serum levels of BNP in pre-discharge stress test. Results: 8 pts, Group I; normal BNP and PSD positive: 8 pts, Group II; normal BNP and PSD negative: 10 pts, Group III; normal BNP and PSD positive: 8 pts, Group IV; normal BNP and PSD negative: 14 pts. There were no significant differences in age, gender, rest cardiac function and rest BNP level among four groups. LV remodeling after 1 year was observed in 18 patients (43%). The patients were divided into four groups, according to their post-stress serum BNP level and post-stress LV dilatation. Group I; abnormal BNP (> 100 pg/ml) and PSD positive:12 pts, Group II; abnormal BNP and PSD negative: 10 pts, Group III; normal BNP and PSD positive: 8 pts, Group IV; normal BNP and PSD negative: 14 pts. There were no significant differences in age, gender, rest cardiac function and rest BNP level among four groups. LV remodeling after 1 year was observed in 12 pts (100%) of Group I, 4 pts (40%) of Group II, 2 pts (25%) of Group III and none of Group IV. The degree of LV remodeling in Group I was significantly higher than other groups. Conclusion: Left ventricular remodeling after 1 year of anterior myocardial infarction is associated with both an elevated level of BNP after stress test and post-stress left ventricular dilatation.
5.33 Impact of endothelial dysfunction on left ventricular remodeling after primary coronary angioplasty for acute myocardial infarction: analysis by quantitative ECG-gated SPECT.
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BACKGROUND: We hypothesized that endothelial cell integrity in the risk area would influence left ventricular remodeling after acute myocardial infarction.

PATIENTS AND METHODS: Thirty patients (61±8 y.o.) with acute myocardial infarction underwent 99mTc-tetrofosmin imaging in sub-acute phase and three months after successful primary angioplasty due to myocardial infarction. All patients were administered angiotensin-converting enzyme inhibitor after revascularization. Cardiac scintigraphy with quantitative gated SPECT were performed at the sub-acute stage and after 3 months after revascularization to evaluate left ventricular (LV) remodeling. The left ventricular ejection fraction (EF) and end-systolic and end-diastolic volume (ESV, EDV) were determined using a quantitative gated SPECT (QGS) program. In 3 months after myocardial infarction, all patients underwent the cardiac catheterization examination with coronary endothelial function testing. BK (0.2, 0.6, 2.0 micro g/min) were administered into the left coronary artery in a stepwise manner. Coronary blood flow was evaluated by the Doppler flow velocity measurement. Patients were divided into two groups by BK response, endothelium preserved group (EP) (n=10) and endothelial dysfunction group (ED) (n=10). RESULTS: At baseline, both global function and LV systolic and diastolic volumes were similar in both groups. However, LV ejection fraction was significantly improved in the EP group, compared with that in the ED group (42±10 % to 48±9 %, versus 41±4 % to 42±13 % p<0.05). LV volumes progressively increased in the ED group compared to that of ED group (123±45 ml to 128±43 ml, versus 111±47 ml to 109±49 ml, p<0.05).

CONCLUSION: In reperfused acute myocardial infarction, endothelial function within the risk area plays an important role with left ventricular remodeling after myocardial infarction.

5.35 Imaging of fatty acid metabolism can express tacrolimus (FK506) impairment on myocardium with model rat and patients after renal transplantation.
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1Hyogo College of Medicine, Int.Med.Coronary Heart Disease, Nishinomiya, Japan, 2Hyogo College of Medicine, Int.Med.Cardiovascular Disease, Nishinomiya, Japan

We investigated with a nuclear medicine approach using an animal model and patients after renal transplantation whether the detection of myocardial impairment due to FK506 were clarified.

[Methods] 1) animal protocol: With administration of FK506 or Ciclosporin (CYA), white rabbits were assigned to the control group (N), one-week administrate group (1W), two-week group (2W), and group subjected to one-month withdrawal following two-week administration (1M). After administration of 201-thallium (TL) and 123-I-BMIPP (BM), their accumulation rates per gram of the myocardium and pathological findings were compared. 2) patients protocol: 14 patients after renal transplantation who received FK506, the pre- and postoperative TL and BM accumulation and other findings were compared.

[Results] 1) CYA groups revealed no difference among the all findings. In the FK506 groups, no difference was observed in the TL rate. However, the BM rate decreased significantly in the 1W and 2W groups than in the N group (N: 1W: 2W: 44 ± 0.03 : 0.32 ± 0.01 : 0.33 ± 0.03, p<0.05 vs. N), whereas no differences in the BM accumulation rate were observed in 1M. Pathological findings for the FK506 groups showed myocardial interstitial edema and cellular infiltration in the 1W and 2W but slight myocardial interstitial edema in the 1M. 2) Five of 14 patients caused cardiac symptom, left ventricular hypertrophy or changes of the electrocardiogram. Although 5 patients had decreasingly the perfusion by BM imaging, after administration of FK506, there were no change in TL imaging. The change of BM were improved after about one month.

[Conclusion] BM may contributes to the clarification of the myocardial impairment due to the FK506. It was suggested that this impairment was reversible.

5.34 Inflammation imaging as a prognostic indicator and its relationship with CRP and inflammatory scintigraphy in chronic dissection of aorta.
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1Hyogo College of Medicine, Int.Med.Coronary Heart Disease, Nishinomiya, Japan, 2Hyogo College of Medicine, Int.Med.Cardiovascular Disease, Nishinomiya, Japan

Background: The prognostic of chronic dissection of aorta (CDA) is believed to depend on the presence or absence of thrombus occlusion of the false lumen and the level of blood pressure control, but very few studies investigated these factors in terms of progression of the dissection. To clarify the effectiveness of that device, 30 patients (group A) (M/F = 22/8, age 66 ± 11 y.) using in-WBC, we have previously reported that a persistent inflammation develops in some cases during the chronic phase of CDA. In the present study, we assessed the relationship between CDA that was treated medically and its prognosis based on the In-WBC findings and blood inflammatory reactions.

Method: The subjects of the present study were 24 of these patients, who underwent medical treatment. The group was divided into two high risk group (H group) of 5 patients (3 patients had enlargement of the false lumen and 1 patient had retrograde dissection) with progressive focus during the chronic phase of CDA. The in-WBC findings and blood inflammatory reactions.

Results and Discussion: There was no difference between the two groups regarding the duration of hospitalization (H: L = 34±3 days : 285±5 days, ns.). CT scanning revealed no difference between the two groups concerning the rate of thrombus occlusion of the false lumen. There was no change in the CRP values during the acute phase and the values were maintained high. However, regarding the changes during the subacute phase (after day 14), the changes in the H group were significantly higher than those in the L group (p<0.05). In the H group, the CRP values were high even in the subacute phase. Furthermore, the In-WBC study revealed that a persistent positive accumulation persisted during the chronic phase in all patients of the H group.

Conclusions: Though primary percutaneous coronary intervention (PCI) as a reperfusion therapy was useful to salvage myocardium in patients with acute myocardial infarction (AMI), there was a serious problem that distal emboli caused the no-reflow phenomenon. Recently, the device (Percu-Surge) to prevent distal emboli and aspirate emboli was developed. To clarify the effectiveness of that device, 30 patients (M/F = 22/8, age 66±11 y.) using Percu-Surge were compared with other 30 patients (group B) (M/F = 22/8, age 66±11 y.) PCI was successful in all patients. Tc-99m-pyrophosphate and Tc-99m-MIBI were done on subacute period. On 20 SPECT segments, the number of uptake segments of Tc-99m-pyrophosphate which was defined as the extent score (ES), the summed defect score (TDS) of Tc-99m-MIBI were calculated. LVEF and regional wall motion of WMS = 1-dyskinesia-4-normal of AMI segments using MIBI-QGS were estimated at rest and during dobutamine(DOB) (5 microgram/kg/min). Results: There were no differences between 2 groups in age, gender, time to reperfusion, peak CPK, ES, TDS(MIBI), LVEF and WMS at rest and DOB. However, delta WMS: A (1.6 ± 1.1 vs. B 1.3 ± 0.9) was higher (p<0.05) than group B. Delta means the change of value. In conclusion, Percu-Surge could not improve myocardial perfusion and cardiac function in subacute period, but improved regional wall motion during DOB infussion, which suggests that Percu-Surge has possibility to improve cardiac function in the future.
5.37
Superiority of 16 frame ECG-Gated FDG PET to 8 frame study for the evaluation of left ventricular function: comparison with echocardiography.
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Background: There have been very few studies regarding diagnostic value of 16-frame ECG-gated Positron Emission Tomography (PET) using 18F-fluorodeoxyglucose (FDG) in order to evaluate the left ventricular contractile function although it is a common method for myocardial perfusion SPECT. To elucidate the value of 16-frame ECG-gated PET, estimates of left ventricular contractile function by this method was compared to those by 8-frame ECG-gated PET and then those by echocardiography. Methods: 55 patients including 44 ischemic heart disease, 9 cardiomyopathy and 2 normal subjects were enrolled to this study. FDG was intravenously administered to all the patients at 1 hour after 75g oral glucose loading. ECG-gated PET images were acquired for 15 minutes at 16 frames per cardiac cycle. PET images were then re-binned to 8 frames per cardiac cycle. End-diastolic volume (EDV) and end-systolic volume (ESV) of left ventricular volume and ejection fraction (EF) were automatically calculated both for 16- and 8-frame PET images with QGS software modified for PET. Echocardiography was performed for all patients to measure same indices by modified Simpson’s method. Absolute errors were calculated for each method as the differences in the ejection fraction by 8- and 16-frame PET and by echocardiography. Results: EDV, ESV and EF measured by echocardiography ranged widely from 54 to 355ml, 21 to 302ml, and 18 to 75%, respectively. End-systolic volume by 16-frame PET was smaller than those by 8-frame PET in all the cases (p<0.0001), whereas end-diastolic volume was similar, resulting in greater ejection fraction by 16 frame PET compared to 8-frame PET (p=0.0001). Compared to echocardiography, absolute errors of ejection fraction by 16-frame PET was 8%, whereas those by 8-frame PET was 17%. Standard deviation of absolute errors was similar. Conclusion: 16-frame PET FDG PET was considered to be superior to estimate cardiac volume and function compared to 8-frame FDG PET.

5.38
Quantitation of myocardial blood flow reserve by means of consecutive myocardial blood flow measurements using split-dose of Tl-201 in pig SPECT study.

The quantitative measurement of myocardial blood flow (MBF) can be achieved by Tl-201 dynamic SPECT and kinetic analysis using appropriate model. Long physical half-life and slow kinetics of Tl-201, however, have made it difficult to measure MBF at baseline and pharmacologically stressed states within a short interval, which is useful for estimating MBF reserve (MBFR). In this study, we present a new split-dose protocol and kinetic model that allow sequential and quantitative MBF measurements at two different states. Dynamic acquisition was performed on miniature pigs (n=7), using a single-head SPECT camera (GCA-7100A, Toshiba, Japan) and a protocol that was completed the first scan of baseline, pharmacologically stressed state was induced by Tl-201 injection was estimated with the kinetic values obtained from the first MBF estimation. Tl-201 dynamic SPECT and kinetic analysis using appropriate model. Long physical half-life and slow kinetics of Tl-201, however, have made it difficult to measure MBF at baseline and pharmacologically stressed states within a short interval, which is useful for estimating MBF reserve (MBFR). In this study, we present a new split-dose protocol and kinetic model that allow sequential and quantitative MBF measurements at two different states. Dynamic acquisition was performed on miniature pigs (n=7), using a single-head SPECT camera (GCA-7100A, Toshiba, Japan) and a protocol that was composed of two sequential dynamic scans for baseline and stress states. The both dynamic scans were acquired for 30 min with Tl-201 injection, respectively. With completing the first scan of baseline, pharmacologically stressed state was induced by CGS-21660 (adenosine A2A selective agonist) injection, before the second dynamic scan. Arterial blood samples were obtained during both the dynamic acquisition. Radiolabeled microsphere of Cr-141 and Cr-51 was injected, respectively, at the same time as Tl-201 injection for the both scans. Dynamic images were generated by OSEM reconstruction, incorporating the corrections of attenuation and scatter. Regional time-activity curve (TAC) was used for the estimation of both MBF values. The baseline MBF value in TAC in SPECT (MBF(1st-SPECT)) was estimated using a conventional 2-compartment model fitting. Background activity at the time of the second Tl-201 injection was estimated with the kinetic values obtained from the first MBF estimation. And, the stress MBF value was estimated using 2-compartment model modified for background activities in the second scan data (MBF(2nd-SPECT)). MBFR was calculated by (MBF(2nd-MBF(1st))/ MBF(1st)). The values of MBF and MBFR were compared between SPECT and microsphere. The value of MBF by microsphere (MBF(MS)) was 0.60 ± 0.15 ml/g/min for baseline and 1.64 ± 0.52 ml/g/min for stress states, respectively. The presented kinetic model provided the good fitting in the MBF(SPECT) estimation using single TAC of sequentially acquired SPECT data. The estimated values of MBF(SPECT) were showed good correlation (r = 0.83) with MBF(MS). There is no significant difference of MBF and MBFR between SPECT and microsphere. The presented Tl-201 split-dose method could provide quantitative values of MBF at different states within shortened scan period (~1 hr). This method may be useful for assessing MBFR accurately and less invasively in heart disease patients.

5.39
Distinct discrepancy between Thallium and BMIPP scans promises LVEDV and LVEF improvement.
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Background: Discrepancy between thallium and BMIPP scans at acute phase of myocardial infarction is known to show the risk area of development of ischemic event in the future. However, the correlation between the discrepancy and the prognosis of left ventricular function is not clear. The aim of this study is to clarify the correlation between the discrepancy and the prognosis of left ventricular function. Methods: Seventy-eight cases, with acute anteroseptal myocardial infarction who underwent Thallium and BMIPP ECG gated dual SPECT at acute phase and three months after the onset, were investigated. Cases were divided into three groups according to the ratio of discrepancy/BMIPP defect score size, group A with ratio zero, group B with ratio between 0.06 and 0.38, and group C with ratio between 0.4 and 1. Left ventricular end-diastolic volume (LVEDV) and left ventricular ejection fraction (LVEF) at acute and chronic phase were compared. Results: In group A, LVEDV at acute and chronic phase were 88.3±18.3 and 93.0±33.0ml (n.s.), and LVEF were 42.0±18.0 and 49.0±14.0% (n.s.). In group B, LVEDV at acute and chronic phase were 102.0±32.1 and 91.0±31.0ml (n.s.), and LVEF were 41.0±13.0 and 49.0±13.0% (n.s.). On the contrary, group C showed significant improvement of LVEDV (from 85.3±27.5 to 76.0±24.0ml, p<0.05) and LVEF (from 45.5±15.0 to 54.0±10.0%, p<0.05). Conclusion: We may presume that discrepancy between Thallium and BMIPP at acute phase of anteroseptal myocardial infarction can predict the improvement of LVEDV and LVEF at chronic phase.

5.40
Thallium quantitative gated SPECT at acute phase of anteroseptal myocardial infarction can predict possibility of future improvement of left ventricular size and ejection fraction.
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Background: Thallium quantitative gated SPECT (TI-QGS) is well known to have a strong diagnostic power of myocardial ischemia. However, the predictive possibility of left ventricular (LV) remodeling in the future is still unclear. We investigated the prediction possibility of LV remodeling in chronic phase of anteroseptal myocardial infarction (ASMI) using TI-QGS in the acute phase. Methods: Sixty-seven cases with acute ASMI underwent TI-QGS at the acute phase and three months after the onset. Cases were divided into two groups according to the size of defect score (DS) of TI-QGS: group L with DS greater than 10 and group S with DS smaller than 9. LV end-diastolic volume (LVEDV) and LV ejection fraction (LVEF) between two phases were compared for each group. Results: LVEDV of group S decreased from acute to chronic phase (from 87.3±29.2 to 75.5±23.4 ml, p<0.05). LVEF of group S recovered from 44.6±14.6 to 54.8±11.1%. However, LVEDV of group L showed no change in the same period (105.3±21.70 and 107.0±29.5 ml, n.s.), and LVEF group L were 37.9±10.5 and 41.6±9.9%, n.s. Conclusions: We presumed that TI-QGS at acute phase of ASMI can predict possibility of LV size reduction and LVEF recovery at chronic phase.
5.41
Effects of percutaneous coronary interventional therapy in chronic total occlusion in patients with no history of MI.

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Percutaneous catheter interventional therapy (PCI) has been recently well improved as a strong tool to re-canalize the stenosed coronary arteries for the patients with angina pectoris by the development of a new device or progress of techniques. However, the patients with chronic total coronary occlusion (CTO) are a subset with many difficulties to do PCI due to the trouble of recanalization of hard coronary plaques and many re-stenosis of a blockade part. Therefore, the rationale to perform PCI to the CTO remains unknown.

Purpose: The aim of this study was assess the effects of the PCI in patients with CTO and no prior myocardial infarction (MI) using Tc-99m-tetrofosmin SPECT.

Method: The study included 18 patients with CTO of the left anterior descending artery and 13 patients with 90% stenosis of the same artery who had undergone gated myocardial perfusion SPECT at rest using Tc-99m-tetrofosmin before and 6 months after PCI. None of them had prior history of MI. Regional myocardial perfusion in 17 segments was scored using a 4-point grading system. The summed rest score (SRS) were calculated as total number of areas with abnormal myocardial perfusion. We compared the SRS and the ejection fraction (EF) before and after PCI and evaluated the relation between them.

Results: CTO group had a higher frequency of reduced EF as compared with those of the stenosis group. (46.1% vs. 63.1% [P=0.02]) on gated SPECT. The myocardial perfusion imaging of the CTO group showed more severe perfusion abnormalities (SRS of 6.3±5.6) than that in the stenosis group (SRS of 4.1±4.0) [P=0.02]. After successful PCI, the EF of CTO group improved (51±12%) [P=0.02], whereas those of stenosis group remained normal (62±11%) [P=NS]. SRS of the CTO group were significantly improved after PCI (from 6.3±5.6 to 3.4±3.4) [P=0.01] whereas SRS of the stenosis group remained normal after PCI (from 0.4±1.0 to 0.2±0.3) [P=NS].

Conclusion: In patients with CTO, both myocardial perfusion and cardiac function were reduced before PCI, indicating greater myocardial damages than those with 90% artery stenosis. On the other hand, successful PCI significantly improved perfusion and function in those with CTO. Thus, PCI is strongly recommended for patients with CTO.

5.42
Delayed heart rate recovery after treadmill exercise: comparison with clinical, exercise and myocardial perfusion parameters.

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Background: Imbalance between sympathetic and parasympathetic tone and excessive stimulation of the autonomic nervous system are fundamental risk factors for cardiac death. Recent studies reported abnormal heart rate recovery (HRR) after the treadmill exercise test is a powerful and independent predictor of significant excess mortality. To evaluate HRR as an index of coronary artery disease, we have compared perfusion and non-perfusion patients.

Method: We compared clinical (age, sex, pervious coronary disease history, diabetics, hypertension), exercise (heart rate, workload), myocardial perfusion imaging (Tc-99m-tetrofosmin) and exercise ECG-gated blood pool (GBP) single photon emission computed tomography (SPECT) (GBP) SPECT algorithms (Cedars-Sinai Medical Center, Los Angeles, Cali) (12 after LAD related infarction (group 1) and 15 after RCA related infarction (group 2)). The left ventricular ejection fraction, end-diastolic volume and end-systolic volume did not differ significantly between the groups (LVEF=50.8% vs 55.1%, LV EDV=73.2 vs 79.7 ml, LVEVES=38 vs 44ml, P>0.05), but right ventricular ejection fraction end-diastolic volume and end-systolic volume were significantly depressed after anterior myocardial infarction (LVEF=57.3% vs 46.3%, LV EDV=56.4 vs 95.1 ml, LVEVES=29.6 vs 54.6ml : P<0.05). There was evidence of right ventricular dilatation in the group with RCA related infarction. Six with inferior infarction had abnormal right ventricular ejection fractions(<40%). The relation between right and left ventricular ejection fractions was markedly different in the two groups. In the group with RCA related infarction there was a significant linear relation between right and left ventricular ejection fraction (R=0.5), whereas in the group with LAD related infarction there was not (R=0.3). Thus right ventricular dysfunction commonly occurs after RCA related infarction. Right ventricular impairment are related after RCA related infarction, but are independent after LAD related infarction. Finally, the different effects of LAD and RCA related infarction on right ventricular function may be explained by site of the myocardial wall involvement after infarction.

5.43
Right ventricular function after acute myocardial infarction: dependence upon infarct-related coronary artery.

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The right and left ventricular function after a first myocardial infarction was assessed ECG-gated blood pool (GBP) single photon emission computed tomography (SPECT) (GBP) algorithms (Cedars-Sinai Medical Center, Los Angeles, Cali) (12 after LAD related infarction (group 1) and 15 after RCA related infarction (group 2)). The left ventricular ejection fraction, end-diastolic volume and end-systolic volume did not differ significantly between the groups (LVEF=50.8% vs 55.1%, LV EDV=73.2 vs 79.7 ml, LVEVES=38 vs 44ml, P>0.05), but right ventricular ejection fraction end-diastolic volume and end-systolic volume were significantly depressed after anterior myocardial infarction (LVEF=57.3% vs 46.3%, LV EDV=56.4 vs 95.1 ml, LVEVES=29.6 vs 54.6ml : P<0.05). There was evidence of right ventricular dilatation in the group with RCA related infarction. Six with inferior infarction had abnormal right ventricular ejection fractions(<40%). The relation between right and left ventricular ejection fractions was markedly different in the two groups. In the group with RCA related infarction there was a significant linear relation between right and left ventricular ejection fraction(R=0.5), whereas in the group with LAD related infarction there was not (R=0.3). Thus right ventricular dysfunction commonly occurs after RCA related infarction. Right ventricular impairment are related after RCA related infarction, but are independent after LAD related infarction. Finally, the different effects of LAD and RCA related infarction on right ventricular function may be explained by site of the myocardial wall involvement after infarction.

5.44
Prognosis and risk stratification of diabetic patients after coronary stenting: impact of silent ischemia on cardiovascular events.

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Aims: We want to evaluate the role of myocardial perfusion scintigraphy (MPS) in risk stratification and prognosis in diabetic patients (pts) after coronary artery stenting and to compare those results in non-diabetic pts. Special interest was the impact of diabetes on clinical and scintigraphic indicators of restenosis and incidence of silent ischemia. Materials and methods: We have evaluated 52 pts (29 male and 13 female, age 57±8 after coronary stenting. 31(59%) pts were diabetics for more than 5 years. Stent location was 61% LAD, 15% LCX and 24% RCA. Pts were followed up for 9 months after the stenting when Tc-99m sestamibi Gated SPECT MPS was performed. We have used 20-segment analysis with 5 point scoring system (0=normal, 4=no uptake). Semiquantiative analysis was done using summed stress score (SSS), summed rest score (SRS) and summed differential or reversibility score (SDS). Reversibility in a stent related coronary artery territory on semiquantitative assessed SPECT study was defined as restenosis indicator. Severity of CAD was estimated using angiographic Gensini score.

Results: Nine months after the stenting 12 pts (24%) had target vessel ischemia, which was silent in 47%. MPS final inducible ischemia in 64% LAD, 9% LCX and 27% RCA artery territories. Pts with target vessel ischemia had average SSS 6.7±4.2 and lower post stress LVEF (p<0.05) comparing to the pts with out inducible ischemia (p<0.01). The prevalence of silent ischemia was higher in diabetic pts -7/12 pts (p<0.05). They also had higher SSS-10.3 vs 5.2 in non-diabetic pts (p=0.01) and SDS-3.7 vs 2.5 (p<0.05). Average Gensini Score was 64.8 in diabetes vs. 92.7 in non-diabetic pts. There was no difference in presence of transit ischemic dilatation (TID). We have not registered any cardiac death or myocardial infarctions. 3 of 12 pts with target vessel ischemia and average SSS-6 had unstable angina and hospitalization in the follow up period. 2 of them were diabetics. No correlation was found between silent ischemia and duration of diabetes.

Conclusion: MPS is a valuable method for detection of ischemia and evaluation of prognosis in both diabetic and non-diabetic patients. Diabetics had more frequent silent myocardial ischemia after stenting, which predicted more cardiac events than did no ischemia. This was closely related to the extent of ischemia indicating the value of MPS for risk stratification after stenting, especially in diabetic patients as a high-risk population.
5.45

Initial experience in Mexico of 18-FDG PET compared with thallium SPECT in the assessment of myocardial viability.

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In patients with myocardial infarction and left ventricular dysfunction, the evidence of myocardial viability is primordial. There are some methods to detect the presence of myocardial viability, 201-thallium reinjection SPECT protocol represents the most common radiospectroscopic technique to evaluate it. Positron emission tomography (PET) using FDG is considered the gold standard. Objective: The aim of this study was to compare globally and by segments the value of both techniques in the detection of viable myocardium.

Methods: Twenty-six consecutive patients with previous myocardial infarction and left ventricular dysfunction were studied. All of them underwent into a SPECT perfusion scan and a FDG PET study to assess myocardial viability. Each study was performed in less than one week between the other. For the analysis, the myocardium was divided into 17 segments. A visual semi-quantitative analysis was carried out according to the following score indicating radiotracer uptake: 0 = normal to 4 = absent. Myocardial viability was defined as the presence of normal, mildly or moderately reduced radiotracer uptake. The scores obtained by PET were compared to those obtained in SPECT. A Student and Chi square tests were used for the quantitative and qualitative variables respectively, statistical analysis was performed using the SPSS v. 10 program.

Results: 442 segments were analyzed. PET detected viability in 134 segments that had been defined as non-viable by SPECT. No differences in the analysis by vascular territories were found. Thirty percent of the segments that were defined as non viable by SPECT were viable by PET, meanwhile only 1% of the segments detected viable by SPECT were considered non-viable with PET. (Table 1)

Conclusions: FDG PET study represents a better technique to detect myocardial viability, compared to thallium reinjection SPECT protocol. By this study we have demonstrated that 3 of each 10 studies may be diagnosed as non viable where viability is present.

PET vs SPECT in Myocardial Viability

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<th>PET</th>
<th>SPECT</th>
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<tr>
<td>Viable</td>
<td>252 (57%)</td>
<td>5 (1.13%)</td>
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<tr>
<td>Non Viable</td>
<td>153 (35%)</td>
<td>50 (11.3%)</td>
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5.46

Cardiac denervation early after transmyocardial CO2-laser revascularisation in 1-123-MIBG planar and SPECT studies.

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Aim: to study the range of changes caused by transmyocardial CO2-laser revascularisation [TMLR] in cardiac adrenergic nervous system [SYSTadren].

Material and methods: forty-seven pts were studied for neuronal activity and integrity with 1-123-MIBG planar and SPECT imaging before [MIBG-0] and 7-21 days after cardiac surgery [MIBG-early]. Sole laser revascularisation was performed in 23 pts and with I-123-MIBG planar and SPECT imaging before [MIBG-0] and 7-21 days after cardiac surgery concurrent with 1 bypass was performed in 24 pts. The group underwent successful PCI and stent implantation of CTO 29 (72.5%) patients had myocardial infarction in the occluded artery area. In 16 (40%) patients-left anterior descending (LAD), 8 (20%)-circumflex (Cx) and 16 (40%)-right coronary artery (RCA) were revascularized. MIBI SPECT revealed reversible perfusion defect in all patients before revascularization. MIBI SPECT and MSCT of coronary arteries at 6 and 12 months were done. Patients free from symptoms and with negative results of exercise test, MIBI SPECT and MSCT were assumed non-restenotic. Results of SPECT and MSCT were compared to angiographic ones: Results: Mean follow up time was 19±9.5 (3-42) months. Restenosis was detected in 16 patients, but in 2-neathor scintigraphy, nor MSCT was performed. Positive MIBI SPECT was observed in 11 (78.6%), and MSCT in 9 (64.3%). In 2 (14.2%) Sensitivity, positive and negative predictive values were 78.6%, 78.6% and 62.5% respectively, whereas MSCT showed sensitivity of 64.3%, predictive value of 81.8% and negative predictive value of 50.0%. Conclusions: Restenosis rate accounted for 40%. Both MIBI SPECT and MSCT facilitated detection of restenosis, although SPECT showed higher sensitivity and negative predictive value, as compared to MSCT.

5.47

Myocardial perfusion Tc99m MIBI SPECT and multislice computed tomography (MSCT) in the assessment of the results of chronic total coronary occlusion (CTO) angioplasty.

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Restenosis assessment in patients after CTO recanalization is often difficult due to frequent, well developed collateral circulation and scar in the area of myocardial infarction. The aim of the is to evaluate the role of MIBI SPECT and MSCT in assessment of restenosis after successfully recanalized and stented CTO. 44 patients underwent successful PCI and stent implantation of CTO 29 (72.5%) patients had myocardial infarction in the occluded artery area. In 16 (40%) patients-left anterior descending (LAD), 8 (20%)-circumflex (Cx) and 16 (40%)-right coronary artery (RCA) were revascularized. MIBI SPECT revealed reversible perfusion defect in all patients before recanalization. MIBI SPECT and MSCT of coronary arteries at 6 and 12 months were done. Patients free from symptoms and with negative results of exercise test, MIBI SPECT and MSCT were assumed non-restenotic. Results of SPECT and MSCT were compared to angiographic ones: Results: Mean follow up time was 19±9.5 (3-42) months. Restenosis was detected in 16 patients, but in 2-neathor scintigraphy, nor MSCT was performed. Positive MIBI SPECT was observed in 11 (78.6%), and MSCT in 9 (64.3%). In 2 (14.2%) Sensitivity, positive and negative predictive values were 78.6%, 78.6% and 62.5% respectively, whereas MSCT showed sensitivity of 64.3%, predictive value of 81.8% and negative predictive value of 50.0%. Conclusions: Restenosis rate accounted for 40%. Both MIBI SPECT and MSCT facilitated detection of restenosis, although SPECT showed higher sensitivity and negative predictive value, as compared to MSCT.

5.48

Percutaneous myocardial laser revascularisation-scintigraphic and echocardiographic assessment of the results.

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Background: Percutaneous myocardial laser revascularisation (PMR) is a novel therapeutic technique aimed at delivering oxygenated blood via a series of channels made by percutaneous approach to the ischemic regions of the heart. In patients with the end stage coronary artery disease PMR is associated with a reduction in symptoms, improved exercise tolerance and enhanced quality of life. The study aimed to assess perfusion in the PMR patients in the long-term follow-up, with a view to establishing possible correlation with their clinical improvement.

Material and methods: 24 patients aged 46-74 years, mean 62 years, with chronic coronary artery disease were enrolled into the study. All of them were referred to the PMR procedure based on the standard criteria. At baseline (one week prior to the procedure), after 3 and 15 months after PMR all patients underwent myocardial gated perfusion scintigraphy (SPECT), and echocardiography with dobutamine stress test. The collected data were analyzed using the ANOVA and Pearson’s correlation test.

Results: In the long term follow-up in the entire group a deterioration, or no changes in perfusion in the areas reperfused by PMR, were observed, although without any statistical significance. Due to the progression of chronic CAD in the long term follow-up we observed deteriorated perfusion in the other, non-reperfused areas, mainly in LAD region. EF measured by SPECT decreased during the follow-up (48.89±14.58 at baseline vs. 43.7±26.94 at 3 months, and vs. 42.97±23.28 at 15 months), although it lacked statistical significance. In stress echocardiography mean WMSI decreased significantly from 1.71±0.24 before PMR down to 1.55±0.21 at the early and long-term follow-up. At long-term follow-up mean echocardiographically estimated EF was 52.7±8.3% and not significantly different from baseline. These changes were accompanied by significant increase of mean CCS score from 2.54±0.78 before the procedure to 3.52±0.51 (P<0.0001) 1 month after, and subsequently by a decrease of 2.78±0.65 in the long-term follow-up.

Conclusions: Since our study failed to demonstrate any improvement whatsoever in perfusion, nor in ventricular function after laser revascularization, it may be reasonably assumed that the clinical benefits of PMR were in fact largely due to the placebo effect of the procedure itself. Admittedly, a relatively small group of patients was assessed and therefore larger trials are still required to establish the practical value of this technique.
5.49
Risk factors and myocardial viability testing with perfusion scintigraphy may imply the treatment of the ischemic left ventricular dysfunction (ILVD) - the results from the registry long-term follow-up
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The value of the viability testing in view of the clinical characteristics of "real-life" registry patients (pts) with ILVD is unknown. The aim of the study was to define the subgroups of pts, in whom myocardial perfusion scintigraphy result may suggest the treatment or prevention strategy.

Methods: 172 consecutive pts (130 males, mean age 60±17) with ILVD (mean ejection fraction of 0.38 ± 0.12) subjected to TI-201 SPECT imaging (130 MBq rest-redistribution) or Tc-99m ECG-gated SPECT (740 MBq at rest) were analysed. The significant viability was defined as the presence of reversible defect or the uptake >50% and the preserved systolic thickening in more than 1 (out of 16) dysfunctional segment. The primary and secondary end-points (SEP) were the overall mortality and major adverse cardiovascular events (MACE) including revascualrization procedures respectively.

Results: The average follow-up was 76±16 months, 40 pts (23%) died, 43% experienced the SEP. The mortality was influenced by the risk factors, no beta-blocker (26%) or acetylsalicylic acid (36%) treatment and poor physical activity (56%). The viable myocardium (57% of pts) was more frequent in pts with SEP (66% vs 19% for the brain stroke, P<0.002) and halved the risk for the stroke. In pts with viable myocardium the revascularization procedures improved the survival (20:3±5 vs 58:5±3, P=0.002) and halved the risk for the stroke. The pts with viability had more hospitalizations.

Conclusion: In registry patients with ischemic left ventricular dysfunction and viable myocardium the revascularization may improve the outcome. The registry data indicate the need to improve the compliance with the secondary prevention measures, especially in patients with viable myocardium.

Event-free survival

5.50
Chronotropic index and heart rate recovery in patients with familial amyloidotic polyneuropathy. Correlation with I-123 metaiodobenzylguanidine cardiac imaging and heart rate variability.
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Injured heart rate (HR) response to exercise measured by chronotropic index (CI) and delayed heart rate recovery (HRRe) are reflective of autonomic tone and have been shown to predict cardiac mortality. Familial amyloidotic polyneuropathy (FAP) type 1 is characterized by neuropathy and progressive dysfunction of the autonomic nervous system. This study was aimed to determine CI and HRRe in FAP pts and to correlate these measures with other parameters of autonomic nervous system.

Methods: 20 pts with TTRVal30Met mutation (10 male; age=39.5±13 y) presenting with different stages of the disease (11 with electrophographic changes) and 20 age-matched healthy control subjects underwent symptom-limited exercise test according to Bruce protocol. CI was defined as (peak HR-rest HR)/(220-age-rest HR), with CI normal. HRRe was defined as the difference between peak HR and HR in 1st min of recovery (bpm) with CI ≥8 normal. CI was decreased in 14/20 FAP pts and in only 1/20 normal variables are shown in table. CI was decreased in 14/20 FAP pts and in only 1/20 normal subjects (p<0.001). HRRe was abnormal in 11 pts and in 2 subjects of the control group (p=0.07). CI and HRRe did not correlate with electrophysiologic severity of the disease nor with MBG uptake. Significant correlations were observed between HRRe and total power (r=0.54, p<0.007) and CI (r=0.58, p<0.007).

Results: heats-to-mediastinum MBG uptake was 2.04±0.4 (normal value 2.6±5.3). Exercise variables are shown in table. CI was decreased in 14/20 FAP pts and in only 1/20 normal subjects (p<0.001). HRRe was abnormal in 11 pts and in 2 subjects of the control group (p=0.07). CI and HRRe did not correlate with electrophysiologic severity of the disease nor with MBG uptake. Significant correlations were observed between HRRe and total power (r=0.54, p<0.007) and CI (r=0.58, p<0.007).

Conclusions: CI and HRRe are simple exercise parameters that are decreased in FAP pts and may be useful to identify autonomic dysfunction early in the course of the disease and to select pts for liver transplantation, which is the only way to control the progression of the disease.

Exercise variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>FAP patients (n=20)</th>
<th>Normal subjects (n=20)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resting HR (bpm)</td>
<td>95 ± 15</td>
<td>81 ± 9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Peak HR (bpm)</td>
<td>151 ± 23</td>
<td>174 ± 15</td>
<td>0.0004</td>
</tr>
<tr>
<td>Exercise duration (sec)</td>
<td>549 ± 150</td>
<td>693 ± 110</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>HR in 1st min of recovery (bpm)</td>
<td>129 ± 21</td>
<td>135 ± 18</td>
<td>ns</td>
</tr>
<tr>
<td>IC</td>
<td>66 ± 22</td>
<td>92 ± 8</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>HRR</td>
<td>22 ± 12</td>
<td>40 ± 14</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

5.51
Validation of Cedars quantitative perfusion SPECT (QPS) in our department: comparison with visual interpretation.
C. Candido Lourenço1, C. Roupae1, A. Ferr-Antunes1, M. Ferreira2, L.A. Providência1, J. Lima1 1Coimbra’s University Hospital, Nuclear Medicine, Coimbra, Portugal, 2Coimbra’s University Hospital, Cardiology, Coimbra, Portugal

Aim: The aim of this study was to assess the agreement between the quantitative and the visual analysis of myocardial perfusion scintigraphy.

Methods: We included 72 patients (50 men, 22 women, mean age of 60±11.6 years) who underwent a one day stress-rest 99mTc-TcTetrofosmin myocardial SPECT. Forty two pts had history of documented myocardial infarction. Perfusion images were divided in 20 segments assigned to six evenly spaced regions in apical, mid-ventricular and basal slices of the short axis and 2 apical segments of the mid-ventricular long axis slice. Each segment was scored by visual analysis from normal perfusion (0) to severely reduced perfusion (4), the stress summed score (SSS), the rest summed score (RSS) and the difference summed score (DSS) were calculated. Automatic quantification was done using QPS software, based on a 20 segment left ventricular model and scoring each segment from normal perfusion (0) to severely reduced perfusion (4) and automatic SSS, RSS and DSS were obtained. Linear regression and analysis of differences between both methods was done. Summed scores obtained by visual and by automatic quantification were classified according to severity (3+: normal, 4-5: moderate; >10 severe) and agreement between classification was determined.

Results: A good correlation between visual and automatic scores was obtained. SSS: visual and QPS-R=0.957; SEE: 2.8
RSS: visual and QPS-R=0.927; SEE: 3.1
DSS: visual and QPS-R=0.648; SEE: 2.6.
The mean differences found between visual and automatic scores were small.

Conclusions: Quantification of myocardial perfusion scintigraphy is known to be a well established technique. Also in our department QPS showed to be a reliable software for the quantitative evaluation of myocardial perfusion scintigraphy.

5.52
Prognostic value of cardiac scintigraphy in patients with left bundle branch block.
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PURPOSE: To evaluate the prognostic value of perfusion scintigraphic patterns in left bundle branch block (LBBB).
POPULATION: 310 consecutive patients (Pt), 128 male and 182 female, mean age 65 years, old with LBBB referred to cardiac scintigraphy were studied.

METHODS: Clinical history, pharmacologic adenosine stress cardiac scintigraphy (SPECT) and rest SPECT with teboroxime and clinical follow-up for cardiac events (CE) were performed. CE were defined as, myocardial infarction, unstable angina, severe heart failure, coronary surgery, coronary angioplasty and cardiac death.

RESULTS: Clinical Profile: Hypertension- 144 Pt; treated diabetes- 36 Pt; treated dislipidemia- 57 Pt; active smokers- 26 Pt; Menopause- 150 Pt; more than 2 CAD risk factors- 78 Pt; angina- 109 Pt; atypical chest pain- 41 Pt; congestive heart failure- 12 Pt; asymptomatic- 148 Pt.

Scintigraphic Pattern: No perfusion defects (PD) - 102 Pt (42.9%); perfusion defects- 104 Pt(50.5%); 95 Pt (45 septal only), 60 Pt other localization.
Clinical follow-up: 207 Pt were followed for a mean period of 20 months (103 Pt lost for follow-up). 51 Pt had cardiac events (24.6%): 3 myocardial infarction, 3 unstable angina, 9 cardiac heart failure, 12 coronary surgery, 18 coronary angioplasty and 6 cardiac death. Cardiac scintigraphy data (presence, type and localization of PD) were correlated to the occurrence of CE (table I) and statistically analysed (chi-square test). Relation PD events- p<0.001; relation PD reversibility/events- p<0.001; relation PD localization/events- p<0.0001.

Conclusions: 1- This LBBB population presented perfusion defects in half of the cases and cardiac events at 20 months in 25%.
2- Patients with perfusion defects developed more cardiac events (42%).
Reversibility and localization besides the septal wall were associated to more frequent cardiac events (65% and 70%, respectively).
3- Patients without perfusion defects in the scintigraphy had good prognosis (94% free of events). Also, perfusion defects exclusively in the septal wall and fixed defects were predictive of good prognosis (respectively, 6% and 8% events).

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD (n=102)</td>
</tr>
<tr>
<td>EVENTS</td>
</tr>
<tr>
<td>NO EVENTS</td>
</tr>
</tbody>
</table>

Scintigraphic data and cardiac events correlation
5.53

Evolution of left ventricular systolic function after coronary revascularization and medical treatment in patients with ischemic cardiomyopathy.


The aim of the study was to analyzed, by means of gated SPECT, the effect of coronary revascularization and medical treatment on left ventricular remodelling in patients with coronary artery disease and impaired left ventricular systolic function.

Methods. We studied 61 patients (mean age: 60 ± 10 years, 6 female) with ischemic cardiomyopathy (LVEF =< 40%) who had two gated-SPECT myocardial perfusion studies with technetium labeled compounds during a follow-up more than 3 months: 30 were revascularized (group A) (24 with CABG and 6 with PTCA; follow-up: 23.5 ± 13 months) and 31 followed with medical treatment (group B; follow-up: 19.7 ± 16 months).

Results. Seventy-three percent (22/30) of the patients of the group A and 38.7% (12/31) of the patients of the group B satisfy scintigraphic viability criteria (p < 0.006). Fifty-seven percent (17/30) of the patients of the group A and 19% (6/31) of the patients of the group B showed a significant improvement of LVEF (LVEF > 5%, p < 0.003) between the first and second study. In patients of group A, a significant reduction in end-systolic volume (ESV) and a significant increase in LVEF were observed, while in patients with medical treatment the differences were not significant.

Picture Results.

Conclusions. Patients with coronary artery disease and reduced left ventricular function who are revascularized showed statistically significant increase in ESV and improvement in LVEF. This fact was not observed in patients who were followed with medical treatment.

Table 1

<table>
<thead>
<tr>
<th></th>
<th>Revascularization</th>
<th>Medical treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Post</td>
<td>1st study</td>
</tr>
<tr>
<td>LVEF (%)</td>
<td>28 ± 6</td>
<td>36 ± 12</td>
</tr>
<tr>
<td>EDV (ml)</td>
<td>162 ± 59</td>
<td>173 ± 67</td>
</tr>
<tr>
<td>ESV (ml)</td>
<td>132 ± 48</td>
<td>113 ± 58</td>
</tr>
</tbody>
</table>

5.54

Clinical management of patients with coronary artery disease and reduced left ventricular ejection fraction with and without viability in gated-SPECT.


The aim of this study was to analyze the clinical management of patients with coronary artery disease and reduced left ventricular systolic function with and without scintigraphic viability criteria.

Methods. During 6 years, 260 consecutive patients (mean age: 63 ± 11 years, 33 females) with left ventricular ejection fraction < 40% of ischemic origin were evaluated by means of gated SPECT with technetium labeled molecules (156 stress-rest test and 50 rest test). Eighty-four percent of them had previous myocardial infarction (96 anterior, 56 infero-lateral and 14 no Q infarction). Absence of scintigraphic myocardial viability criteria (no ischemia, uptake at rest >30% and/or no systolic thickening in more than 3/17 segments) of the regions with severe hypokinesia, akinesia or dyskinesia were analyzed. Also, coronary revascularization suitability in the coronary angiography was evaluated.

Results. There were 59 patients without scintigraphy viability criteria: 39 out of 156 without ischemia in stress-rest SPECT, 68/206 without <30% uptake and 76/206 without systolic thickening in more than 3 segments in rest gated-SPECT.

Results Table

<table>
<thead>
<tr>
<th></th>
<th>Viable Patients (n=147)</th>
<th>Non-viable patients (n=59)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronary angiography</td>
<td>105 (71.4%)</td>
<td>45 (76.3%)</td>
<td>0.48</td>
</tr>
<tr>
<td>Revascularization</td>
<td>51 (34.7%)</td>
<td>18 (30.5%)</td>
<td>0.565</td>
</tr>
<tr>
<td>PTCA/CABG</td>
<td>8 (15.6%)/43 (84.3%)</td>
<td>7 (38.9%)/41 (61.1%)</td>
<td>0.04</td>
</tr>
</tbody>
</table>

5.55

Quantitative gated SPECT inter assay reproducibility in atrial fibrillation.


Aim of the study. Inter assay reproducibility of gated SPECT for the evaluation of left ventricular volumes and ejection fraction is high in patients with sinus rhythm but it has not been studied in the presence of atrial fibrillation (AF). Therefore, the aim of this study was to evaluate the inter assay reproducibility of this technique in the quantification of left ventricular end-diastolic volume (EDV), end-systolic volume (ESV) and ejection fraction (EF) in patients with AF.

Methods. Forty patients (mean age: 69 ± 7 years, 13 women) with atrial fibrillation were studied by means of two day stress-rest gated SPECT with 99mTc-labeled compounds. Two rest gated SPECT acquisitions (1st g-SPECT and 2nd g-SPECT) separated more than 30 minutes were acquired. The quantitative values (EDV, ESV, and EF) were obtained using the QGS® method. Correlation, linear regression, and variation coefficient between the first and second gated SPECT were evaluated.

Results: Mean values of ventricular volumes and EF, variation coefficient, and analysis of Pearson correlation and linear regression were obtained: Results Table. A good correlation and linear regression were obtained. The variation coefficient for EF was three times greater than in patients without AF, and two times greater for ESV (Interassay variability of EF was 2.0 ± 5.1 (r=0.94); EDV was 4.5 ± 8.6% and ESV was 3.4 ± 6.6 ml in patients without AF in our nuclear cardiology department).

Conclusions. Interassay reproducibility of the gated SPECT in the determination of left ventricular volumes and ejection fraction is acceptable even in the presence of atrial fibrillation.

Table 1

<table>
<thead>
<tr>
<th></th>
<th>g-SPECT 1st</th>
<th>2nd</th>
</tr>
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<tbody>
<tr>
<td>EF %</td>
<td>57.9 ± 13.1</td>
<td>55.8 ± 11.6</td>
</tr>
<tr>
<td>EDV (ml)</td>
<td>90.1 ± 43.9</td>
<td>93.2 ± 43.5</td>
</tr>
<tr>
<td>ESV (ml)</td>
<td>43.8 ± 29.8</td>
<td>43.8 ± 29.8</td>
</tr>
<tr>
<td>Linear regression</td>
<td>r = 0.91</td>
<td>r = 0.99</td>
</tr>
<tr>
<td>ANOVA test</td>
<td>p &lt; 0.000</td>
<td>p &lt; 0.000</td>
</tr>
<tr>
<td>Variation coefficient</td>
<td>6.4 %</td>
<td>5.2 %</td>
</tr>
</tbody>
</table>

Mean ± SD

5.56

Left ventricular function and phase analysis with equilibrium radionuclide angiography in patients with biventricular pacemaker. Preliminary results.

A. Africa Muxi1, P. Paredes1, J. Ortiz2, J. Duch1, E. Diz-Infante1, S. Fuertes1, J. Orus3, LL. Mont2, F. Pons3. 1Hospital Clinic, Nuclear Medicine, Barcelona, Spain, 2Hospital Clinic, Cardiology, Barcelona, Spain

Resynchronization pacing with a biventricular pacemaker has been added to conventional advanced heart failure treatment, in order to improve functional class in these patients.

Aim: To evaluate left ventricular ejection fraction (LVEF) changes and resynchronization in patients with advanced heart failure after a biventricular pacing implant.

Material and method: The study group consisted of 50 patients (41 men and 9 women, mean age 69 ± 8 years) with advanced heart failure. Twenty-five patients had a dilated cardiomyopathy and the remaining 25 were ischemic.

An equilibrium radionuclide ventriculography was carried out following standardized techniques, 72 hours after the implant. Two acquisitions were performed; one with the pacemaker connected and a second after disconnect the pacemaker.

At 6 months a control study was also made and responders were defined as those who were alive, had not received a heart transplant and achieved more than 10% increase in distance in the 6 minute-walking test. Changes in LVEF and resynchronization (according to the phase analysis) were studied comparing the connected and disconnected modes and also comparing the basal and the 6 months studies.

Results: LVEF increased significantly at 6 months both with the pacemaker connected (23.38 ± 11.47 vs. 27.06 ± 13.57, p<0.003) and with the pacemaker disconnected (22.84 ± 10.42 vs. 26.65 ± 13.42, p<0.001), compared to the basal study. Moreover, a significant improvement in LVEF was found at 6 months with the pacemaker connected compared to the disconnected basal study (27.06 ± 13.57 vs. 22.84 ± 10.42, p<0.001). In the basal study, after disconnection of the pacemaker, a synchronisation worsening was found in 11% of responder patients vs. 39% of non-responder patients.

Conclusions: Equilibrium radionuclide angiography in patients with biventricular pacemaker shows a statistical LVEF improvement. In the basal study, resynchronisation worsening after disconnect the pacemaker may predict the lack of response.
Impact of revascularization strategy on long-term prognosis in patients with chronic ischemic left ventricular dysfunction.

C. Pollack1, J.P. Hellermann2, M. Namdar1, P. T. Patrick Siegrist1, P. Koepfli1, N. Bartenstein1, U. Schurr1, R. Jenmi2, PA. Kaufmann.1 University Hospital Zurich, Nuclear Cardiology, Zurich, Switzerland, 2University Hospital Zurich, Cardiovascular Center, Zurich, Switzerland, 3Cardiac Surgery, University Hospital, Cardiovascular Centre, Zurich, Switzerland.

Background: The relative benefits of coronary artery bypass graft surgery (CABG) versus percutaneous transluminal angioplasty (PTCA) in patients with chronic ischemic left ventricular (LV) dysfunction (LVD) are largely unknown.

Aim: To assess the impact of revascularization strategy on long-term prognosis in patients with LVD.

Methods: We assessed the follow up (fu) of 102 patients with chronic ischemic LVD who underwent FDG and NH3 PET scan for assessment of hibernating myocardium (+NH3/FGD mismatch). Patients were grouped according to the presence (hibernation) or absence of viable myocardium (no hibernation).

Results: see table 1

Conclusion: Our results demonstrate a strong association between CABG and increased first-year mortality compared to PTCA in the absence of myocardial viability assessed by PET. The long-term follow up, however, reveals a markedly reduced survivors rate in CABG compared to PTCA irrespective of presence or absence of viable myocardium.

Table 1.

<table>
<thead>
<tr>
<th></th>
<th>Hibernating</th>
<th>Hibernating</th>
<th>No Hibernating</th>
<th>No Hibernating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CABG</td>
<td>PTCA</td>
<td>CABG</td>
<td>PTCA</td>
</tr>
<tr>
<td>n</td>
<td>29</td>
<td>27</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>age, years</td>
<td>59.2±9</td>
<td>56.1±13</td>
<td>64.9±9</td>
<td>65.7±6</td>
</tr>
<tr>
<td>gender, male</td>
<td>86%</td>
<td>86%</td>
<td>78%</td>
<td>88%</td>
</tr>
<tr>
<td>LVEF (%)</td>
<td>33±11</td>
<td>28±9</td>
<td>30±7</td>
<td>35±3</td>
</tr>
<tr>
<td>3-vessel disease (%)</td>
<td>49%</td>
<td>62%</td>
<td>44%</td>
<td>48%</td>
</tr>
<tr>
<td>mean fu, years</td>
<td>4.2±2.4</td>
<td>4.9±2.5</td>
<td>4.4±2.6</td>
<td>4.6±1.6</td>
</tr>
<tr>
<td>first year mortality</td>
<td>13.0%</td>
<td>13.2%</td>
<td>20.0%</td>
<td>6.0%</td>
</tr>
<tr>
<td>survivors, end of fu</td>
<td>51.4%</td>
<td>71.8%</td>
<td>49.4%</td>
<td>80.4%</td>
</tr>
</tbody>
</table>

Ischemia in diabetic patients without known coronary artery disease.

R. Rim Hassad, H. Hamami, A. Sellem, H. Ben Braham. Military Hospital, Nuclear Medicine, Tunis, Tunisia

AIM: Coronary artery disease (CAD) is the leading cause of mortality and morbidity in patients with diabetes mellitus and these patients have an elevated prevalence of silent myocardial ischemia.

The aim of this study is to compare the prevalence of inducible ischemia in symptomatic and asymptomatic patients.

MATERIEL ET METHODE: We studied 40 consecutive patients, with at least five years history diabetes mellitus without history of myocardial ischemia or evidence of previous myocardial infarction represented on ECG.

Rest and stress myocardial perfusion were evaluated qualitatively by two experienced and independent observers.

RESULTS: Our 40 patients were equally divided between males and females. The mean age was 58 years. 38 were diabetic type II. 23 patients were symptomatic of typical angina (12 cases), or atypical chest pain (11 cases).

17 patients were absolutely asymptomatic.

The myocardial perfusion scintigraphy was positive (reversible hypo perfusion or irreversible hypo perfusion) in 91% of cases in symptomatic patients and in 64% of cases in asymptomatic ones. 30% of the diabetic patients with CAD (26% of symptomatic and 35% of asymptomatic patients), have been diagnosed only by the myocardial perfusion scintigraphy.

CONCLUSION: The perfusion SPECT is potentially useful in assessing CAD in patients with diabetes mellitus, especially in asymptomatic cases when the other examinations are negative.

Diagnostic accuracy of Tc-99m MIBI gated SPECT for the detection of silent myocardial ischemia in hemodialysis patients: comparison with risk factors.

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Although coronary artery disease (CAD) is a major cause of mortality and morbidity in patients undergoing hemodialysis (HD), there is no accurate diagnostic method for the detection of silent myocardial ischemia. The aim of this study is to assess the diagnostic accuracy of Tc-99m MIBI gated SPECT for the detection of silent myocardial ischemia in HD patients and correlate results with laboratory and clinical risk factors.

Patients and methods: 31 Asymptomatic patients undergoing HD (20 men, 11 women) with a mean age of 45 (range: 25-75) were included to the study. Serum electrolytes, creatinine, homocysteine and adhesion molecules were measured prior to dialysis.

Ambulatory blood pressure, carotid intima media thickness measurements, echocardiography and gated Tc-99m MIBI myocardial perfusion scintigraphy (MPS) were performed in all patients. Coronary angiography (CA) was performed in those with myocardial perfusion defect and/or reduced left ventricular ejection fraction.

Results: gated-MPS results were abnormal in 9 (29%) patients. 6 of these patients had greater than 50% probability involving one or more coronary arteries on CA. There were significant differences between patients with perfusion defects (group A) and those with normal MPS (group B) regarding carotid intima media thickness, serum levels of adhesion molecules and markers of inflammation. All of these variables were higher and the duration of HD was significantly longer among patients in group A (132±89 months vs. 59±60 months p<0.05). The follow-up period lasted 20 months (range: 14-26). In group B, one patient was admitted to the hospital for severe angoira pectoralis whereas in group A 7 patients sustained cardiac events. The time between MPS and cardiac event varied from 1 to 13 months. Logistic regression analysis showed that quantitative MPS results (summed stress score) was significantly related to cardiac events: (odds ratio: 20, p<0.003, CI: 95%). The prevalence of cardiac events was significantly different among groups A and B (75% in group A and 13% in group B, p<0.01). The echocardiographic findings did not differ significantly between two groups.

Conclusion: in asymptomatic HD patients, duration of HD, inflammation, elevated serum adhesion molecules account for the increased incidence of CAD. Gated MPS is a safe and non-invasive screening test for the detection of myocardial ischemia in patients with high risk. The discordant results (perfusion defect/normal coronary angiography) can be attributed to endothelial dysfunction and abnormal vasodilatation capacity of the coronary circulation.

Detection of early diastolic dysfunction in patients with left ventricular hypertrophy using 16-frame gated myocardial perfusion SPECT.

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Diastolic function (DFx) is known to deteriorate before systolic function (SFx) in left ventricular hypertrophy (LVH) and its early diagnosis and treatment may improve outcomes. Assessment of DFx using 16-frame sestamibi myocardial perfusion SPECT (MPS) has been described, with peak to filling (TTPF) proving the most stable DFx parameter in normals when MPS is acquired without “bad-beat rejection.” To explore DFx in patients in whom abnormality is expected, we compared its assessment in 30 pts with LVH (mean age 60±12) to 30 age-matched controls (mean age 57±8). None of the patients in the control group had hypertension, diabetes or known cardiac disease. There was no significant difference in SFx parameters between groups with end-diastolic volume (EDV), end-systolic volume (ESV) and ejection fractions (EF) being 120±35 mL and 112±18 mL, 52±21 mL and 44±10 mL, 58±8% and 61±4% in LVH group and the control group, respectively (p>0.05).

However, DFx was worse in LVH group as measured by TTPF, which was 223±86 ms in LVH and 160±18 ms in the controls (p<0.0005). Although peak filling rate (PFR) was lower in LVH group (2.2±0.7 EDVs/s) compared to controls (3.4±0.3 EDVs/s), the difference was not statistically significant. The higher value of mean heart rate (HR) in LVH group might have influenced PFR, causing falsely “normal” values similar to control group. In 7 patients in the LVH group with repolarization abnormality on ECG, DFx was found to be even lower (mean PFR 1.9±1.1 EDVs/s and TTPF 256±99 ms).

Our study shows that the detection of DFx abnormality is feasible with 16-frame gated MPS in patients with LVH and normal perfusion and SFx. Although an adjustment for age, SFx parameters and HR is needed for the accurate assessment of PFR, they are not necessary for TTPF in the detection of abnormality. TTPF appears to be a stable parameter to evaluate the DFx abnormality in gated MPS, which without adjustment shows differences between patients with LVH and normals. Thus, it is a reliable parameter to evaluate the DFx abnormality in gated MPS. The findings, in conjunction with previous studies in normals, suggest that this parameter may provide useful clinical information in assessing DFx, even in studies acquired without “bad-beat rejection.”
5.61
Usefulness of low dosedobutamine and nitrate Tc99m-MIBI gated SPECT in the evaluation of myocardial viability.
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Objective: In evaluation of myocardial viability, determination is less accurate than its reality in the studies of 99mTc-MIBI than studies of 201Tl and PET are compared. Recently owing to several methods have improved in order to increase the usefulness of 99mTc-MIBI, the underestimate situation can be decreased with carrying out quantitative analysis, nitrate and dobutamine. However, limited information is available about combination of low-dose dobutamine and nitrate-enhanced Tc99m-MIBI gated SPECT. Aim of the study was to evaluate the diagnostic potential of the combination of both low-dose dobutamine and nitrate on Tc99m-MIBI gated SPECT in detection of myocardial viability.

Material and Methods: The study included 21 patients with acute MI admitted to critical care department, Osmangazi university. Ten patients were males, 11 females, with a mean age of 52±4 years. MI was anterior in 15 and inferior in 6 patients. Patients with previous MI were excluded.

Rest and combination of both low dose dobutamine and nitrate Tc99m MIBI gated SPECT were performed within 1 week after AMI. A dual-head gamma camera with high-resolution collimators and 15% with a 140keV photopeak of 99mTc was used. SPECT was performed with 32 projections over an 180° elliptical orbit at 45°/projection, 64 × 64 matrices, 8-frames/cardiac cycle. The studies were reconstructed using filtered back-projection without attenuation or scatter correction. The reconstructed slices were realigned along the heart axis and short-, horizontal long-, and vertical long-axis views were obtained. For tracer activity quantification, the gated SPECT images were summed, obtaining a standard perfusion study. The regional perfusion, left ventricular ejection fraction (LVEF), end diastolic and end systolic volumes (EDV, ESV), volume (V), stroke volume (SV) and extent score (ES) were assessed rest and after combination of both low-dose dobutamine and nitrate Tc99m Tc99m-MIBI gated SPECT.

Results: The findings of Tc99m-MIBI gated SPECT imaging following the administration of low-dose dobutamine and nitrate and the rest Tc99m-MIBI gated SPECT findings revealed that while the levels of EF (p<0.05) increased significantly, there was a significant decrease in EDV (p<0.05), ESV (p<0.05), V (p<0.05) and SV (p<0.001) values.

Conclusion: These results suggest that the combination of dobutamine with nitroglycerin 99mTcMIBI gated SPECT may be an adequate alternative to low-dose dobutamine test for evaluation of myocardial viability and provides useful information of myocardial perfusion and function.

5.62
Is stress-only technetium-99m-tetrofosmin SPECT imaging feasible when a one-day stress-rest protocol is used?
A. Cheetham, V. Naylor, F. Ghioito, M. McGhee, MB. Al-Housni, AD. Andrew Kelion. Harefield Hospital, Nuclear Medicine Department, Harefield, United Kingdom

Background: In myocardial perfusion scintigraphy (MPS), a normal stress study obviates the resting study. This is an advantage of a stress-rest order when a one-day study is employed, but it may be impractical for the reporting physician to review every stress acquisition prior to the resting injection. We investigated whether technologists can identify a significant number of normal studies from a stress acquisition alone.

Methods: Four technologists (one experienced and a consultant) scored 200 consecutive stress-only technetium-99m-tetrofosmin (250MBq) SPECT acquisitions with access to clinical and exercise ECG data (1/2 normal, no reinjection required; 3=probably normal with artifact, reinjection required; 4=abnormal). Scores were compared with the final clinical report based on stress and gated resting acquisitions.

Results: Clinical indications were diagnostic 85, post acute coronary syndrome 23, post MI 22, post CABG 27, and other 59. Studies were normal and abnormal. The readers each identified up to 30% of patients as not requiring a resting injection (Table). None of the patients so identified by the two most experienced readers turned out to have abnormal studies, though the less experienced technologists made occasional errors.

Conclusion: Technologists can identify a significant number of patients as having normal MPS from the stress acquisition of a one-day technetium-99m protocol. Such patients could be sent home without a resting study, saving patient and gamma camera time, and reducing radiation exposure by a factor of four. Less experienced technologists would make occasional errors, but these would be identified at the time of reporting, allowing relevant patients to be recalled for a resting study with only minor inconvenience.

<table>
<thead>
<tr>
<th>Consultant</th>
<th>Experienced (Tech 1)</th>
<th>Tech (2)</th>
<th>Tech (3)</th>
<th>Tech (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total not requiring resting injection</td>
<td>59</td>
<td>57</td>
<td>62</td>
<td>31</td>
</tr>
<tr>
<td>Number abnormal on final report (%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>3 (5%)</td>
<td>1 (3%)</td>
</tr>
</tbody>
</table>

Patients identified as not requiring a resting injection who turned out to have an abnormal study.

5.63
Myocardial perfusion scintigraphy using exercise stress is compatible with an efficient, high-volume service.
MB. Al-Housni, F. Houssings, S. Hinton-Taylor, AD. Andrew Kelion. Harefield Hospital, Nuclear Medicine Department, Harefield, United Kingdom

Background: Dynamic exercise is the optimal form of stress in myocardial perfusion scintigraphy (MPS), providing prognostically important exercise indices and optimal imaging when a technetium-99m tracer is used. An increasing number of centres now use exclusively pharmacological stress “for convenience”. We report our experience using treadmill exercise to provide a high-volume MPS service since moving into a new department.

Methods: One-day stress-rest technetium-99m-tetrofosmin protocol is employed, with a dedicated cardiac gamma camera. Currently, 9 patients are stressed each morning, supervised by a nuclear cardiologist and radiographer. Patients are prepared by a radiographer assistant with electrodes and a cannula before entering the in-house stress room.

Results: 833 patients underwent MPS over a period of 7 months (November 2002 to June 2003). 562 (68%) were stressed using treadmill exercise, 136 (24%) using the modified rather than the full Bruce protocol; 261 (31%) required adenosine, and 4 (<<1%) dobutamine. 79 of 210 (38%) patients referred for MPS due to multiple indications (52) perform an exercise ECG were successfully exercised. Mean exercise time was 8.0±2.9min; 508 (90%) patients exercised maximally. Over the study period, monthly MPS activity increased progressively from 58 to 162 patients, and this level has been maintained (Figure).

Conclusion: The majority of patients referred for MPS can be stressed using dynamic exercise. With an appropriate system in place, more than 2000 patients per year can be studied during office hours on a single cardiac gamma camera. Exercise stress is fully compatible with an efficient high-volume service.

5.64
Perfusion myocardial scintigraphy: experience in the massively obese patient.
P. Birbeck, S. Thatikonda, M. Feldkamp, T. Thomas Rosamond. University of Kansas Hospital, Nuclear Cardiology, Kansas City, MO, United States, Mid-America Cardiology, Nuclear Cardiology, Kansas City, MO, United States

Introduction: Myocardial perfusion imaging (MPI) in the massively obese patient (MOP) is an increasingly frequent problem. Limited data is available from the literature on this select group. We review and characterize our experience with MPI in the MOP.

Methods: We reviewed the medical records of a large cardiographic practice to identify patients categorized as MOP, body weight greater than 325lbs. Analysis of MPI studies was performed and follow-up determined. Comparison to subsequent cardiac cath was correlated to define test sensitivity, accuracy and normalcy rates.

Results: From more than 80,000 patients, 900 were identified as MOP or EOB (<1.1%). Of this group, 115 patients had MPI (12.8%); 35 female, 80 male, with a mean age of 49.9±8.9 years, significantly younger than controls: 61.1±12 years (p<0.05). Mean body weight of MPI was 356±27.8 lbs. (range: 325-433 lbs. vs. 200±50 lbs. in the control group. Mean body surface area was greater in the MOP than in controls (2.69±0.16m2 vs. 2.06±0.29m2, p<0.05). Obese patients were taller than controls, 5'10±4 inches vs. 5'7±4 inches. Comparing MOP to controls, ejection fraction (52.2±11.6 vs. 64.8±8.9%), and end diastolic volume (138.9±53 vs. 74.8±25.6 ml) were significantly different. MOP were studied with adenosine in 78.2%, with dobutamine in 6.9%, and with exercise in 14.8%. 49 out of the 115 perfusion studies were considered abnormal (42.6%), There were no significant differences in age (49.2±8.6 years vs. 50.5±7.6 years), weight (359±26 vs 354±29 lbs.), ejection fraction (50.6±13 vs. 53±10), or lung heart ratios (0.46±0.11 vs. 0.50±0.12) in the abnormal studies vs. normal studies in MOP. By cath 20 were true positives and 20 were false positive. 66 studies were not classified: 2 of which were cathered: one true negative, one false negative. None of the remaining 64 normal studies were submitted to diagnostic heart cath (97%). The mean follow-up of normal studies in MOP was 8.9±3.4 months with no angina, myocardial infarction of sudden death being identified. The sensitivity for MPI in the MOP was 95%, accuracy 73.9%, normalcy rate 69%, positive predictive value 40.8%, negative predicted value 98%. Specificity was low but only 2 of 66 patients (3%) with normal MPI were cathed.

Conclusion: MPI in the MOP is a challenging problem with high sensitivity but with limited specificity. Techniques to improve test specificity are needed in the MOP.
5.65
Extracardiac abnormalities on myocardial perfusion imaging.
M. Raza1, G.S. Girusher Panjrab1, A. Haider1, D. Jan1. 1Drexel University College of Medicine, Cardiology, Philadelphia, PA, United States, 2New York, NY, United States

AIM: This study was aimed to determine the frequency and clinical relevance of incidental but significant noncardiac findings (NCFs) detected on inspection of raw rotating projection data of single photon emission computed tomography (SPECT) perfusion imaging for the evaluation of known or suspected CAD.

METHODS: We retrospectively reviewed computer based study results of 305 patients for noncardiac findings, who underwent myocardial perfusion imaging for the evaluation of CAD. All the images were interpreted by a single observer.

RESULTS: Of the 305 patients, a total of 20 noncardiac findings (6%) were observed in 15 patients: 70% were gastrointestinal abnormalities (Hepatosplenomegaly, hiatal hernia, ascites, gastrointestinal tumors) and 30% thoracic (Breast and mediastinal abnormalities).

CONCLUSIONS: Incidental noncardiac findings are relatively common in patients undergoing SPECT myocardial perfusion imaging. It is prudent to diligently look for these abnormalities. These can reveal malignancies like thymoma, lymphoma, cancers of lung and gastrointestinal tract and hiatal hernias.

5.66
Left ventricular volume measurements with gated thallium myocardial perfusion SPECT: establishment of normal range values.
A. Yang1, M. Feldkamp1, R. Schumacher2, J. Reynolds3, E. Clark1, D. Speiser1, M. Schindel1, T. Hackney1, T. Thomas Rosamond3. 1University of Kansas Hospital, Nuclear Cardiology, Kansas City, KS, United States, 2University of Kansas Hospital, Nuclear Cardiology, Kansas City, KS, United States, 3Mid-America Cardiology, Nuclear Cardiology, Kansas City, KS, United States

Introduction: Left ventricular volume and ejection fraction calculations with gated SPECT imaging are commonly performed with Technetium as the perfusion agent. Thallium can also be used with this technique. Normal range values for left ventricular volumetrics are not available for gated Thallium imaging. We sought to establish the gender matched normal value for left ventricular volumetrics and ejection fraction using Thallium as the perfusion agent.

Methods: We reviewed 90 normal Thallium gated perfusion studies in low to intermediate risk patients (50 female, 40 male) to establish the expected normal range for left ventricular volumetrics and ejection fraction using Thallium as the perfusion agent.

Results: Normal males differed from normal females according to age (56±9 vs. 63±12yrs: p<0.01), weight (100±20 vs. 85±23 kg: p<0.001), height (178±6 vs. 164±6cm: p<0.0001), body surface area (2.2±0.2 vs 1.9±0.3 m²: p<0.001), and end-diastolic volume (90±27 vs. 63±17 ml: p<0.0001). End-systolic volume (37±15 vs. 21±10ml: p<0.0001) and stroke volume (53±14 vs. 42±9ml: p<0.0001) were also greater in normal males compared to females. Left ventricular ejection fraction was significantly higher in females than in males (69±8 vs. 60±8%: p<0.0001).

Conclusions: We establish the normal expected range for LV volumetrics with Thallium myocardial gated perfusion imaging according to gender. The numerical values for LV volumes in men are greater than those for women, while ejection fractions are higher in women. Absolute values for LV volumetrics appear to be lower than in other imaging modalities, likely due to the resolution limitations of Thallium and SPECT. Knowledge of the normal ranges, however, should allow for appropriate interpretation in the clinical setting and for comparison in serial studies.

5.67
The sagittal heart: a newly recognized heart orientation variant and its impact upon diaphragmatic attenuation artifact.
A. Yang1, M. Feldkamp1, J. Vacek1, T. Thomas Rosamond3. 1University of Kansas Hospital, Nuclear Cardiology, Kansas City, MO, United States, 3Mid-America Cardiology, Nuclear Cardiology, Kansas City, MO, United States

Introduction: We describe an unusual, but not rare heart orientation on supine myocardial perfusion imaging (MPI). The heart appears in a longitudinal orientation in which the base of the heart lies cranially, the apex caudally. This sagittal orientation (SAG) contrasts with the more common transverse-horizontal orientation (HOZ). We postulated the SAG would impact the frequency of diaphragmatic artifact (DA).

Methods: 1,000 consecutive MPI were reviewed to define the incidence of SAG. Scinigraphic data were reviewed to identify DA. Test group variables were compared to controls.

Results: 56 patients had SAG (29 male, 27 female) or 5.6%. SAG patients had significantly lower mean body weight (69.5 kg ± 16 vs. 91.4 ± 23, P < 0.001) and mean body surface area (1.70m² ± 0.2 vs. 2.06 ± 0.3, P < 0.001) than controls. There were no significant differences between SAG and HOZ in terms of age (63 years ± 14 vs. 60 ± 11), or height (70.8 cm ± 11 vs. 70.1 ± 9). Ejection fractions were greater in the control hearts (65% ± 9 vs. 55 ± 16), but both groups were within a normal limit. End-diastolic volumes were slightly larger in the SAG group (88.5ml ± 45 vs. 74.0ml ± 26). SAG patients had a more scaphoid abdominal appearance compared to controls. There was significantly lower incidence of DA in SAG 4% vs. control hearts 17%.

Conclusion: Patients with SAG are lighter and trimmer than controls. The incidence of DA is markedly less in SAG as compared to HOZ. The reduced frequency of DA is most likely due to scaphoid abdominal configuration. In controls, the abdominal soft tissue presses the diaphragm up into the chest creating a more HOZ. Algorithms for attenuation correction should take SAG into consideration.

5.68
Association of left ventricular mass and stress induced left ventricular cavity dilation in patients with normal myocardial perfusion scans.
V. Vikas Jindal. Strong Memorial Hospital, Internal Medicine, Rochester, MN, United States

BACKGROUND: Stress induced LV cavity dilation (TID) correlates with severe and extensive coronary artery disease (CAD) and may influence adversely the prognosis associated with otherwise normal myocardial perfusion scans (MPS). However, the impact of microvascular disease associated with LV hypertrophy on TID remains undefined.

OBJECTIVE: To assess the relationship of left ventricular mass (LVM) and stress induced left ventricular cavity dilation in patients with normal MPS.

METHODS: We reviewed records of 1647 patients who underwent MPS at our institution between January 1, 2002 and December 31, 2002 by retrospective query of the nuclear cardiology database. Of these, 106 patients had normal MPS (20 segment model, summed stress score < 3 and summed rest score < 3), were 18 to 85 years old, had normal echocardiographic EF (> 55%) and gave consent for investigative follow-up evaluation. We compared the number of patients with high and low LVM and TID with Chi-square analysis, using mean values of these variables as cut points.

RESULTS: Table 1

<table>
<thead>
<tr>
<th>LVM Mass</th>
<th>TID &lt;1.1</th>
<th>TID ≥1.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;225g</td>
<td>17</td>
<td>33</td>
</tr>
<tr>
<td>≤225g</td>
<td>37</td>
<td>19</td>
</tr>
</tbody>
</table>

Chi-square analysis of LV Mass and TID

Table 1

Planar Images: Horizontal vs Sagittal
5.69

Impact of left anterior fascicular blocks on the interpretation of stress electrocardiograms.
U. Uzodimma Dim1, L.M. Hungard2, V. Mouradian1, K.J. Nichols2, O.O. Akinioboye2. 1Saint Francis Hospital, Roslyn, NY, United States, 2Long Island Jewish Hospital, Nuclear Medicine, New Hyde Park, NY, United States

Background: The interpretation of stress electrocardiograms is known to be affected by conduction anomalies such as bundle branch blocks. However, the impact of left anterior fascicular blocks (LAFB’s) on stress electrocardiograms has not been critically assessed.

Methods: The databases of two nuclear cardiology centers were retrospectively studied for patients who had clinically indicated exercise nuclear stress tests over a 5-year period. Of the 10,322 patients identified, 110 (1%) had LAFB without bundle branch block, PVC, or LVH. The study cohort consisted of 33 patients (Age 66.9 ± 9 years; 27% female) with LAFB and 80 gender-matched control patients without LAFB. All patients had clinically indicated angiograms without revascularisation performed within 1 month of stress tests. Chi-square analysis was done to determine the association between ischemia by conventional EKG criteria (> 1 mm ST-segment depression) versus significant coronary artery disease (CAD) by quantitative angiographic criteria (greater than 70% stenosis in any major vessel) in both groups.

Results: For the controls vs. LAFB group, the accuracy (77.5% vs. 45%, p = 0.004) and sensitivity (31% vs. 9.5%, p = 0.01) were higher. There was no difference in specificity (p=ns) [see table].

Conclusion: Exercise induced ST-segment depression has a significantly lower sensitivity and accuracy for myocardial ischemia in the presence of left anterior fascicular blocks. Hence exercise stress testing alone is an inadequate screening tool for this population.

LAFB Vs Controls Results

<table>
<thead>
<tr>
<th>EKG</th>
<th>CAD</th>
<th>Controls</th>
<th>Group A</th>
<th>Controls</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>EKG</td>
<td>CAD</td>
<td>CAD</td>
<td>(n = 31)</td>
<td>CAD</td>
<td>(n = 80)</td>
</tr>
<tr>
<td>CAD</td>
<td>2 (6%)</td>
<td>0 (0%)</td>
<td>5 (6%)</td>
<td>7 (9%)</td>
<td></td>
</tr>
<tr>
<td>EKG</td>
<td>19 (58%)</td>
<td>13 (26%)</td>
<td>11 (14%)</td>
<td>57 (71%)</td>
<td></td>
</tr>
<tr>
<td>Chi Square</td>
<td>P value</td>
<td></td>
<td>0.69</td>
<td>P value</td>
<td>0.15</td>
</tr>
</tbody>
</table>

5.70

Improved prediction of hibernating and scarred arteries by gated myocardial perfusion SPECT analysis.
K. Snyder1, D. Polepalle2, K.J. Nichols3, O.O. Akinioboye2. 1State University of New York, College of Pharmacy, Stony Brook, NY, United States, 2Saint Francis Hospital, Roslyn, NY, United States, 3Long Island Jewish Hospital, Nuclear Medicine, New Hyde Park, NY, United States

Hypothesis: In deciding whether to assess viability in patients who exhibit a fixed perfusion abnormality on a rest/stress dual-isotope study (rest Tl-201/stress Tc-99m-sestamibi), we hypothesized that percent wall thickening (%WT) derived from the stress scan is capable of predicting a finding of hibernating versus scarred myocardium on 24-hour redistribution scans. Methods: Twenty-five patients who underwent a clinically indicated dual isotope gated myocardial perfusion SPECT study, followed by 24 hour TI-201 imaging for viability assessment, were recruited if they had at least one myocardial segment with a fixed perfusion abnormality on rest/stress perfusion analysis. %WT analysis was performed on the stress sestamibi scans using QGS software (Cedars-Sinai Medical Center, Los Angeles, CA) employing a 20-step linear color scale, such that each color scale division represented a 5% increment in wall thickening. %WT was tabulated based on the number of color transitions from diastole to systole. %WT values in segments that showed evidence of significant redistribution on 24 hours scans, consistent with hibernating myocardium, were compared with thickening in segments that failed to redistribute, consistent with scar.

Results: Myocardial perfusion redistribution of activity was absent in 15 subjects and present in 10. Overall, 88% of cases were correctly characterized by logistic regression analysis of %WT values (chi-square = 22.2; df = 1; p < 0.0001), and ROC analysis yielded 94% accuracy (95% confidence = 78%-99%), with sensitivity = 70% and specificity = 100% (see Table).

Conclusion: Analyses of regional % wall thickening on stress scans using gated myocardial perfusion SPECT can differentiate between hibernating myocardium and scar. This approach might be useful in guiding decisions as to whether to bring patients back for a 24-hour scan to assess viability after a dual isotope stress myocardial perfusion study or not.

% Redistribution activity

<table>
<thead>
<tr>
<th>% WT</th>
<th>0-5%</th>
<th>6-10%</th>
<th>&gt; 11%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redistribution</td>
<td>9</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Redistribution</td>
<td>6</td>
<td>3</td>
<td>7</td>
</tr>
</tbody>
</table>

5.71

Post-exercise and adenosine blood clearance and myocardial count density characteristics of Tc-99m sestamibi and Tc-99m tetrofosmin.
G. Gordon DePuy2, H. Khattak, M. Friedman, L. Thompson, St. Luke’s-Roosevelt Hospital, Nuclear Medicine, New York, NY, United States

Background: Because myocardial extraction of Tc-99m sestamibi (mibi) at maximal coronary blood flow rates is known to differ from that of Tc-99m tetrofosmin (tetro), we postulated that post-stress blood clearance rates and myocardial count density may likewise vary. Methods: Post-stress blood clearance was evaluated by means of sequential venous blood sampling for 6 min. post-injection in 20 patients (pts) receiving mibi (10 exercise, ex), 10 adenosine (adeno) and 20 gender- and age-matched pts receiving tetro (10 ex, 10 adeno). Ex pts were injected with tracer at peak treadmill ex, which was then continued for 1.5 min. Adeno pts were injected after a 3 min infusion, which was then continued for another 3 min. Also, to evaluate the consequences of differences in post-stress blood clearance, the stress/rest maximal count density ratio (S/R) was measured in reconstructed tomograms in 125 pts receiving mibi (54 ex, 71 adeno) and 125 receiving tetro (54 ex, 71 adeno) for a single-day, 9 mCi rest/ 36 mCi stress protocol. Results: The mean time from maximal to 50% blood concentration (T1/2) was longer for tetro than for mibi for ex (4.46 vs. 2.76 min, p = 0.04) and for adeno (7.53 vs. 5.23 min, p = 0.02). In all pts adeno T1/2 was longer than ex T1/2 (6.44 vs 5.31 min, p = 0.04). The mean S/R ratio was lower for tetro than for mibi with ex (3.69 vs. 4.84, < 0.05) and for adeno (2.98 vs. 3.57, p = 0.01). In all pts the adeno S/R ratio was lower than that for ex (3.58 vs. 4.33, < 0.01). Conclusion: Because of delayed blood clearance the S/R ratio is lower for tetro than for mibi and lower for adeno than for ex. Therefore, for tetro vs. mibi and for adeno vs. ex there is relatively lower stress myocardial count density and consequently a greater potential for "shine-through" of resting tracer activity into the stress images, possibly decreasing sensitivity in detecting CAD.

5.72

Coronary calcium scoring after non-ischemic myocardial perfusion imaging studies, clinical usefulness.
R. C. Randall Thompson, Al. Michelie, K. Moser, J.H. O’Keefe, N. Fritsch, TM Bateman. Mid America Heart Institute, Cardiology, Kansas City, MO, United States

BACKGROUND: A number of physicians recommend coronary artery calcium scoring (CAC) in selected patients after myocardial perfusion imaging (MPI) in order to improve sensitivity for the detection of significant coronary artery disease (CAD) or in selected patients with symptoms, to improve diagnostic confidence for the absence of significant CAD. So far, however, there is very little data to support this approach.

METHODS and RESULTS: We reviewed all 200 patients without known coronary artery disease who were referred for CAC by multidetector CT scanning (MDCT) shortly after MPI at our medical center. None had an ischemic MPI. There were 73 (36.5%) men, the mean age was 53 ± 13 years, and 17 (8.5%) were diabetics. The mean pretest likelihood of disease was 32.5 ± 25% and the mean risk of developing coronary artery disease events in the next 10 years based on Framingham risk factor profile model was 11.6 ± 8.4%. Thirteen patients (6%) had CAC scores greater than 400 units indicating significant CAD and another 22 (11%) patients had CAC 100-400 units indicating CAD which was possibly significant. In addition, 27 patients had mildly abnormal CCS (score >10-100) suggesting early CAD and the remainder, (n=139) had CCS less than 10 confirming no significant CAD. Traditional risk factors and patient characteristics including the presence of stress induced ECG changes or exercise induced chest pain were not significantly different between the patients with CAC score > 100 compared with those with CAC score < 100. However, the 92 patients who had detectable coronary artery calcifications (CAC > 0) were older (p<0.01) and had a higher Framingham risk score (p=0.002) compared with patients with CAC score = 0. With a mean follow up of 9 (± 7) spl months, 84.5% of patients with CAC score > 100 had been given the advice to take lipid lowering therapy and 88% had been advised to take aspirin 44.5% and 66% respectively of those with a CAC = 0 (<0.001 and p < 0.02 respectively).

CONCLUSION: Thus, in a series of patients who were referred for CAC scoring after non-ischemic MPI, 3.52% (17.5%) were reclassified from not having CAD to having significant CAD based on a CAC score > 100. Patients who were reclassified were not easily identifiable based on clinical or stress test parameters, but Framingham risk score did predict the presence of any CAD. Clinicians appear to modify medical therapy based on the results of CAC scoring.
5.73

Post-ischemic myocardial stunning: a frequent phenomenon of prolonged duration during diagnostic stress tests with positive ECG changes.

F. Mut, I. Vidal, A. Rener, M. Nunez, B. Alvarez, M. Mario Beretta. Asociacion Espanola, Nuclear Medicine, Montevideo, Uruguay

Objective: To evaluate the occurrence and duration of myocardial stunning during routine diagnostic cardiac perfusion stress tests with positive electrocardiographic (ECG) changes. Methods: We prospectively studied 50 patients (pts.), 37 men, mean age 66±10 years submitted for evaluation of suspected or known coronary artery disease (CAD) with 99mTc sestamibi. Stress test was exercise in 31 cases, dipyridamole in 18 and dobutamine in one. Gated SPECT was performed in the rest and post-stress period (1 hour post-injection) using a 2-day protocol. Patients having positive ECG changes with ST≥1.5 mm had a second post-stress acquisition 2 hours after injection of the radiopharmaceutical. Left ventricular ejection fraction (LVEF) was determined using the QGS software package. A decrease of at least 10% in post-stress LVEF with respect to the basal (rest) value was considered positive criteria for diagnosis of myocardial stunning. Variations in LVEF were compared with the number of ischemic segments (reversible defects) observed in the perfusion images using a 20-segment segmentation model.

Results: Mean±SD values for LVEF are expressed in the table. Twenty-five pts.(50%) presented criteria for myocardial stunning. Of those, only 6 recovered the rest LVEF value at 2 h, while the remaining 19 pts. persisted with stunning including 7 cases which demonstrated further worsening of LVEF. No significant difference was found between rest LVEF of pts. with and without stunning. In 42 pts. reversible perfusion defects were detected (ischemic pattern). Number of ischemic segments were 2.32±1.34 in pts. with stunning and 1.44±1.12 in those without stunning (p<0.05). No significant relationship was found between n° of defects and prolonged stunning. Conclusion: Frequent occurrence of stunning is demonstrated in positive diagnostic stress tests, which can last up to 2 h after the test is completed.

Mean ± SD values for LVEF

<table>
<thead>
<tr>
<th></th>
<th>Rest LVEF (%)</th>
<th>Post-stress LVEF 1 h (%)</th>
<th>Post-stress LVEF 2 h (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population (n=50)</td>
<td>52 ± 8</td>
<td>47 ± 10(*)</td>
<td>47 ± 11(*)</td>
</tr>
<tr>
<td>With stunning (n=25)</td>
<td>53 ± 7</td>
<td>42 ± 8(*)</td>
<td>42 ± 10(*)</td>
</tr>
<tr>
<td>Without stunning (n=25)</td>
<td>52 ± 8</td>
<td>52 ± 10</td>
<td>52 ± 9</td>
</tr>
</tbody>
</table>

(*) p<0.05 compared to rest LVEF.