P268
Atherosclerosis of the main arteries of the brain in acute coronary syndrome
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Introduction: The prevalence of atherosclerosis varies within individual countries. The highest incidence of atherosclerosis in Europe, North America, while in Asia, Africa, Latin America, the atherosclerosis occurs much less frequently. Goal. Stratification of atherosclerosis of the main arteries of the head, as a risk factor for acute myocardial infarction.

Materials and methods: The study included 71 patients with acute coronary syndrome, 47 men and 24 women aged from 40 to 70 years. All patients underwent ultrasound examination of the main vessels of the head and neck on the machine expert class.

Results: The average age of patients with acute coronary syndrome was 57±8.4 years. 36 patients diagnosed with myocardial infarction, 27 – unstable angina. 9 cases of death. In the study of brachycephalic vessels of the trunk showed signs of atherosclerosis - the thickening and impaired differentiation of the intima of the vascular wall, stenotic lesions (expressed in percentages). The thickness intima-media of the brachycephalic artery 0.98±0.14, stenosis was 7.1±11.4. Lesions of the internal carotid arteries: the right thickness intima-media brachycephalic artery 0.88±0.17, stenosis 21.05±15.12. Accordingly, the left - thickness intima-media - 0.88±0.48, stenosis 20.07±17.45. Accurate measurements of patients with the thickness intima-media of brachycephalic artery correlates with the calculations of forecast mortality on a scale of Grace: r=0.24, p=0.04 correlation with prognosis of death during hospitalization: r=0.26, p=0.032 correlation of prognosis of death in a period of 6 months.

Conclusion: Acute coronary syndrome in modern aspect represents the point of application of the atherosclerotic process. The systemic nature of atherosclerosis is confirmed in this study and reflects the forecast mortality during hospitalization and at six months.

From a practical point of view, ultrasonic scanning of brachycephalic arteries in acute coronary syndrome may be contribute to the selection of patients for a phase of vascularization and bypass surgery of the coronary vessels.

P269
MIBG scintigraphy to better identify patients who are most likely to benefit from AICD in primary prevention
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Background: 1–2% of the adult population in developed countries has heart failure. In this population, mortality has been significantly reduced by the advent of ICD in primary prevention. About 80% of the ICD recipients will never experience an event requiring the appropriate intervention of the ICD. Currently doesn’t exist a reliable screening test to select patients candidate to ICD implant.

MIBG scintigraphy, such as in ADMIRE study, demonstrated very high negative predictive value for arrhythmic events in patients with Heart/Mediastinum ratio late < 1.6 and a good positive predictive value in patients with H/M late > 1.6.

The aim of this study is to assess if the MIBGs should be useful to identify patients with ICD who do not benefit from the ICD implantation for a low risk of arrhythmias and those who could procrastinate implant.

Methods: This is a prospective study where patients undergoing MIBGs from February 2012 to December 2015. Inclusion criteria were: age > 18 years old, LVEF ≤ 35% with idiopathic or ischemic heart disease, no previous documentation of malignant ventricular arrhythmias. Patients were divided in two groups based on of H/M late < 1.6 or ≥1.6 on MIBGs.

Primary end-point: mortality and malignant arrhythmias (MACE)

Results: 81 patients enrolled (median age: 69 years); 38 with ischemic and 43 with idiopathic heart disease. 54 patients presented H/M late < 1.6 and 27 patients with H/M late > 1.6.

During the 4 years of follow-up, 620 patients were treated by coronary stent- and aortic arch calcification (AoAC) are attenuation correction (AC) has been used for many years to improve the evaluation of non-gated myocardial perfusion SPECT studies, by minimizing the effects of tissue attenuation on SPECT images. Usually, gated-SPECT studies are not AC, because there is not a CT acquired in each phase of the cardiac cycle of the gated-SPECT.

Objective: To analyze the impact on the gated-SPECT quantitative parameters after the application of AC on these gated images.

Material and method: Twenty-six patients (69 ± 11.7 years old, 19.2% women) were selected and submitted to a one day stress-rest myocardial perfusion SPECT study with 99mTc-tetrofosmin. The gated rest high dose images were acquired using a GE Discovery 670 gamma camera, with 128 matrix, 1 image/3, 25s/image, 8 frames/cycle, with a non gated low-dose CT to generate the AC map. All studies were processed using iterative reconstruction (2 iterations, 10 subsets, BTV filter 0.35/10) with and without AC, first with the QGS program to obtain quantitative values and assessment of systolic thickening and mobility. In addition all studies have been reprocessed (with and without AC) with the Synctool program to obtain the quantitative phase-analysis synchronism values.

Results: In the evaluation of non gated SPECT images, there were significant differences in SRS and % Extend between images with and without AC (p < 0.05). In the gated-SPECT values (Table 1), there were significant differences between EDV, ESV, %SM, %ST, %ST and Thikening Extend (p < 0.05), with lower values of EDV, ESV with AC, and higher %SM, %ST, %ST, and Thikening Extend with AC. There were no significant changes in EF, diastolic function parameters and Motion Extend. In the evaluation of the synchronism, there were significant differences in SD and Bandwidth, with higher values with AC.

Conclusions: Applying attenuation correction to gated-SPECT improves the assessment of systolic thickening, mobility and synchrony, with a slight decrease of volumes, but without altering the EF.
P274 Utility of test bolus noise in adjusting the tube current and voltage of coronary computed tomography angiography in morbidly obese patients
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Background: Automated tube voltage selection (ATVS) algorithms are widely used for tube current (mAs) and voltage (kV) setting during coronary computed tomography angiography (CCTA). Although it is associated with a reduction in radiation exposure. Excessive image noise, however, has been reported.
Objectives: The purpose of this study is to predict image noise level using the noise of the test bolus (TB) scan for a further adjustment of the KV and mAs of the CCTA.
Methods: We enrolled 380 morbidly obese patients (body mass index >30 kg/m2) undergoing CCTA with dual-source CT in all patient we use ATVS to set the tube current and voltage. Both image and TB noise (defined as the standard deviation of CT number within the aortic root) Furthermore image and TB signal (defined as the mean CT number within the aortic root) was measured.
Results: patients cohort was divided into two groups according to the image noise. One group with the noise <30 HU and another group with noise ≥30HU. We found that the group with noise >30 HU has significantly higher TB noise (27.6 ± 18.5 HU, P <0.001). BMI (34.7±3.5 vs 32.8±3.9, P<0.001) and body weight (88.14±vs85:30±p=0.001) when compared to lower noise group. In addition multivariable linear regression analysis showed that TB noise has significant correlation with the image noise: (R=0.724 , R2=0.524 -p=0.001) , BMI has weaker correlation :R=-0.359 , R2=0.128 -P=0.0001, and the body weight has nonsignificant correlation (R=-0.258 , R2=0.066 -P=0.6) with image noise.
Conclusions: the noise of TB may assist in providing information about the CCTA noise level, which may guide to a better adjustment of tube current and voltage when ATVS algorithms is used in morbidly obese patient.

P275 Prediction of clinical significance of moderate coronary stenosis in multiple lesions in coronary computed tomography angiography one-beat acquisition
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Background: The clinical significance of moderate coronary stenosis is a fundamental to the choice of treatment. The gold standard is invasive fractional flow reserve (FFR) studying by quantitative coronary angiography (QCA). The role of 256 slices coronary computed tomography angiography (CCTA) one-beat acquisition is insufficiently studied and may be an important factor to predict the clinical significance of moderate coronary stenosis.
Purpose: To identify morphological CCTA predictors for the clinical significance of moderate coronary artery stenosis using the FFR studying by QCA.
Methods: A total of 61 arteries (43 consecutive patients) underwent CCTA and QCA associated with a lesion-specific FFR measurement were retrospectively analyzed. CCTA was performed on a 256-slices CT one-beat acquisition, three-phase injection protocol by using smart shot dual injector. Stenosis from 30-69% were considered as moderate. FFR ≤0.80 was considered as functionally significant. The degree and length of stenosis was evaluated on CCTA and QCA.
Results: The mean age was 67.3±10.1, BMI 27.3±4.4 kg/m2 and 75% were males. No difference between coronary stenosis degree and length measured by CCTA and QCA (p=0.10 and p=0.94 respectively) were observed. 29% patients (18 arteries) have clinically significant moderate stenosis with FFR ≤0.8; 23% (n=14) have moderate but not clinically significant stenosis (FFR>0.80) and 48% (n=29) were presented by 30-49% stenosis All of stenosis ≤50% by CCTA were functionally non-significant with FFR>0.8 (p=0.05, 100% negative predictive value (NPV)). As CT-predictors for the clinical significance of moderate coronary stenosis (FFR<0.8) were revealed: stenosis length ≥16 mm (sensitivity (ss) 78%, specificity (sp) 73%, PPV 82%, NPV 73%, p=0.004) and multiple stenosis in calcified arteries with the stenosis’s length ≥16 mm (sp 86%, PPV 85%, p=0.012).
Conclusions: CCTA plays an important role for noninvasive assessment of clinical significance of moderate coronary stenosis. Moderate stenoses are clinically significant (FFR<0.8) if their length is more than 16 mm in calcified arteries, particularly in culprit arteries with multiple stenosis.
P276

new settings for evaluation of coronary artery stenosis in patients with high coronary artery calcium score by coronary computed tomography angiography: expanding the boundaries
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Background: A high coronary artery calcium score (CACS) is a significant limitation for the assessment of coronary arteries due to the difficulties of its visualisation. New approaches by using coronary computed tomography angiography (CCTA) one-beat acquisition in patients with a calcium score over 1000 HU are not sufficiently studied.

Purpose: To evaluate the permeability of coronary arteries by using the 256-slices CT one-beat acquisition in patients with high CACS.

Methods and materials: A total of 61 patients (976 coronary artery segments) under went CCTA were retrospectively analyzed with CAC assessment by 256-slices CT one-beat acquisition, three-phase injection protocol by using smart shot dual injector. 19 patients (group 1) have CACS 0-399 HU, 21 patients (group 2) with a calcium score 400-999 HU and 21 patients (group 3) with CACS more than 1000 HU.

Results: The average age was 68.7±8.9, BMI 27.5±3.4 kg/m², mean heart rate 66.3±11.8 and 80% were males. No difference between groups in heart rate, contrast volume, scanning time and exam dose were observed. The CACS was 79.1±139.5 HU in a 1st group, 757.2±195.9 in a 2nd group and 2035.7±1170 in a 3rd group with a maximum CACS as 7914 HU. Arrhythmias often occurred in patients with CAC more than 1000HU (25%), which was significantly higher than in the other groups: only sinus rhythm in 1st group and 9.5% of arrhythmic patients in 2nd group. Also, patients from 3rd group were older (71.6±9.7 years). All of coronary artery segments were analyzable in 1st group. 1.8% (n=6) segments in the 2nd group and 5% (n=16, p<0.005) in the 3rd group were not accessible to analysis. All of non-visualized segments were distal. The largest number of segments, unsuitable for the analysis (n=6), was found in one patient with CAC 6089HU.

Conclusion: CCTA one-beat acquisition with three-phase injection protocol by using smart shot dual injector is a reliable method to evaluate the permeability of coronary arteries with high and very high coronary artery calcium score. Only few distal segments were not accessible to analysis, whereas all of proximal and middle segments were of a good quality.

P277

Can well-trained CCTA technicians provide accurate interpretation of CCTA findings in chest pain patients presenting to the ED in after hours?
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Introduction: Coronary artery calcium (CAC) scoring, using non contrast computed tomography, is a clinically useful noninvasive estimate of coronary artery disease (CAD) burden and it is used as a screening method to detect subclinical CAD. Although, among asymptomatic patients the absence of measurable CAC is associated with very low adverse event rates, the absence of calcium in the coronary tree does not exclude the presence of non calcified plaque.

Objectives: Assess the frequency of obstructive CAD in asymptomatic patients with a CAC score of zero undergoing coronary computed tomography angiography (CCTA).

Methods: We included patients without known CAD, oligo symptomatic with intermediate risk of CAD, who were sent to perform a cardiac computed tomography, CAC score and a CCTA. We analysed the characteristics of the population, we quantified CAC using the Agatston score and we defined the severity of the coronary artery obstructions.

Results: 840 patients performed a CAC Score and a CCTA, we selected the ones without known CAD 466 patients (55,5%) and had an Agatston CAC Score of zero 220 patients (47%) that were the population that we analysed. We divided the population in two groups, the group of patients without obstructive CAD 189 patients (85%) and the group of patients with obstructive CAD 31 patients (15%) p 0.0001. In the group of patients with obstructive CAD < 50 %, 20 patients (9,7 %) and obstructive CAD > 50 %, 11 (5,3%), p NS. Significant obstructions (50-70 %) 8 patients (3,8 %) and severe obstructions (> 70 %) 3 patients (1,5 %), p NS.

Conclusion: The absence of calcium in the coronary artery tree assessed with non contrast cardiac computed tomography using the Agatston CAC Score does not rule out obstructive CAD and atherosclerosis. CCTA adds incremental information for CAD diagnosis beyond that provided by the CAC score.

P278

i-Train: a social platform for e-learning/e-training in diagnostic by imaging
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Background: The diagnostic test of choice in chest pain patients presenting to the ED in after hours is often lacking, requiring the aid of technicians, thus requiring an accurate training, a continuous skill maintenance.

Purpose: To develop an “E-Learning” / “E-Training” platform for health practitioners, to improve effectiveness in the clinical interpretation of medical images. The creation of a worldwide community of expert practitioners on this topic is also expected.

Methods: The platform is composed of a Web-based version and a mobile App, to reach the maximum number of possible end-users. The simple login mechanisms for authentication are based on E-Mail and Social Networks. Both the E-Learning and E-Training sections rely on Web 2.0 principles, with anonymised clinical cases periodically provided by healthcare specialists. The answers collected are compared, in online reports, with those obtained by the other participants.

Results: Both the E-Learning and E-Training sections have been implemented within the platform and, based on the results of the programmes on echocardiology, we expect to enroll at least 100 participants within the next year on the different programmes that are going to be implemented.

Conclusion: Remote training programmes could reduce misinterpretation of medical images and improve skills of participants, enabling them to enter a healthcare professionals’ network for peer-discussion and comparison on medical imaging. To our opinion this approach, given the good success of remote training applications in medicine, could form the basis for future add-ons in healthcare personnel formation.
P280

Infective endocarditis comparison of 99mTc-HMPAO-labeled leukocyte SPECT/CT and echocardiographic evaluation
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Background: Infective endocarditis (IE) is one of the most common life-threatening infection syndromes, with remaining high mortality. Establishing diagnosis is a clinical challenge. The aim of this study was to evaluate and compare results of single photon emission tomography and computed tomography with technetium99m-hexamethylpropyleneamine oxime–labeled leukocytes (99mTc-HMPAO-SPECT/CT) and echocardiography in patients with suspected IE.

Methods: The study group included 40 consecutive adults - participants undergone transthoracic (TTE) and transesophageal echocardiography for assessment of lesions typical for IE. Subsequently all patients had performed 99mTc-HMPAO-SPECT/CT, evaluated for presence and location of increased radioactivity foci.

Results: Patients with TTE lesions diagnostic for IE had a higher prevalence of positive 99mTc-HMPAO-SPECT/CT results (p=0.048). Participants with TTE vegetation within intracardiac portion of electrode had a higher prevalence of increased radioactivity foci along intracardiac portion of electrode in 99mTc-HMPAO-SPECT/CT (p=0.006). There is no statistically significant correlation between echocardiographic and scintigraphic results of heart valves assessment. Patients who had involvement of extracardiac portion of electrode in 99mTc-HMPAO-SPECT/CT had more often TTE valvular vegetations (p=0.002). Extracardiac inflammatory foci occurred more frequently in heart failure patients (p=0.049).

Conclusions: 99mTc-HMPAO-SPECT/CT and echocardiography need to be complementary modalities in diagnosing IE, defining its localization and range of infection.

P282

Dipeptidyl peptidase IV inhibition improves sympathetic nerve activity in patients with chronic heart failure
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Background: Incretin hormones—including glucagon-like peptide-1 (GLP-1), a target for diabetes mellitus (DM) treatment—are associated with cardioprotection, hinting us to look into potential incretin-related compounds in failing hearts. As dipeptidyl peptidase IV (DPP-IV) inhibition increases plasma GLP-1 levels in vivo, we investigated the cardio-protective effects of a DPP-IV inhibitor (DPP4i) in heart failure (HF) patients. Recent study reported that DPP4i increase the bioavailability of plasma brain natriuretic peptide (BNP) (1-32), delay the progression of heart failure and increase the efficacy of exogenously administered BNP (1-32) in decompensated heart failure. On the other hand, Cardiac imaging with I-123 metaiodobenzylguanidine (MIBG) is a non-invasive toll to risk stratify patients with HF. In the patients with non-ischemic cardiomyopathy, cardiac MIBG activity is a very powerful predictor of survival. Cardiac sympathetic imaging can help in understanding how sympathetic overactivity exerts its deleterious actions which may result in better therapy and outcome for patients with HF.

Methods: We determined whether DPP4i therapy improved cardiac sympathetic nerve activity (CSNA) as evaluated using MIBG. In 74 patients with non-ischemic HF, but no cardiac events for at least 5 months, were identified on the basis of a history of decompensated acute heart failure requiring hospitalization. These patients underwent MIBG scintigraphy just before leaving the hospital and 12 months later. All patients were divided in two groups, Group A: received DPP4i (n=34), and Group B: did not (n=40). The delayed total defect score (TDS), delayed heart/mediastinum count (H/M) ratio, and washout rate (WR) were determined from MIBG scintigraphy, and H/M concentrations were measured at same time points.

Results: After 12 months, all CSNA parameters were improved in both groups: the extent of change in TDS was -6.9 ± 3.9 in group A and in -2.7 ± 6.4 group B, that in H/M ratio was 0.14 ± 0.13 and 0.06 ± 0.18, that in WR was -10.8 ± 8.0 % and -4.1 ± 8.6.

Conclusions: We conclude that DPP4i can be more beneficial for CSNA for HF patients, and suggest that DPP4i mediates cardioprotection against non-ischemic cardiac dysfunction.

P283

Left ventricular synchrony parameters and reverse left ventricular remodeling: a gated SPECT study
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Background: Regaining left ventricular (LV) synchrony play an important role in reverse LV remodeling, following cardiac resynchronization therapy (CRT) in chronic heart failure (CHF) patients. Purpose: Explore role of CRT in ameliorating LV dyssynchrony and its impact on reverse LV remodeling.

Methods: Thirty CHF patients underwent CRT implantation. Gated SPECT assessment of left ventricular (LV) dyssynchrony was done through LV phase analysis and LV end-systolic volume (LVEDV) was examined, prior to CRT and 6 months later.

Results: Thirty patients received CRT (mean age 58.7±9.0, 24 males). Reverse LV remodeling (decline >15% from baseline VES) was documented in 19 patients. Baseline LV dyssynchrony assessment showed significant differences between responders and non-responders, (Histogram Bandwidth: BW: 150.7±24.8 versus 174.1±32.2, P = 0.034; and Histogram Standard deviation: SD: 53.8±9.1 versus 61.9±3.7, P = 0.033). Multivariate regression analysis showed delta change in histogram BW (B = 0.69, P = 0.006) and delta change in histogram SD (B = 0.51, P = 0.005) were independent predictors of reverse LV remodeling.

Conclusion: Patients with higher degrees of dyssynchrony tended to show lower magnitudes of reverse LV remodeling with limited improvement in LV dyssynchrony. However, improving dyssynchronous contracting pattern resulted into better reverse LV remodeling.

P284

Gated SPECT myocardial perfusion phase analysis and cardiac 123I-MIBG in the evaluation of cardiac resynchronization therapy (CRT)
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Aim: The purpose of the present study was to assess the contribution of the evaluation of left ventricular dyssynchrony by Gated SPECT myocardial perfusion and cardiac sympathetic nerve activity by 123I-MIBG to determine significant functional recovery after CRT in heart failure patients. Material and methods: We have studied 17 patients (4 women, mean age: 66 ± 5, 57-77 yo) with dilated cardiomyopathy (5 ischemic, 12 non-ischemic) and CRT indication. We performed basal cardiac 123I-MIBG obtaining early and late heart to mediastinum ratio (EMH and LHM), washout rate (WR) and myocardial GSPECT at rest with 99mTc-MIBI with assessment of left ventricular ejection fraction (LVEF), end-diastolic (EDV) and end-systolic (ESV) ventricular volumes and parameters of LV diastolic dysfunction by phase analysis (standard deviation, histogram bandwidth (HB) by
Syntace ECToolbox. The patients underwent clinical follow-up with new assessment of cardiac 123-MIBG and myocardial GSPECT 12 months after CRT implantation, available in 1017 patients with a total of 54 performed explorations.

**Results:** Mean basal LVEF was 20.1±6.7% (10-33), with EDV: 239.4±74.6, ESV: 194±75.7ml, EHM: 2.31±0.59, LVM: 2.09±0.52, WR: 30.8±17.2, SD: 50.1±15.4, HB: 163±72. After 12 months follow-up, there were clinical improvement in 7 patients, deterioration of the same and no changes in 2. Mean follow-up LVEF was 24.5±12.9% (10-47), with improved LVEF in 5 patients and LVEF lower than basal or without changes in the other 5. Comparing patients with and without functional recovery, we found significant differences in follow-up EHM: 2.75±0.26 vs 1.8±0.45 (p<0.01), LHM: 2.68±0.50 vs 1.69±0.39 (p=0.01), SD: 41.7±8.3 vs 58.7±7.8 (p=0.02), HB: 140±49 vs 202.2±15 (p=0.03). The basal values tended to be higher in patients with functional recovery, but without statistical significance: EHM: 2.72±0.90 vs 2.16±0.33, LHM: 2.19±0.75 vs 2.01±0.37, SD: 46.6±5.6 vs 56.3±23.1 and HB: 137.2±31.6 vs 200.5±96.6.

**Conclusion:** Evaluation of cardiac sympathetic nerve activity by 123-MIBG and LV dysynchrony by Gated SPECT myocardial perfusion phase analysis showed significant changes after CRT in relation with functional recovery and could help to select patients to cardiac resynchronization therapy, but more patients should be evaluated.

**P285**

**Comparison of coronary angiographic scoring systems with fractional myocardial mass for vessel-specific myocardial mass**

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**Objectives:** We compared %fractional myocardial mass (%FMM) with angiographic scores and also with performing percutaneous coronary intervention (PCI).

**Background:** The burden of coronary artery disease has been assessed by various angiographic scores and also with performing percutaneous coronary intervention (PCI).

**Methods:** Engaged using a JR 4 catheter. Patient underwent a cardiac CT. This shows the coronary artery was found to be originating from the right coronary sinus and was thoracic surgical team and been worked up for surgical correction of the anomaly. MR. This showed inducible ischemia in the RCA territory. Patient referred to cardiothoracic surgical team and been worked up for surgical correction of the anomaly.

**Results:** The clinical presentation and management options might differ on case to case basis. Cardiac CT is the investigation of choice for identifying coronary anomalies, particularly their origin and proximal course.

The clinical presentation and management options might differ on case to case basis and might even be different for a similar anomaly in different individuals. An intramural course, completely with in the wall of the aorta is a serious anomaly, associated with reports of sudden death during exertion.

**Conclusion:** Anomalous origin with coronary artery course between the aorta and pulmonary artery in a young (30-50) year person carries the greatest risk for an adverse event, with or without symptoms. Management: A conservative approach can be adopted in patients with anomalous right coronary artery and no evidence of ischemia. Surgery is indicated for anomalous left coronary arteries arising from the opposite sinus with an interarterial course between the aorta and pulmonary artery. Surgical repair is also indicated for right coronary artery arising from the opposite sinus or courses between the aorta and pulmonary artery when the patient is symptomatic or there is evidence of otherwise unexplained indoluble ischemic in these territories.

We report three cases of anomalies of the coronary arteries found on cardiac CT in our department.

Case 1: 58 years old gentleman presented with sharp chest and back pain and evaluated for possible aortic dissection. Cardiac CT was performed as part of triple rule out protocol. An incidental finding of anomalous right coronary artery from the left coronary sinus was documented (Fig 1). The case was discussed in the multi disciplinary team meeting. In the absence of any attributable symptoms, this was considered to be low risk and no specific treatment was deemed necessary.

Case 2: 38 years old female investigated for exertional chest pain. Cardiac CT found anomalous origin of right coronary artery, originating from left coronary sinus and taking an intrarterial course (Fig 2 and Fig 3). Patient had a stress perfusion cardiac MR. This showed inducible ischemia in the RCA territory. Patient referred to cardiothoracic surgical team and been worked up for surgical correction of the anomaly.

Case 3: 58 years old male underwent coronary angiography following NSTemi. Left coronary artery was found to be originating from the right coronary sinus and was engaged using a JR 4 catheter. Patient underwent a cardiac CT. This shows the anomalous left coronary artery to be passing through the infundibular septum caudal to the pulmonary valve to reach the left side of the heart (Fig 5,6). This does not need any specific management.

**Abstract P286 Figure.**

**P286**

**Anomalies of coronary artery origin, which one to correct?**

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Anomalies of coronary ostia and their course are the most common anomalies observed at angiography, accounting for 90% of such cases. Remaining 10% are anomalies of termination ie coronary fistulae. Most patients with coronary anomalies are asymptomatic and most coronary anomalies are believed to be benign (70-80%).

Only about 20-30% of those recognized are potentially serious or lethal.

Cardiac CT is the investigation of choice for identifying coronary anomalies, particularly their origin and proximal course.

This study aimed to assess the utility of dual myocardial SPECT using 123I-BMIPP and 123I-MIBG in patients with MVD after reperfusion therapy.

**Methods:** From April 2009 to June 2011, we retrospectively studied 125 consecutive AMI patients with MVD who underwent DUAL in a clinically stable state after reperfusion therapy. These patients were divided into a positive mismatch group (an
abnormal uptake of 123I-BMIPP compared with that of 201-Tl; n = 59) and a negative mismatch group (n = 66) by semi-quantitative visual assessment. The positive mismatch group was further divided according to whether coronary revascularisation therapy for non-culprit lesions was performed (n = 30) or not (n = 29). The study end-points were cardiac events (a composite of acute heart failure, cardiac death and AMI). Data was analysed using Kaplan-Meier methods.

Results: The mean follow-up periods was 4.89 years. During the follow-up period, the incidence of cardiac events was higher in the positive mismatch group (two cardiac deaths, one AMI and 10 heart failures) than in the negative mismatch group (seven heart failures) (p < 0.047). Serious events (cardiac death and AMI) were observed only in the no-revascularisation group.

Conclusion: DUAL is a valuable guide for the revascularisation of non-culprit lesions in AMI patients with MVD.

P288
Usefulness of myocardial perfusion imaging after percutaneous coronary intervention
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Backgrounds: Different angiographic patterns and restenosis rate may affect diagnostic value of myocardial perfusion imaging (MPI) in the era of drug-eluting stents. In this work we aimed to determine the ability of MPI to evaluate the clinical outcome in patients treated with DES.

Material and methods: We evaluate seventy consecutive patients treated with second generation sirolimus-eluting stents for coronary artery disease. The mean age of the cohort was 66.8 ± 10.2, 73% were male, 10% with diabetes, 11% had prior percutaneous coronary intervention (PCI) and 31% had prior coronary artery bypass grafting. In this cohort 70 patients with 86 de novo lesions (LAD involved in 37%, CX in 29%, Cx in 14%) were implanted 93 SES; emergent or urgent PTCA was carried out for acute coronary syndrome in 20% of patients. Device and procedural success were 100%. Dual anti-platelet therapy was assumed at least for 12 months. These patients underwent to MPI between 6 and 22 months post procedure. Myocardial perfusion analysis was performed by visual interpretation (perfusion defects reversibility) and by semi-quantitative analysis using an automated 17 segments polar map. The assessment of defect severity and extent were done with a Five-Point Model Scoring System (normal perfusion: 0, mild reduction in counts: 1, definitely abnormal: 2; severe reduction in counts: 3; absent uptake: 4).

Results: While the stress test was positive in 45% of patient, MPI showed no significant reversibility perfusion defects with a SSS of < 3 (mean 2.2) in ten subjects (14.2%). In five of these patients coronary angiography was repeated and no in stent restenosis was observed; no cardiac death was observed during the follow up.

Conclusions: Our results, however limited by a small number of patients, also indicate that MPI is an excellent non-invasive diagnostic tool to evaluate long-term follow-up after percutaneous coronary intervention.

P289
CT coronary angiography has a low rate of follow-on investigation in real world practice: First year of experience in a large tertiary hospital
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Background: CT coronary angiography (CTCA) is increasingly used to investigate patients with suspected coronary artery disease (CAD) in the UK. The UK’s NICE Clinical Guideline 95 currently recommends CTCA in patients in whom stable angina cannot be excluded based on clinical assessment alone if estimated likelihood of CAD is 10-29%. The updated guidance, recommends CTCA in typical or atypical anginal chest pain regardless of pre-test probability and in non-cardiac chest pain if the 12 lead ECG is abnormal.

Results: Of 70 referrals were assessed. Average age 52.5 years (SD 8.5 years). 47.5% male. Symptoms: typical chest pain 48.5%, atypical chest pain 39%, non-cardiac chest pain 12.5%. Pre-test probability calculated by referral in 15% of all referrals. Percentage of referrals with high pre-test probability 15%; intermediate 52%; low 33%. Referrer identifiable as a doctor in 51% of referrals, remaining referrals were made by nurses or a non-identifiable health care professional. Referral for ‘assessment of reversible ischaemia’ was made in 17.5% of all referrals.

Conclusions: Despite guidelines to promote ‘best practice’ many referring clinicians don’t follow the guidelines as published (67% referrals for CTCA in intermediate or high pre-test probability or non-cardiac chest pain). Although changes to guidelines provoke anxiety actual change may be far less than the perceived change.

P290
Appropriate use of CT coronary angiography in patients with stable chest pain: implications for new NICE guidance, and compliance with the Ionising Radiation (Medical Exposure) Regulations (IRMER) 200
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Background: CT coronary angiography (CTCA) is increasingly used to investigate patients with suspected coronary artery disease (CAD) in the UK. The UK’s NICE Clinical Guideline 95 currently recommends CTCA in patients in whom stable angina cannot be excluded based on clinical assessment alone if estimated likelihood of CAD is 10-29%. The updated guidance, recommends CTCA in typical or atypical anginal chest pain regardless of pre-test probability and in non-cardiac chest pain if the 12 lead ECG is abnormal.

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P291
The first experience of patient-specific geometry extraction from CT images for noninvasive assessment of fractional flow reserve using one-dimensional mathematical model with fully automated algorithm
SS. Smakov1; P. Zhelezskii; A. Plyamin; K. Savchenkov; D. Narr; D. P. Nesterov; T. Smirnov; T. Popov; R. Pyramov; N. Chumak; A. Konstantinov
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Background: Nowadays invasive evaluation of fractional flow reserve (FFR) is one of the main methods used for detecting ischemia-causing lesions.

Abstract P289 Figure.

Abstract P288 Figure.

Abstract P290 Figure.

Abstract P291 Figure.

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Recent achievements in computational fluid dynamics and computer simulations allow non-invasive assessment of FFR using data obtained from CT angiography. The noninvasive assessment of FFR is almost never applied in the Russian Federation. The first experience of patient-specific geometry extraction from CT images for a non-invasive assessment of Fractional Flow Reserve, using a one-dimensional mathematical model with fully automated algorithm, is described in our study.

**Purpose:** For the first time apply the method of noninvasive assessment of Fractional Flow Reserve using a one-dimensional automated hemodynamic model based on coronary CT angiography and assess the suitability of this method in clinical practice.

**Methods:** The computational one-dimensional mathematical model with fully auto-
mated algorithm of extraction of patient-specific geometry from CT images for noninvasive assessment of fractional flow reserve using data obtained by routine coronary CT angiography was developed by our investigator group.

Two patients were included in our test study. Coronary CT angiography with further FFR assessment and invasive evaluation of FFR as a reference control were performed. From the anatomical point of view stenoses >50% were considered as significant (based on the data from CTA), induced ischemia was diagnosed at FFR/FFRCT < 0.80.

**Results:**
- The first patient had proximal stenosis of the left main coronary artery (LCA) - 50% (FFR - 0.72 vs FFRCT - 0.84; difference +17%), stenosis of the middle third of the circumflex artery (LCX) 80% (FFR - 0.59 vs FFRCT - 0.61; difference + 3%), stenosis of the middle third of the left anterior descending artery (LAD) 50% (FFR - 0.51 vs FFRCT - 0.58; difference + 14%).
- The second patient had proximal stenosis of the right main coronary artery (RCA) - 55% (FFR - 0.93 vs FFRCT - 0.87; difference - 5%), stenosis of the middle third of the left anterior descending artery (LAD) 80% (FFR - 0.74 vs FFRCT - 0.87; difference - 5).

The obtained data demonstrate the ability of the developed model to reproduce the indicators of invasive evaluation of fractional flow reserve (FFR) with acceptable accuracy and the diagnostic eligibility of this method.

**Conclusion:** The study showed encouraging results. Substantial difference in some cases is accounted for multivessel disease and possible inaccuracy in clinically measured values of FFR. Thus clinical implementation of this method requires the further research, which should include estimating the diagnostic accuracy, sensitivity and specificity of noninvasive FFR assessment for the larger cohort of patients.

**P292**

**Chronic treatment with verapamil and acetyl-salicylic acid may improve myocardial perfusion and symptoms in patients with Chagas disease cardiomyopathy: a pilot study**

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**Background/Introduction:** Chest pain is a common symptom in patients with Chagas disease cardiomyopathy (CDC). Although this might be explained by scintigraphy evidence of regional myocardial disturbances in patients with angiographically normal coronary arteries, there is no standard evidence based therapy for this condition.

**Purpose:** We aim to evaluate the impact of verapamil and acetyl-salicylic acid (ASA) on quality of life and myocardial perfusion defects in CDC patients with chest pain and microvascular ischemia.

**Methods:** This pilot study evaluated prospectively 15 patients. CDC was confirmed by 2 serologic tests. All of them had chest pain and no significant epicardial coronary artery lesions by coronaryangiography. Mild or no left ventricle systolic dysfunction was an inclusion criteria. A questionnaire of quality of life (EQ-5D) and an SPECT myocardial scintigraphy (physical stress preferably) were performed before and three months after treatment with oral verapamil and ASA. Comparison of pre and post EQ-5D and SPECT perfusion results were performed using Wilcoxon signed rank test for paired data.

**Results:** Mean age was 60 ± 12 years, 12 (70%) men. SDS was significantly reduced after treatment (4.6 ± 2.5 vs 2.1 ± 2.3, p = .008). Decrease in SDS was observed in 11 (73%) participants, of those seven (47%) exhibited a post-treatment SDS equals zero, i.e., had no more evidence of stress induced perfusion abnormal-
ancies. In the evaluation of quality of life, an enhancement in EQ-5D values post treat-
ment was also significant (0.67 ± 0.18 vs 0.85 ± 0.11, p = .002).

**Conclusions:** The combined use of a microvascular vasodilator and an antiplatelet agent seems to improve quality of life and reduce ischemic perfusion abnormalities in patients with CDC. This pilot study paved the way for an ongoing investigation aimed at getting more definitive evidence of benefit with these drugs as compared to placebo in CDC and idiopathic microvascular derangements.

**P293**

**Reduced subendocardial myocardial blood flow in myocardial microvascular dysfunction in the patients with end stage renal disease evaluated by ATP stress 13N-ammonia PET myocardial perfusion imaging**

S. Ohshima

Nagoya PET Imaging Center, Nagoya, Japan

**Background:** Several studies demonstrated that myocardial microvascular dysfunction (MVD) would be related to poor prognosis in the patients with chronic kidney disease. On the other hand, it has been widely thought that subendocardial ischemia could be related to MVD, but this relationship has not been well investigated. We studied the myocardial microvascular microfunction evaluated by 13N-ammonia PET myocardial perfusion imaging (MPI) study in the patient with end stage renal disease.

**Methods:** Twelve diabetic patients and 15 non-diabetic ESRD patients without perfu-
sion defect (SSS = 3) were investigated. Myocardial blood flow (MBF) at rest and dur-
ing ATP induced hyperemia, and myocardial flow reserve (MFR) in each patient were evaluated by 13N-ammonia PET MPI study. MVD was defined as both MFR<2.0 and stress MBF<2.0. Subendocardial and subepicardial MVD were dividedly measured. Subendocardial ischemia was evaluated using static perfusion imaging. Each of the parameters was compared between diabetic and non-diabetic ESRD patients.

**Results:** Stress MBF and MFR were significantly reduced in diabetic than in non-di-
abetic ESRD patients. MVD (40%, 20%, p<0.05) and subendocardial ischemia (20%, 6.7%, p<0.05) were more frequently observed in diabetic than in non-diabetic ESRD patient. Subendocardial MBD during ATP induced hyperemia was significantly reduced than subepicardial MBF in the patients with subendocardial ischemia with MVD.

**Conclusion:** Reduced subendocardial MBF with MVD were more frequently observed in diabetic than in non-dietic ESRD patients. It could be related to the worsening of cardiac function and poor prognosis in diabetic ESRD patients.

**P294**

**Molecular imaging of myocardial cannabinoid type 1 receptor upregulation in obesity**

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**Funding Acknowledgements:** Departmental Fund from Johns Hopkins University (T. Schindler), Baltimore, and the Intramural Research Program of NIAAA/NIH (G.Kunos, and P. Pacher)

**Background:** Experimental research signifies an activation of myocardial cannabinoid type 1 receptor (CB1-R) by endocannabinoids as potential cause of cardiac dysfunction in obesity.

**Purpose:** Aim of the study was to evaluate targeting myocardial CB1-R in normal weight and obese mice with translation to humans using [11C]OMAR and PET/CT.

**Methods:** Applying the CB1-R ligand [11C]OMAR, dynamic PET/CT was carried out in seven obese and five normal weight mice. Ex vivo validation was performed by pol-
ymerase chain reaction. Subsequently, myocardial CB1-R expression was also deter-
mined in seven individuals with advanced obesity (AOB; BMI ≥30kg/m2) and five nor-
mal weight controls (CON; BMI<25kg/m2).

**Results:** Quantifications of the myocardial OMAR retention was higher in obese than in normal weight mice [8.13 (2.87, 11.74) %/min vs. 0.10 (0.03, 0.11) %/min, p = 0.015]. Absolute quantification of CB1-R gene expression with droplet digital PCR confirmed CB1-R up-regulation in obese [73.7 (68.1, 75.9)] copies/µL versus normal weight mice [54.5 (50.5, 57.8) copies/µL, p = 0.005]. Translation to humans also signi-
fi ed higher OMAR retention in AOB than in CON [5.88 (2.06, 7.16) %/min vs. 0.51 (0.33, 1.19)%/min, p<0.015].

**Conclusions:** Noninvasive imaging of cardiac CB1-R expression with [11C]OMAR and PET/CT is feasible and signifies an upregulation of cardiac CB1-R expression in obesity.
Apical sparing pattern of left ventricular myocardial 99mTc-HMDP uptake in patients with transthyretin-related cardiac amyloidosis

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University Hospital Henri Mondor, Creteil, France

Objectives: A decreased longitudinal strain in basal segments with a base-to-apex gradient has been described in patients with cardiac amyloidosis (CA). Aim of the study was to investigate the left ventricular (LV) regional distribution of early-phase 99mTc-Hydroxymethylene diphosphonate (99mTc-HMDP) uptake in patients with transthyretin-related cardiac amyloidosis (TTR-CA).

Methods: All patients underwent a whole-body planar 99mTc-HMDP scintigraphy acquired at 10 min post-injection (early-phase) followed by a thorax SPECT/CT. The relative segmental uptake % was investigated on AHA 17-segment model and 3-segment model (basal, mid-cavity, apical).

Results: Sixty-one TTR-CA patients were included of whom; 29 were wild-type (wt-TTR-CA) and 32 had hereditary TTR-CA (m-TTR-CA). Early myocardial 99mTc-HMDP uptake occurred in all TTR-CA. In all patients, segmental analysis of the LV myocardial distribution of 99mTc-HMDP uptake showed an increased median uptake (25th-75th interquartile range) in basal/mid-ventricular segments compared to the lowest median uptake of apical segments (respectively 79 [72-86] vs. 72 [64-81]; P < 10-6). This pattern was similar in wt-TTR-CA group (78 [70-84] vs. 70 [61-81]; P < 10-6), in m-TTR-CA group (80 [74-86] vs. 73 [66-82]; P < 10-7) and remains constant independently of the TTR mutation’s subtype with P ranging 10-5 to 0.03.

Conclusions: Early-phase myocardial scintigraphy identified regional distribution of 99mTc-HMDP uptake characterized by a base-to-apex gradient, corroborating echocardiographic and cardiac MRI findings. This relative apical sparing pattern was similar across TTR-CA and TTR mutations' subtypes.

P297
SPECT MPI in the assessment of post infarct therapeutic strategy

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Introduction: Prognosis following MI depends on a number of factors including geographic location, patient’s health, extent of heart damage, and treatment given. However early risk stratification post-MI and therapeutic strategy is important to identify patients at high risk for a new ischemic event as well as patients with high risk for cardiac death.

Objective: To assess by MPI-SPECT the therapeutic approach and allows appropriate post-MI management an accurate determination of prognosis.

Patients and methods: 580 patients in early phase of post myocardial infarct have been investigated in by SPECT/MPI. Patients have been classified in two groups: those who have received thrombolysis combined or not with revascularization and those who have not receive timely the thrombolytic protocol. All patients recruited for this prospective study during three months in 2016 underwent the two days protocols physical/pharmacological stress/rest Gated SPECT MPI using tetrofosmine (Myoview) and acquisition by dual head gamma camera.

Abstract P295 Figure.
Abstract P297 Figure.

P298

Relationships between coronary artery atherosclerosis burden and myocardial perfusion patterns in patients with stable coronary artery disease

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Funding Acknowledgements: Grant from the Russian Science Foundation (N15-15-10016).

Background: Relationships between coronary atherosclerosis and myocardial ischaemia in patients with angiographically intermediate (40-69%) and significant (>70%) coronary artery stenosis are still not fully understood. The aim of our study was to assess the prevalence and regional quantitative perfusion in patients with angiographically intermediate and significant stenosis in comparison with summed extent of normal myocardium have more significant differences between patients with angiographically intermediate and significant stenosis in comparison with normal myocardium.

Conclusion: Patients with MB in the LAD show significant differences in global and regional quantitative perfusion. We suggest that the impairment of coronary vasodilation capacity might be present not only in the LAD territory affected by an MB, but also in the neighbouring LCx and RCA territories. Our results support the relevant role of hybrid PET/CCTA in the assessment of MB.

Abstract P298 Table No. 1.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>NPS (N=12)</th>
<th>RPD (N=11)</th>
<th>p Value</th>
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</thead>
<tbody>
<tr>
<td>62.96 +/- 8.2</td>
<td>65.4 +/- 7.11</td>
<td>60.2 +/- 8.9</td>
<td>0.14</td>
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<tr>
<td>BMI (kg/m2)</td>
<td>28.37 +/- 4.17</td>
<td>27.9 +/- 5.09</td>
<td>28.9 +/- 2.99</td>
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<tr>
<td>Male gender</td>
<td>17 (73.9)</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>3 (13)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Hypertension</td>
<td>14 (60.8)</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>5 (21.7)</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Previous myocardial infarction</td>
<td>12 (52.1)</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Markis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>17 (73.9)</td>
<td>6 (50)</td>
<td>11 (100)</td>
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<tr>
<td>II</td>
<td>3 (13)</td>
<td>3 (25)</td>
<td>0 (0)</td>
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<td>III</td>
<td>1 (4.3)</td>
<td>1 (8.3)</td>
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<tr>
<td>IV</td>
<td>2 (8.6)</td>
<td>2 (16.6)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

Abstract P299

P299

SPECT spect myocardial perfusion abnormalities with isolated coronary artery ectasia

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Abstract: Myocardial perfusion (MP) patterns in patients with coronary artery ectasia (CAE) are poorly defined. We evaluated the pattern of abnormal MP in patients with isolated CAE, demonstrated by 99m-Tc-Sestamibi.

Method: We included 23 patients with angiographically documented CAE and no significant coronary artery obstruction. Patients underwent stress-rest 99m-Tc Sestamibi within two months after coronary angiography. They were divided in 2 groups: normal perfusion scan (NPS) and reversible perfusion defects (RPD). Summed stress score (SSS) derived from 17 segment. A SSS < 4 (< 5% myocardium) defined normal, 4 to 8 (5-10%) mildly abnormal and >8 (>10%) indicated moderately to severely abnormal score.

Result: Twelve patients (52.1%) had NPS; eleven (47.8%) had RPD. Among 11 patients with RP, 7 (63.6 %) had mild and 4 (36.3 %) had moderate ischemia, and all of them have Markis type I (p = 0.05). Table No 1. Diffuse CAE was significantly more prevalent in RP vs. NPS. Cardiovascular risk factors such as diabetes mellitus, hypertension, smoking habit and dyslipidemia were not statistically different between groups. Diffuse coronary ectasies in the left anterior descending artery (LADA) (p<0.01) and circumflex artery (CAx) (p=0.03) were more common among those with RPD.

Conclusion: RPD demonstrated by 99m-Tc Sestamibi in patients with isolated CAE were common despite no differences in cardiovascular risk factors. All patients with RP had Markis type I. Diffuse CAE of LADA and CAx was more common among those with RPD.

Abstract P300 Table No. 1.

<table>
<thead>
<tr>
<th>Stress extent</th>
<th>NPS (N=12)</th>
<th>RP (N=11)</th>
<th>p Value</th>
</tr>
</thead>
</table>
| Stress extent as extent of reversible perfusion defect and extent of normal myocardium have more significant differences between patients with angiographically intermediate and significant stenosis in comparison with summed stress and difference scores. Segment Stenosis Score showed more strong correlation relationships with SPECT myocardial perfusion indexes in comparison with Segment Involvement Score.

P300

Perfusion and contractile reserve in patients with end-stage renal disease: a prospective study combining myocardial perfusion scintigraphy and stress echocardiography

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Funding Acknowledgements: The presented study was in part sponsored by Siemens Medical Solutions (Erlangen, Germany).

Background: Cardiovascular disease is the major cause of morbidity and mortality in patients with end-stage renal disease (ESRD). Therefore, these patients need a careful cardiac risk assessment. However, clinical algorithms to identify coronary vasculopathy in ESRD patients are not yet standardized, mainly because conventional screening algorithms for coronary artery disease exhibit poor accuracy in this population.

Purpose: To compare the performance of myocardial perfusion scintigraphy (MPS) and stress echocardiography (ECOH) in ESRD patients.

Methods: A total of 377 ESRD patients on a kidney transplant waiting list were prospectively enrolled in this study. In these patients adenosine stress MPS (n=377) and dobutamine stress ECHO (n=185) were performed. Results were correlated to cardiovascular risk factors and findings of coronary angiography in cases with myocardial ischemia detected by MPS and/or ECHO.

Results: Perfusion defects were observed in 12% (n = 46/377) of ESRD patients by MPS while stress-induced wall motion abnormalities occurred in 15% (n = 52/318) of diagnostic stress ECHO. The direct comparison of the two imaging modalities...
available in 185 ESRD patients showed concordance in 84% of cases with respect to the detection of stress-induced ischemia (Cohen’s kappa = 0.458). In 12 of 185 cases (6%) an MPS finding was not matched by an ECHO finding, in 17 of 185 cases (9%) MPS was normal albeit an abnormal ECHO. Multivariate logistic regression identified the duration of dialysis, gender and total cholesterol as decisive predictors for the presence of both perfusion defects and wall motion abnormalities (all p < 0.05).

In 36 patients with stress-induced ischemia in MPS and/or ECHO a coronary angiography was initiated on clinical grounds. Ischemia findings in MPS and/or ECHO were correlated with a significant stenosis in 16 of the 36 patients undergoing angiography.

Conclusion: The study compared the diagnostic performance of MPS and stress ECHO in a large ESPID patient cohort. As expected, MPS and ECHO provide complementary functional information in ESPID patients and should be further evaluated with respect to their contribution to individual risk assessment.

P301
Comparison between the summed difference score and myocardial blood flow measured by 13N-Ammonia
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Background: Both the myocardial perfusion pattern and myocardial blood flow (MBF) are used to assess patients with suspected coronary artery disease (CAD). The aim of this study was to compare the perfusion pattern (using the summed difference score [SDS]) with MBF in a consecutive group of patients undergoing PET/CT with 18F-FDG and 13N-Ammonia (13NH3).

Methods: 47 consecutive patients, aged 65 ± 12 years (42 men) with known or suspected CAD underwent vasodilator stress-rest PET/CT with 13N-Ammonia for clinical indications. The SDS was determined by a commercially available software based on a 17-segment model. SDS was measured at rest and during hyperemia by dynamic acquisition and single compartment model analysis. From the rest and stress MPI, the absolute difference (stress-rest) (MDPB) and coronary flow reserve (CFR) were derived.

Results: There were no significant differences between patients with no ischemia (SDS ≤ 1) and those with ischemia (SDS > 1) in CFR (2.84 ± 0.73 vs. 2.63 ± 0.89, p = NS) and MDPB (1.34 ± 0.45 vs. 1.24 ± 0.53 ml/min/g, p = NS). There were however significant regional differences (141 different vascular territories in 47 patients) between these two groups (CFR: 2.84 ± 0.95 vs. 2.16 ± 0.57, p < 0.001 and MDPB: 1.39 ± 0.6 vs. 0.87 ± 0.39, p < 0.001). The correlation between regional CFR and regional MDPB with SDS were significant (y = 2.714±0.050 R = 0.368 and y = 1.276±0.119 R = 0.44).

Conclusion: The SDS is the difference between two measurements (stress-rest) and it correlates better with regional MDPB, which is another measurement that reflects the difference between stress and rest. The correlation is better on regional than global basis.

P302
Radionuclides methods in hemodynamic changes after revasculization of main lower extremity arteries at patients with multifocal atherosclerosis
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 Aim: To study the impact of intravascular revasculization of main lower extremity arteries on contractile force and perfusion of myocardium at patients with multifocal atherosclerosis.

Methodology: The sample consists of 20 patients with hemodynamic insignificant coronary stenosis and chronic peripheral artery disease (stage IIb–IV). For all patients we assess cardiovascular hemodynamics, contractile force and perfusion of myocardium by using radionuclide angioscintigraphy (RAGP) and GSEPCT (gated single photon emission computed tomography) with 99mTc-tetrofosminum.

Results: On first 24 hours after intravascular revasculization of main lower extremity arteries by using RAGP there was a significant improvement of blood flow in greater and lesser circulation, to great extent due to improvement pulmonary haemodynamics. Moreover, according to GSEPCT after surgery there was a significant improvement of contractile reserve of myocardium due to decrease of end systolic volume and increase of ejection fraction and peak of ejection rate. However, stroke volume and left ventricle diastolic function did not change significantly. Also there was signs of perfusion improvement (decrease average size of perfusion defect) from 5.3 ± 6.9, SRS: 12.0 ± 4.6 vs. 7.6 ± 5.3, P < 0.001 for all and lower LVEF (49% vs 53%).

Conclusion: According to GSPECT after surgery there was a significant improvement of blood flow in greater lower extremity after restoration of arterial blood flow.

P303
Registry of single egyptian center for myocardial perfusion imaging, comparison between young and older patients
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Cairo University Hospitals, Critical care department, Cairo, Egypt.

Background: There is increased incidence of CAD in the young Myocardial perfusion imaging (MPI) revolutionized the evaluation of coronary artery disease (CAD) and risk-stratifying patients, diagnosis and post-infection period.

Purpose: Analysis of registered patient data subjected to MPI in Critical Care Department, Cairo University hospitals (2006-2015). Comparison between MPI in young & old age is mandatory for dictating management strategy.

Patients & Methods: A retrospective single center registry, with enrolled 6158 patients, referred for MPI. Personal data, comorbidities, cardiovascular risk factors, standard 12-lead ECG and cardiac hemodynamics were collected. In addition, left ventricular (LV) functional parameters, summed stress score (SSS), summed rest score (SRS) and summed difference score (SDS) were recorded.

Results: Our study comprised 6158 patients (Age: 54.6 ± 9.6, Males: 67%, Hypertension: 52%, Diabetes: 30%, Smoking: 28%). Positive exercise testing in 13.1% and ischemia-induced LV dilatation in 21% of scans. Males achieved higher target heart rate, (90 ± 25 vs. 79 ± 19%, P < 0.001). They showed higher tracer uptake defects (SSS: 17.2 ± 13.4 vs. 10.0 ± 12.7; SRS: 5.3 ± 8.9 vs. 2.4 ± 6.4; SRS: 4.6 ± 8.6 vs. 3.6 ± 6.9, SRS: 12.0 ± 4.6 vs. 7.6 ± 6.3, P < 0.001 for all) and lower LVEF (49% vs 53%). Exercise-induced LV dysfunction (LV stunning) occurred predominantly in hypertensive patients (19.2% vs. 3.7%, diabetes 14.3% vs. 6.9%, smokers 12.0% vs. 8.5%, P < 0.001). In all young patients (> 40 years old) had higher tracer uptake defects, (SSS: 17.0 ± 13.3 vs. 14.2 ± 13.7; SRS: 13.4 ± 6.4 vs. 9.6 ± 5.0, P < 0.001 for all). Presence of diabetes, hypertension and smoking had a false positive rate of 2.9% to predict positive coronary angiography.

Conclusion: This is the first registry of Egyptian population in a tertiary hospital, giving similar profiles to other international worldwide registries and highlighting higher risks and worse prognosis in elderly rather than young populations.

P304
SPECT MPI findings in the prognosis of dilated cardiomyopathy
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Introduction: Dilated cardiomyopathy (DCM) is a condition in which the heart becomes enlarged and cannot pump blood efficiently. The decreased heart function can affect the lungs, liver, and other body systems. Coronary microvascular disease could be a cause or a variant form of DCM that affects the small blood vessels of the heart. The prognosis for dilated cardiomyopathy (DCM) is proper to each individual patient according the degree of the damages of the tiny blood vessels. Some patients could have a normal life and remain essentially asymptomatic. Others develop symptoms that can progress. MPI and SPECT/MPI are important imaging modalities to assess the DCM and to establish its prognosis.

Objective: To assess the role and the place of SPECT/MPI in establishing therapeutic strategy of DCM.

Patients and methods: In 5 months, 102 patients have been referred to nuclear medicine department for DCM assessment. All patients recruited underwent a two days protocols physical/pharmacological stress/rest Gated SPECT MPI using tetrofosmine (Myoview) and acquisition with a dual head gamma camera (Symbia T6). A SPECT MPI analysis using the 4DM SPECT was done for each patient followed by a SPECT perfusion findings and clinical status, risk factors and echocardiography results.

Results: Mean/average age of patients was 61 years with a ratio Men/women equal to 1.12 (53% vs 47%). The risk factors were dominated by the fourth: Hypertension (66%), Diabetes (45%) and dyslipidemia (26%). Then follow the other risk factors, smoking (21%) and heredity (8%). 84% of patients were clinically symptomatic: dyspnea was the most frequent symptom (68%) followed by pectoris angina (42%). In the 102 patients, mean average ejection fraction obtained by echocardiography was 43%, 26% of patients presented LBBB and underwent only a pharmacological stress SPECT MPI. SPECT MPI showed fixed defects in 66% of patients, reversible defects in 53% and normal patterns in 8% patients. Among patients with fixed defects, 60% have had more than 3 segments involved, 30% between 2 to 3 and 10% only one segment. Regarding patients with reversible defects, 35% have had more than 3 segments involved, 40% between 2 to 3 and 25% only one segment. Both number of reversible defects and fixed defects were well correlated to the degree of clinical symptoms. SPECT MPI has helped in most cases to confirm or to change the therapeutic strategy by better assessment of the micro vascular damages.

Conclusion: SPECT MPI in dilated cardiomyopathy is an important prognostic procedure and should have a major place in finding the initial therapy strategy. This improvement of the therapeutic management of DCM will have a direct impact by reducing further cardiac events and improving quality of life.
P305
Prognostic impact of ischemia & myocardial viability assessed by stress myocardial perfusion spectroscopic imaging in ischemic MR patients with LV dysfunction undergoing CABG + mitral valve repair
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Introduction & Aim: Functional Mitral Regurgitation (MR) occurs with structurally normal valve as complication of systolic LV dysfunction precipitated by IHD. Even moderate ischemic MR has negative prognosis with impaired LV function post CABG. PET proves that presence of scar is a poor prognostic indicator of surgical outcome of ischemic MR. Our aim was to analyze prognostic impact of ischemia & myocardial viability assessed by stress Myocardial Perfusion Imaging in ischemic MR patients with LV dysfunction undergoing CABG & Mitral Valve (MV) Repair (MVR).

Materials & Methods: 14 pts (M: F = 10:4 pts; mean age 57 ± 11 yrs) with ischemic MR + M who underwent CABG were retrospectively analyzed. Preoperatively, all pts had their resting LV function & MR severity assessed by transthoracic Echo. MR Severity was graded as mild (1, 2) & severe (3 or 4+). All underwent same day 99mTc MILO Exercise (TMT / Adenosine: 6 pts) MPI preoperatively. A 20-segment myocardial model was used for quantitation. No. of infarcted, ischemic & viable myocardial segments were quantified by Stress Summed, Rest & Difference scores (SSS, SRS & SDS). 11/14 patients underwent CABG with MVR & remaining 3 pts had only CABG. All pts undergoing CABG. At least 6 months (mean 10 ± 4 months) follow up done. Postoperative echocardiography was routinely performed by 6th month for LV EF & MR assessment.

Results: 2 / 14 patients expired during follow up and showed larger infarct size (scar 11 segments) & persistent severe MR. Of 11 patients post CABG & MVR, 6 showed significant improvement in both LV EF & MR score postop.

Discussion: Ischemic MR is a common complication after MI. This is attributed to:
- a) aneurial dilatation of LV
- b) apical, posterior & lateral displacement of papillary muscles, increase of tethering & incomplete coaptation of MV
- c) LV wall malfuncion adjacent to single papillary muscle (more frequently posterior one) producing asymmetrical MV deformation
Calafio et al have reported that in presence of low EF and dilated LV, moderate (2/4) Ischemic MR has to be corrected. Atilog et al have stated in their study “Does CABG alone correct moderate Ischemic MR? That End-systolic distance between the coaptation point of mitral leaflets & plane of MV annulus is the key point to decide repair (10 mm) or replacement (> 10 mm) of mitral valve.

Conclusion: Presence of viable & ischemic myocardium in a better prognostic marker than scarred myocardium in patients with ischemic MR undergoing CABG & MVR. Stress MPI SPECT is a useful investigation in assessing & prognosticating ischemic MR prior to surgery.

P307
SPECT fits better than Dobutamine echocardiography for the evaluation of the cardiac shock wave therapy effect: data from double blind, randomized, placebo-controlled study
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Background: Several small studies showed that the application of cardiac shock waves might improve myocardial perfusion inducing angiogenesis. However, the high-quality data on the dynamics of myocardial perfusion and regional myocardial contractions resulting from cardiac shock wave therapy (CSWT) are scarce.

Purpose: To assess and compare the effects of the CSWT on perfusion parameters by myocardial single photon emission tomography (SPECT) and on regional myocardial contractility by dobutamine stress echocardiography (DSE).

Methods: A prospective, randomized, double blind, placebo controlled study was performed to assess the efficacy of CSWT, on top of optimal medical treatment (OMT) in patients with heart failure and diabetes type II and/or CAD. Dobutamine stress echocardiography (DSE) and pharmacological SPECT with adenosine were performed to assess inducible myocardial contractility and perfusion deteriorations. After baseline evaluation, 59 subjects were assigned randomly to study group: OMT + placebo and OMT + CSWT. Patients were treated with 9 sessions of CSWT over 9 weeks. Efficacy endpoints were assessed at 6 months follow up.

Results: The mean age of the patients was 69.4 ± 7.8 years in the OMT + placebo group and 67.2 ± 7.8 years in the OMT + CSWT group. The cardiac risk factor profile was almost similar at each patient had at least 2 risk factors for cardiovascular disease. About half of the patients in each group had undergone PCI and over 60% had undergone CABG. There were no significant differences for clinical, myocardial contractility and perfusion parameters between groups at baseline.

Conclusion: SPECT is a specific and valuable method for assessing the efficacy of CSWT.

P308
Relationship between focal reduction in cardiac 1-123 metaiodobenzylguanidine uptake and left ventricular longitudinal function in patients with Anderson-Fabry disease
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1National Research Council, Institute of Biostucture and Bioimaging, Naples, Italy; 2University Federico II, Department of Advanced Biomedical Sciences, Naples, Italy
Purpose: We investigated the relationship between abnormalities of cardiac sympathetic innervation and left ventricular (LV) function in patients with Anderson-Fabry disease.

Methods: We performed 1-123 metaiodobenzylguanidine (MIBG) cardiac imaging and speckle tracking echocardiography in 23 patients (11 men, mean age 43 ± 13 years) with genetically proved AFD and preserved LV ejection fraction and in 10 age and gender-matched control subjects. From planar and single-photon emission computed tomography (SPECT) MIBG images heart to mediastinum (H/M) ratio and regional defect score were calculated. The total defect score (TDS) was calculated as the sum of the segmental tracer uptake using the standardized 17-segment model. Global and segmental longitudinal systolic strain was obtained by speckle tracking echocardiography.

Results: At SPECT MIBG imaging, TDS was 0 in 10 patients (group 1) and ranged from 1 to 54 in the remaining 13 patients (group 2). Late H/M ratio below two-fold standard deviation of control subjects (1.75) was observed in 8 patients of group 2 and in none of group 1. Patients of group 2 had significantly higher LV mass index (118.35 ± 45.7 vs. 161.47 ± 45.2, p < 0.05), lower wall thickness (0.41 ± 0.06 vs. 0.50 ± 0.08, p = 0.01), left atrial volume (35.5 ± 12 ml vs. 48.3 ± 10 ml, p = 0.01) and systolic pulmonary artery pressure (28.5 ± 9 mmHg vs. 34.7 ± 9 mmHg, p = 0.01). On the contrary, systolic longitudinal strain was significantly lower in patients of group 2 compared to those of group 1 (-19.3 vs -14.5%, p < 0.01). In the whole patient population, a significant correlation between MIBG TDS and global longitudinal strain (r = -0.60, p = 0.005) and left atrial volume (r = 0.43, p = 0.05) was found. At multivariable linear regression analysis, global longitudinal strain was the only independent predictor of TDS (β = 4.83, p < 0.05).

Conclusions: The results of the present study indicate that reduced cardiac MIBG uptake results impairment in LV longitudinal function in AFD patients. Noteworthy, focal denervation of cardiac sympathetic activity may be present even in patients with preserved H/M ratio.

P309
18F-FDG-PET/CTA in the evaluation of patients with congenital heart diseases and suspected infective endocarditis
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Purpose: To evaluate the added value of 18F-FDG-PET-CT-Angiography(PET/CTA) in the diagnosis of infective endocarditis(IDE) in patients with congenital heart disease(CHD), where Duke criteria(DC) and echocardiography(ECHO)have limitations due to a complex anatomy and frequent prosthetic material.

Moreover, a prospective study was conducted in a tertiary centre with a multidisciplinary IE and CHD Units. PET/CTA was performed and compared with ECHO in all consecutive patients with CHD and suspected IE. Initial diagnosis with DC, PET/CTA and DC+PET/CTA information were compared with a final expert team diagnostic consensus performed with all clinical, microbiological and imaging information.

Results: Eighteen patients(10 men; median age 37 year; median time from last surgery 42.8 months) from Nov-12 to Ag-16 entered the study. Based on their major clinical findings and DC criteria, 14 patients were classified as IDE: 10 had implantable devices (pacemaker, atrial or ventricular defibrillator), 2 had prosthetic material, 1 had prosthetic conduits and 11 had patches for VSD closure, 6

Abstract P307. Table. Results

<table>
<thead>
<tr>
<th>Group</th>
<th>OMT = placebo (n=25)</th>
<th>OMT + CSWT (n=26)</th>
<th>p</th>
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</thead>
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<tr>
<td>Baseline</td>
<td>6 month</td>
<td>follow up</td>
<td>Baseline</td>
</tr>
<tr>
<td>CCS class III/II, %</td>
<td>0.4/1.99</td>
<td>0.4/1.22</td>
<td>0.069</td>
</tr>
<tr>
<td>Wall motion score, rest</td>
<td>23.8 ± 7.7</td>
<td>23.7 ± 6.8</td>
<td>0.499</td>
</tr>
<tr>
<td>Wall motion score, stress</td>
<td>26.3 ± 5.7</td>
<td>26.4 ± 5.8</td>
<td>0.334</td>
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<tr>
<td>Summed stress score</td>
<td>10.3 ± 9.2</td>
<td>10.2 ± 8.8</td>
<td>0.268</td>
</tr>
<tr>
<td>Summed rest score</td>
<td>3.9 ± 5.3</td>
<td>4.5 ± 5.2</td>
<td>0.644</td>
</tr>
<tr>
<td>Summed difference score</td>
<td>6.4 ± 5.8</td>
<td>6.2 ± 5.2</td>
<td>0.034</td>
</tr>
</tbody>
</table>

* p < 0.05 considered in significant
Barcelona, Spain; 4University Hospital Vall d’Hebron, Cardiac Surgery Department, A. Roque1; MN. Pizzi2; H. Cuellar-Calabria1; N. Fernandez-Hidalgo3; A. Igual4; Postsurgical inflammatory patterns and its temporal evolution 18F-FDG-PET/CTA of prosthetic cardiac valves and aortic tube grafts: P310 False positive ECHO. Table shows the IE classification. DC was positive in 7, negative in 6 and doubtful in 5. PET/CTA was positive in 15 and Surgery was performed in 42% and 2 patients died during the intervention. ECHO care-associated in 61%. The most frequent microorganisms was S. epidermidis(37%). IE was early in 44% and health-suspected IE with an added diagnostic value to the modified DC (increased sensitivity) and improving cases classification.

Abstract P309 Table. IE Classification

<table>
<thead>
<tr>
<th>IE CLASSIFICATION</th>
<th>DC</th>
<th>PET/CTA</th>
<th>DC + PET/CTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFINITIVE (D)</td>
<td>6 (33%)</td>
<td>15 (83%)</td>
<td>15 (83%)</td>
</tr>
<tr>
<td>POSSIBLE (P)</td>
<td>10 (56%)</td>
<td>0</td>
<td>1 (6%)</td>
</tr>
<tr>
<td>REJECTED (R)</td>
<td>2 (11%)</td>
<td>3 (17%)</td>
<td>2 (11%)</td>
</tr>
</tbody>
</table>

P310 18F-FDG-PET/CTA of prosthetic cardiac valves and aortic tube grafts: Postsurgical inflammatory patterns and its temporal evolution A. Roque1; MN. Pizzi2; H. Cuellar-Calabria1; N. Fernandez-Hidalgo2; A. Igual4; D. Garcia-Dorado1; J. Castell-Conesa5; M. Escobar1; S. Aguade-Bruix6 1University Hospital Vall d’Hebron, Radiology Department, Barcelona, Spain; 2Hospital Vall d’Hebron, Cardiology Department, Epidemiology Unit, Barcelona, Spain; 3University Hospital Vall d’Hebron, Infectious Diseases Department, Barcelona, Spain; 4University Hospital Vall d’Hebron, Cardiac Surgery Department, Barcelona, Spain; 5Universitary Hospital Vall d’Hebron, Nuclear Medicine Department, Barcelona, Spain Background: 18F-FDG-PET/CT-Angiography (PET/CTA) is a new technique providing improved diagnostic accuracy in prosthetic valve endocarditis. However, there is little available data on the postoperative morphologic and metabolic features following prosthetic valve or aortic graft surgeries, so early postoperative inflammation could be misdiagnosed as false-positive cases of infection. We prospectively evaluated a group of postoperative patients without suspected infection to define characteristic image findings after recent surgery and its short-term evolution. Methods: We prospectively recruited 30 patients that had been divided into 3 subgroups (10 ascending aortic grafts, 10 prosthetic aortic valves and 10 prosthetic mitral valves). They underwent serial 18F-FDG-PET/CTA examinations at 1, 6 and 12 months after surgery. We evaluated the metabolic features (FDG uptake intensity, distribution and location) and the anatomic changes (soft tissue reaction, post-surgical collections and perivalvular complications). The temporal evolution features of these findings were evaluated at 1, 6 and 12 months after surgery. Results: Prosthetic valves: there were 8 aortic and 4 mitral bioprosthesis and 2 aortic and 6 mitral mechanical valves. A characteristic mild, homogenous and diffuse perivalvular FDG uptake was visualized in 15/20 cases at 1 month after surgery. A more intense, but still homogenous, FDG uptake was observed in 5/20 cases. In these 5 patients the surgical technique was more aggressive (extensive annular decalcification, subvalvular preservation) which likely increases inflammatory reaction. None of the 20 cases developed perivalvular collections or pseudaneurysms during the time of follow-up. Aortic grafts: there were 4 Bentall-Bono tubes, 3 Tiron-David surgeries and 3 ascending aortic grafts. A characteristic FDG uptake pattern was observed: mild and homogenous uptake at tube sutures that was a lot more intense than in the peritube. Most of patients presented a peritube collection/soft tissue reaction immediately after surgery, which gradually improved until resolution in subsequent controls. We observed a trend in the evolution over time of these findings, the improvement in inflammatory changes between the first and sixth months after surgery were more marked than in the 6-12 months period. Conclusion: This preliminary data suggest that there are characteristic patterns of 18F-FDG uptake and typical anatomic changes following prosthetic valve and aortic graft surgeries. This could help differentiate inflammatory reactive changes from infection in most cases. Moreover, most of the morphologic and metabolic features tend to improve more markedly in the first 6 months of follow-up.

Abstract P309 Figure.

P311 Delayed FDG PET/CT imaging in prosthetic heart valve endocarditis: is it better? AM. Scholtens1; HJ. Verbreme2; RPJ Budde3; MGEH Lam1 1University Medical Center Utrecht, Imaging, Utrecht, Netherlands; 2Academic Medical Center of Amsterdam, Nuclear Medicine, Amsterdam, Netherlands; 3Erasmus Medical Center, Rotterdam, Netherlands Purpose: 18F-fluorodeoxyglucose positron emission tomography with computed tomography-based attenuation correction (FDG PET/CT) has been of increasing interest in the diagnostic workup of prosthetic heart valve endocarditis (PVE). The optimal acquisition time has not yet been established, with some reports advocating later imaging times to improve accuracy. We compared standard and late FDG PET/CT images in the setting of PVE. Materials and Methods: 14 scans in 13 patients referred for FDG PET/CT for suspicion of PVE were performed at standard (60 min post injection) and late (150 min post injection) time points. Images were scored based on visual interpretation (PVE vs. no PVE) and semi-quantitatively with SUVmax and the Target-to-Background Ratio (TBR, defined as [SUVmax valve/SUVmean blood pool]). Visual and semi-quantitative scores were compared for both time points. The imaging findings were related to the final diagnosis, based on surgical findings in all cases of infection and unre- markable follow up after clinically rejected diagnosis of endocarditis in all others. Results: Compared to the standard time, TBR was higher in late images, mostly due to diminished activity in the blood pool. Late images were more prone to false positive interpretation for both visual and semi-quantitative analyses (sensitivity, specificity, positive predictive value and negative predictive value were 100%, 38%, 55% and 100% respectively for late images, versus 83%, 88%, 83% and 88% respectively for standard images). Conclusion: Delayed FDG PET/CT for PVE should be interpreted with extreme caution due to its propensity for false positive results.

Abstract P311 Figure.
P312
Nocturia as a risk factor for cardiovascular disease in men
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Background: The CAC score is a known predictive factor for metabolic syndrome and cardiovascular disease (CVD). Lower urinary tract symptoms are also known to be related to metabolic syndrome and atherosclerosis. However, only a few studies have investigated predictive ability of the CAC score and nocturia for cardiovascular events.

Purpose: The objective of this study was to investigate the predictive ability of the coronary artery calcium (CAC) score, measured by using coronary computed tomography for cardiovascular events related to nocturia in men.

Methods: The study participants were recruited from 45,831 patients who underwent CT coronary angiography (CTCA) as part of a health check-up examination at the Health Promotion Center between March 2003 and December 2013. Among the participants who underwent CTCA, 16,079 men who completed the IPSS questionnaires were enrolled in the study.

Results: Nocturia strongly statistically correlated with the CAC score severity in multivariable logistic analysis that adjusted for age, smoking status, status of alcohol consumption, systolic blood pressure, total and HDL cholesterol, triglycerides, presence of diabetes, use of antihypertensive medication and use of statins (CAC=0: reference, CAC<100, OR: 1.34, 95% confidential index (CI): 1.06-1.65, p<0.001 and CAC ≥100, OR: 1.60, 95% CI: 1.41-1.81, p<0.001).

Conclusion: This study confirm that nocturia to be a predictor of CVD in men without a history of CVD.

Abstract P312 Figure.

P313
MPI and some less recognised predictors for silent myocardial ischemia in middle-aged patients with type 2 diabetes mellitus
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1University in Presov, Faculty of Health Care, Presov, Slovak Republic; 2Klinikum Kassel, Nuclear medicine, Kassel, Germany; 3ViVAMED ltd, Nuclear Medicine, Presov, Slovak Republic; 4Sekcov Polyclinic, Presov, Slovak Republic

Funding Acknowledgements: KEGA (Cultural and Educational Granting Agency) grant 066PU-4/2016, Ministry of Education, Science, Research and Sports of the SR. Some data confirm a relatively high prevalence of silent myocardial ischemia (SMI) in elderly (aged over 60 yrs) patients (pts) with type 2 diabetes mellitus (T2DM), while no data are available in subjects of middle-aged subgroup (<60 yrs).

Results: Lung cancer patients of both sexes had a significantly higher mean mPA diameter compared to controls (men: 27.29 ± 3.86 vs. 25.88 ± 2.43; women: 26.10 ± 2.80 vs. 24.45 ± 1.82; P<0.05). Similarly, a higher proportion of lung cancer patients of both sexes had an abnormal mPA diameter compared to controls (men: 35.1% vs. 12.5%; women: 32.6% vs. 10.7%; P<0.05). In terms of PA ratio, lung cancer patients of both sexes had a significantly higher mean PA ratio (men: 0.63 ± 0.10 vs. 0.79 ± 0.08; women: 0.65 ± 0.11 vs. 0.79 ± 0.09; P<0.05), with a higher proportion also having an abnormal PA ratio (men: 24.6% vs. 11.1%; women: 27.9% vs. 14.3%; P<0.05) compared to controls. A positive weak correlation was detected between mPA diameter and age (men: r=0.15, women: r=-0.13), and between aortic diameter and age (men: r=-0.31, women: r=-0.12). A negative weak correlation between PA ratio and age was found in men (r=-0.14), but not in women (r=0.02).

Conclusion: 18F-FDG PET/CT imaging can be used for the incidental detection of clinically significant increases of pulmonary arterial enlargement suggestive of PH in specific patient populations. With the increasing use of this modality for different indications, the mPA diameter and the PA ratio constitute easily reproducible measures that could guide diagnosis of PH and reduce cardiovascular morbidity and mortality.

Abstract P314 Figure.

P315
Subclinical atherosclerosis in asymptomatic patients with metabolic syndrome: the role of multi-slice computed tomography coronary angiography
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Background: The association of metabolic syndrome with acute cardiovascular events is well known, but its association with stable coronary artery disease is still not clear.

Results: Information about post-stress LVEF drop and NT-proBNP level detected in stress, in addition to the pre-scan conventional risk factors, can contribute to more precise identification of SMI in these pts. Our data suggest further research exploring the value of complex screening for SMI in middle-aged asymptomatic pts with T2DM.

Abstract P315 Figure.
Purpose: The aim of this study was to evaluate the relationship of metabolic syndrome and its various components with the coronary calcium score, number of coronary vessels affected and diseased segments using multi-slice computed tomography (MSCT) coronary angiography.

Patients and methods: This prospective cohort study included 50 patients referred to the Cardiology Department of the hospital. All patients were in sinus rhythm (heart rate less than 70 beats/min) with normal ECG and normal echocardiographic study. MSCT data acquisition and post-processing were done to all patients. Coronary segments with a diameter of at least 1.5 mm at their origin were included and a cutoff point was set at 15%. The number of vessels was measured with an electronic caliper tool.

Results: Most of our patients were males (60%), patients' mean waist circumference was 102 ± 12 cm, 63% were diabetics and 77% were hypertensive. Triglycerides were elevated in 67% and HDL was low in 63%. Calcium score was zero in 40% of the cohort and was in the range of 1% to 16% in 44% had a calcium score above 100. There was a significant positive relationship between the calcium score and the number of diseased vessels (p = 0.0001) and diseased segments (P = 0.004). Individual metabolic syndrome components (diabetes, high triglycerides and low HDL) had a significant positive relationship with the calcium score, number of diseased vessels and diseased segment (P = 0.01). Furthermore, various combinations of metabolic syndrome components showed also significant positive relationship with the calcium score, number of diseased vessels and diseased segment (P = 0.01).

Conclusion: Metabolic syndrome with variable combinations of its components increases the risk of subclinical coronary atherosclerosis as assessed by coronary calcium score and coronary plaques using MSCT coronary angiography.

P316
Relationship of sleep apnea and pulmonary artery trunk diameter
AR. Sajjadieh Khajouei1; F. Nikaiin2; KIANA Arzani2
1. Isfahan University of Medical Sciences, Institute of medicine, Isfahan, Iran (Islamic Republic of); 2. Islamic Azad University (Najafabad Branch), Shariati general hospital, Isfahan, Iran (Islamic Republic of)

Introduction: “Obstructive Sleep Apnea” is one of the most well-known medical problems in recent years and the leading cause of disability, one of the major causes of death and the most medical cause of daytime sleepiness. Studies show that there is a link between obstructive sleep apnea and cardiovascular diseases, so that common risk factors have been identified for the two diseases. Several studies has shown a possible link between obstructive sleep apnea and pulmonary hypertension as coronary hyperfunction is associated by pulmonary artery dilatation, our hypothesis in this study is that there could be a relationship between “obstructive sleep apnea” and “pulmonary artery trunk diameter”.

Methods and materials: This case-control study is done on 161 patients admitted to the cardiology ward who perform cardiac CT angiography. By completing the questionnaire for the diagnosis of “obstructive sleep apnea” (Berliner Questionnaire), Patients were divided into two groups with and without obstructive sleep apnea (case and control). Demographic data (including age and gender) were recorded for patients. Diameter of pulmonary artery trunk and diameter of ascending aorta in all patients were measured. The data is transferred to a computer and analyzed using SPSS version 23.

Results: This study is done included 161 patients with an average age of 54.2 ± 12.2 years. 39.1% of them had obstructive sleep apnea and 60.9% of them did not. The mean diameter of aorta in two groups are 3.3 ± 0.6 cm and 3.2 ± 0.5 cm and pulmonary artery trunk 2.9 ± 0.4 and 2.8 ± 0.5 cm. The diameters were measured with an electronic caliper tool. A significant positive relationship between the calcium score and the number of diseased vessels and diseased segments was an independent predictor of all cause mortality as well as cardiac mortality, in patients with LBBB and LVEF < 35%.

Conclusions: The results of this study shows that there is no significant difference between the diameter of the aorta and the pulmonary artery in two groups with and without obstructive sleep apnea. The ratio of the pulmonary artery to the aortic diameter between the two groups also is not different. Finally, this study shows that in patients with sleep apnea there is no significant pulmonary artery dilatation However, more studies are needed to approve this result.

P317
Correlation of LBBB and mechanical left ventricular dysynchrony in patients with normal and abnormal left ventricular function and prediction of mortality
N. Zahir; T. Bentali; B. Strasberg; I. Mads; A. Gustein; R. Komowski; A. Solosky
Rabin Medical Center, Belinson Hospital, Petah Tikva, Israel

Introduction: Patients with LBBB with symptoms of heart failure and LVEF < 35% are recommended with guidelines for electromechanical resynchronization therapy (CRT) device as this has shown to improve cardiac outcome.

Purpose: We studied the significance of mechanical LV dyssynchrony (MLVD) in patients with LBBB and LV function and prediction of mortality.

Methods: We correlated the database of clinical cardiology lab, patients for gated SPECT MPI who had LBBB in the basic ECG. The patients were divided into 3 groups according to LVEF. All the clinical, perfusion, LV function and MLVD measured by phase standard deviation (PSD) were compared.

Results: There were 260 consecutive cases in this study. Group 1 included 22 patients with LVEF > 50%, group 2-42 patients with LVEF 35%-50%. And group 3-121 patients with LVEF < 35%. The QRS width was 119-140 ms (95% CI), similar in all groups. However, PSD values were significantly different and increased across the 3 groups (mean values, 24, 36, 60, p < 0.0001 respectively). NYHA class prevalence (3-4) was 4%, 20%, 62% across the 3 groups of LVEF (p < 0.0001). No correlation was seen between QRS width in the presence of LBBB. During median follow up of 5 years, all because deaths occurred in 4, 10 and 34 patients in the 3 groups, accordingly. In Cox regression analysis, PSD was an independent predictor for all cause mortality in patients with LVEF > 35% (p = 0.004, 95% CI 1.031-1.58, p = 0.032) and for cardiac mortality as well (HR1.057; 95% CI 1.022-1.094).

Conclusions: MLVD in patients with LBBB was increasingly abnormal with correlation to LV systolic function, without correlation to QRS width. In addition to LVEF, PSD was an independent predictor of all cause mortality as well as cardiac mortality, in patients with LBBB and LVEF < 35%.

P318
Derivation of CVT SPECT 123 I-metaiodobenzylguanidine heart-to-mediastinum ratio from planar myocardial scintigraphy and their mutual correlation
R. Akr; Y.-H. Liu; S. Vardavoli; R. Lampert; A.J. Sinusas; E.J. Miller
Yale New Haven Hospital, New Haven, United States of America

Funding Acknowledgements: An Investigator Initiated Trial Grant from GE Healthcare, Inc., and a Grant-in-Aid research grant from the American Heart Association (14GRNT19004010)

Introduction: Assessment of cardiac-123 I-mIBG uptake relies on the heart to mediastinal ratio (HMR) on planar images. Determined cardiac-solid state SPECT systems cannot perform planar imaging, necessitating validation of SPECT HMR vs. traditional planar HMR values.

Purpose: We sought to develop novel semi-automated quantitative methodologies for measuring SPECT HMR from a GE Acyclone camera and determine its correlation to traditional planar HMR.

Methods: Planar and SPECT 1-23 I-mIBG images from 21 healthy volunteers were analyzed by two observers. Planar images were acquired from a wide field-of-view GE Acyclone, and planar HMR was calculated as per 1-23 I-mIBG package insert guidelines (manual traditional method, MTM), as well as using both an elliptical region of interest (Ellp-ROI) and a region growing ROI (RG-ROI) techniques. SPECT/CT images were acquired using a dedicated cardiac GE Acyclone SPECT/CT camera. Newly developed software using various cardiac and mediastinal ROI segmentation methods was used to measure SPECT HMR. Upper and lower limits of the heart were determined from fused SPECT/CT images and the LV ROIs and mean LV counts were calculated using both Ellp-ROI and RG-ROI techniques. Medial ROI counts were measured from fixed volumes of three different ROIs (i.e. upper mediastinum (UM), lower mediastinum (LM), and contralateral lung (CL)). Reproducibility was assessed by intra-class correlation coefficient (ICC) and Bland-Altman (X-A) analysis.

Results: For planar images, HMR calculations using the LV RG-ROI method showed highest inter- and intra-operator levels of agreement, compared to the Ellp-ROI and MTM (inter-observer ICC = 0.98 vs 0.95 vs 0.86; B-A 95% limits of agreement = (-0.13 to 0.19 vs (-0.14 to 0.15 vs (-0.21 to 0.37; intra-observer ICC = 0.97 vs 0.93 vs 0.87; B-A 95% limits of agreement = (-0.09 to 0.11 vs (-0.06 to 0.24 vs (-0.25 to 0.35). For SPECT images, HMR calculation done by HMR-UM, HMR-LM and HMR-CL all showed excellent intra- and inter-operator agreement (intra-observer ICC =0.96 vs 0.95 vs 0.95; B-A analysis 95% limits of agreement = (-0.08 vs 0.31 vs (-0.53 to 0.61 vs (-1.11 to 0.94; inter-observer ICC = 0.95 vs. 0.97 vs 0.95; B-A analysis 95% limits of agreement = (-0.06 to 0.60 vs (-0.50 to 0.72 vs (-1.1 to 0.95. However, among all three SPECT methods, HMR with upper mediastinal background (HMR-UM) showed the strongest linear correlation to planar HMR as compared to other two methods (R = 0.91 vs 0.72 vs 0.76 respectively).

Conclusion: I-123 I-mIBG SPECT HMR quantification using the upper mediastinum as background has the strongest correlation to planar HMR quantification. A numeric HMR analogous to planar HMR can be derived from I-123 I-mIBG SPECT via simple linear equation which may allow use of new, dedicated cardiac SPECT cameras, such as the GE Acyclone, for I-123 I-mIBG imaging.
Abstract P319 Table. Characteristics/interpretation of scans

<table>
<thead>
<tr>
<th>Variable</th>
<th>Overall (n=200)</th>
<th>RestReg (n=100)</th>
<th>ExReg(n=100)</th>
<th>P-Value</th>
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</thead>
<tbody>
<tr>
<td>Age</td>
<td>64.9 ± 12</td>
<td>66.1±12.7</td>
<td>63.6±11.1</td>
<td>.138</td>
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<tr>
<td>Male</td>
<td>130 (65.0%)</td>
<td>65 (65.0%)</td>
<td>65 (65.0%)</td>
<td>.705</td>
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<tr>
<td>Stress Dose (mSv)</td>
<td>68 ± 24</td>
<td>62.5±8.54</td>
<td>72.5±7.45</td>
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<tr>
<td>Effective Dose (mSv)</td>
<td>7.11 ± 2.39</td>
<td>7.68±2.48</td>
<td>6.53±2.16</td>
<td>&lt;.001</td>
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<tr>
<td>Extracardiac activity</td>
<td>.069</td>
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<tr>
<td>Grade III</td>
<td>59 (29.5%)</td>
<td>34 (34.0%)</td>
<td>25 (25.0%)</td>
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<td>Grade I</td>
<td>82 (41%)</td>
<td>33 (33.0%)</td>
<td>49 (49.0%)</td>
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</tr>
</tbody>
</table>

Abstract P320 Figure.

P320 Comparison of myocardial perfusion SPECT between gamma cameras with different types of detectors

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Aim: The aim of the study was to compare traditional and cadmium-zinc-telluride detector gamma cameras used in ECG-synchronized myocardial perfusion scintigraphy for determining the left ventricular hemodynamic indicators.

Materials and Methods: The study included 25 patients aged 35 to 68 years (average age: 58.67 ± 10.96 years) with coronary artery disease and heart failure (NYHA class I-II). All patients received ECG-synchronized myocardial perfusion scintigraphy using two types of gamma cameras: with traditional sodium iodide crystal-based detectors (Forte, Philips) and with highly sensitive cadmium-zinc-telluride (CZT) solid-state detectors (Discovery NM/CT 570c, GE). Left ventricular end-diastolic volume (EDV), end-systolic volume (ESV), stroke volume, and ejection fraction (EF) were calculated. Planar tomography (CT) of the heart was used as a reference method.

Results: Comparison of the results obtained by using gamma cameras with CZT and traditional detectors did not show any significant differences in the values of EDV (116.57 ± 70.76, GE vs. 97.00 ± 61.17, Philips; p > 0.05) and ESV (59.71 ± 61.59, GE vs. 56.00 ± 61.62, Philips; p > 0.05). However, the values of stroke volume (56.85 ± 12.62, GE vs. 41.00 ± 12.38, Philips; p = 0.04) and EF (55.43 ± 13.74, GE vs. 47.71 ± 14.05, Philips; p < 0.03) differed significantly. Left ventricular volumetric indicators and EF, obtained by the radionuclide method, were significantly lower compared to the corresponding values obtained by CT (EDV: 176.01 ± 21.8 vs 12.38, Philips; p = 0.04) and EF (55.43 ± 13.74, GE vs. 47.71 ± 14.05, Philips; p < 0.03) (Figure).

Conclusion: The study showed that the type of detector significantly affected the results of the left ventricular hemodynamic evaluation. Hemodynamic indicators, calculated based on data from gamma cameras with CZT detectors, were more accurate. In addition, the use of CZT detectors shortened the duration of the procedure and reduced the radiation exposure for patients.

P321 Is phase analysis still have incremental value on Tc-99m MPI even with pharmacological stress?

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Purpose: Recently, phase analysis on myocardial perfusion imaging (MPI) was found to be useful in cardiology not only for arrhythmic disease and heart failure, but also for ischemic heart disease. Some study indicates phase discordant occurs with exercise induced ischemia. However, pharmacological stress is not actual STRESS which increases oxygen demand, thus effect on myocardial phase is not clear. Especially, when we use Tc-99m perfusion agents, interval between stress and imaging should be wide enough to recover from phase discordant induced by stress. We hypothesized that if the pharmacological stress MPI performed with Tc-99m perfusion agents still induce phase discordance, difference of phase parameter measured with stress and rest MPI should be larger in patients with ischemia than in that without. We analyzed the phase change on MPI under pharmacological stress MPI.

Subjects and Methods: We analyzed 98 consecutive patients who underwent pharmacological stress MPI. Images obtained with 16/fr cycle ECG gate using Tc-99m perfusion agent. Pharmacological stress test was performed with either metoprolol or atenolol. The study included 25 patients aged 35 to 68 years (average age: 58.67 ± 10.96 years) with coronary artery disease and heart failure (NYHA class I-II). All patients received ECG-synchronized myocardial perfusion scintigraphy using two types of gamma cameras: with traditional sodium iodide crystal-based detectors (Forte, Philips) and with highly sensitive cadmium-zinc-telluride (CZT) solid-state detectors (Discovery NM/CT 570c, GE). Left ventricular end-diastolic volume (EDV), end-systolic volume (ESV), stroke volume, and ejection fraction (EF) were calculated. Planar tomography (CT) of the heart was used as a reference method.

Results: Comparison of the results obtained by using gamma cameras with CZT and traditional detectors did not show any significant differences in the values of EDV (116.57 ± 70.76, GE vs. 97.00 ± 61.17, Philips; p > 0.05) and ESV (59.71 ± 61.59, GE vs. 56.00 ± 61.62, Philips; p > 0.05). However, the values of stroke volume (56.85 ± 12.62, GE vs. 41.00 ± 12.38, Philips; p = 0.04) and EF (55.43 ± 13.74, GE vs. 47.71 ± 14.05, Philips; p < 0.03) differed significantly. Left ventricular volumetric indicators and EF, obtained by the radionuclide method, were significantly lower compared to the corresponding values obtained by CT (EDV: 176.01 ± 21.8 vs 12.38, Philips; p = 0.04) and EF (55.43 ± 13.74, GE vs. 47.71 ± 14.05, Philips; p < 0.03) (Figure).

Conclusion: The study showed that the type of detector significantly affected the results of the left ventricular hemodynamic evaluation. Hemodynamic indicators, calculated based on data from gamma cameras with CZT detectors, were more accurate. In addition, the use of CZT detectors shortened the duration of the procedure and reduced the radiation exposure for patients.

P322 Tc99m-pyrophosphate scintigraphy using solid-state detector alcyone SPECT: comparison to planar imaging for the diagnosis of transthyretin cardiac amyloidosis

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Introduction: Tc99m-pyrophosphate (Tc99m-PYP) scintigraphy is an emerging tool for the diagnosis of transthyretin (TTR) cardiac amyloidosis. Planar imaging is routinely used for Tc99m-PYP studies, however new solid-state detector, cardiac-only cameras are unable to perform planar imaging.

Purpose: To compare global qualitative and regional quantitative cardiac Tc99m-PYP uptake imaging using the solid-state GE Alcyone SPECT camera in comparison to traditional planar imaging.

Methods: Tc99m-PYP scintigraphy was performed on 23 patients with known or suspected cardiac amyloidosis using both traditional dual-head, wide-field of view Anger and GE Alcyone solid-state detector cameras following the same injection of Tc99m-PYP. Planar imaging was analyzed qualitatively (visual grade 0-3) and quantitatively (heart-to-contralateral chest (HCL) ratio). Qualitative, quantitative, and the regional distribution of Tc99m-PYP uptake on Alcyone SPECT was analyzed using 3D moded reconstruction and normalized polar maps (respectively). All patients underwent 1-hour post injection imaging with both planar and Alcyone SPECT. Patients with positive 1-hour planar image also underwent 3-hour imaging to determine optimal incubation time.

Results: Mean planar Tc99m-PYP HCL ratio in patients with visual grade 2 or 3 uptake was significantly higher as compared to visual grade 0 or 1 (1.76 ± 0.36 vs. 1.19 ± 0.21, p < 0.001). Among the patients who underwent both 1-hour and 3-hour
imaging, there was a trend toward a reduction in the mean HCL ratio from 1-hour to 3-hours (1.61 ± 0.30 vs. 1.52 ± 0.35 respectively, p=0.071), while there was a strong linear correlation of HCL ratio between 1-hour and 3-hour planar imaging (r=−0.931, p=0.001). On Alcynon SPECT imaging, the region of maximum Tc99m-PYP uptake was most frequently located in the septum (48), followed by the inferior wall (38), and anterior (5) and lateral walls (6). Moreover, the region of maximum Tc99m-PYP uptake on Alcynon SPECT was no different between 1 and 3 hour imaging. **Conclusion:** There is heterogeneous regional distribution of Tc99m-PYP uptake on Alcynon SPECT in patients who have visual and quantitatively positive planar images for TTR cardiac amyloidosis. This data will allow for the development of global and regional indices of Tc99m-PYP uptake using Alcynon SPECT that correspond to established planar interpretative methods. One hour planar imaging trends towards higher quantitative thresholds compared to 3-hour imaging.

### P323

**Nuclear cardiology practice in the developing world: results from an IAEA clinical audit on myocardial perfusion imaging**

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Under-utilization of Myocardial perfusion imaging (MPI) in the developing world may be due to lack of appropriate training. Intergovernmental organizations have invested into educational activities in those countries.

The objective of this study was to assess the outcome of these training initiatives. Twenty-four centers were evaluated (8 from Asia; 4 from Eastern Europe; 5 from Africa and 7 from Latin America). Raw data from 15 MPI studies were sent, re-processed and reported, addressing the following parameters: a) summed difference score (SDS); b) qualitative assessment of perfusion; c) function; d) transient ischemic dilatation (TID); e) judgement on high risk or not. Reports from 6 international experts were used for comparison.

The inter-rater reliability (IRR) was calculated using the Kappa statistic. The k value between participants was fair and ranged between 0.17 for SDS and 0.33 for left ventricular function (table). In comparison, agreement between the experts was moderate to substantial (0.53 to 0.69 for perfusion). Differences between participants and experts were found to be significantly different, except for the assessment of TID.

**Conclusions:** There is much scope for improvement in the inter-rater agreement between physicians reporting MPI studies in developing countries.

### P324

**Comparative analysis of SPECT myocardial perfusion scintigraphy and coronary angiography in CAD patients with indeterminate exercise stress test findings**

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1Oncology Institute of Vojvodina / Medical Faculty Novi Sad, Nuclear Medicine Department, Sremska Kamenica / Novi Sad, Serbia; 2Oncology Institute of Vojvodina, Nuclear Medicine Department, Sremska Kamenica, Serbia; 3Srebrenicka Klinika, Srebrenica, Bosnia and Herzegovina; 4Institute of Cardiovascular Diseases of Vojvodina, Sremska Kamenica, Serbia; 5Oncology Institute of Vojvodina / Medical Faculty Novi Sad, Diagnostic Imaging Center, Sremska Kamenica / Novi Sad, Serbia

**Purpose:** To determine diagnostic value of single photon emission tomography myocardial perfusion scintigraphy (SPECT MPI) in comparison to coronary angiography (CA), in the diagnostic evaluation of critical coronary artery stenosis in the patients (pts) with coronary artery disease (CAD) and previous indeterminate exercise stress test findings.

**Material and methods:** 195 CAD pts (123 males, 72 females, mean age 59.48±9.36) with previous indeterminate exercise stress test findings subsequently underwent ECG-gated pharmacological stress Tc-99m MIBI SPECT MPI and coronary angiography (CA) in a timeframe no longer than 3 months. Subjects were classified in a group without previously confirmed CAD, consisted of 120 pts (61.54%), and a group of 75 pts (38.46%) with previously performed therapeautical revascularization procedure, who are also considered to be with intermediate risk for cardiac events due to the fact that previously unsuccessful revascularization procedure was performed. SPECT MPI and CA findings were compared in general and regionally, by the affected coronary arteries and their irigational territories.

**Results:** SPECT MPI demonstrated myocardial ischaemia in 95 pts (48.7%), while in 100 pts (51.3%) myocardial ischaemia was found. CA showed the presence of significant coronary artery stenosis in 101 pts (51.8%), and the absence of the significant stenosis in 94 pts (48.2%). Complete match of the positive SPECT MPI findings on myocardial ischaemia and CA findings on coronary arteries stenosis has been presented in 85 pts (43.6%); complete match of negative SPECT MPI findings was noted in 84 pts (43.1%); and in only 26 pts (13.3%) SPECT MPI findings were not in the correlation with the CA findings, demonstrating the overall high to very high correlation between two methods with the sensitivity of 84.2%, specificity of 89.4%, accuracy of 86%, positive predictive value of 89.5% and negative predictive value of 84%. The assumed value of the diagnostic accuracy of SPECT MPI observed in relation to the relevant function findings in all patients was 95.9%, with sensitivity of 96.77%, specificity of 94.17%, positive predictive value of 94.74% and negative predictive value of 97%.

**Conclusion:** SPECT MPI represents a non-invasive diagnostic method with high diagnostic value in CAD detection in the patients with intermediate risk and previous indeterminate exercise stress test findings, demonstrating high to very high correlation with CA, as the actual golden standard in the diagnosis of CAD.

### P325

**Heart rate response during dipyridamole infusion is associated with cardiac events in patients with normal perfusion SPECT**

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**Objective:** Dysfunction of the autonomic system predicts cardiovascular events including sudden death, especially in patients with type 2 diabetes, regardless of the presence of coronary artery disease (CAD). Cardiac autonomic dysfunction is also a powerful predictor of risk for mortality after myocardial infarction in the general population. As heart rate response (HRR) to vasodilator stress can be a marker of HR variability reflecting the integrity of the autonomic system, we intended to define the prognostic value of HRR during dipyridamole test in a population of patients with suspected coronary artery disease but with normal SPECT myocardial perfusion imaging (MPI).

**Methods:** A total of 845 patients were retrospectively analyzed, in whom MPI SPECT was performed in a two-day protocol. Pharmacologic stress included infusion of 0.56 mg/kg of dipyridamole over 4 min followed by IV injection of 99mTc-MIBI, which was repeated at rest. Normal myocardial perfusion was defined as a SDS score of 0 or lower. HRR was calculated as the maximum percent HR change from baseline. Patients in the lower quartile of HRR were compared to those in the other quartiles regarding nonfatal MI or cardiac death at 5 years of follow-up.

**Results:** A total of 237 patients (28%) had normal perfusion SPECT MPI (123 women, age 65±11 years), of which 60 (25.3%) had HRR <15% (lower quartile) compared to 177 with HRR ≥15%. In the first group, 25 events were identified vs. 33 in the other quartiles (42% vs. 17% p=0.001). Diabetes was significantly associated with cardiac events (p=0.037), but was not a predictor of abnormal HRR. Rest left ventricular ejection fraction (LVEF) and stress-induced ST depression ≥1 mm were not independently associated with event rate nor were predictors of HRR.

Interestingly, the presence of diabetes was not more common in patients with attenuated HRR using a cutoff at the lower quartile.

**Conclusions:** HRR provides significant prognostic information in patients with normal MPI with dipyridamole, and this variable seems to be even more powerful than ST changes or rest LVEF. Thus, a normal MPI should be interpreted cautiously when associated with abnormal HRR with dipyridamole. Further work assessing these results in diabetic patients with abnormal SPECT or known CAD is warranted.
Purpose: Cardiac hybrid imaging integrating SPECT and coronary computed tomography myocardial perfusion imaging (SPECT MPI) is well-defined in STEMI patients who underwent primary PCI, MI assessed by coronary cineangiography (CCCA) and matching reversible SPECT defect; (2) unmatched CCCA and SPECT finding; and (3) normal finding by CCTA and SPECT. Cox's proportional hazard regression was used to identify independent predictors for events. During a median follow-up 69 months (25th–75th percentile: 30–77), an event occurred in 49 patients, including 14 deaths. A corresponding matched hybrid image finding was associated with a significantly higher incidence of events (p < 0.001). However, after Cox's multivariate analysis, a stenosis ≥50% on CCCA was the only independent predictor for events (odds ratio 4.44, 95% CI 1.99–8.98, p < 0.001).

Conclusions: In a population referred for hybrid SPECT/CCTA imaging, the presence of a coronary stenosis ≥50% was the only independent predictor of events.

P329
Comparison of quantitative image parameters and diagnostic accuracy in submillisievert coronary CT angiography reconstructed with ASIR and MBIR
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University Hospital Zurich, Department of Nuclear Medicine, Zurich, Switzerland

Funding Acknowledgements: The University Hospital Zurich holds a research agreement with GE Healthcare.

Background/Introduction: In asymptomatic patients the finding of high carotid artery atherosclerotic burden is associated with major magnitude of inducible myocardial ischemia, allowing the implementation in this subgroup of higher risk a timely revascularization strategy and change of the prognosis in the short term.

P327
Long-term prognostic value of SPECT MPI after primary PCI for STEMI
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1Leiden University Medical Center, Department of Cardiology, Leiden, Netherlands; 2Leiden University Medical Center, Department of Nuclear Medicine, Leiden, Netherlands; 3Leiden University Medical Center, Department of Medical Statistics, Leiden, Netherlands

Funding Acknowledgements: The Department of Cardiology has received research grants from Biotronik, Medtronic, Boston Scientific Corporation and Edwards Lifesciences.

Background/Introduction: The long-term prognostic value of single-photon emission computed tomography myocardial perfusion imaging (SPECT MPI) is well-defined in patients with stable CAD. Myocardial infarction (MI), measured by SPECT MPI within 1 month after ST-segment elevation myocardial infarction (STEMI) and primary percutaneous coronary intervention (PCI), is strongly associated with short-term all-cause mortality and heart failure hospitalization. However, no studies have been performed determining the long-term prognostic value of SPECT MPI after primary PCI for STEMI.

Methods and results: A group of 310 pts out of 417 (74%) presented high AVB: (PS:12,3±6 points as HRI. All the pts with HRI underwent coronary cineangiography (CCCA) and matching reversible SPECT defect; (2) unmatched CCCA and SPECT finding; and (3) normal finding by CCTA and SPECT. Cox's proportional hazard regression was used to identify independent predictors for events. During a median follow-up 69 months (25th–75th percentile: 30–77), an event occurred in 49 patients, including 14 deaths. A corresponding matched hybrid image finding was associated with a significantly higher incidence of events (p < 0.001). However, after Cox's multivariate analysis, a stenosis ≥50% on CCCA was the only independent predictor for events (odds ratio 4.44, 95% CI 1.99–8.98, p < 0.001).

Conclusions: In a population referred for hybrid SPECT/CCTA imaging, the presence of a coronary stenosis ≥50% was the only independent predictor of events.
Radiocardioanography in the evaluation of pulmonary and cardiac hemodynamics in patients with chronic heart failure

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Aim: Radionuclide evaluation of cardio-pulmonary hemodynamics disorders in patients with coronary heart disease (CHD) complicated by chronic heart failure (CHF).

Methods and materials: The study included 108 patients (all males, mean age – 53.87 ± 7.20 years) with CHD 2-4 functional classes of angina complicated by CHF (NYHA II-III). All patients underwent a radiocardioanography with 99mTc-per-technetate. Basic hemodynamic parameters were calculated: cardiac minute output (MO); stroke volume (SV); blood volume in the pulmonary circulation (PC) (BVPC); heart and stroke indices (HI, SI); circulation efficiency ratio (CER); arterial modal time (TAM); venous modal time (TVM); pulmonary time (TPUL) as the sum of TAM and TVM; periods of ventricular half ejection of the right ventricle (T1/2RV) and left ventricle (T1/2LV), reflecting their contractile ability.

Results: Radiocardioanographic results showed significant changes in the main indicators reflecting the functional state of both pulmonary and cardiac circulatory systems. The increase in TPUL and TAM occurred in the majority of cases (84.3 % and 97.2 %, respectively). The elongation of TAMI indicated the formation of pulmonary hypertension in combination with right ventricle insufficiency, and the TAM increase (61.1 % of cases) indicated venous congestion of the left heart compartments and adjacent large pulmonary veins.

The increase of T1/2RV and T1/2LV, the decrease of CMO and cardiac and stroke indices connected with reduced cardiac pump function, as well as circulation efficiency ratio can be considered the proof of the above. The decrease in CMO below normal values were detected in 92 (85.2 %) of 108 patients, SI - in 84 (77.8 %) patients, the HI was reduced in the majority of patients surveyed (97.2 %), and CER - in 79.6 % of cases. Traditionally, heart insufficiency and its severity were associated with impaired left ventricle systolic function which is usually assessed by ejection fraction (EF) of the left ventricle (LV). However, a significant proportion of the number of chronic HF patients have normal or near normal LV EF (> 45-50 %). In our study in more than half of the patients (52.5 %) left ventricular ejection fraction was more than 50 %, and in 76.3 % of the examined patients - more than 40 %. Average LV EF was 50.93 ± 14.22 % and ranged from 23 % to 71 %. We have also found a highly reliable inverse correlation relationship between T1/2LV and LV EF and between EF and pulmonary hemodynamic parameters. Despite the fact that the majority of the examined patients had quite satisfactory left ventricular myocardial contractility, the increase in the blood flow time through the right heart compartments and pulmonary arteries allows to speak about heart insufficiency progression.

Conclusion: Radiocardioanography allows a high level of informativeness to estimate the changes in speed and volume parameters of cardiopulmonary hemodynamics at any stage of heart failure.

Impact of motion compensation and partial volume correction in the assessment of coronary plaques with 18F-NaF PET/CT Imaging

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Background: Recent studies suggested that 18F-NaF-PET enables visualization and assessment of coronary plaques with 18F-NaF PET/CT imaging.

Methods: The objective of this work is to implement an image reconstruction framework using a local projection (LP) method on MoCo images, SUV values were within 15% of the true simulated value (p > 0.971 for sensitivity, p = 0.977 for false positive rate, and diagnostic odds ratios).

Results: A total of 16 studies encompassing 2092 patients were included. Overall sensitivity of CZT-SPECT was 0.84, specificity 0.69, positive likelihood ratio 2.73, negative likelihood ratio was 0.24, diagnostic odds ratio 11.93, and area under the curve of the summary receiver operating characteristic curve 0.89. Meta-regression comparing Aclyone vs D-SPECT did not show any statistically significant difference (p = 0.971 for sensitivity, p = 0.774 for false positive rate, and p = 0.711 for diagnostic odds ratio).

Conclusion: CZT-SPECT MPI has a high diagnostic accuracy for significant CAD, without significant differences between Aclyone and D-SPECT technologies. These findings, combined with the low radiation exposure, supports the widespread use of CZT-MPI.

How reproducible are the volumetric measurements from gated perfusion SPECT when a one-day stress-rest protocol is used?

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Background: Changes in left ventricular (LV) volumes and ejection fraction (EF) on gated myocardial perfusion SPECT (MPS) between rest and stress acquisitions may indicate severe ischaemia and an adverse prognosis. Correct interpretation requires knowledge of the reproducibility of each measurement for the imaging protocol used.

Purpose: To establish the reproducibility of LV volumetric measures between the low-dose stress acquisition and high-dose rest acquisition of a one-day stress-rest technetium protocol in a large unselected population.

Methods: Over a one year period at a tertiary cardiac centre, all patients undergoing MPS using a one-day stress-rest protocol were identified retrospectively. LV volumes and EF were calculated automatically using Cedars Sinai QPS and GGS software. Patients were excluded if there was incomplete volumetric data, poor image quality preventing reliable quantification, or when LV EF was non-physiologically high (> 75%) on either acquisition.

Results: 1,636 studies were identified, of which 1,014 had no exclusion criterion. For the 621 studies without inducible hypoperfusion (no fixed defect in 539, fixed defect in 20), mean EF at rest was higher than after stress (62.4 ± 10.3% vs 61.2 ± 10.4%).
The added value of gated-PECT myocardial perfusion imaging among the elderly and very elderly patients: A turn for better prognosis?

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Background/Introduction: There is a continuing need to identify effective methods of non-invasive cardiovascular risk stratification, which may direct management decisions in the elderly and very elderly population. The diagnosis value of Gates-Single Photon Emission Computed Tomography (g-PECT) Myocardial Perfusion Imaging in the elderly remains scarce, particularly in octogenarians.

Purpose: To evaluate the added value of g-PECT in the diagnosis, prognosis and decision making in elderly and very elderly patients.

Methods: We conducted nuclear screening in 183 patients 65+ years old who were referred for diagnosis and stratification of CAD. All were screened by g-PECT (one day rest/stress Tc99m tetrofosmin or only rest); the stress protocol was made according to clinical conditions (dipyridamole or mixed: dipyridamole and exercise, and only exercise). Exclusion criteria: structural heart disease, dilated or hypertrophic myocardial, and heart failure. Patients were allocated in two groups: 1) elderly (65-79), and 2) very elderly (80+). We evaluated clinical characteristics, history of previous cardiovascular events and cardiovascular risk factors and indication of the study.

Results: From all 183 patients (162 elderly and 21 very elderly) mean age was 72 ± 5.5 years old. In the elderly mean age was 71 ± 4.21, whilst very elderly group mean age was 83 ± 2.3. Most common risk were ischemic event (p < 0.001), hypertension (73%), and dyslipidemia (52%); in the very elderly group were hypertension (90%), history of ischemic event (57%), and diabetes mellitus and dyslipidemia (38%) each. Indication of g-PECT: In the elderly group was control after a coronary intervention or surgical revascularization (51%) and in very elderly angina (42%). We conducted protocols as follows: 57.3% were mixed (rest/effort), 37.7% with dipyridamole infusion only, 3.8% only rest and 2 (0.9%) patients only exercise. Myocardial perfusion was positive in all patients. In the elderly group, 64.3% had mild, 29% had moderate, and 6.8% had severe ischemia; in the very elderly group, 76.2% had mild, 19% had moderate, and only one patient (4.8%) had severe ischemia.

From all patients, 21(11.4%) from the elderly group with moderate to severe ischemia were referred to catheterization; 12 of them underwent stent placement and 2 patients to surgical revascularization, 7 continued with medical treatment. None of the very elderly was referred to catheterization, since all (except one) were low to intermediate risk and received medical treatment.

Conclusion: G-PECT proved to add value in the diagnosis and decision making process in the elders and even in the very elders. This non-invasive cardiovascular imaging assessment is very safe, even conducting the effort protocol, and reduces the risk of referring a patient to an unnecessary catheterization. G-PECT represents to be a gatekeeper option and a turn for better prognosis risk stratification.
Abstracts

P338
Drug stress plus mild exercise stress is useful for reducing streak artifacts in myocardial perfusion SPECT
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Background: Streak artifacts are the most common source of error in myocardial single-photon emission computed tomography (SPECT) imaging. It has been often discussed that low grade exercise adding to drug stress may be useful for reducing the artifact, but it still remains controversial.

Purpose: The purpose of this study was to evaluate the effectiveness of drug plus low grade exercise stress to reduce streak artifacts.

Method: We examined 135 patients and divided 5 groups, drug stress only (group D, n=16), six minutes 25W (group 25W, n=34), six minutes 35W (group 35W, n=28), six minutes 45W (group 45W, n=24) and three minutes 50W (group 25-50W, n=33). We studied the data of summed stress score (SSS) ≤3, and used the planar imaging of them.

Result: In the planar imaging, there were significantly low in the max heart π (p<0.015, p<0.01) and minimum below heart count (p<0.01, p<0.031) between group D and group 35W, 45W, and significantly high in the ratio of max heart count to minimum heart count between group D and group 35W, 45W (p<0.028, p<0.014).

Moreover, there was significantly high in the ratio of max heart count to max lower heart count between group D and group 45W (p<0.046).

Conclusion: Our study suggests that drug plus more than 35W exercise stress is useful for reducing the stress artifact.

P339
Multidetector computed tomography in dilated cardiomyopathy in comparison with myocardial biopsy: its significance in myocarditis detection and prognosis
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Purpose: to study the significance of cardiac multidetector computed tomography (MDCT) in diagnosis of the myocarditis in patients with dilated cardiomyopathy (DCM) syndrome in comparison with myocardial biopsy and its prognostic value.

Methods: 127 patients (92 male, 46.3±11.8 years) with DCM syndrome (LVEDD 6.6±3.8 sm, LVEF 29.7±9.5%) were included. All of them were undergone 320-slices MDCT with an assessment of the late contrast enhancement (LCE), measurement of viral genome, anti-heart antibodies, Echo-CG, and MRI (n=24) and three minutes 25W plus three minutes 50W (group 35W-45W, n=28) low grade exercise stress to reduce streak artifacts.

Streak artifacts are the most common source of error in myocardial single-photon emission computed tomography (SPECT) imaging. It has been often discussed that low grade exercise adding to drug stress may be useful for reducing the artifact, but it still remains controversial.

Conclusion: Our study suggests that drug plus more than 35W exercise stress is useful for reducing the stress artifact.

P341
The utility of 99mTc-pyrophosphate SPECT in combination with left atrium 64-MDCT in diagnosis of latent myocarditis in patients with atrial fibrillation
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Background: Latent myocarditis is a frequent cause of heart failure in patients with atrial fibrillation (AF). Early diagnosis is important to start specific treatment. However, many cases of myocarditis are not discovered by clinical examination. The most accurate method for the diagnosis of myocarditis by SPECT is 99mTc-Pyrophosphate (99mTc-PYP) imaging

Methods: We examined 20 patients (pts) (15 males and 5 females, mean age 64.5±8.6) with isolated persistant or permanent AF. According to the results of clinical and instrumental examination, all patients underwent SPECT with 99mTc-Pyrophosphate (99mTc-PYP) 18 hours post injection (delayed SPECT), following by left atrium 64-MDCT. Both images were then combined using 2 marks (radionuclide and radiopaque) to define more exactly the localization of 99mTc- PYP uptake in the heart and to exclude ventricles blood pool and bone elements. Endomyocardial biopsy (EMB) samples were taken during catheter ablation of AF. SPECT-CT results were compared with the EMB and immunohistochemical findings.

Results: According to clinical and instrumental data only 11 pts regime of the arrhythmia, 7 pts- inspiratory dyspnea and in 6 pts was the relationship of AF and previously infectious disease. Any changes in the blood indicating inflammation have been identified in any pts. Moreover, in all patients LVEF was normal. According to histological data 92% of myocarditis was verified in 16 pts. In combination with left atrium 64-MDCT a potential as an effective noninvasive tool of diagnoses of latent myocarditis in pts with isolated AF. Acknowledgment: This study was supported by Russian Science Foundation “The role of autonomic nervous system in pathogenesis of ventricular and supraventricular arrhythmias” (gra).

Aim: To compare results of 99mTc-Pyrophosphate myocardium SPECT in combination with left atrium 64-MDCT with histology data in patients with isolated persistent atrial fibrillation (AF).

Materials and methods: We examined 20 patients (pts) (15 males and 5 females, mean age 64.5±8.6) with isolated persistant or permanent AF. According to the results of clinical and instrumental examination, all patients underwent SPECT with 99mTc-Pyrophosphate (99mTc-PYP) 18 hours post injection (delayed SPECT), following by left atrium 64-MDCT. Both images were then combined using 2 marks (radionuclide and radiopaque) to define more exactly the localization of 99mTc- PYP uptake in the heart and to exclude ventricles blood pool and bone elements. Endomyocardial biopsy (EMB) samples were taken during catheter ablation of AF. SPECT-CT results were compared with the EMB and immunohistochemical findings.

Results: According to clinical and instrumental data only 11 pts regime of the arrhythmia, 7 pts- inspiratory dyspnea and in 6 pts was the relationship of AF and previously infectious disease. Any changes in the blood indicating inflammation have been identified in any pts. Moreover, in all patients LVEF was normal. According to histological data 92% of myocarditis was verified in 16 pts.

Aim: To compare results of 99mTc-Pyrophosphate myocardium SPECT in combination with left atrium 64-MDCT with histology data in patients with isolated persistent atrial fibrillation (AF).
Conclusions: 

Values than CMR (p < 0.001) for ESV (67.8 ± 24.2 mL) and SV (85.9 ± 17.6 mL) (p < 0.001) than CMR but with a high correlation-coefficient (rho = 0.959, p < 0.001). DSCT showed higher mass values than CMR (p < 0.001), but with a high correlation (rho = 0.795, p < 0.001). DSCT versus Echo results were less correlated. No significant CAD was detected.

Discussion: The number of patients found with the criteria was not optimal and statistical determination could not be made to make an adequate correlation determination. However, if a trend of greater risk is shown in patients with Chagas disease with vascular pattern in the presence of ventricular tachycardia.

Abstract P343 Table. Ventricular Tachycardia in Chagas.

Ventricular tachycardia No Ventricular tachycardia Total

<table>
<thead>
<tr>
<th>Vascular pattern</th>
<th>5</th>
<th>1</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>No vascular pattern</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Normal spect</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>11 patients</td>
<td>8 patients</td>
<td>19</td>
</tr>
</tbody>
</table>

Total case with ventricular tachycardia 11 (57.8%).

P344 Measurement of left ventricular ejection fraction in candidates to implantable cardioverter-defibrillator: echocardiography versus radionuclide ventriculography in 67 patients

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Introduction: Conflicting results have been reported in the measurement of left ventricular ejection fraction (LVEF) by various techniques. Dealing with chronic heart failure patients (CHF) inaccurate LVEF measurement may lead to inappropriate cardioverter-defibrillator (ICD) implant.

Aim of the study: To assess the difference in measurements of LVEF obtained by echocardiography (ECHO) and radionuclide ventriculography (RNV) in a group of CHF patients candidates to ICD implant

Materials and methods: From 2010 to 2014 we studied 67 CHF patients (age 26-87 years mean 76, 54 mean and 13 females, class NYHA II-IV) candidates to ICD implant measuring the ejection fraction with both of methods (ECHO and RNV) during the hospitalization in our department. Measures were effected in the same day or the day after without clinical or therapeutic changes.

Results: The mean of LVEF at the Echo measurement was 37.61 ± 11.6% (range 20-78%). The mean of LVEF at the RNV measurement was 35 ± 12.5% (range 15-76%). The mean difference (Echo EF – RNV EF) was 2.6 ± 6.7% (range 12 - 22%).

The statistic analysis demonstrated a linear correlation, statistically significant, between the LVEF measured with the two methods (Fig 1) while the was not a statistically significant between the difference of the two means. Analyzing the dates with the Bland-Altman plot (fig.2) we noticed that, despite a modest mean difference the
values included in the confidence interval are distant from the median (respective 15.7% e -10.5%).

Conclusion: Our study shows a strong linear correlation between the values of LVEF measured with the two methods (Echo / RNV) as well as a modest mean difference, demonstrating the clinical utility of both. However, the wide range of mean differences (26.2%) recommended to base some clinical decisions, which the ICD implantation, on a integrated assessment of LVEF obtained with both methods.

Abstract P344 Figure.