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53 **Can Benefit be Expected from Further Risk Factor Modification in Treated Diabetics with Pre-clinical Coronary Artery Disease? A 64 Slice Coronary CT Angiography Study**

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54 **D-SPECT Myocardial Perfusion Imaging Provides Better Image Quality in Obese Patients – Result of a Multi-Center Trial.**

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55 **Estimation of Left Ventricular Ejection Fraction Using a Novel Acoustic-Based Device: Algorithm Development and Initial Clinical Validation**

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Can Benefit be Expected from Further Risk Factor Modification in Treated Diabetics with Pre-clinical Coronary Artery Disease? A 64 Slice Coronary CT Angiography Study

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Background and aims: Coronary artery disease (CAD) is a primary cause of mortality and morbidity in type 2 diabetes mellitus (DM) but is often deeply ingrained before symptoms occur due to non-modifiable risk factors (age, gender, duration of DM, past smoking) despite standard preventive medical therapy. In order to better define targets for further intervention in a cohort of well-treated diabetics with no known CAD we examined the correlation of treatable risk factors with pre-clinical coronary atheroma on 64 slice coronary CT angiography (CCTA).

Methods: Pts with hemoglobin A1C<7.0% and treated with statins and ACE inhibitors were selected (N=100) from 554 asymptomatic diabetics without known CAD undergoing CCTA in an ongoing prospective outcomes study (age 64.4±5.3 yrs, 54% women, mean duration of DM 8.3±7.1 yrs, clinic BP 140±18/81±10). Modifiable risk factors for coronary atheroma (current smoking, HbA1C, systolic blood pressure, total cholesterol/HDL-C ratio, waist circumference) were examined for their independent correlation with multi-vessel coronary artery atheroma after adjusting for factors that were non-modifiable at time of study entry (age, gender, duration of DM, past smoking).

Results: After adjustment for non-modifiable risk factors systolic hypertension was the only independent modifiable risk factor for coronary atheroma (odds ratio 1.35/10mmHg, 95%CI 1.07-1.6, p=0.015).

Conclusions: In asymptomatic diabetics >55 yrs with no history of CAD, DM for mean of 8 yrs and treated with guideline recommended therapy, clinic blood pressure remained an independent modifiable predictor of coronary artery atheroma on 64 slice CCTA.

D-SPECT Myocardial Perfusion Imaging Provides Better Image Quality in Obese Patients – Result of a Multi-Center Trial.

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BACKGROUND: D-SPECT (DS), a novel high-speed and ultra-sensitive single-photon emission computed tomography (SPECT) myocardial perfusion imaging (MPI) technology, has recently been shown to provide fast MPI with high image quality in a non selected population. Image quality in obese patients tends to be degraded. Therefore, we aimed to compare D-SPECT vs. conventional Anger camera SPECT (A-SPECT) MPI in obese patients.

METHODS Forty three patients (age 54±13, M 44%, weight 118±24 kg, BMI 42±6) underwent same-day Tc-99m sestamibi rest / stress MPI.

D-SPECT images were performed within 30 min after A-SPECT. Images were visually analyzed on separate occasions by two readers blinded to the scores given for the other imaging modality. Summed stress score (SSS) and summed rest score (SRS) were calculated. Images were qualitatively assessed with a 5-point scale (poor, fair, good, very good, excellent).

RESULTS SSS and SRS were 1.3±3.2 vs. 3.5±3.8 and 0.8±2.7 vs. 1.9±3.1 for D-SPECT and A-SPECT, respectively. D- SPECT SSS and SRS correlated with A-SPECT respective scores ($r=0.67$, $p<0.0001$ for SSS, and $r=0.90$, $p<0.0001$ for SRS). The rates of normal, equivocal and abnormal studies were 31/43(72%), 7/43(16%) and 5/43(12%) vs. 7/43(16%), 23/43(53%) and 13/43(30%) for D-SPECT vs. A-SPECT, $p=0.008$. In 7/8 cases where A-SPECT was abnormal and D-SPECT was normal, motion and/or breast artifacts were noticed. The rate of good and higher image quality was 42/43 (98%) vs. 29/43 (77%) for D-SPECT and A-SPECT respectively, $P<0.01$.

CONCLUSIONS In obese patients, D-SPECT technology provided better image quality than A-SPECT and reduced the rate of equivocal studies.

Estimation of Left Ventricular Ejection Fraction Using a Novel Acoustic-Based Device: Algorithm Development and Initial Clinical Validation

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Background: Heart sounds are related to heart function. We developed an algorithm and examined the feasibility of estimating left ventricular ejection fraction (LVEF) by a novel acoustic-based device (Vibration Response Imaging [VRI], Deep Breeze, Or-Akiva, Israel).
Methods: 141 subjects (117 patients and 24 healthy volunteers; age 55±15 yrs, 82% men) with sinus rhythm were examined by both the VRI device and echocardiography. Left ventricular ejection fraction (LVEF) was determined by echocardiography (echo-LVEF) using the biplane Simpson's method. Low-frequency acoustic signals (10-70 Hz) were recorded by VRI from the left posterior thorax by a matrix of 36 microphones during 8 seconds of breath-holding and an electrocardiogram was recorded simultaneously. The acoustic signals were processed digitally and an algorithm was developed to estimate LVEF (VRI-LVEF). The algorithm was based on a combination of multiple acoustic parameters (systolic and diastolic acoustic signals, beat-to-beat variability of acoustic signals, and propagation of the acoustic signals throughout the matrix), electrocardiographic, and clinical parameters. The algorithm was developed based on data from a stratified random sample of 70 subjects (training group) and tested on 71 subjects (validation group; the 2 groups were matched by LVEF).
Results: Mean LVEF was 51±15% (range 11-76%). LVEF was reduced (< 50%) in 55 subjects (39%) and severely reduced (< 35%) in 28 subjects (20%). Examples of peak early systolic acoustic signals in patients with normal and severely reduced LVEF are shown in the figure (graphic representation of spatial distribution of peak systolic acoustic signals in the matrix of microphones [top] and quantitative assessment of acoustic signals in the acoustic center during the cardiac cycle [bottom]). VRI-LVEF calculated by a multivariate algorithm correlated significantly with echo-LVEF (R^2 = 0.60; P <0.001). In all subjects (training and validation groups combined) – VRI-LVEF accurately predicted the presence of abnormal (<50%) or very abnormal (<35%) echo-LVEF, with sensitivities of 84% and 82% (respective sensitivities for detecting echo-LVEF <50% and <35%), specificities of 86% and 91%, positive predictive values of 79% and 70%, negative predictive values of 89% and 95%, and accuracies of 85% and 89% (similar results for training and validation groups).
Conclusions: LVEF can be estimated using a novel acoustic based device, with a high negative predictive value for detecting abnormal LVEF. This device may assist in triage of patients according to LVEF prior to definitive assessment of LVEF by echocardiography.