Cardiology
Coronary vascular dysfunction and prognosis in patients age 75 and older. Venkatesh Murthy1, Masanao Naya1, Rory Hachamovitch2, Courtney Foster1, Mariya Gaber1, Jon Hainer1, Sharmila Dorbala1, Ron Blankstein1, Marcelo Di carli1;
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Objectives: To evaluate the incremental prognostic value of quantitative coronary flow reserve (CFR) as measured by positron emission tomography (PET) in elderly patients aged 75 and older.

Methods: 704 consecutive patients aged 75 years and older referred for rest/stress Rb-82 PET were followed for a median of 1.2 years (IQR: 0.5-2.1). The extent and severity of PET perfusion abnormalities was assessed by semi-quantitative visual analysis. Rest and stress myocardial blood flows (MBF) were calculated using factor analysis and a 2-compartment kinetic model, and were used to compute CFR (stress/rest MBF). Cardiac mortality was ascertained using the Social Security and National Death Indices and medical records.

Results: Overall, 66 patients died from cardiac causes (9.4%). Patients with normal, mild-moderate, and severely abnormal PET scans based on semi-quantitative visual analysis showed a stepwise increase in annualized cardiac mortality rates (3.5, 5.6 and 11.3%, respectively; P=0.0001). After correction for clinical risk factors (Duke clinical score), resting left ventricular ejection fraction (LVEF) and its change during stress and the combined extent and severity of scar and ischemia, reduced CFR (below median value) was associated with increased mortality (HR 1.92 for CFR $\leq 1.5$ vs. $>1.5$, P=0.02). Cox proportional hazards analysis revealed that global CFR added incremental prognostic value beyond clinical and PET variables (incremental chi-squared=6.0, P=0.01; NRI=0.183, 95% CI 0.070-0.309). Annualized cardiac mortality rates among patients with normal MPI were 6.5 and 1.8% for CFR $\leq 1.5$ and $>1.5$, respectively (P=0.01; Figure 1).

Conclusions: Addition of quantitative CFR enables identification of low risk cohorts among elderly patients aged 75 years and older and provides incremental risk stratification over clinical variables, semi-quantitative measures of ischemia/scar and LVEF.
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Adding CFR improves diagnostic accuracy of $^{13}$N-ammonia PET MPI to detect CAD. Michael Fiechter, Jelena Ghadri, Gebhard Catherine, Tobias Fuchs, Aju Pazhenkottil, René Nkoulou, Bernhard Herzog, Felix Kuhn, Oliver Gaemperli, Philipp Kaufmann; Department of Radiology, Clinic of Nuclear Medicine, Cardiac Imaging, University Hospital Zurich, Zurich, Switzerland.

Objectives: Quantitative measurement of flow and coronary flow reserve (CFR) has been perceived as an important advantage of PET over SPECT MPI. We analyzed the added diagnostic value of CFR over PET MPI alone as assessed with $^{13}$N-ammonia and PET/CT to predict angiographic coronary artery disease (CAD).

Methods: Seventy-three patients underwent one-day adenosine-stress/rest $^{13}$N-ammonia PET/CT MPI and global CFR was calculated. The added value of CFR as an adjunct to MPI for predicting CAD (luminal narrowing $\geq 50\%$) was evaluated using invasive coronary angiography as a standard of reference.

Results: Sensitivity, specificity, positive predictive value, negative predictive value and accuracy of MPI for detecting significant CAD was 79%, 80%, 91%, 59%, and 79%, respectively. Adding the cut-off for global CFR<2.0 to MPI findings significantly improved the above values to 96%, 80%, 93%, 89%, and 92%, respectively ($P<0.005$).

Conclusions: The quantification of the global CFR in $^{13}$N-ammonia PET/CT MPI provides a substantial added value in diagnosing CAD. Particularly in patients with normal MPI it helps to unmask clinically significant CAD.

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Adaptive servo-ventilation therapy can improve cardiac sympathetic nerve activity, cardiac function, exercise capacity and symptom in chronic heart failure patients. Takuji Toyama, Hiroshi Hosizaki, Yosuke Honda, Akihito Kudo, Takashi Nagasaka, Hiroyo Mizunuma, Takefumi Tukada, Hitoshi Adachi, Shigeru Ohsima; Division of Cardiology, Gunma Prefectural Cardiovascular Center, Maebashi, Japan.

Objectives: Adaptive servo-ventilation (ASV) therapy was reported to be effective to improve central sleep apnea and to treat chronic heart failure (CHF). The purpose of this study is to clarify whether ASV therapy is effective to improve cardiac sympathetic nerve activity, cardiac function, exercise capacity and symptom in CHF patients.

Methods: In this study, 30 patients with CHF (DCM/ICM=26/4, male/female=28/2, age=68+/-9y.o), whose left ventricular ejection fraction (LVEF) was under 40% were divided into ASV therapy (ASV) group (n=15) and the conservative therapy (non-ASV) group (n=15) for half a year. Nuclear medical examinations including MIBG and MIBI imagings were performed. Exercise capacity was estimated using specific-activity-scale (SAS). Cardiac MIBG uptake was assessed as the heart/mediasitinum activity ratio (H/M) from anterior planar image and total defect score (TDS) which was the summation of defect scores (0= normal to 4=defect) from 17 SPECT segments, which were acquired in 4 hours after tracer injection. MIBG washout rate (WR) was calculated from anterior early and delayed planar images. Moreover LVEF, end-diastolic volume and end-systolic volume using MIBI quantitative gated SPECT were calculated. Delta value was calculated to subtract primary value from 6 months value.

Results: There were no significant differences on basic characteristics between two groups. Following values of ASV group were better (p<0.05) than non-ASV group in delta-TDS (-8.5+/-4.9 vs. 0.9+/-3.6) and delta-H/M (0.13+/-0.18 vs. -0.07+/-0.1) of I-123-MIBG imaging, delta-LVEF (5.5+/-4.2% vs. 0.7+/-3.0%), delta-SAS (2.1+/-1.9 vs. 0.3+/-1.0) and delta-NYHA (-0.9+/-0.7 vs. -0.1+/-0.3).

Conclusions: Adaptive servo-ventilation therapy for half a year is effective to improve cardiac sympathetic nerve activity, cardiac function, exercise capacity and symptom in patients with chronic heart failure.