to age and DM at baseline. Further including EF as a covariate does not improve the multivariable model (P=0.1)

	Univariate		Full adjustments	
	HR (95% CI)	P value	HR (95% CI)	P value
Age	1.1 (1–1.1)	<0.01	1.1 (1–1.1)	<0.01
Sex	1.2 (0.6–2.6)	0.6	1.1 (0.5–2.6)	0.8
BMI	1.0 (0.9–1.1)	0.6	1.0 (0.9–1.1)	0.4
DM	2.4 (1.2–4.8)	<0.02	2.7 (1.2–5.7)	0.01
HTN	1.5 (0.7–3.1)	0.3	1.3 (0.6–2.7)	0.5
Impaired GLS	1.2 (1.1–1.2)	<0.01	1.0 (0.9–1.1)	0.6
Impaired GLSR (0.1)	1.4 (1.3–1.5)	<0.01	1.4 (1.2–1.5)	<0.01
Impaired GCS	1.1 (1–1.2)	0.02	1.0 (0.9–1.1)	0.5
Impaired EF %	1.1 (1–1.1)	<0.01	1.0 (1–1.1)	0.1

Conclusion: In inpatients at long-term risk of HF, impaired GLSR is independently associated with an approximated 40% increased risk of new onset HF or mortality over a 4-year period.

P2746
Two-dimensional speckle tracking echocardiography for early triage of patients with acute chest pain: a TRAC-SI multicenter trial

K. Ishii[1], E. Hyodo[2], Y. Seo[3], T. Ishizu[3], E. Tada[4], H. Kihara[5], M. Daimon[6], A. Tanaka[7], T. Akasaka[7], H. Ito[8], H. Watanabe[9], J. Yoshikawa[2]. *[1]Kansai Electric Power Hospital, Cardiology, Osaka, Japan; [2]Nishinomiya Watanabe Cardiovascular Center, Cardiology, Nishinomiya, Japan; [3]Tsukuba University Hospital, Cardiology, Tsukuba, Japan; [4]Kansai Electric Power Medical Reseach Institute, Cardiology, Osaka, Japan; [5]Kihara Cardiovascular Clinic, Cardiology, Asahikawa, Japan; [6]University of Tokyo, Cardiology, Tokyo, Japan; [7]Wakayama Medical University, Cardiology, Wakayama, Japan; [8]Okayama University Hospital, Cardiology, Okayama, Japan; [9]Tokyo Bay Urayasu/Ichikawa Medical Center, Cardiology, Urayasu, Japan.* On behalf of A TRAC-SI Multicenter Trial

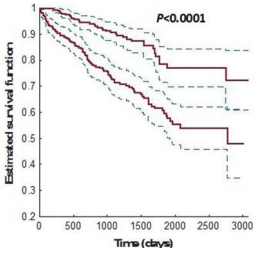
Background: Two-dimensional speckle tracking echocardiography (2D-STE) has been reported to be useful for the diagnosis of myocardial ischemia by detecting delay in regional myocardial expansion (diastolic stunning) up to many hours after an episode of angina. The hypothesis is that 2D-STE improves initial diagnosis in patients with possible acute coronary syndrome (ACS) who visit emergency department (ED) complaining of chest pain.
Methods: 388 consecutive patients with acute chest pain and without wall motion abnormality, who were admitted to an ED at 1 of 12 clinical sites in Japan, were enrolled and underwent 2D-STE at ED. Left ventricular (LV) longitudinal, circumferential, transverse and radial strain values at aortic valve closure (A) and one-third of diastole duration (B) were measured. The strain imaging diastolic index (SI-DI) was value was determined as: (A-B)/A×100% to assess the regional LV active relaxation and was used to identify the regional LV delayed relaxation. All patients underwent coronary CT or coronary angiography to establish the diagnosis of ACS. Clinicians were blinded to the 2D-STE results.
Results: Out of 388 patients, 2D-STE analysis was possible in 358 patients (92%). With assessment of coronary CT or coronary angiography, ACS was diagnosed in 114 patients (29%). 2D-STE was obtained at a mean of 5.3 hours after chest pain episode. SI-DI of longitudinal, circumferential, transverse and radial strain of ischemic segments were significantly lower than those of non-ischemic segments (30.4±18.4 vs. 73.1±25.4, 34.9±15.7 vs. 79.8±17.9, 38.7±18.3 vs. 81.3±23.5, 40.2±18.7 vs. 80.3±15.5, p<0.001, respectively), and transverse and radial SI-DI demonstrated high diagnostic accuracy (area under the curve: 0.83, 0.78, respectively). Sensitivity, specificity, and negative predictive value for ACS of transverse SI-DI are 80.5%, 67.0%, % and 90.4%, respectively, using a cut-off value of 65.6 (odds ratio: 9.3, 95% confidence interval: 5.9 to 18.7).
Conclusion: In patients with acute chest pain evaluated at ED, normal SI-DI could exclude ACS. Detection of diastolic stunning using 2D-STE at ER is a promising technique for the improvement of the initial diagnosis of ACS (UMIN000013859).

P2747
Left atrial longitudinal strain, left atrial size and left ventricular remodeling: implications for heart failure and preserved ejection fraction

M. Sardana[1], Z. Hashmath[2], G. Oldland[2], R. Miller[2], V. Satija[2], B. Ansari[2], J. Lee[2], R. Bhuva[2], A. Husain[2], A. Mustafa[2], W. Witschey[2], S. Akers[3], J. Chirinos[2]. *[1]University of Massachusetts, Medicine, Worcester, United States of America; [2]University of Pennsylvania, Philadelphia, United States of America; [3]Corporal Michael J. Crescenz VA Medical Center, Philadelphia, United States of America*

Background: Left atrial (LA) reservoir longitudinal strain (LSTR) has been proposed to be strongly dependent on LA volume. Whether LA LSTR predicts outcomes independently of LA volume index (LAVI) and left ventricular (LV) LSTR is controversial.
Purpose: We assessed the geometric determinants of LA LSTR and its association with death or heart failure (HF) admission, independently of LA geometry and LV LSTR.
Methods: We prospectively studied 640 adults without HF (n=419), HF with preserved ejection fraction (HFpEF, n=101), or HF with reduced ejection fraction (HFrEF, n=120). We measured LA and LV LSTR using feature-tracking MRI.
Results: HFrEF was characterized by greater absolute LV cavity, wall and epicardial volume, whereas HFpEF was characterized by abnormal relative LV and atrio-ventricular geometry (higher LA/LV maximum volume ratio and LV wall-to-cavity volume ratio). Both groups demonstrated LA enlargement. LAVI was associated with LA-LSTR (β=-0.29; P<0.0001), but this association was entirely based on relative LA-to-LV geometry, rather than absolute LV or LA volumes. Furthermore, LAVI was associated with LA strain independently of LV strain only in HFrEF (but not in HFpEF or subjects without HF). Although the LA/LV volume ratio was the key geometric determinant of LA-LSTR (β=-0.25; P<0.0001) in all groups, it was not itself predictive of incident death or HF admission over a median follow-up=37.1 months. In contrast, for any given LA size and global LV-LSTR, LA-LSTR was independently associated with incident death or HF admission (Hazard Ratio [HR]=0.63; 95% CI=0.47–0.84; P=0.0017). In analyses adjusted for clinical factors, LAVI, and LV ejection fraction, LA-LSTR was associated with incident adverse events (HR=0.70; 95% CI=0.51–0.96; P=0.0291; Figure), whereas LV-LSTR was not (HR=1.15; 95% CI=0.84 to 1.56; P=0.37).

Figure: Kaplan Meier survival curves for LA strain above (upper red curve) and below median (lower red curve). Dotted blue lines indicate 95% confidence interval



Conclusions: LA-LSTR is closely associated with the relative atrioventricular geometry, rather than LA size per se. LA-LSTR is predictive of incident adverse events independently of LA size and LV LSTR.
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P2748
The cardiac isovolumic contraction time predicts heart failure in the general population

A. Saed Alhakak[1], P. Brainin[1], R. Mogelvang[2], J. Skov Jensen[1], T. Biering-Sorensen[1]. *[1]Gentofte University Hospital, Department of Cardiology, Copenhagen, Denmark; [2]Rigshospitalet - Copenhagen University Hospital, Department of Cardiology, Copenhagen, Denmark*

Background: Color Tissue Doppler imaging (TDI) M-mode through the mitral leaflet is an easy and precise method to obtain cardiac time intervals. Our aim was to investigate if increased isovolumic contraction time (IVCT) as an early marker of systolic dysfunction could predict heart failure (HF) in the general population.
Methods: A total of 1,915 participants from the general population underwent a general health examination including TDI echocardiography. The IVCT was measured. The primary endpoint was HF. Prevalent HF was excluded (n=23).
Results: During a median follow-up time of 11 years, 123 (6.4%) participants were diagnosed with HF.
The risk of HF increased incrementally with increasing tertiles of IVCT, being approximately two-fold higher in the 3rd tertile as compared to the 1st tertile (HR 2.53; 95% CI (1.62–3.97), p<0.001) (figure). Assessing the association between IVCT and incident HF the risk increased with 29% per 10ms increase in IVCT (per 10 ms increase: HR 1.29; 95% CI (1.18–1.42), p<0.001). The association remained significant after adjusting for age, gender, hypertension, diabetes, body-mass index, previous ischemic heart disease, systolic blood pressure, heart rate, pro-BNP, eGFR, ejection fraction <50%, left ventricular mass index, E/e', E/A and the deceleration time (DT), (per 10ms increase: HR 1.19; 95% CI (1.03–1.37), p=0.022).

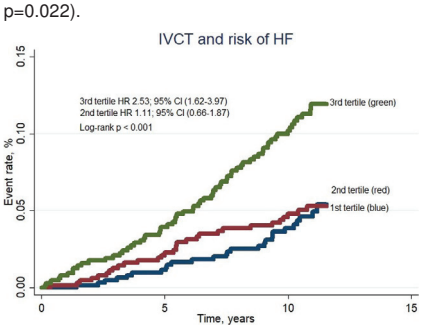


Figure 1

Conclusion: In a low risk general population, the IVCT provides novel prognostic information on the long-term risk of HF.

P2749
Tricuspid anulus displacement (TAPSE) is a determinant of cardiac stroke volume independently of left ventricular function

G. Borio[1], A. Rossi[1], G. Benfari[1], A. Barbieri[2], N. Gaibazzi[3], A. Erlicher[4], G. Mureddu[5], S. Frattini[6], G. Faden[7], M. Beraldi[8], A. Moreo[9], V. Lazzarini[8], F.L. Agostini[8], P. Temporelli[10], P. Faggiano[7]. *[1]Civil Hospital Maggiore at Borgo Trento, Cardiology, Verona, [2]Santa Maria Nuova Hospital, Reggio Emilia, [3]Hospital of Parma, Parma, [4]Regional Hospital of Bolzano, Bolzano, [5]S.Giovanni Calibita Fatebenefratelli Hospital, Rome, [6]Hospital of Cremona, Cremona, [7]Civil Hospital of Brescia, Brescia, [8]Hospital Carlo Poma, Mantova, [9]Niguarda Ca' Granda Hospital, Milan, [10]Fondazione Maugeri, Veruno, Italy*

Introduction: The determinants of cardiac stroke volume (SV), which is the final output of ventricular function, have been incompletely established. In particular it is unclear whether right ventricular function contributes to cardiac output independently of left ventricular (LV) and valves function.
Methods: Unselected consecutive patients were prospectively enrolled in multiple Italian centers.
A comprehensive echocardiographic evaluation was performed. LV volumes and ejection fraction (EF) were measured by means of biplane Simpson methods. Right ventricular function was measured by tricuspid annulus displacement (TAPSE). SV was measured at left ventricular outflow tract level. Tissue Doppler was performed and systolic (S') and diastolic tissue velocities registered. Averaged E/E' was measured. Mitral (MR), tricuspid (TR) and aortic (AR) regurgitation were semi-quantitatively evaluated. Systolic pulmonary pressure (sPAP) was measured by TR velocity.
Results: 1253 patients (mean age 65.5±15.1; male 54.5%) were included. Patient presented an EF of 56.2±10.9% (18.8% with an EF below 50%), mean TAPSE of 21.4±4.2 mm and E/e' of 10.2±6.3. At univariate analysis, EF, S', E/E', EDV, AF, TR, AR and TAPSE were associated with SV ($p<0.0001$ for all). After adjustment for confounders, TAPSE maintained an independent association with SV (OR 1.4; 95% CI 1.1–2.2; $p<0.0001$). The role of TAPSE is maintained even in the subgroups of EF impairment, diastolic dysfunction and pulmonary hypertension (Table).

TAPSE and SV in different subgroups

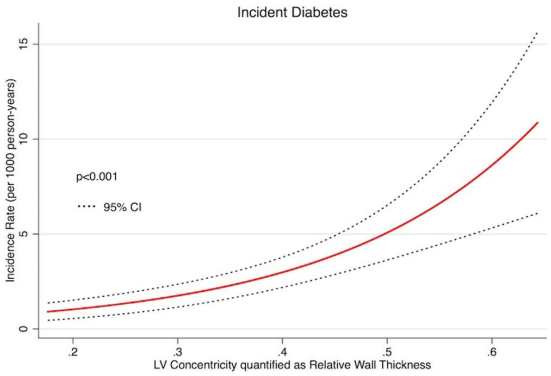
	Odds Ratio	95% CI	p value
EF ≥50%	1.47	1.02–1.91	<0.001
EF <50%	1.41	0.68–2.15	<0.001
E/e' ≥14	2.32	1.20–3.44	<0.001
E/e' <14	1.29	0.77–1.82	<0.001
sPAP ≥35 mmHg	1.82	1.25–2.39	<0.001
sPAP <35 mmHg	1.46	0.55–2.37	0.002

Discussion: SV is the final product of a complex interplay of multiple factors. Our data shows that TAPSE has an important independent and incremental role in its determinations. The present study underlies that a careful evaluation of right ventricular function is crucial in understanding cardiac dynamics.

P2750
Left ventricular concentric geometry predicts incident diabetes mellitus independent of established risk factors in the general population: the copenhagen city heart study

D. Modin[1], J.S. Jensen[1], R. Mogelvang[1], P.G. Jorgensen[1], M.T. Jensen[1], J.P. Seferovic[2], T. Biering-Sorensen[1]. *[1]Gentofte University Hospital, Department of Cardiology, Copenhagen, Denmark; [2]Clinical center of Serbia, Diabetes and Metabolic disorders, Belgrade, Serbia*

Background: Subtle impairments in left ventricular (LV) function and geometry are common findings in diabetic individuals. However, whether these impairments precede the development of Diabetes Mellitus (DM) is not entirely clear.
Methods: Echocardiograms from 1694 individuals from the general population free of prevalent diabetes mellitus or heart failure were analyzed by conventional and tissue Doppler imaging methods. Left ventricular (LV) concentric geometry was defined as either LV concentric remodeling or LV concentric hypertrophy as directed in contemporary guidelines. The severity of LV concentricity was assessed by relative wall thickness (RWT) calculated as posterior wall thickness (PWT) indexed to left ventricular internal diameter at end diastole (LVIDd) (RWT = 2*PWT / LVIDd). End point was incident DM.
Results: Median follow-up time was 12.6 years (IQR: 12.0–12.8 years). Follow-up was a 100%. A total of 55 participants (3.3%) developed DM during follow-up. At baseline, the prevalence of a concentric LV geometric pattern was significantly higher (41.8% vs 20.3%, $p<0.001$) in individuals who developed DM during follow-up. In a final multivariable model adjusting for age, sex, systolic blood pressure, smoking status, total cholesterol levels, triglyceride levels, BMI, blood glucose, HbA1C levels, prevalent ischemic heart disease and A wave velocity, LV concentric geometry and RWT remained significantly associated with incident DM (LV concentric geometry: HR 2.06, 95CI 1.15–3.71, p=0.016) (RWT: HR 1.43, 95CI 1.08–1.90, p=0.012, per 0.1 increase). This association remained despite adjustment for established risk factors for DM.



Incident diabetes and LV concentricity

Conclusion: Altered LV geometry may precede the development of DM. LV concentric geometry determined by echocardiography and the severity of LV concentricity evaluated as RWT are associated with incident DM in the general population.

P2751
Mechanical dispersion as marker of left ventricular dysfunction and prognosis in stable coronary artery disease

B.A. Havneraas Kvisvik[1], E.N. Aagaard[1], L. Morkrid[2], H. Rosjo[1], M.K. Smedsrud[3], C. Eek[4], B. Benz[4], K.H. Haugaa[4], T. Edvardsen[4], J. Gravning[4]. *[1]Akershus University Hospital, Oslo, Norway; [2]Oslo University Hospital, Department of Medical Biochemistry, Oslo, Norway; [3]Oslo University Hospital, Department of Paediatric and Adolescent Medicine, Oslo, Norway; [4]Oslo University Hospital, Department of Cardiology, Oslo, Norway*

Background: Assessment of global longitudinal strain (GLS) is superior to ejection fraction (EF) in evaluation of left ventricular (LV) dysfunction in patients with stabile coronary artery disease (CAD). However, the role of mechanical dispersion (MD) in this context is unresolved.
Objectives: We aimed to evaluate the potential role of MD as marker of subtle LV dysfunction and long-term prognosis in patients with stable CAD.
Methods: EF, GLS and MD were assessed in 160 patients with stable CAD, one year after successful coronary revascularization. Serum levels of high-sensitivity cardiac troponin I and amino-terminal pro B-type natriuretic peptide were quantified as markers of LV dysfunction. The primary end point was defined as all-cause mortality, whereas the secondary end point was defined as the composite of all-cause mortality and hospitalization for acute myocardial infarction or heart failure during follow-up.
Results: MD was successfully quantified in 98% of the patients (46±14 ms, [mean±SD]). There were no significant associations between EF and the biochemical markers of LV dysfunction, while both MD and GLS correlated with hs-cTnI (R=0.450 and R=0.307, $p<0.01$) and NT-proBNP (R=0.379 and R=0.202, $p<0.05$). During a mean (±SD) follow-up of 8.5±0.4 years, 14 deaths and 29 secondary events occurred. Only MD was significantly increased in nonsurvivors, and also associated with both the primary and secondary end point in a Cox regression model, after adjustment for EF and GLS.
Conclusions: In patients with stable CAD, MD may be a promising marker of subtle LV dysfunction and adverse prognosis.

CLINICAL USEFULNESS OF CARDIAC CT

P2752
Anatomy of coronary artery relevance to ablation in the pulmonary sinus

X. Dong, M. Tang, Q. Sun, S. Zhang. *Fuwai Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Department of Cardiology, Beijing, China People's Republic of*

Background: Ablation above pulmonary sinus of Valsalva (PSV) becomes increasingly common in certain ventricular outflow arrhythmia. Understanding of the regional anatomy is intensively concerned to avoid procedure complications.
Purpose: To describe the anatomic relationships of pulmonary sinus of Valsalva (PSV) to its adjacent structures using analysis of computed tomographic coronary angiograms (CTCA).
Methods: We studied 145 patients investigated for chest pain with CTCA. The relationships between the PSV and adjacent structures were described by analysis of 2-dimensional images and 3-dimensional reconstructions.
Results: The left adjacent sinus (LAS) located within 5 mm of the left main coronary artery (LMCA) in 67% (within 2 mm in 19%) and from the LAD in 87% (within 2 mm in 36%). The anterior sinus (non-adjacent sinus) was within 5 mm of the left anterior descending coronary artery (LAD) in 1% and out of 5 mm from LMCA in all cases. 93% LAS was within 5 mm of the left aortic sinus of Valsalva (within 2 mm in 27%), remaining 80% right adjacent sinus (RAS) within 5 mm from as-