

index remained unchanged in the AP group and on a lower level in the EI group. In contrast during DI, systolic strain and stroke volume initially increased (5µg/kg/min: strain=77±6%, p<0.01), then progressively returned to baseline. During EI, stroke volume and systolic strain decreased (strain=38±2%, p<0.001). Pacing also decreased stroke volume and systolic strain in the AP (180/min: strain=36±2%, p<0.001) and EI groups (180/min: strain =25±3%, p<0.001).  
 Conclusions: For normal myocardium, peak systolic strain rate may better reflect regional contractile function and is more independent of HR and stroke volume. In contrast systolic strain is mainly related to stroke volume and therefore reflects on a regional myocardial level changes in global hemodynamics.

10:36 a.m.

**1165MP-129 Accurate Detection of Regional Contraction Using Angle-Corrected Tissue Strain and Displacement Imaging Combined With Two-Dimensional Tissue Doppler Tracking Technique**

**Yasuhiro Abe,** Takuya Sasaki, Ryoichi Kanda, *Toshiba Medical Systems R&D Center, Tochigi, Japan.*

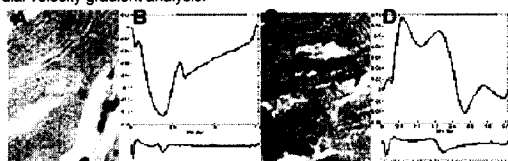
**Background:** Myocardial velocity gradient or strain rate has been used to assess regional myocardial contraction. However these methods are susceptible to noise since they are defined as the spatial derivative of local velocities determined by tissue Doppler imaging (TDI). Strain or displacement is more robust to noise since it is based on integration of velocity over time, but requires tracking of the myocardial motion throughout the cardiac cycle to accurately determine the local velocity at the same myocardial location. We have, therefore, developed prototype software (ApIq, Toshiba Corp., Japan) to obtain 2-dimensional (2D), angle-corrected tissue strain/displacement imaging with the tissue Doppler tracking (TDT) technique and have validated it by a numerical modeling study.  
**Method:** Transmural velocity distribution was numerically modeled from the following conditions to generate the parasternal short axis TDI data: end diastolic wall thickness (10mm), linear velocity gradient with constant velocity (60mm/sec) at endocardium, and systolic wall thickness (15-25mm). A contraction point was set at the center of the left ventricular cavity and velocity was automatically angle-corrected. The myocardial velocities were obtained throughout the cardiac cycle with and without TDT technique. Then, displacement was obtained by integrating angle-corrected velocity over time. Finally, strain is obtained as spatial derivative of the displacement.  
**Results:** Compared with the theoretically estimated values, both the error of peak position (PP) and the error of peak displacement were significantly smaller with TDT (p<0.05) than that without TDT. (PP error: TDT(+) =0.3±0.2 mm, TDT(-) =-8.1±2.5 mm; Peak displacement error: TDT(+) =0.3±0.1 mm, TDT(-) =1.3±0.8 mm) Similar results were confirmed with strain.  
**Conclusion:** The newly developed angle-corrected tissue strain/displacement imaging could accurately detect the regional strain/displacement when combined with TDT. It is important to utilize 2D tissue Doppler tracking technique to obtain accurate detection of regional contraction.

10:48 a.m.

**1165MP-130 Regional Myocardial Velocity Gradient and Histologic Analysis of Experimentally Altered Myocardial Energetics**

**Peter C. Anagnostopoulos,** Cristina Pistoru, Petras Dzeja, Marek Belohlavek, *Mayo Clinic, Rochester, Minnesota.*

The purpose of this study was to examine if myocardial velocity gradients (MVG) could quantitate regional changes associated with experimentally altered myocardial energetics and to relate these changes to histology.  
**Methods:** Echo and tissue velocity images were obtained from 10 open-chest pigs at baseline and incrementally after intracoronary infusion with iodoacetamide (IAA), a potent inhibitor of creatine kinase (CK) and glyceraldehyde dehydrogenase (GADPH). Inhibition of CK results in uncoupling myocardial contraction, reduced crossbridge cycling, and impaired calcium handling. MVG from normal and IAA infused myocardium were compared. Myocardial biopsies of normal and IAA zones were obtained, rapidly cooled, assayed for CK and GAPDH activity, and examined histologically.  
**Results:** Following IAA infusion, we observed increased echogenicity and wall thickness, and decreased regional wall motion. MVG analysis revealed decreased systolic shortening, shortening of ejection period, and the development of regional diastolic dysfunction (post systolic shortening). Histologic findings are shown below. Enzyme analysis showed a near 100% reduction in CK and GAPDH activity occurring at a dose of 130 mmol/g myocardium.  
**Conclusion:** In this novel model of selective metabolic inhibition of myocardium, we demonstrate parallel changes in local function related to histologic changes and measurable by myocardial velocity gradient analysis.



A - Histology of normal myocardium taken from a region outside the IAA infusion. B - graph demonstrating normal strain pattern (value = -14.8%) without a significant post systolic shortening. C - Histology of IAA infused tissue with normal cellularity and long sequences of fine bands (contraction bands)(Arrows) signifying overlap of actomyosin filaments. D - graph demonstrating impaired strain (value +13.8%) with a significant post systolic shortening.

POSTER SESSION

**1166 Electron Beam Computed Tomography: Epidemiology and Comparative Studies**

Tuesday, March 19, 2002, 9:00 a.m.-11:00 a.m.

Georgia World Congress Center, Hall G  
 Presentation Hour: 10:00 a.m.-11:00 a.m.

**1166-54 Inverse Relationship Between Simultaneously Measured Coronary Calcification and Bone Mineral Density in 12,000 Patients: Relationship to HDL Cholesterol**

**Amanda Patenaude,** Jerry Friede, Alistair I. Fyfe, *Medical City Dallas Hospital, Dallas, Texas, Vital Imaging, Dallas, Texas.*

While coronary calcification and osteoporosis are both associated with aging, it is not clear whether there is a causal or incidental link between the two.  
**METHODS:** Bone density and coronary calcification were simultaneously measured in 12,470 patients, 4500 women and 7970 men using electron beam tomography. Bone density was measured at L4,5 and coronary calcification scored (CAS) using the Agatston method. Advanced lipid testing using NMR spectroscopy was used in a subgroup of 179 patients 69 females, 110 males, including Lp(a), homocysteine and HS-CRP. Results were compared using both simple and multiple logistic regression analysis.  
**RESULTS:** Patient age range was 16 to 96 years (mean 56 years). There was a predicted age dependent decline in bone mineral density for both men (p<0.005), and women (p<0.0005). CAS was positively correlated with age in men (p=0.0005) and women (p<0.0005). There was a significant independent inverse correlation between bone density and coronary calcification in men (p<0.0005), but this was not true in women (p=0.78). There was an age and gender independent relationship between bone mineral density and HDL cholesterol levels (p<0.01). There was no relationship between bone mineral density and Total cholesterol, LDL concentration, small dense LDL, Lp(a), homocysteine or HS-CRP.  
**CONCLUSIONS:** Coronary calcification in men appears to be directly related to bone mineral loss; in women, the relationship is less clear. Low HDL cholesterol levels are related to osteoporosis in both men and women.

**1166-55 Increased Severity of Coronary Atherosclerosis Among Asymptomatic Asian-Indians**

**Arun Hatwarkar,** Nisha Patel, David S. Reiss, Matthew J. Budoff, *Harbor-UCLA Research and Education Institute, Torrance, California.*

**Background:** Many studies have reported an increased mortality from coronary artery disease in Asian-Indians compared with other ethnic groups. Electron beam tomography (EBT) can be used for quantitation of the amount of coronary artery calcium (CAC).  
**Objective:** To evaluate whether ethnic differences exist in the prevalence and severity of CAC in asymptomatic, high risk individuals.  
**Methods:** We evaluated persons of different ethnic groups from among asymptomatic persons enrolled in ongoing studies of atherosclerosis. We measured prevalence of cardiovascular risk factors, prevalence and severity of CAC with EBT, and assessed the independent contribution of ethnicity with multivariate analysis.  
**Results:** 1,446 asymptomatic persons of various ethnic groups were queried on risk factors and scanned using EBT. Table 1 demonstrates the prevalence of cardiovascular risk factors and CAC results for each ethnic group. Patients of Asian-Indian descent (n=156) had a higher mean CAC score than other ethnicities. This persisted despite a lower incidence of hypertension than all other races. After multivariate analysis, Asian-Indian race was a significant predictor of the severity of CAC (odds ratio 1.26; 95% CI 1.05,3.97). Persons of Asian and African-American descent had lower prevalence and CAC burden.  
**Conclusions:** Asian-Indian race was associated with increased plaque burden, despite a lower incidence of hypertension, and similar incidence of other cardiovascular risk factors in this study.

**Risk Factor Prevalence and CAC Values (\*p<0.05 as compared to Asian Indians)**

Race	Number	CAC Prevalence	Mean Score	Median Score	Hypertension	Tobacco Use	Diabetes	High Cholesterol	Family History
Asian-Indian	156	62%	188	23	22%	8%	18%	35%	48%
Asian	357	58%	64*	11	36%*	9%	15%	40%	43%
Hispanic	617	53%	159	2	33%*	8%	13%	35%	50%
African-American	316	53%	60*	3	51%*	12%	15%	33%	47%

**1166-56 Determinants of the Progression of Coronary Calcification: A Multivariate Analysis in 250 Patients**

**Ralph Maeffert,** Karsten Pohle, Dieter Ropers, Matthias Regenfuss, Magda Kusus, Theresa Menendez, Gerd Muschliol, Werner Moshage, Werner G. Daniel, Stephan Achenbach, *Department of Internal Medicine, Division of Cardiology, University of Erlangen, Germany, Erlangen, Germany.*

**Background:** Electron Beam Tomography (EBT) permits quantification of coronary calcification (CC), the amount of which correlates to the coronary atherosclerotic plaque burden.  
**Methods:** Using EBT, we measured the progression of coronary calcification (CC) in 250 patients (pts), mean age: 62.1±9y, 88.3% male, mean LDL-cholesterol level (LDL) 131.7±42 mg/dl) and analyzed the influence of atherosclerotic risk factors. EBT was performed at baseline and repeated after a mean interval of 17.3±4 month with identical acqui-