ANALYSIS OF SEGMENTAL MYOCARDIAL FUNCTION AFTER LOAD ALTERATION USING MRI TISSUE TAGGING

Linda C. Palmon, Nathaniel Reichek, Barbara Tallant, Susan B. Yeon, Joao Lima, Eric Hoffman, Leon Axel, Hospital of the University of Pennsylvania, Philadelphia, Pa.

Magnetic resonance tagging provides a noninvasive method to evaluate segmental myocardial function topographically. Using one such technique, Spatial Modulation of Magnetization (SPAMM), we have demonstrated transmural heterogeneity of segmental myocardial shortening in normal human LV. To determine the load dependence of segmental shortening heterogeneity, we examined circumferential segment shortening (%S) before and after phenylephrine (phenyl) infusion in normal canine LV using SPAMM. Magnetic resonance imaging and high fidelity LV pressure recordings were performed in 6 sedated adult dogs before and after phenyl infusion, and %S determined at anterior, inferior, lateral, and septal regions in endocardial, midwall, and epicardial layers on 3-6 slices. Mean basal LV end-systolic pressure was 115±13 mmHg before, and 208±10 mmHg after phenylephrine. Mean basal heart rate was 93±10 before, and 100±12 after phenyl.

	(%S)endo	(%S)mid	(%S)epi	p
basal	33±11	20±8	15±10	.0001
phenyl	26±11	16±9	12±10	.0001
p	.0001	.0001	.01	

Results demonstrated significant global depression of %S after phenyl infusion. However, the normal transmural gradient was preserved from endocardium to epicardium. Regional differences in %S were not significant. We conclude that despite known transmural and regional differences in fiber orientation, normal heterogeneity of segmental shortening is preserved during increased afterload.

EFFECT OF ANGIOTENSIN II ON REGIONAL WALL MOTION AND RELAXATION IN INTACT DOGS.

Toshiro Miura, Valmik Bhargava, Brian D. Guth, Shunichi Miyazaki, Ciro Indorfy, Katharina S. Sunnerhagen, and Kirk L. Peterson.

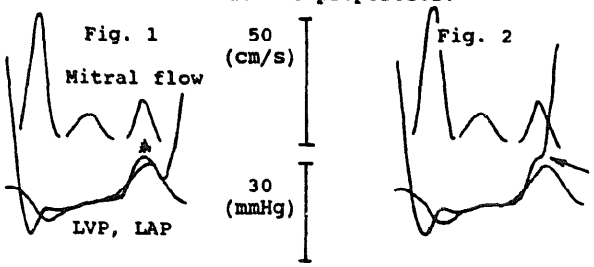
University of California San Diego, and VA Medical Center, San Diego, CA.

To assess the effect of increased afterload on left ventricular function, left ventricular pressure was measured by Millar catheter and its decay rate (Tau) calculated in 7 dogs. Regional wall motion was assessed by a new frame-by-frame video-intensity technique which correlates regional intensity to global during each 50 msec, yielding slope of linear regression, a measure of transient asynchrony. Slopes <1 are defined as abnormal. At control, asynchrony was not detected in any region. After infusion of angiotensin II, peak left ventricular pressure increased by 35 mmHg with significant increase in Tau (32 ± 4 to 39 ± 7 msec, p<0.005). Mean ejection fraction decreased from 46% to 33% (p<0.01). All dogs showed early diastolic asynchrony. Five of seven displayed diastolic asynchrony in apical region and remaining two in inferior region. During early systole, asynchrony was noted in apical region in five of seven animals and inferior region in one. Mean slope in abnormal regions were -0.32 in early systole and -0.73 in early diastole. The corresponding mean values in normal regions were 2.67 and 3.29. Thus, increased afterload resulted in transient asynchrony in both early systole and diastole in intact left ventricle, which may contribute in part to slow relaxation estimated by Tau.

THE LEFT VENTRICULAR END DIASTOLIC PRESSURE MAY NOT BE UNIQUELY RELATED TO THE END DIASTOLIC VOLUME IN HEART FAILURE

William Stevenson-Smith, Steven Solomon, Guillaume Jondeau, Kang-xiong Liao, Tadashi Tanoue, Monir Shikan, Anil Khullar, Chaim Yoran, Edward L. Yellin, Albert Einstein College of Medicine, Bronx, NY

In 5 dogs with tachycardia-induced congestive heart failure (enlarged LV with elevated EDP), LVEDP frequently rose and fell with LA contraction (Fig. 1,[*]). Measurements of LAP, LVP, and pulsed Doppler mitral flow, eliminated mitral regurgitation (ie, decreasing volume). A nonlinear, volume and strain-rate dependent, viscoelasticity is a plausible explanation: pressure depends on flow rate as well as on compliance. This phenomenon is most evident in the chronically dilated heart and we assume it is due to structural changes in the myocardium. When it is masked by short, but normal, PR intervals (Fig. 2), the LVEDP [arrow] or wedge pressure will **not** be uniquely related to the volume, and can be a misleading index of LV volume and passive diastolic elastic properties.



Thursday, March 7, 1991
Poster Displayed: 9:00AM–12:00NOON
Author Present: 10:00AM–11:00AM
Hall F, West Concourse
Clinical Pharmacology: Ischemia, Coronary Artery Disease—Mechanisms

DEHYDROEPIANDROSTERONE *IN VIVO* AND *IN VITRO* INHIBITS PLATELET AGGREGATION.

Robert Jesse, John Nestler, David Eich, Michael Hess, Medical College of Virginia, Richmond, VA

Dehydroepiandrosterone (DHEA) is an endogenous androgenic steroid with a myriad of physiological effects, including the ability to delay progression of atherosclerosis in certain animal models. We hypothesized that a potential mechanism for this effect could be through an influence on platelet function. Platelet aggregation was studied in citrated platelet-rich plasma (PRP) by turbidimetric techniques. Addition of 3.3 to 10.0 μM DHEA-sulfate (DHEA-S) to PRP showed a dose dependent inhibition of arachidonic acid induced platelet aggregation which was in part dependent upon the length of time the platelets were exposed to DHEA prior to aggregation being initiated by the addition of arachidonate. At 3.3 μM DHEA completely inhibited aggregation with a preincubation period of 5.0 min., while at 10.0 μM aggregation was completely inhibited with pre-incubation less than one min. Thromboxane B_2 production declined proportionally to added DHEA-S: control = 96.8 ± 6.2 pg/ml PRP, with 3.3 μM DHEA-S = 46.0 ± 4.0, 6.7 μM = 27.3 ± 1.1 and 10 μM = 21.8 ± 1.8 pg/ml PRP. In a double blind placebo controlled trial, male volunteers ages 22 to 37, were given either placebo (n=5), or 300 mg of DHEA t.i.d. (n=5), for 14 days. Baseline values for aggregation and DHEA/DHEA-S were determined on 3 occasions prior to starting medication. These were again tested on days 7, 10, 14, and 30. Four of the 5 patients taking DHEA developed a delay in the rate of aggregation or an increase in the minimal concentration of arachidonate needed to initiate aggregation; in one patient aggregation was completely inhibited. In the fifth patient there was no change. None of the patients taking placebo had any changes in aggregation. At baseline, serum DHEA was 5.83 ± 3.9 ng/ml: levels between day 7-14 in the treated group were 28.7 ± 13.9, and in the placebo group were 5.58 ± 4.1 ng/ml. Serum DHEA-sulfate was 316.20 μg/dl at baseline, and between day 7-14 was 1451.9 ± 419.5 in the treated group and 260.5 ± 56.7 ug/dl in the placebo group. We conclude that increasing serum DHEA concentration can affect platelet reactivity, both when added directly to platelet rich plasma or when taken orally prior to preparation of PRP.