

DEVELOPMENT OF ISCHEMIC CONTRACTURE IN NORMAL AND HYPERTROPHIED RAT HEARTS: EFFECT OF PRETREATMENT WITH VERAPAMIL. Stanley B. Digerness, Azai Appelbaum, Leif A.L. Bergdahl, and John W. Kirklin. University of Alabama in Birmingham, Birmingham, AL 35294

Ischemic contracture and the effects of verapamil were studied in the isolated rat heart exposed to normothermic ischemia followed by reperfusion. Function before ischemia and after 30 to 40 min of reperfusion was measured with a left ventricular balloon. Hypertrophied hearts were produced by banding the ascending aorta for 7 to 10 days. Verapamil (2 mg/L) was infused 5 min before ischemia and for the first 5 min of reperfusion. Normal untreated hearts (N=5) developed contracture at an average of 19.6 min, verapamil-treated hearts (N=5) an average of 30.4 min, the difference being significant ($P < 0.01$). Hypertrophied untreated hearts (N=7) developed contracture at 13.3 min, while hypertrophied verapamil-treated hearts (N=7) developed contracture at 27.6 min. This difference was also significant ($P < 0.01$). Systolic functional recovery (developed pressure and dP/dT) were significantly depressed in all groups, and end-diastolic pressure significantly elevated, indicating damage was severe and irreversible. Thus, verapamil significantly delays ischemic contracture development in both normal and hypertrophied rat hearts; hypertrophied myocardium develops contracture sooner than normal myocardium. Once contracture occurs, however, irreversible damage has taken place. Supported by NHLBI contract 5P50 HL-17667(SCOR), NIH.

SPONTANEOUS CARDIAC HYPERTROPHY DURING RECOVERY FROM PERINATAL NUTRITIONAL ALTERATION OF RAT HEART GROWTH. Russell T. Dowell Dept. Physiol., Univ. Kansas Med. Ctr., Kansas City, KS 66103

Heart development is changed by perinatal nutrition. Adjusting litters to 4, 8, or 16 rats/litter at 4 days post-birth affects the numbers of cells and mitochondria in the LV of 21 day-old rats. Fast-growing (4/litter) rats have greater numbers of LV cells and mitochondria than slow-growing (16/litter) rats. At 21 days of age, LV pressure and contractility (dP/dt) are directly related to cell and mitochondrial numbers despite uniform levels of myofibrillar ATPase. Recovery from LV growth modification was evaluated in previously litter-size adjusted rats which were weaned, housed in groups of 4, and fed ad libitum until 63 days old. LV weight of 4/litter rats increased from 197 ± 6 mg ($X \pm SE$; n=8) to 703 ± 18 . LV growth in 16/litter rats (123 ± 6 to 625 ± 21 mg) was accelerated. Total DNA is fixed at $1,500 \pm 100$ μ g in normal, adult rat LV. DNA values were 20-30% lower ($1,162 \pm 42$ μ g) in LV of adults from 16/litter groups; thus, LV growth was enhanced via hypertrophy. Protein/DNA values (mg/mg) of 79 ± 5 and 56 ± 1 in slow- and fast-growing groups, respectively, verify this conclusion. LV dP/dt was altered under control conditions in slow- ($5,630 \pm 500$ mmHg/sec) vs fast-growing ($6,740 \pm 200$) groups. Differences were maintained during complete aortic occlusion ($9,070 \pm 340$ vs $10,220 \pm 240$). Spontaneous cardiac hypertrophy during recovery from perinatal nutritional modification influences adult heart contractile function. (Supported by HL 28456 and HD 16247).