73 HEMODYNAMIC RESPONSES TO ERGOMETER EXERCISE IN CHILDREN WITH ASD OR VSD

Bruce S. Alpert, Darlene M. Moes, Robert H.DuRant, William B. Strong (Spon. by J.F. Griffith) University of Tenn Center for the Health Sciences, Dept. Pediatrics, Memphis.

Our previous maximal exercise studies performed on patients with left ventricular volume or pressure overload or cyanotic lesions revealed decreases of heart rate(HR), systolic blood pressure(BP), workload(Wmax), and peak working capacity index(PWCI)in comparison to 405 healthy controls. We sought to define these data in children with ASD (n=35) or VSD (n=79). The data were compared by analysis of covariance, controlling for age, sex, race, and body surface area.

	Control	ASD	VSD
HR (min^{-1})	192	171*	177*
BP (mmHg)	145	149	151
Wmax (kg.m/min)	557	512	545
PWCI (kg.m/min/kg)	14.9	12.9*	13.9

*=p<0.05 compared to control; mean values shown

Age and body surface area were significant covariates for the BP, Wmax, and PWCI variables. There were strong main effects of race on HR and BP values, and both race and sex on the 2 workload indices. The ASD and VSD patients had decreased values of maximal HR; the ASD patients had lo$_{\text{w}}$ values of PWCI. As in almost all other patient groups, the BP response to exercise for ASD or VSD patients did not differ from control. Racial influences on BP were significant; in each comparison, the black children had higher values than their white counterparts.

74 CHILDREN'S CARDIOVASCULAR REACTIVITY-HEART RATE RESPONSES TO PSYCHOLOGIC STRESS AND THEIR MODULATION BY RACE OF EXPERIMENTER

Bruce S. Alpert, Joseph K. Murphy, Darlene M. Moes, William B. Strong (Spon. by J.F. Griffith) University of Tennessee Center for the Health Sciences,Department of Pediatrics, Memphis.

Our studies have shown increased systolic blood pressure(BP) reactivity to physical stress(exercise)in healthy black(B) children in comparison to healthy white(W) counterparts. We sought to determine the hemodynamic responses to another stressor, the psychologic challenge of 3 video pong games under increasingly demanding instructions. Heart rate (HR) and BP were measured in 170 healthy children(subjects). The HR delta values (maximal minus resting)were:

Subject	Game	W^aW^b	WB	BW	BB
M	1	4.1*	-3.6*	1.0	2.5
	2	7.3*	-0.7	2.4	4.4*
	3	10.7*	4.6*	7.5	10.0*
F	1	5.0*	-3.0	1.0	8.1*
	2	5.5*	3.9	5.9	9.3*
	3	3.8	6.0	4.9	7.9*

a=subject race; b=experimenter race; *=p<.05

The delta values for both systolic and diastolic BP were similar to those shown for HR.

The race of the experimenter (BorW)was a critical variable in the respones;same-race experimenter-subject pairs had significantly greater reactivity than mixed-race pairs. Research into the mechanisms of essential hypertension must address the issue of experimenter race if both B and W subjects are studied.

●75 DEVELOPMENTAL DIFFERENCES IN CARDIAC FUNCTION IN HUMAN NEONATES.

Robert S. Appleton, Thomas P. Graham, Robert B. Cotton, Gordon A. Moreau, Robert J. Boucek. Vanderbilt University, Department of Pediatrics, Nashville.

There are limited data on cardiac function in premature infants. Computer-determined instantaneous velocities of the left ventricular(LV) minor axis provide estimates of systolic and diastolic function. We determined the LV Maximal Velocity of Shortening(MVS) and Maximal Velocity of Lengthening(MVL) for 32 neonates of various gestational ages(GA) within the first three days of life. Infants with Congenital Heart Disease, Patent Ductus Arteriosus(PDA), asphxia, or sepsis were excluded from the study. $\bar{x}$±S.D. were:

Group	*GA(wks)*	*Birth Wt(kg)*	*n*	*MVS(mm/s)*	*MVL(mm/s)*
I.	*26-28*	*0.88±.15*	*8*	*38.5±7.0*	*42.8±7.3*
II.	*29-31*	*1.30±.09*	*8*	*41.0±7.7*	*49.8±11.*
III.	*32-34*	*1.65±.11*	*6*	*56.8±13.*	*67.7±6.6*
IV.	*38-42*	*3.20±.36*	*10*	*54.6±10.*	*80.5±23.*

There were no differences between groups I & II for either MVS or MVL, but values for both Groups were less than Groups III or IV (p<.01).

Conclusions 1)The data indicate developmental differences in systolic and diastolic cardiac function and support experimental evidence for differences in contractility and compliance in the immature heart. 2)These parameters may prove useful in studying the effects of hemodynamic loads such as a PDA on cardiac function in the critically ill premature infant.

76 DIGITIZED ECHOCARDIOGRAPHIC ASSESSMENT OF LEFT VENTRICULAR WALL MOTION IN INFANTS AND ADOLESCENTS WITH SICKLE CELL ANEMIA.

Frederick W. Arensman, Wesley Covitz, Lynn K. Reyes, Virgil McKie Kathleen McKie, Harry C. Davis, (Spon. by Albert W. Pruitt). Medical College of Georgia, Department of Pediatrics, Augusta, Georgia.

To examine ventricular wall motion in sickle cell anemia (SS), two groups of SS patients (pts) underwent digitized echocardiographic analysis. Group I consisted of 30 SS infants (mean age 0.8 yrs). Group II consisted of 70 SS pts (mean age 13.8 yrs). When these groups were compared to nonanemic controls (C) of similar age, no differences were found in shortening fraction or systolic time intervals. Computer derived information included: R-R interval, maximum (Max) and minimum (Min) LV size, Max and Min septal and freewall thickness, Max rate of septal and freewall thickening and thinning. Timing of each event was normalized as a percentage of the total R-R interval. Mean value ± standard deviation and a p value for various groups are shown below:

Group	I-SS	I-C	Sig	II-SS	II-C	Sig
R-R interval (msec)	416±54	400±117	NS	753±12	999±53	.003
Systole						
Min LV Dimension (cm)	1.8±.3	1.7±.4	NS	3.1±.5	2.7±.4	<.001
Septal Thickness (cm)	.64±.1	.62±.2	NS	1.2±.2	1.2±.2	.002
Time Max Freewall Thickening	.59±.2	.45±.1	NS	.57±.1	.52±.1	.007
Diastole						
Max LV Dimension (cm)	2.8±.4	2.7±.5	NS	4.9±.6	4.3±.6	<.001
Time Max Septal Thinning	.78±.1	.69±.1	NS	.45±.1	.38±.1	<.001
Time Max Cavity Filling	.74±.1	.71±.1	NS	.59±.1	.52±.1	<.001

Adolescents with SS have abnormalities of LV dimension and wall motion which are not present in infancy. Systolic delay in achieving Min LV size may be secondary to increased stroke volume. The etiology of diastolic delay septal thinning and max cavity filling is unknown.

●77 ASSESSMENT OF CORONARY AND AORTIC ANASTOMOSES FOLLOWING ANATOMIC CORRECTION OF TRANSPOSITION OF THE GREAT ARTERIES.

Frederick W. Arensman*, Hans H. Sievers**, Peter Lange**, Rosemary Radley-Smith***, Alexander Bernhard**, Paul Heintzen**, Magdi Yacoub*** (Spon. by Albert W. Pruitt). Medical College of Georgia, Department of Pediatrics, Augusta, Georgia*, University of Kiel, Kiel, West Germany**, Harefield Hospital, Harefield, England***.

Anatomic correction of transposition of the great arteries (TGA) is usually done at a young age and always entails circumferential anastomoses of the aorta and coronary arteries. Longterm success of this procedure is predicated on adequate growth of these anastomotic sites. To assess these anastomoses, 25 patients (pts) underwent one or two cardiac catheterizations from 1 to 53 months (mean 18.8 months) following anatomic correction. Early catheterizations (mean 12 months following repair) were performed in 23 pts and late studies (mean 30 months following repair) in 13. Age at repair ranged from 2 to 168 months, and 15 pts were less than one year of age. Fifteen pts had undergone previous pulmonary artery banding in preparation for anatomic repair. Five distinct aortic diameters were measured on AP and lateral angiograms. Measurements were made at the anastomotic site, proximal, and distal to the anastomosis. Nearly all diameters of the aorta were larger than control values. There were no differences in early and late postoperative measurements. There were no differences when previously banded pts were compared to non-banded pts. No patient had a pressure gradient measured across the aortic anastomosis. Subjective examination of the coronary arteries showed no areas of kinking, narrowing or tortuosity and there was never ECG evidence of ischemia.

We conclude that coronary and aortic anastomoses allow for satisfactory growth following anatomic correction of TGA even when there has been prior pulmonary artery banding. The large ascending aorta does not appear to undergo progressive dialation following anatomic correction.

●78 INHIBITION OF SODIUM-CALCIUM EXCHANGE BY AMILORIDE: EFFECTS ON THE FORCE-FREQUENCY RESPONSE IN IMMATURE AND ADULT MYOCARDIUM.

Michael Artman, David Crump, Robert C. Boerth, Robert J. Boucek. Univ. of South Alabama Coll. of Medicine, Depts. of Pediatrics and Pharmacology, Mobile, AL.

The mechanisms which account for the normal positive staircase response to increasing contraction frequency remain unclear. It has been postulated previously that transarcolemmal sodium-calcium (Na-Ca) exchange may be important for the generation of a normal force-frequency response (FFR). To test this hypothesis, we performed FFR before (Pre) and 60 minutes after (Post) inhibition of Na-Ca exchange by amiloride (1.0 mM) using isometrically contracting right ventricular papillary muscles from immature (I; 14-21 days of age) and adult (A) rabbits. Results for maximal rate of tension development (dT/dt; gm/sec) obtained during the Pre and Post FFR are tabulated below (mean±SE):

	Contraction Frequency (Hz)			
	0.25	0.5	1.0	1.5
I-Pre	1.8±0.2	2.5±0.2	4.2±0.5	6.1±0.7
I-Post	1.3±0.2	2.4±0.5	4.6±0.9	6.6±1.0
A-Pre	5.2±1.0	7.6±1.9	12.5±5.3	17.8±9.3
A-Post	5.5±1.8	9.7±3.9	13.4±5.3	16.6±1.4

Thus, under these conditions, the positive staircase response to increasing contraction frequency was preserved in the presence of amiloride in both age groups. These results suggest that Na-Ca exchange is not critical for the generation of the normal FFR in I or A rabbit myocardium.