145 LEFT VENTRICULAR WALL MOTION IN VOLUME AND PRESSURE OVERLOAD. Daniel Campbell, Bernadette Noriega, Ran Anbar, Otto G. Thilenius, Rene A. Arcilla; The University of Chicago, Department of Pediatrics, Chicago.

Left ventricular (LV) global function and wall motion were analyzed in isolated volume or pressure overload. LV pressures and angiograms of 17 children with normal LV (Gp I), 11 with mitral regurgitation (Gp II), and 13 with aortic stenosis (Gp III) were computer-digitized to derive: end-diastolic, end-systolic volumes (EDV, ESV), ejection fraction (EF), end-systolic wall stress (ESWS). Lines perpendicular to apex-base axis divided LV wall in frontal projection into 6 segments: left-basal (A), left-mid (B), left-apical (C), right-apical (D), right-mid (E), right-basal (F). Segment contraction was expressed by mean fractional shortening (MFS) of chords from wall to apex-base axis within that segment. Mean values in Gps I, II and III were: EDV (% normal) = 96, 132, 91 (II > I and III, $p < .01$, .02); ESV (cm^3/M^2) = 19, 30.6, 19 (II > I and III, $p < .001$, .01); ESWS (dyn x $10^3/cm^2$) = 29.3, 41, 22.1 (II > I and III, $p < .01$, .001). EF in I, II and III (0.69, 0.66, 0.66) and ESWS/ESV ratio (1.55, 1.2, 1.19) were similar (p = ns). MFS was highest in segments A, B, C but least in E, F in I, II and III. However, MFS of segments A and B were less in Gp II (0.36, 0.35) than in Gp I (0.53, 0.47) ($p < 0.001$) or Gp III (0.45, 0.46) ($p < 0.02$). MFS of C, D, E, F were similar in I, II and III. Thus abnormal wall motion may occur despite normal global function. Its occurence in volume overload can be related to high wall stress throughout cardiac cycle.

† 146 ATRIAL PACING TO ESTIMATE SINOATRIAL CONDUCTION TIME IN CHILDREN. Robert M. Campbell, Macdonald Dick II, Paul Hees. Univ. of MI, C.S. Mott Child. Hosp., Div. of Ped. Card., Ann Arbor

Studies in adults have shown a strong correlation between indirect total sinoatrial conduction time (TSACT) using extrastimulus (ES) and atrial pacing (P). No data using P in children exist. To compare P vs. ES, and to examine the effect of different P rates in children, we studied 55 pts.—age 0.2-18.5 yrs—using P and ES. Because children exhibit a wide range of age-related cycle lengths, P was performed using a train of 9 paced right atrial beats normalized to 88-92% (90%),(n=32) or 93-97% (95%),(n=38) of the sinus cycle length (SCL); 15 patients had P determined at both paced cycle lengths. Sinus node (SN) suppression was estimated by recovery CL/SCL x 100(%)(REC). In 13/55 pts ES TSACT was indeterminant. There was no significant difference ($\bar{X}\pm SD$) in $\overline{SCL}$ ($\overline{576}\pm152$ vs. $\overline{574}\pm149$ msec), $\overline{REC}$ ($\overline{101.9}\pm1.7$ vs. $\overline{104.4}\pm6.1\%$), and $\overline{TSACT}$ ($\overline{128}\pm40$ vs $\overline{126}\pm74$ msec) (n=26) between $\overline{ES}$ and P at $\overline{90\%SCL}$. ES vs P TSACT correlation was r=0.82 ($p<0.001$). Similarly with P at $\overline{95\%SCL}$, there was no significant difference in $\overline{SCL}$ ($\overline{572}\pm129$ vs. $\overline{576}\pm125$ msec), or $\overline{REC}$ ($\overline{101.3}\pm1.9$ vs. $\overline{102.9}\pm5.7\%$); however, $\overline{TSACT}$ was greater by ES than P ($\overline{137}\pm38$ vs. $\overline{105}\pm58$ msec; $p<0.001$) (n=29) with r=0.82 ($p<0.001$). Intrapatient variation was wide at both pacing rates: coefficient of variance was 33% and 42%, respectively. We conclude that TSACT by P in children, as in adult studies, shows wide intrapatient variability but corresponds well with ES. TSACT by P at $\overline{90\%SCL}$ approximates ES TSACT in children better than P at $\overline{95\%SCL}$ perhaps related to more complete SN capture and less pacemaker focus shift. For TSACT by P in children we recommend pacing at $\overline{90\%SCL}$.

147 ELECTROPHYSIOLOGICAL EVALUATION IN PATIENTS WITH COARCTATION OF THE AORTA. Alfonso Casta (Spon. by Walter J. Meyer), The University of Texas Medical Branch, Department of Pediatrics, Galveston, Texas.

Arrhythmias, sudden death and conduction defects have been associated with certain intracardiac abnormalities (valvular aortic stenosis, subaortic stenosis and mitral valve prolapse). In this study, electrophysiological (EP) evaluation was done in 4 pts with coarctation of the aorta (COA) (2 preop, 2 post op). This evaluation determined resting intracardiac intervals and atrial and A-V nodal refractory periods (RP) during sinus and one atrial paced cycle. Ventricular RP were also determined in the 2 post op pts. Ages ranged between 6 1/2 and 21 years. None had electrocardiographic or historical evidence of dysrhythmias. The PR interval was less than 125 msec in 3/4. The A-H interval was less than 66 msec in 3/4. The atrial RP was prolonged in 1/4. Antegrade and retrograde dual A-V nodal pathways without dysrhythmias were demonstrated in the 2 post op pts. Repetitive ventricular responses were also induced in these 2 pts. Nonsustained atrial reentry was induced during atrial extrastimulation in 1/4. His-Purkinje (HP) EP characteristics were shown in 3/4. The relative RPHP ranged between 490 and 530 msec during sinus rhythm; and between 380 and 420 msec during the paced atrial cycle. These were prolonged for the respective sinus cycle. One pt developed atrial flutter during the post op period.

EP assessment revealed various abnormalities of the conduction system in pts with COA. This suggests that EP assessment should be included in the evaluation of COA.

148 BILATERAL OCULAR COMPRESSION DURING EKG MONITORING: A PROSPECTIVE STUDY TO EVALUATE VAGAL TONE IN CHILDREN. Alfonso Casta (Spon. by Ben H. Brouhard), The University of Texas Medical Branch, Department of Pediatrics, Galveston, Texas.

Increased vagal tone has been recognized as an underlying mechanism for syncope (S) in adults. The cardiac response to bilateral ocular compression (OC) was examined in 42 children (C) during EKG monitoring. The duration of OC ranged between 3 and 6 sec. All were in sinus rhythm. Ages ranged between 1 mo and 18 yrs. The diagnoses included congenital heart disease (15), GE reflux (4), history (hx) of S (8), functional murmur (6), asymptomatic bradycardia (6) and miscellaneous (5). The PR ranged between .08 and .24 sec and 8/42 had 1° A-V block. The RR interval before OC ranged between .40 and 1.32 sec; following OC ranged between .40 and 6.64 sec. The post OC RR over the pre OC RR interval change was <300% in 33 (gr I) and ≥300% in 9 (gr II). 12.2% in gr I had hx of S versus 44.4% in gr II ($p<0.05$). Also 44.4% in gr II had 1° A-V block versus 12.2% in gr I ($p<0.05$). One in gr II with S required a ventricular pacemaker. All C tolerated OC well.

An increase in the RR interval of less than 300% above baseline was considered a normal response. Children with an increase over 300% had a significant increase in S and 1° A-V block compared to children with an increase of less than 300%. OC should be performed in the evaluation of C with S and may aid in the selection of therapy.

149 HIS-PURKINJE ELECTROPHYSIOLOGICAL CHARACTERISTICS IN CHILDREN WITH HEART DEFECTS. Alfonso Casta, David W. Sapire, Wendy J. Wolf (Spon. by Randall M. Goldblum) The University of Texas Medical Branch, Department of Pediatrics, Galveston, Texas

Refractory periods (RP) of the atrium, atrioventricular (A-V) node and of the right ventricle have been determined with the atrial extrastimulus (AES) technique in children with and without heart defects (HD). Limited data is available on the RP of the HIS-Purkinje (HP) network in children with preoperative (preop) and postoperative (postop) HD. Electrophysiologic studies (EPS) were performed in 49 children with various preop and postop HD. Ages ranged between 2 and 20 years. EPS consisted in determining sinus node recovery times; atrial and A-V nodal RP. AES was coupled to sinus rhythm and to 1 or 2 paced cycle lengths. The relative (R) RPHP was determined in 18/49 (37%) patients (10 preop and 8 postop). Only 2/18 had prolonged H-V interval at rest. During AES coupled to sinus rhythm the RRPHP ranged between 270-530 msec. During AES coupled to atrial pacing the RRPHP ranged between 250-470 msec. These values did not differ significantly between the preop and postop patients. The RRPHP decreased when the cycle length was shortened. The effective (E) RPHP and the RRP of the His-bundle (HB) were only determined in 4/49 patients.

In conclusion, the RRPHP did not differ significantly between the preop and postop patients and, therefore, it is a functional electrophysiological characteristic of HP system; and it was more easily elucidated than the ERPHP and RRPHB.

150 RESPONSES OF HYPERTHYROID CHILDREN TO EXERCISE. A. Cavallo, A. Casta, H. D. Fawcett and M. L. Nusynowitz, (Spon. by W. J. Meyer, III), The University of Texas Medical Branch, Department of Pediatrics and Division of Nuclear Medicine, Galveston, Texas.

We studied responses to exercise in 8 children with untreated hyperthyroidism (H), ages 8-17 yr. Graded exercise was performed on a supine cycle ergometer with workload increments every 3 min until exhaustion. Left ventricular (LV) ejection fraction (EF) was measured by radioangiocardiography. Resting heart rate (HR), 115±14, and systolic blood pressure (SBP), 134±12, increased at peak exercise to 187±26 and 177±24, respectively. Physical working capacity index (PWC) was 8.5±3.2 kg-m/min.kg, mean work to exhaustion (MWE) 259±38 kg-m/min, maximal endurance index (MEI), 195±52. Resting EF was .68±.08. Based on exercise EF response patients were divided into 2 groups: Group I (n=4) had a rise in EF of .05 to .10 above resting EF, a normal response. Group II (n=4) had less than .05 increase or an actual decrease in EF by .03 to .10, suggesting decreased LV reserve; one patient had poor LV wall motion. A comparison between groups I and II showed no significant differences in exercise time, maximum HR or SBP, ECG responses, or in PWC, MWE and MEI. The correlation coefficient between ΔEF (exercise EF minus resting EF) and T4 was r=-.87 ($p<0.05$) and between ΔEF and T3, r=-.93 ($p<0.001$). The data indicate that H may cause LV dysfunction as determined by abnormal response in EF to exercise, which cannot be predicted by standard exercise parameters;severity of H, by T3 and T4 levels, may be a determining factor in the occurrence of cardiac dysfunction.