115 RENAL CIRCULATORY RESPONSES TO ACTIVATION OF SOMATO-SYMPATHETIC AND BARORECEPTOR REFLEXES IN PIGLETS.

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The degree of participation of the renal circulation in neonatal cardiovascular responses was evaluated by altering afferent inputs to the central regulatory system. Thirty-seven piglets from 1-25 days were anesthetized with 0.25-0.5% halothane in N_2O-O_2, paralyzed and artificially ventilated to maintain normal arterial blood gases and pH. Renal arterial flow was recorded continuously (electromagnetic transducer) with aortic pressure (AoP) and heart rate. Resistance (R) was calculated as $\overline{AoP}$/mean flow. Baroreceptor stimulation, by sudden high pressure infusion of 1-2ml of saline through a catheter whose tip was located in the carotid sinus, lowered $\overline{AoP}$ 11-17% in all piglets; renal R decreased in piglets ≥1 week. Baroreceptor inhibition, by 10-30sec occlusion of both common carotid arteries, elevated $\overline{AoP}$ 11-17% in all animals; renal R increased in piglets ≥1 week. Somato-sympathetic reflexes were elicited by stimulation of the central cut end of the right sciatic or median nerve with 10sec trains of 1.0msec pulses over the ranges of 0.2-1.0mA and 1-100Hz. In piglets of all ages, high frequency stimulation increased renal R significantly (at least 19%). The renal vasculature appears to participate at a younger age in integrated cardiovascular responses to somato-sympathetic reflexes than to baroreceptor reflexes. (Supported by Nassau Heart Assoc.)

116 *INTRARENAL BLOOD FLOW DISTRIBUTION (IRBFD) AND RENAL RENIN SECRETORY RATES (RRSR) IN CHILDREN WITH COARCTATION.*

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The renal mechanisms involved in sustaining hypertension were evaluated in 7 children ages 5-11 with coarctation. IRBFD was determined following renal artery injections of 133Xe which measures rates of flow and the fraction of total renal blood flow to the outer cortical (OC) nephrons in which renin is produced. RRSR was calculated by multiplying OC flow by the renal venous minus arterial difference in immunoreactive plasma renin activity (PRA). When measurements were made in both kidneys (4 children), results between the kidneys were averaged. When compared to data obtained in 8 normal kidneys the following was found in the 7 children with coarctation and 5 patients with L-R shunts. OC flow was reduced in children with shunts or coarctation ($p < 0.01$). Fractional flow to the OC was reduced only in children with shunt lesions ($p < 0.01$). RRSR in shunt lesions (430±201 SEM) were not different from that observed in coarctation (201 ng/ml/min/100 gm ± 92 SEM) ($p = 0.28$). These findings as well as the demonstration of normal renin profiling in three children (4 hr upright PRA vs. 24 hr. urinary sodium excretion compared to a series of approximately 100 normal children) with coarctation suggest that the persistence of hypertension in coarctation is independent of the renin angiotensin system and compatible with the experimental two kidney model of hypertension.

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117 CHANGES IN LEFT VENTRICULAR(LV) CONTRACTION AND PULMONARY VASCULAR RESISTANCE AFTER INDOMETHACIN FOR PATENT DUCTUS ARTERIOSUS (PDA),

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Fifteen infants(gest.age 27 wks.and birthweight 847g)were given indomethacin in 1-3 doses(total 0.39mg/kg)for PDA, at median age of 7 days(range 4-66).Echocardiograms were performed before and after indo(mean 1.67 days).Eleven infants responded clinically (Gp 1) and 4 did not (Gp 2).Both groups had similar pre-indo echo values but Gp 2 did not change significantly after therapy.

GROUP I (N = 11)

	Pre	Post	p
LAD(cm)	1.04*	0.73	<0.001
LA/Ao	1.70*	1.16	<0.001
LVEDD(cm)	1.42*	1.20	<0.01
%FSI	41.7*	34.4	<0.001
LPEP/LVET	0.23*	0.35	<0.001
VCF(circ/sec)	2.30*	2.09	<0.05
RPEP/RVET	0.33	0.31	NS

*more than 2SD from normal values.

LAD=left atrial dimension
LA/Ao=LA to aortic ratio
LVEDD=LV end diastolic dim
%FSI=% fractional shortening index
PEP/VET=ratio pre-ejection period/vent.ejection time
VCF=mean velocity of fiber shortening

Pre-indo findings suggest enhanced LV contraction with reduced afterload and increased preload. Gp 1 echo changes are similar to those after ductal ligation.This and the finding that Gp 2 shows no changes in LV echo measurements after indo suggest that the changes in Gp 1 are due to constriction of the ductus and not to myocardial depression.Unchanging RPEP/RVET in both groups is consistent with unaltered RV function and/or pulmonary vascular resistance with the doses of indo used.

118 PHYSIOLOGIC ATTRIBUTES INFLUENCING BLOOD PRESSURE IN YOUTHS 6-17 YEARS

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Data from the U.S. Health Examination Surveys were analyzed to determine factors related to blood pressure during childhood and adolescence. These surveys examined 12,887 youths representing a national probability sample of U.S. children aged 6-17 years. A subsample of 2,200 youths were examined on two occasions, 3 or 4 years apart, permitting a longitudinal assessment of blood pressure change. Physiologic maturation (assessed by radiographic skeletal age) was related to systolic and diastolic pressures in males and females through this age range. Weight, adiposity (skinfold thickness), hematocrit, and pulse rate related to blood pressure independent of skeletal age. Similar characteristics were associated with longitudinal changes in pressures. Systolic murmurs were associated with higher systolic pressures at the time of the examination, but were not predictive of pressures on a subsequent examination. The longitudinal cohort experienced a significant "tracking" of blood pressure, i.e., individuals maintained their peer rank for blood pressure through time. These analyses delineate important characteristics related to blood pressure during youth and define the relative influences of growth, adiposity, and "tracking" on blood pressure levels in a large, national sample of children.

119 BLOOD PRESSURE AND HUMORAL FACTORS IN CHILDREN OF HYPERTENSIVE PARENTS.

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Blood pressure(BP) response to exercise and levels of vasoactive substances are being investigated in normotensive(NBP) children of hypertensive(HBP) parents. Preliminary, but thus far significant, findings in 11 white(W) and 22 black(B) children (10-17 yrs)include: mothers of B children had higher ($p<.002$) systolic (SBP) and diastolic(DBP) pressures ($p<.009$) than W mothers.

Although resting heart rates were lower in B (103/min) than W (122/min) children ($p<.002$), there were no differences between resting SBP and DBP in the children. However, at maximum exercise DBP was significantly greater in B (95mmHg) than W (88mmHg) children ($p<.03$). Vasoactive substance differences are listed below:

Urine=Ur, Plasma=Pl	Pre-exercise B	Pre-exercise W	Pre-exercise (p)	Post-exercise B	Post-exercise W	Post-exercise (p)
Ur Kallikrein(E.U./2 h)	0.16	0.53	(<.000)	0.17	0.44	(<.003)
Ur Sodium(M.Eq./2 h)	30.0	17.2	(<.02)	20.3	11.6	(<.01)
Ur Potassium(M.Eq./2 h)	7.1	9.9	(<.01)	9.2	11.2	(ns)
Pl Renin(ng/ml/hr)	3.3	7.1	(<.01)	8.3	14.9	(<.01)

Racial differences in BP and vasoactive substance measurements have been established in adults with HBP. These data suggest that similar differences already exist in resting heart rates, in exercise BP, and in vasoactive substance measurements in NBP children of B and W HBP parents.

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120 EFFECTS OF LIDOCAINE AND QUINIDINE ON THE ELECTROPHYSIOLOGIC PROPERTIES OF NEONATAL AND ADULT CANINE CARDIAC PURKINJE FIBERS.

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Clinical studies have shown age related differences in the cardiac electrophysiologic responses to some cardioactive drugs. We used standard microelectrode techniques to determine whether there are age related changes in the effects of lidocaine (L) and quinidine (Q) on cardiac cellular electrophysiologic properties. Neonatal (N) and adult (A) canine cardiac Purkinje fibers were superfused with L 2-40mg/l or Q 0.5-20mg/l. The threshold concentration for L effects on action potential (AP) amplitude was 40 mg/l for N and 20mg/l for A; on maximum upstroke velocity of phase 0 depolarization ($\dot{V}max$) 5mg/l for N and 2mg/l for A; on action potential duration (APD) 2mg/l for both N and A. The threshold concentration for Q effects on AP amplitude was 2.5mg/l for both N and A; on $\dot{V}$ max 1.25/l for both N and A; on APD 1.25mg/l for both N and A. For all variables studied the maximum effects of L on A action potential characteristics were greater than on N. For Q, the maximum effects were greater on N than on A. These studies indicate that there are significant age related differences in the cellular electrophysiologic responses to L and Q which vary depending on the drug studied. The ionic mechanisms underlying these observations remain to be determined.