67 INTELLECTUAL DEVELOPMENT AND PHYSICAL GROWTH. Darrell M Wilson, Philip L Ritter, Sanford M Dornbusch, Paula M Duncan, Ron G Rosenfeld, Stanford University, Departments of Pediatrics and Sociology, Stanford, California

The possible existence of a relationship between growth and intellectual development has long fascinated investigators. We recently reported a significant association between height (normalized for age and sex, NH) and IQ scores (both WISC, a measure of intellectual development, and WRAT, a measure of academic achievement) in 6768 adolescents (age 12-17 yr) studied in Cycle III (1966-1970) of the National Health Examination Survey (NHES). In this study, we analyze the association between NH and IQ scores among 7119 children, aged 6-11 yr, from Cycle II (1963-1965) of the NHES. We also examine the association between changes in NH and changes in IQ scores in a longitudinal group of 2117 subjects (aged 8-11 yr) studied first in Cycle II and 2-5 yr later in Cycle III. In Cycle II, as in Cycle III, we found a modest but highly significant correlation between NH and IQ scores ($r=0.18$, WISC; 0.17, WRAT; $p<0.0001$). However, within the longitudinal group, there was no correlation between changes in NH and changes in IQ scores ($p>0.15$). Grouping the subjects by sex, SES, or NH in Cycle II did not alter these results. Although we have shown a significant correlation between NH and IQ scores in both Cycles II and III, the data from the longitudinal group revealed no association between changes in NH and changes in IQ scores. These data imply that the factors contributing to the association between NH and IQ scores are active in early childhood and are complete by age 8 yr, suggesting that therapies to increase height are unlikely to affect IQ scores in normal children.

†68 **"INTERNALIZING" IN CHILDREN WITH CHRONIC GASTROINTESTINAL DISORDERS.** Beatrice Wood, John B. Watkins, John T. Boyle, Jose Nogueira, Elana Zimand. Univ. of PA Sch. of Med., Children's Hosp. of Philadelphia.

Achenbach's Child Behavior Check List, a standardized test of psychosocial functioning, was used to assess the following groups (ages 6-16): Crohn's Disease (N=42), Ulcerative Colitis (UC)(N=27), Recurrent Abdominal Pain (RAP)(N=41) and healthy siblings (N=66). Groups were contrasted by scores on two subscales derived from factor analysis of test items. The "Internalizing" (I) subscale reflects depression, anxiety and withdrawal. The "Externalizing" (E) subscale reflects hyperactivity, aggression and anti-social behavior. A standardized Disease Activity Index measured degree of illness. **RESULTS:** 1) Patient groups had higher "I" scores than sibling groups ($p < .001$). 2) RAP "I" scores were higher than Crohn's and UC's ($p. < .001$). 3) "I" scores correlate with disease activity for Crohn's ($r = .5$, $p < .001$), but not for UC. 4) Siblings of UC patients "externalize" ($p < .001$), as compared to siblings of Crohn's and RAP. **CONCLUSIONS:** A) "Internalizing" types of psychological problems occur with chronic gastrointestinal illness, and are worse for patients with non-organic abdominal pain syndromes. B) Crohn's and UC patients differ in the mechanisms underlying the relationship between psychological and disease factors. C) These findings indicate that psychological intervention should focus on "internalizing" types of symptoms and that Crohn's patients may be especially vulnerable during flares. D) Differences among sibling groups show that family patterns of behavior differ according to disease group. This indicates the importance of taking family context into account when developing and carrying out a treatment plan.

●69 NEURODEVELOPMENTAL PROGRESSION IN MIDDLE CHILDHOOD

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Learning disorders and developmental delays in middle childhood involve the functions developing most rapidly during this period. This study employed a new neurodevelopmental exam for this age group. Pearson Correlation Coefficients relating age in years to task performance were determined for a random sample of youngsters (n=426) stratified by age (9-15 years) and gender. Subjects were drawn equally from 3 working class communities. Significant correlations ($r^2 > 0.05$, $p < 0.001$) between age and performance were found on 16/34 items.

Developmental progression with age ($r^2 > 0.05$, $p < 0.001$) was seen on 3/3 fine motor items involving rapid retrieval memory, including finger opposition speed and cursive writing rate.

Marked progression ($r^2 = 0.05$ to 0.18, $p < 0.001$) was noted on 2/2 language items involving rapid retrieval memory, such as rapid category naming, and 2/2 expressive language tasks.

Less significant development with age ($r^2 \leq 0.04$) was found on all 3 pure fine motor tasks (such as imitative finger movement), 2/3 receptive language tasks not involving rapid retrieval memory, and on 1/2 visual-perceptual tasks, all commonly stressed in traditional evaluations for school problems. The acquisition of efficiency of output and rapid retrieval memory appears to be a major accomplishment of middle childhood and delays in such rapidly progressing skills may play a significant role in impairing academic productivity. Neurodevelopmental assessments for this age group should emphasize such quickly developing functions.

CARDIOLOGY

●70 BIOCHEMICAL BASES FOR TOLERANCE OF THE NEWBORN HEART TO ISCHEMIC INJURY: DEVELOPMENTAL DIFFERENCES IN ADENINE NUCLEOTIDE DEGRADATION BETWEEN ISCHEMIC IMMATURE AND ADULT MYOCARDIUM. A POSSIBLE ROLE OF SARCOLEMMAL 5'-NUCLEOTIDASE. Anwar S. Abd-Elfattah, Christopher K. Godwin, Robert L. McRae, David P. Hamme, Andrew S. Wechsler (Sponsored by Page A. W. Anderson), Department of Surgery, Duke University Medical Center, Durham, NC 27710.

We determined the rate of ATP depletion and catabolism in 8 canine immature hearts (IM-2 weeks old) and 5 adult (AM) hearts in response to normothermic global ischemia in vitro. Transmural serial biopsies were obtained just before ischemia and at 2,5,10, 15,20,25,30,40,50 and 60 min of ischemia. Myocardial adenine nucleotides, nucleosides, purines and NAD+ were determined by HPLC.

Isch.(min)		0	10	20	40	60
ATP	IM	20.7±0.8	17.5±3.0	13.2±3.2	5.0±1.6	1.7±0.2
	AM	27.0±3.1*	13.2±4.2	8.5±3.3	4.2±2.3	0.7±0.3
AMP	IM	2.1±0.5	2.0±0.6	5.0±1.5*	15.0±2.5*	11.8±2.1*
	AM	1.3±0.5	2.0±0.4	1.3±0.1	2.6±0.8	5.6±0.5
Ado	IM	0.2±0.1	0.5±0.1	0.4±0.1	0.4±0.1	0.4±0.1
	AM	0.4±0.2	2.5±0.4*	2.0±0.4*	1.0±0.1*	0.8±0.2*

n moles/mg protein, Mean±SEM, 2-way ANOVA, * P<.05

IM retained more AMP than AM during ischemia. Purines accumulated more in AM than IM. IM may have either less 5'-nucleotidase and/or the enzyme may be kinetically less responsive to AMP accumulation. AMP reserve in ischemic IM may enhance the tolerance of newborn hearts to ischemia and hypoxia by increasing the rate of ATP repletion bypassing both the salvage and the de novo pathways. Inhibition of 5'-nucleotidase may provide increased metabolic protection in mature hearts during ischemia and reperfusion.

†71 DETECTION OF EARLY VENTRICULAR DYSFUNCTION BY AFTERLOAD CHALLENGE USING A NON-IMAGING CARDIAC PROBE (NUCLEAR STETHOSCOPE).

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The standard ejection phase indices of ejection fraction (EF) or mean ejection rate (SER) may be normal at rest in the presence of early left ventricular dysfunction in children with hemoglobinopathies (HPt). It has been shown in animals that the y intercept of the linear force velocity relation is a function of contractile state. In man, mean BP under varying loading conditions plotted against SER normalized for end diastolic volume (EDV), represents a linear force velocity relationship. To utilize this principle to detect subclinical ventricular dysfunction in HPts we used the nuclear stethoscope to measure SER while infusing methoxamine to increase afterload in 2 HPts with Sickle Cell disease and 7 with Thalassemia major. All 9 were asymptomatic and had normal function by 2-D echo as well as normal baseline SER and EF. All were on chronic transfusion protocols. For comparison, similar data was obtained from 4 healthy volunteers. The mean value of the y intercepts for the plots of SER and mean BP for the HPt was 3.14±.7 EDV/S which was significantly lower than the mean value for the controls of 4.36±.3 EDV/S ($p < .05$). Furthermore, 7 of 9 HPts had values > 2 SD below the control mean. In conclusion: the use of the nuclear stethoscope to measure the response of ejection phase indices to afterload challenge is a new, noninvasive method which appears to be more sensitive in detecting subclinical abnormalities in the contractile state than standard measures of function such as EF.

72 HEMODYNAMIC RESPONSES TO EXERCISE IN CHILDREN WITH CYANOTIC FORMS OF HEART DISEASE

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Myocardial oxygen supply during exercise may be impaired in patients with cyanotic heart disease; myocardial fibrosis secondary to chronic hypoxia may prevent normal exercise capacity post-operatively. We performed continuous, graded, maximal cycle ergometer exercise tests on 87 children and young adults. There were 66 with tetralogy of Fallot (TF)(5 pre-repair), 13 with d-transposition(TGA) (all post-repair), and 8 with tricuspid atresia (TA)(1 post-repair). The patients were compared to 405 healthy subjects by analysis of covariance with respect to race, sex, age, and body surface area. The maximal values of the following were measured: heart rate, systolic blood pressure, workload, and peak working capacity index.

	Control	TF(pre)	TF(post)	TGA	TA
Heart rate(min^{-1})	192	152*	168*†	160*†	141*
Blood pressure(mmHg)	145	165	149	150	148
Workload(kg.m/min)	557	621†	579†	435	189*
Work index(kg.m/min/kg)	14.9	9.8*	12.9*†	13.0†	7.5*

*=p<.05 compared to control; †=p<.05 compared to TA Ischemia on ECG was seen in 6/8 TA, 4/13 TGA, and 1/5 pre-repair TF patients. In the 61 post-repair TF patients, there was no statistical correlation between age at surgery, years since surgery, pre-repair O_2 saturation or hemoglobin, or post-repair RV/LV pressure ratio and any exercise variable. The TF patients improved post-op, suggesting non-fibrotic myocardium.