**● 13** EFFECTS OF EXERCISE TRAINING ON INSULIN SENSITIVITY IN ADOLESCENTS WITH TYPE I DIABETES (IDDM). Kyle W. Landt, Barbara N. Campaigne, Frederick W. James and Mark A. Sperling. Department of Pediatrics, Children's Hospital Medical Center, University of Cincinnati, Cincinnati, Ohio.

Although regular exercise is generally considered beneficial for IDDM, an influence of physical training on insulin sensitivity in adolescent IDDM has not previously been documented. We assessed insulin sensitivity via the hyperinsulinemic-euglycemic clamp technique using an insulin infusion of 100 mU/$M^2$/min while maintaining fixed basal glucose levels of 90 mg/dl before and after 12 weeks of a regimen of vigorous structured exercise in 9 IDDM, or no exercise in a pubertally matched IDDM control group. Glucose utilization rate (mg/$M^2$/min; M) was 265 ± 34 ($\bar{X}$ + SE) before vs 337 ± 31 after exercise representing a 35 ± 10% increase in insulin sensitivity ($p < 0.05$). No change in insulin sensitivity occurred in controls (M = 280 ± 86 vs 281 ± 89). Free insulin levels (IRI) were 724 ± 96 μU/ml during the hyperinsulinemic clamp; no differences were present after the 12 week study in the exercise group (715 ± 113 μU/ml). Insulin sensitivity did not correlate significantly to free IRI. In the exercise group, there were significant increments in maximal $O_2$ consumption ($VO_2$) on a bicycle ergometer (7.01 ± 2.5%; $p < 0.05$), and in lean body mass (LBM; 4.6 ± 1.5%; $p < 0.02$). The increase in insulin sensitivity was not correlated to either $VO_2$ or LBM. We conclude that exercise training independently increases insulin sensitivity, LBM and $VO_2$ in adolescents with IDDM. These changes must occur at receptor or post receptor events and cannot be ascribed to changes in antibody binding since free insulin remained unchanged.

**● 14** ADRENAL ANDROGENS ARE ELEVATED IN YOUNG WOMEN WITH ACNE AND/OR HIRSUTISM. Anne W. Lucky, Joseph McGuire, Sherril J. Rudy & Robert L. Rosenfield. U of Cincinnati & Child Hosp Med Cntr, Depts of Derm & Peds, Cincinnati; Yale U Sch of Med, Dept of Derm, New Haven; U of Chicago, Dept of Derm, Chicago

Because elevated androgens have recently been found in patients with acne(A) and/or hirsutism(H), we have studied 32 young adult females, 15-34 yrs, who came to a dermatologist(A=13,H=2,A+H=17). 29 of these subjects had elevated baseline plasma free testosterone and dehydroepiandrosterone(DHEA) sulfate levels. Each subject and 15 controls who had no significant A or H received 1.5 μg dexamethasone hs before the am infusion of 1-24 ACTH 10 μg/$m^2$ IV. One patient with acne had an abnormal response of 17α-hydroxyprogesterone(17 Prog) at 30'(383 ng/dl vs≤216) and 60'(551 vs≤230), diagnostic of the mild 21-hydroxylase deficiency form of congenital adrenal hyperplasia(CAH). 15 patients had abnormal responses of 17α-hydroxypregnenolone(17 Preg) at 30'(959-1858 ng/ml vs≤937) and 60'(1021-2620 vs ≤981). DHEA and androstenedione(AD) were assayed in 18 subjects and abnormal responses were noted in 8 & 7 subjects respectively. Three patients (1=A, 2=A+H) had abnormal responses of 17 Preg and DHEA with normal responses of 17 Prog and AD suggestive of the 3β-hydroxysteroid dehydrogenase form of CAH. The other patterns of elevated androgen response to ACTH could not be attributed to a single enzyme dysfunction. Elevated androgens may underlie acne and/or hirsutism. The adrenal contribution is significant, representing well-defined CAH syndromes as well as functional adrenal hyperresponsiveness to ACTH.

**15** 24-HOUR VARIATIONS IN SERUM OSTEOCALCIN (Oc) CONCENTRATIONS IN TEENAGE MALES. Morri E. Markowitz, Caren Gundberg, John F. Rosen. Dept. Peds. and CRC, Albert Einstein Coll. Med., Montefiore Med. Ctr., Bronx, N.Y.; Dept. Orthopedic Surgery, Children's Hosp. Med. Ctr., Boston, MA.

Oc (bone-gla protein), a calcium-binding protein found in bone, has been used as a marker for metabolic bone disease. Serum concentrations of Oc are known to peak during adolescence. Since blood ionized calcium concentrations ($Ca^{++}$) undergo circadian rhythmicity in teenagers, we examined the possibility that time of sampling may be an important factor in interpreting Oc levels. 2 healthy adolescent males, aged 15 and 17, had blood sampled q 30' for 24 hours via an indwelling venous catheter. Blood $Ca^{++}$ and serum Oc, total calcium ($Ca_T$) and phosphate ($P_i$) concentrations were determined.

| Oc, ng/ml: | Subject #1 | Subject #2 | Nl adult n=90 | Nl 17y ♂ n=8 | Nl 15y ♂ n=6 |
|---|---|---|---|---|---|
| 24 hr mean±SD | 19.6±3.8 | 7.4±4.3 | 7.1±2.9* | 14.6±2.3* | 28.5±6.1* |
| Range | 10.8-30.4 | 1.6-18.9 | 2.0-14.0 | 6.7-17.3 | 17.3-56.0 |

* = Random samples

Marked variations in Oc concentrations were found in both subjects throughout the day. No significant correlations were found between Oc and mineral patterns. However, the intersubject correlation between 24-hour Oc concentrations was .46, $p<.01$. Conclusions: 1) Daily fluctuations in serum Oc concentration from individuals must be taken into account in interpreting the results from randomly obtained blood samples; 2) Correlation in Oc patterns between 2 subjects suggests the presence of circadian rhythmicity in serum Oc.

**● 16** ASSESSING ADOLESCENT MOTHERS AND THEIR 9 MONTH OLDS IN THE LABORATORY. Elizabeth R. McAnarney, Henry N. Ricciuti, Ruth A. Lawrence, Jennifer P. Anderson. Univ. of Rochester, Strong Mem. Hosp., Dept. of Peds., Roch., N.Y.

Children of adolescent mothers do less well behaviorally than children of adults. We are reporting on the development of a qualitative instrument, using 9-point scales to assess the interaction between adolescents and their 9 month olds from two 10-minute videotaped sequences (1 in a high chair; 1 free play on floor) in the laboratory. A manual was developed to describe the behavior for each scale and to define the degree of behavior represented by the points on the scale. Initially, two trained coders independently rated 10 videotapes using 25 maternal, 10 child, and one maternal-child scales. Intercoder agreement for each scale was calculated by dividing the number of items on which coders agreed within one scale point by the sum of the agreements and disagreements. Any scale with intercoder agreement of <0.7 was redefined, and 10 tapes were independently scored by the coders and intercoder agreement recalculated. The instrument now contains 14 maternal, 6 child, and one maternal-child scales, all with intercoder agreement of >0.7 (Rge. of 0.7-0.9). Maternal scales assess affect, communication, encouragement of motor, cognitive, and perceptual activities, and selected attachemnt (Ainsworth) items; child scales assess affect, communication, social contact, behavior toward mother; and the maternal-child scale assesses the quality of the interaction. The presentation will illustrate the utility of the scales to evaluate changes in the interaction of adolescents and their 9 month olds.

**17** DIFFICULTIES RETURNING TO DIET THERAPY IN PATIENTS WITH PHENYLKETONURIA. K. Michals, R. Matalon, M. Dominik, Univ. IL, Dept. Nutrition & Medical Dietetics and Pediatrics, Chicago, IL, V. Schuett and E. Brown, The Waisman Center, Madison, WI.

Forty-one patients with phenylketonuria (PKU) whose dietary therapy was discontinued at an average age of 6 years were placed on a phenylalanine restricted diet after 1 to 16 years of unrestricted diet. Resumption of diet was prompted by decline in academic achievement, behavior problems, loss of I.Q., abnormal changes in the EEG, tremors, eczema and body odor. Twenty-three patients failed to comply with diet restrictions even after as much as one year of counseling and their blood phenylalanine levels remained greater than 25mg/dl. Eighteen patients maintained some diet restrictions but they still reported excessive intake of phenylalanine, an average of 1370mg daily in the first two years and 700mg daily after 4 years. Average blood phenylalanine levels in this group were 17.8mg/dl after 2 years and 14.8mg/dl after 4 years indicating poor compliance. The limited degree of success with diet seemed to be related to the length of time off diet. The 23 patients who failed were on an unrestricted diet an average of 9 years compared to 4 years for the remaining 18 patients. This study indicates the difficulty in returning to a phenylalanine restricted diet, particularly in adolescents and young adults. Since the female PKU patients must return to diet prior to conception this problem may have serious implications for this population who is at risk for unplanned pregnancies.

**● 18** GONADAL AND ADRENAL HORMONE CORRELATES OF SELF-CONCEPT IN EARLY ADOLESCENCE Editha D. Nottelmann, Elizabeth J. Susman, Jerome H. Blue, Lorah D. Dorn, Gale E. Inoff, Laboratory of Developmental Psychology, National Institute of Mental Health, Bethesda, MD; George P. Chrousos, Gordon B. Cutler, and D. Lynn Loriaux, National Institute of Child Health and Development, National Institutes of Health, Bethesda, MD (Spon. by Arthur S. Levine)

The purpose of the study was to examine the relation between endocrine changes during puberty and psychological development. The participants were 9- to 14-year-old males (n=39) and females (n=25) enrolled in a longitudinal study. Assessments of physical development consisted of pubertal stage according to Tanner and plasma determinations for luteinizing hormone, follicle stimulating hormone, testosterone, estradiol, dehydroepiandosterone, dehydroepiandosterone sulfate, and androstenedione. The Perceived Competence Scale for Children was used to assess adolescent self-concept. A pattern of negative correlations emerged between pubertal stage, hormone levels, and adolescent self-perceptions, with statistically significant relationships (.01 or .05 level) between pubertal stage and self-concept for males (physical and general competence) and females (social competence); between gonadotropins and sex steroids and self-concept for males (cognitive competence) and females (cognitive, social, and physical competence); and between adrenal androgens and self-concept for males (cognitive, social, and physical competence) and females (cognitive competence). Thus, both adrenal (adrenarche) and gonadal (gonadarche) changes in adolescence may exert influence on the way adolescents perceive themselves.