HGH has been found to inhibit glucose consumption in the intact erythrocyte and in hemolysates. The inhibition is dose dependent and species specific. Inhibition of glucose consumption is associated with a rise in red cell levels of glucose-6-phosphate and fructose-6-phosphate and with an increase in the % of the glucose metabolized via the pentose pathway. These effects suggest that HGH may alter red cell glucose consumption by inhibition of phosphofructokinase activity.

Incubation of crude HGH in a final concentration of 128 μg/ml produced a 55.1 ± 4.7 % decrease in red cell glucose consumption in 21 normal adults. Red cells from premature infants showed a 37.5 % inhibition, term infants 45.9 %, children 3 months to 12 years 51.2 %, and individuals over age 65 only 17.0 %. Five patients with hypopituitarism responded in a normal fashion—52.4 % inhibition while 3 patients of short stature with normal levels of HGH showed responses of only 19.9, 18.2 and 12.3 % and one of these individuals showed no growth response after 3 months of HGH therapy. The decreased inhibitory effect observed in the erythrocytes of premature infants, the aged, and in certain individuals with short stature may reflect end organ unresponsiveness. This simple *in vitro* test may be useful in predicting HGH responsiveness and in further defining the mechanism of action of this hormone in a cell that metabolizes only carbohydrates. (SPR)

12 *Thyroid Hypocalcemic Factor (Thyrocalcitonin) in Children.* CONSTANTINE S. ANAST, RICHARD A. GUTHRIE* and JOAN A. FOLWELL*, Univ. of Missouri, Sch. of Med., Columbia, Mo.

Previous studies indicated that thyrocalcitonin (TCT), the thyroid hypocalcemic factor, played an important role in calcium homeostasis in animals. In the present study the response to calcium loads was compared in normal and in thyroid-treated athyrotic children in an effort to obtain physiologic evidence for the secretion of a hypocalcemic factor (TCT) by the thyroid gland of children. Calcium, in a dose of 10 mg/kg, was administered i.v. at a constant rate over a 3-hour period. Periodic blood samples obtained before, during and after the infusion were analyzed for calcium, magnesium and phosphorus. Although the baseline serum calcium levels were similar in the athyrotic and normal children, there was a significant quantitative difference in the response of these two groups to calcium loads. Substantially greater increases in serum calcium levels were observed in most of the athyrotic children. The mean increase in serum calcium mid-way and at the end of the infusion was twice as great in the athyrotic as in the normal children. A similar difference was still detected 30 and 60 minutes after the end of the infusion. On the other hand, in two cretins with intact thyroid glands (defect in organification of iodine) and in children with thyrotoxic goiters, the response to calcium loads was similar to that observed in the normal children. The serum magnesium levels remained constant in all of the children studied and no consistent changes were observed in the serum phosphorus levels.

This study provides evidence for the secretion of a thyroid hypocalcemic factor (TCT) in children and indicates the nature of its role in maintaining calcium homeostasis. (SPR)

13 *Plasma 17-Ketosteroid Levels During Adolescence.* ROBERT L. ROSENFIELD*, A. ANNE PATTI* and WALTER R. EBERLEIN, Children's Hospital of Philadelphia, Pa.

To study adrenal maturation at adolescence, pooled blood was collected from prepubertal males, age 6–9 years, and from pubertal boys, age 12–14 years. Plasma steroid sulfates were extracted in the form of methyl green salts, which were solvolyzed and then successively subjected to purification by means of the Girard T-reagent, digitonin, thin-layer chromatography, and gas-liquid chromatography (free steroid, acetate, trimethylsilyl ether) on the phases SE-52 and QF-1. In the 6–9 year-old pool the level of androsterone sulfate (AS), corrected for 80 % recovery, was 8.6 μg %; and of dehydroepiandrosterone sulfate (DHAS), corrected for 65 % recovery, 13.5 μg %. In the 12–14 year-old male pool the level of AS was 56.7 μg % and of DHAS 80.3 μg %. In adult males, studied for comparison, plasma levels of AS were 40–53 μg % and of DHAS 89–209 μg %. No etiocholanolone sulfate or free 17-ketosteroid was detected.

The dramatic rise of plasma DHAS and AS during adolescence appears to occur simultaneously wih beginning testicular maturation. Since ACTH secretion is not known to change at the time of adolescence, these observations suggest that beginning adrenal production of DHAS at this age is not directly related to ACTH stimulation, but rather that it is promoted by some other trophic factor. (SPR)

14 *Urinary Acid Mucopolysaccharides in Myxedema.* J. KENNETH HERD*, State Univ. of N.Y. at Buffalo, Sch. of Med., Buffalo, N.Y. (introduced by Sumner J. Yaffe).

Changes of the skin in myxedema are thought due to changes in its composition of acid mucopolysaccharides (AMPS). In the skin of the hypothyroid rat it has been shown that the content of hyaluronic acid is increased and the content of chondroitin sulfate decreased. A study of the changes in the urinary excretion of acid mucopolysaccharides in two children with acquired myxedema was carried out in order to gain more knowledge about the character of myxedema in humans. Twenty-four hour urines were collected on both children before and at the beginning of treatment with dessicated thyroid. AMPS were precipitated with cetyl trimethyl ammonium bromide and excretion expressed as mg of hexuronic acid/gm of creatinine. AMPS were then fractionated on columns of Dowex 1X2 (Cl^-) and eluted with 6 stepwise gradients of NaCl. Components in each fraction were identified by microelectrophoresis on cellulose acetate, analysis of hexuronic acid, hexosamine and sulfate content and identification of the specific hexosamine by paper chromatography.

Pretreatment total AMPS were normal for both children and remained so during initial treatment with dessicated thyroid. However, chromatographic fractionation of the pretreatment urinary AMPS yielded a product in the first fraction which is nearly identical in both children and which appears to be hyaluronic acid. Hyaluronic acid is not found in this fraction of AMPS from control urine in this laboratory. The results suggest that human myxedema also contains increased hyaluronic acid. (SPR)

15 *Decreased Incorporation of Uracil-2-C^{14} in the RNA Fraction of Mouse Fibroblast Cultures Grown with Pancreatic Diabetic Insulins.* CLAUDE C. ROY*, RONALD GOTLIN*, DENNIS SHAPCOTT* and DONOUGH O'BRIEN, Univ. of Colo. Med. Ctr., Denver, Col.

Insulin stimulates the rate of protein synthesis and has a marked effect on RNA metabolism. Previous work on diabetic insulins has shown that serum derived juvenile diabetic insulin is abnormally resistant to degradation by insulinase and that pancreatic diabetic insulin has a decreased capacity to stimulate the incorporation of glycogen into rat diaphragms. The purpose of this study was to examine the possibility that diabetic insulin is abnormal in its action on RNA synthesis. A series of cultures are inoculated simultaneously with 5×10^5 log phase diploid mouse fibroblasts of 3T6 strain. Growth is allowed until day four at which time the medium is replaced with fresh medium containing 0.5 mc of uracil-2-C^{14} (S.A. 20 mc/millimole). Pancreatic insulins from normal and adult diabetics were prepared by acid-ethanol extraction and added to the tissue culture in a concentration of 1000 μ units/per ml of nutrient medium. After a 48 hr. incubation period, the cellular monolayer is subdivided by conventional chemical methods and the C^{14} activity of the RNA fraction is estimated.

	Diabetic (5)				
No. plates	2	2	1	2	2
Mean C.P.M./plate	5541	3980	6683	5496	7285
	Normal (2)				
No. plates	2	2			
Mean C.P.M./plate	58941	45469			
	S.D.			P*	
Normal pancreas	52205 ± 10,050			< 0.001	
Diabetic pancreas	5797 ± 1,136				

(SPR)

16 *Hormonal Regulation of Bilirubin Excretion by Rat Liver.* LAWRENCE M. GARTNER, JUDITH GLUCK* and IRWIN M. ARIAS*, Albert Einstein College of Medicine, New York, N.Y.

In hypophysectomized (hypox) or thyroidectomized (thyrox) rats, the hepatic capacity to excrete bilirubin decreased progressively, reaching the maximal reduction, 40 % of normal, 7 days post-hypophysectomy and 18 to 25 days post-thyroidectomy. Both the volume of bile secreted and the concentration of bilirubin in bile were reduced. Hepatic uptake of bilirubin *in vivo* was unaffected by hypophysectomy but was reduced to 64 % of normal by thyroidectomy. Neither hypophysectomy nor thyroidectomy affected bilirubin glucuronide formation by liver homogenate *in vitro*. In hypox rats, the excretory defect was corrected after 6 days treatment with porcine growth hormone (2.0 mg/day) or thyroxine (1.25, 2.5 or 10.0 μg/day). In thyrox rats the excretory defect was corrected after 6 days treatment with thyroxine (2.5 or 5.0 μg/day). Treatment of thyrox rats with porcine growth hormone (2.0 mg/day/6 days) restored hepatic excretory capacity to 71 % of normal.

Although neither hypophysectomy nor thyroidectomy altered hepatic glucuronyl transfereas activity *in vitro* when bilirubin served as glucuronide acceptor, when o-aminophenol (OAP) served as glucuronide acceptor hepatic glucuronyl transferase activity declined gradually to 25 % of normal 7 days post-hypophysectomy and 18 days post-thyroidectomy. In hypox rats, the OAP conjugation defect was corrected after 22 days of thyroxine administration (10.0 μg/day), whereas 6 days treatment with either growth hormone or thyroxine failed to correct the OAP conjugation defect.

These studies reveal that growth hormone and thyroxine are important in the regulation of hepatic bilirubin excretion and suggest that the synthesis of ethereal (e.g. OAP) and ester (e.g. bilirubin) glucuronides may be catalyzed by different glucuronyl transferases. (SPR)

17 *Urinary C21 Corticosteroid Sulfates in the Urine of Premature Infants Pre and Post ACTH.* JACQUES R. DUCHARME, GILLES LEBOEUF and THOMAS SANDOR*, Depts. of Ped. and Med., Univ. of Montreal and L'Hôp. Ste. Justine, Montréal, Canada.

We have studied the urinary excretion of cortisol (F), cortisone (E), tetrahydrocortisol (THF), tetrahydrocortisone (THE), 6β-hydroxycortisol (6β-OHF) and corticosterone (B) in premature infants. Each specimen was extracted sequentially for free, β-glucuronidase and solvolysis liberated steroids; each metabolite was identified by constant isotope ratios, and quantitated by a double-isotope derivative assay. In 3 normal prematures studied within the first 48 hours of life, 6β-OHF, THF, F and B were mainly recovered as free or sulfated compounds. THE and E were mainly sulfurylated. In a 4th infant, with respiratory distress syndrome, studied similarly, 6β-OHF was mainly sulfated while THF was mostly as a glucuronoside. THE and B were equally glucuro and sulfo-conjugated while F and E were equally recovered in free or sulfated form. In a pool of 8 premature infants studied from two weeks of age, prior to ACTH, approximately 60 % of F and E were sulfo-conjugated, while a larger proportion of B was in the sulfate form. 6β-OHF and THF were predominantly excreted as sulfates, while THE was mostly unconjugated. Post ACTH, there was a considerable increase of all steroids and glucuro-conjugation seemed genererally enhanced except for F. These studies suggest that: 1. in resting state, most C21 steroids are excreted unconjugated or conjugated with sulfuric acid, in accord with limited glucuro-conjugation; 2. some limitation in reduction of Ring A of the steroid molecule exists since more unreduced metabolites are recovered than in older children and adults; 3. glucuroconjugation can be enhanced under stress or ACTH, suggesting that glucuro-conjugation is not maximal in resting state; 4. these metabolic particularities persist at least up to four weeks of age. (SPR)

18 *A New Form of Congenital Adrenal Hyperplasia.* MARIA I. NEW* and RALPH E. PETERSON*, Cornell Univ. Medical College, New York, N.Y. (introduced by W.W. McCrory).

A new form of adrenal hyperplasia in a 12-year-old boy is being described. The unique features are: 1. classical signs of primary hyperaldosteronism, i.e. mild hypertension, hypokalemic alkalosis, low plasma renin, hypervolemia and fixed hyperaldosteronism unaffected by sodium restriction or excess; 2. low normal plasma levels of cortisol, corticosterone but elevated plasma aldosterone; 3. elevated plasma ACTH; 4. low normal urinary free cortisol, 17OH, 17KS, pregnanetriols which respond poorly to ACTH; 5. normal rise of plasma testosterone to chorionic gonadotrophin; 6. marked decrease of aldosterone production and marked fall in elevated blood pressure following treatment with glucocorticoids; 7. after 6 months of prednisone therapy blood pressure and aldosterone response to restriction and administration of sodium remain normal. Turnover rates of corticosterone (B), desoxycorticosterone (DOC), cortisol (F), and desoxycortisol