ENZYME ADAPTATIONS BY CULTURED ADIPOCYTES OF HUMAN INFANTS AND CHILDREN

73 F. Adebajo⁺/Intr. by J.K. Lloyd/ Children's Hospital of Phila., Rebound Health Center, Penna. U.S.A.

Assays of Lactate Dehydrogenase /LDH-L and LDH-P/, Malate Dehydrogenase /MDH/ and Glucose-6-Phosphate Dehydrogenase /G6PDH/ were done weekly on cultured adipocytes and skin fibroblasts grown in synthetic medium and obese serum. Levels of MDH was similar in adipocytes and skin fibroblasts, while the levels of LDH-L, LDH-P and G6PDH were lower in adipocytes than in skin fibroblasts. After transformation to a fibroblast-like appearance, in culture, the adipose cells /now termed adipofibroblasts/ contain significantly more of each enzyme than did the initial adipose cell isolates. The levels of activities of LDH-L, LDH-P and G6PDH increased to the same levels as in skin fibroblasts, however MDH activities rose to much higher levels than those found in skin fibroblasts. In obese serum, activities of LDH-L, LDH-P did not significantly change but the activities of MDH and G6PDH dropped sharply in adipofibroblasts, when as in cultures of skin fibroblasts only the G6PDH activities dropped significantly, the other enzyme activities being unchanged. On the basis of these and other data it is concluded that adipose cells are not just fibroblasts with lipid-storing ability.

INFANTILE FAMILIAL HYPERTRIGLYCERIDEMIA: DEFECT IN ADENYL CYCLASE-cAMP-PROTEIN KINASE-TRIGLYCERID LIPASE SYSTEM ?

74 E. Kaukel⁺, H.J. Sternowsky⁺, U. Gärtner⁺/Intr. by K.H. Schäfer/. Depts. Med. and Pediat., Univ. Hamburg, West Germany.

Hyperlipoproteinemia I pattern was found in three 14, 11, 6 year old siblings by LPelectrophoresis and ultracentrifugation. Chylomicrons were inducible by 50% dietary fat, not carbohydrate. Bone maturation was delayed, thyroid function normal. All had stunted growth. STH levels after arginine, insulin, glucose were normal. I.v. glucose loading revealed increased glucose assimilation. Stimulation of lipolysis in vivo with glucagon and orciprenaline /100 ng/kg/min ea./ was significantly lower /p<0.01 resp. <0.025/ than in unaffected controls. During these stimulations plasma levels of cAMP increased to significantly higher levels /p<0.05 resp. <0.025/ than in controls. These results indicate a defect in adenyl cyclase-cAMP-protein kinase-triglycerid lipase system. Since plasmatic cAMP rises to higher levels than normal we assume that the cAMP binding enzyme, protein kinase, is deficient or inactive in the lipolytic cascade and in glycogen metabolism.

SERUM LP-X IN INFANTILE CHOLESTATIC JAUNDICE /CJ/.

75 J.R. Foley⁺, H.N. Magnani⁺ and P. Alaupovic⁺/Intr. by W.M. Teller/. Universitäts-Kinderklinik Ulm, Germany and Oklahoma Medical Research Foundation, Oklahoma Medical Research Foundation, Oklahoma City, USA

To test the feasibility to differentiate intrahepatic from extrahepatic cholestasis with the test for LP-X/cholestatic serum lipoprotein/, we have initially examined sera from 38 infants with CJ by immunoelectrophoresis. LP-X was absent in 19 with neonatal hepatitis, but present in 16 infants with biliary atresia /BA/ and in 3 with severe intrahepatic cholestasis. To further characterize CJ in LP-X positive infants, we attempted to influence serum LP-X with cholestyramine /CSM/, a non-absorbable bile acid binding resin. During a two week /4gm/day/ administration of CSM, LP-X increased /p>0.1/ in all 13 infants with BA, whereas it decreased /p<0.025/ in all 7 infants with intrahepatic cholestasis. LP-X negative infants /<7mo/ never had BA. The effect of CSM on lowering serum LP-X in infants with patent extrahepatic bile ducts is mediated via a predictable alteration of bile acid metabolism by CSM: increased fecal excretion and increased hepatic synthesis from cholesterol. The ensuing rise of hepatobiliary excretion of bile acids is associated with similarly enhanced excretion of cholesterol and phospholipids. These events lower serum cholesterol and phospholipids, the major constituents of LP-X

URINARY PREGNANETRIOLONE EXCRETION BEFORE AND AFTER ACTH STIMULATION IN PARENTS OF CHILDREN WITH 21-HYDROXYLASE DEFICIENCY⁺⁺

76 J. Homoki⁺, A.T.A. Fazekas⁺, W.M. Teller Department of Pediatrics, University of Ulm, Fed. Rep. Germany.

In healthy persons no or very little pregnanetriolone /PT'one; 3 α , 17 α , 20 α -trihydroxy-5 β -pregnan-21-one/ is excreted in the urine. In patients with congenital adrenal hyperplasia /CAH/ due to 21-hydroxylase deficiency more than 100 ug/day of PT'one are excreted. The excretion is even further augmented by ACTH stimulation. Four healthy parents of children with 21-hydroxylase deficiency were studied. Urinary PT'one excretion was determined by capillary gas chromatography /1/ on the day before and on the day after injection of 40 IU ACTH /Synacthen/ i.m. Eight normal adults served as controls. Results: No PT'one excretion was detectable in the control adults. The parents excreted 0 to 4 ug PT'one daily before and 289 $\pm$ 122 ug/day after ACTH stimulation. Conclusion: It is proposed that heterozygous carriers of CAH due to 21-hydroxylase deficiency can well be detected by their urinary PT'one excretion after ACTH stimulation. /1/ J. Homoki et al.: J. Steroid Biochem. 5, 302/1974/

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THYROXINE BINDING GLOBULINE /TBG/, T₃, T₄ AND TSH IN NEWBORN INFANTS.

77 P. Stubbe⁺, R. Hesch⁺, J. Gatz⁺, P. Heidemann⁺ and A.v.z. Mühlen⁺/Introduced by W. Schröter/. Children's Hospital, University of Göttingen and Dep. of Endocrinology, Medical School Hannover, Federal Republic of Germany.

Fullterm infants of comparable gestational age were investigated. In group I the radioimmunological determinations were done in maternal venous blood at delivery, mixed umbilical blood and at 1, 3, 6, 12, 24 and 48 hrs of age. The mean results for TBG /mg/ 100 ml/ were as follows: 1.65, 1.14, 1.27, 1.19, 1.2, 1.2, 1.27. In group II the determinations were performed at 1, 3, 5 and 7 days of age and gave the following mean TBG results: 1.31, 1.37, 1.31, 1.34. T₃, T₄ and TSH showed the known increase during the first hours of life and the known ratio of mother to fetus. TBG concentrations in the fetus were 30 per cent lower than in maternal blood and had no immediate postnatal increase. Thus the postnatal increase of T₃ and T₄ are independent of TBG concentration in the neonate and no increase of TBG synthesis is necessary to cover requirements of T₄ transportation.

METABOLIC RATE AND TEMPERATURE CONTROL IN LOW BIRTH-WEIGHT INFANTS: LONGITUDINAL STUDY

78 J.C. Sinclair⁺, McMaster University, Hamilton Ontario, Canada /Intro. by J. Mestyan/

In order the study metabolic rate and temperature control under controlled thermal conditions, we constructed a closed-circuit respirometer for newborn infants which permits the simultaneous measurement of oxygen consumption rate /Vo₂/, and body and environmental temperatures. A total of 178 exams have been performed on 62 newborn infants. Over the first five weeks of extrauterine life, minimal Vo₂ expressed per unit surface area or per unit body weight rises substantially. The neutral operative temperature falls progressively. Both rectal-environmental and mean skin-environmental temperature gradients rise. Ambient thermal insulation is slightly low in comparison with the adult, and tissue insulation is substantially lower. Studies in babies under 1000 grams birthweight show the importance of gestational age differences even in this weight group in determining metabolic rate total specific thermal insulation, and neutral operative temperature. These observations allow the first estimate of the caloric requirement for extra-uterine growth in prematurely born infants, based on concurrently measured differences in their metabolic rates.