17 PLASMA INSULIN AND LIVER GLYCOGEN STORAGE IN RABBIT AND RAT FETUSES. A. Jost, M. Gilbert, and A. Kervran. Laborat. Physiologie comparée, Université Paris VI, 75005 PARIS, France.

Glycogen storage in the fetal liver obeys a hormonal control (Jost, Harvey Lect. 55:201, 1961). In rabbits it is prevented by decapitating the fetus before day 25; it is restored by giving a corticosteroid + prolactine or GH to the decapitate. In rats glycogen storage is prevented in fetuses decapitated on or before day 18 on condition that the mother is adrenalectomized; it is restored simply by giving a corticosteroid. It was studied whether these variations in liver glycogen are paralleled by variations in plasma immunoreactive insulin (IRI). Rabbits:fetuses decapitated on day 24 and studied day 29 (number in brackets):glycogen=2.8±0.2(10)mg/g fresh tissue;IRI:73±6(12)uU/ml(human standard);controls:glycogen=26±3(11);IRI=45±4(17). Rats:1)mother adrenalectomized on day 14, fetuses decapitated on day 18 and studied on day 21:glycogen=10.0±6(8)mg/g;IRI=113±16(8)uU/ml(rat standard);2) same treatment + 100µg cortisol acetate 24hr before:glycogen=58.4±4 (10) ;IRI=95±29(10);3)controls:glycogen=91.3±2(4);IRI=138±21(16). The striking differences in liver glycogen are not paralleled by similar variations in plasma insulin. If insulin is required for glycogen deposition in the liver, it is not the limiting factor in decapitated fetuses.

18 SOMATOMEDIN ACTIVITY IN THE HUMAN HEPATIC VEIN. F. Girard, R, M. Schimpff, C. Lassare, M. Donnadieu. Hop. Trousseau, Paris 12e, France.

Blood samples were taken simultaneously from the humeral artery (H.A.) and the hepatic vein (H.V.) of 7 male adults. Somatomedin (SM) activity was measured by the incorporation of ^{35}S into embryonic chick cartilage, and growth hormone assayed by radio immunology. In 9 out of 10 cases the concentration of SM in the hepatic venal blood was found to be superior to that in the arterial blood. The mean of the differences in SM activity (H.V.-H.A.) was + 0,29 ± 0.10 (standard error) units/ml. This difference is significant. In these conditions, the hepatic venal blood yielded a SM activity 47% ± 16% higher than that in the humeral artery. In the 3 cases where a second pair of samples were taken 20 or 40 minutes after the first, a similar difference was observed. However, in the 11 subjects tested for growth hormone, no significant difference was found between the concentration of growth hormone in the 2 types of blood. The observation of high SM levels in the efferent blood of the liver tends support to the experimental findings of McConaghey who proposed the liver as the site of SM production. However, taking into consideration the hepatic plasma flow (measured in 3 cases $\bar{Q}$ = 0,810 l/min) the importance of the differences observed must be regarded as questionable, since these would imply a very large production of SM. In this respect, the measured SM activity has to be discussed.

19 OBSERVATIONS ON A SOMATOMEDIN (SM) INHIBITOR IN SEVERELY MALNOURISHED CHILDREN

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In 13 patients with marasmus or kwashiorkor, plasma SM was measured using the porcine costal cartilage assay. Non-parallelism (N.P.) due to a shallow slope prevented quantitation in many samples. Results: SM-distribution: on admission $\leq .20$:5; $.20 < x \leq .50$:3; $.50 < x < .80$:2, N.P.:3. After 4-6 weeks of treatment: low : 6, normal: 1, N.P. : 3 (3 had died, all with initial SM $< .20$). After 8-10 weeks: low: 3, normal or high : 3, N.P. : 3 (one more child had died). Mixing plasma from 3 untreated patients with the standard lowered its apparent potency with 35, 67 and 0% resp. Heating plasma after acidification increased its potency relative to a standard control from $< .12$ to .65. Concl.: In severe and chronic malnutrition heat-labile SM-inhibiting material is present in plasma, initially persisting during treatment. This may contribute to the problems in reverting these children from a katabolic to an anabolic state.

20 STUDIES ON SOMATOMEDIN IN NEWBORN AND ITS RELATIONSHIP TO THE EXCRETION OF GROWTH HORMONE IN URINE. K. W. Kastrup, H. H. Andersen. Childrens Hospital, Fuglebakken, Copenhagen.

Somatomedin (SM) was determined in cord blood and maternal blood with the chick embryo assay. The ratio cord blood/maternal blood was around 0.90. Synchronous variations between the paired samples could be demonstrated suggesting a placental transfer. In prematures low values around 0.30 units SM was found in the first days of life, within 6 days the values were in the range for normal infants - 6 months of age. In mature infants initial values about 0.70 units SM was found to be within normal range after 6 days of life. Growth hormone excretion in the urine was determined also in prematures. In prematures very high excretion was found in the first 3 days of life i.e. more than 1000 ng/100 ml. After 6 days excretion of 100 - 1000 ng/100 ml was found. In matures the initial excretion in the range of 500 ng/100ml decreased to less than 100 ng/100 ml in one week. The high excretion in prematures is related to impaired renal function but also represnets increased production. It is suggested that the increased production of growth hormone in the first days of life is related to generation of SM in the newborn.

21 STUDIES ON HUMAN PLASMA SOMATOMEDIN ACTIVITY IN THE NEONATAL PERIOD

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Plasma Somatomedin activity (SM) was measured in normal newborns by the porcine rib cartilage assay according to Van den Brande and Du Caju. Results were expressed as potency ratio related to an adult reference standard. The mean SM in mothers at delivery ($n = 14$) was 0.26 ± 0.19 (SD), range 0.10 - 0.83, and was higher ($p < 0,01$) in cord blood ($n = 14$) 0.54 ± 0.33, range 0.10 - 1.32 In newborns aged from 2 to 10 hours SM was not detectable in 3 individual samples and five pools of plasma. In 3 others cases SM was respectively 0.14, 0.26 and 0.42. The mean SM increased on day 4 and 5 (0.98 ± 0.46, range 0.43 to 1.55) in six infants. After the age of one month the mean SM was 0.42 ± 0.24, range 0.10 - 0.89. No in vitro inhibitory effect could be demonstrated in plasmas with low SM activities.

These variations in SM might be due to the early decrease in plasma oestradiol and to the later diminution in circulating GH.

22 AGE-DEPENDENT VARIATION IN CARTILAGE RESPONSE TO SOMATOMEDIN.

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Department of Physiology, University of the Witwatersrand, Medical School, Johannesburg, South Africa, 2001.

The role of variation in end-organ cartilage response to somatomedin (SM) as a significant determinant of growth velocity has been investigated.

The response of costal cartilage of foetal and post-natal rabbits to SM has been assessed by simultaneously measuring ^{35}S and ^{3}H-thymidine uptake in vitro. Cartilage from rabbits of known growth rate at 23 and 30 days after conception (gestation 33 days), and at 1, 7, 17, 28, 39, 64, 90 and more than 200 days after birth, was studied. An excellent correlation between thymidine uptake and the growth velocity of the costal cartilage was shown. The uptake of ^{35}S was also closely related to growth velocity and the $^{3}H/^{35}S$ ratio declined as growth rate slowed.

Serum SM of each age group was measured by the porcine cartilage technique of Van den Brande. The post-natal serum SM increased progressively with age to an adult plateau.

This study suggests that the growth velocity of costal cartilage is determined by the combined effects of end-organ response and serum SM stimulus.