835 HYPERAMMONEMIA IN PREMATURE INFANTS:

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Plasma levels of ammonium, glutamine, glutamate, alanine, α-keto-glutarate and urinary excretion of orotate were measured in full-term, n=41, premature small for gestational age (SGA), n=9, and premature appropriate for gestation age (AGA), n=27, infants. At 0-3 days of life there was a significant difference ($p<.001$) in plasma ammonium concentrations in the premature SGA and AGA infants (mean±SEM) 45±3, 47±2 μM as compared to the full-term infants, 27±1 μM (adult normal <30 μM). When the two premature groups reached term by weight or gestational age they were still hyperammonemic (39±3, 47±3 μM). It was not until 6-8 weeks of postnatal age that plasma ammonium levels became normal in all the prematures (29±1 μM). Associated with the hyperammonemia was a significant ($p<.01$) decrease of plasma α-keto-glutarate concentration, 12±1 μM, in premature AGA (n=13), compared to 22±1 μM in full-term (n=17) infants and an increase ($p<.05$) in urinary orotate excretion, 9±2 as compared to 4±1 μg/mg creatinine. There was a significant, $p<.001$, relationship between birth weight and plasma ammonium concentration ($r=-0.65$) and between α-keto-glutarate and plasma ammonium levels ($r=-0.86$). There were no differences in the plasma concentrations of glutamine, glutamate or alanine. Both premature groups were asymptomatic. Possible mechanisms responsible for these abnormalities include development delay of one or more of the enzymes related to the urea cycle or urea cycle substrate deficiency.

836 INSULIN RELEASE DURING ACUTE AND CHRONIC HYPOXIA.

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Glucose-induced insulin release was studied in 6 month old puppies during acute and chronic hypoxia, alone and in combination. Six experimental animals were rendered chronically hypoxic (PaO_2 ~ 40 torr) by creation of a R→L shunt at age 1½ months. Six control animals (PaO_2 >70 torr) underwent sham procedures at the same age. Acute hypoxia (AH)(PaO_2 ~ 20 torr) was produced in both control and experimental animals by ventilation with 8 or 10% oxygen. All experiments included glucose pulses (.25 gm/kg) given during ventilation with room air and with low oxygen mixtures. Tabulated below are the mean increases in plasma glucose and plasma insulin in each group. Only significant differences are indicated.

	Glucose Increase (mg%)	Insulin Increase (μU/ml)	
Control (PaO_2 > 70)	106.3	44.5	p < .01
Control + AH (PaO_2 ~20)	112.0	5.3	
Experimental (PaO_2 ~ 40)	89.0	45.0	p < .01
Experimental + AH (PaO_2 ~ 20)	93.0	10.3	

These data indicate that chronically hypoxic animals have an insulin response to glucose challenge equivalent to controls. The diminished insulin response seen in acutely hypoxic animals is not prevented by chronic hypoxia. Since insulin is crucial for fuel metabolism, these observations are relevant to heat and energy production in children with cyanotic congenital heart disease who encounter situations which acutely impose further oxygen deficiency.

837 PURINE METABOLISM IN THERAPY OF VON GIERKE'S DISEASE

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Recently Green et. al. (N.E.J. Med. 294:423, 1976) have demonstrated that nocturnal infusion of a high carbohydrate diet is effective in treating patients with Von Gierke's disease. We have studied potential factors which may explain the lower serum uric acid with this therapy. Glycine-1-^{14}C incorporation into urine uric acid, fractional renal acid clearance and red cell phosphoribosylpyrophosphate (PRPP) levels were studied during a control period of frequent daily high carbohydrate feedings (hcf) and frequent daily high carbohydrate feedings and nocturnal vivonex infusion (hcfn). Twenty four hours after injection of glycine-1-^{14}C, the specific activity of uric acid was 3 times greater in hcf than in a control with Glycogen Storage Type III, and this was lowered to 2 times greater with hcfn. Total six day incorporation was 0.68% of the injected glycine-1-^{14}C with hcf, 0.40% in hcfn, and 0.18% in the control. Fraction excretion of uric acid increased from 11.3 per cent in hcf to 26.3 per cent in hcfn. PRPP levels were 8.0 picomoles/mg protein in hcf, 6.4 in hcfn and 6.0 in controls. We conclude additional of nocturnal feedings to hcf 1)decreases the accelerated de novo purine synthesis to a level still higher than control 2)increases fractional renal uric acid excretion by the kidney associated with lowered serum lactic acid, and 3)does not change red cell PRPP levels. Near normalization of purine metabolism with hcfn in Von Gierke's disease should significantly decrease the risk of gout.

838 ESTROGEN EFFECT ON CALCIUM UPTAKE BY BONE.

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Cord blood plasma has high concentrations of estrone (E1), estradiol (E2) and estriol (E3). E2 causes hypocalcemia in newborn rats and in parathyroidectomized (PTX) adults. Since kidney and intestine have been excluded as sites of this action, bone is the presumptive locus of calcium (Ca) sequestration.

Uniform discs from the calvaria of newborn rats and young mice were incubated in Krebs' solution. The addition of E2 to the medium or prior E2 injection of the donors increased Ca uptake by 60-100%. Nitromiphene, a competitive blocker of estradiol, prevented this effect and eliminated hypocalcemia after E2 in vivo. Discs from donors injected with parathyroid extract (PTE) showed decreased Ca uptake; when both PTE and E2 were given, uptake equalled that of uninjected controls. Since E2 lowers Ca in PTX rats, its effect on bone must be independent of, as well as opposite to, that of parathyroid hormone.

E1, thought to be active only after hepatic conversion to E2, caused hypocalcemia in vivo but not in vitro. E3 was inert both in vivo and in vitro.

These findings suggest that the high plasma estrogen concentrations present in the neonate may contribute to hypocalcemia through a direct effect on bone.

839 THE PROGNOSTIC VALUE OF TEMPERATURE GRADIENTS IN PRETERM INFANTS.

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When ambient temperature is controlled to maintain a stable body temperature, the diagnostic value of the latter is lost. Under these conditions, the differences between ambient, skin and core temperature (temperature gradients) should assume clinical significance. Temperature gradients were evaluated in 82 preterm infants of appropriate weight for gestational age. Thirty-eight were healthy and 44 developed RDS, of whom 16 died. All were nursed in incubators with ambient temperature regulated to maintain abdominal skin at 36.5 C. Ambient, core and abdominal skin temperatures were recorded for the first 6 hours of life. The gradients of ambient to skin and core to skin were analyzed for each hour. Ambient was higher than skin temperature in all infants during the first hour, indicating a heat-gaining state. After the first hour, the subsequent pattern of the gradients differed significantly in healthy infants, distressed survivors and infants who died. In healthy infants, the ambient to skin gradient became negative crossing the increasing core to skin gradient between 1 and 2 hours, whereas in surviving distressed infants this crossing occurred later, between 3-5 hours, reflecting continued inadequate heat production. These findings suggest temperature gradients are a useful tool to monitor heat flow patterns and can provide an accurate prognosis within the first six hours of life.

840 EFFECT OF DIETARY PROTEIN AND MAGNESIUM ON PLASMA CHOLESTEROL LEVELS IN WEANLING RATS.

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The critical phase in the pathogenesis of atherosclerosis may begin in early infancy. This is a report of dietary induction of an important risk factor, hypercholesterolemia, in male rats of 28-38 g fed laboratory chow (210 mg magnesium (Mg)/ 100 g; 23.4 % crude vegetable protein) or purified diets varying in respect to Mg: (0 to 150 mg/ 100 g) and casein (1 to 40 %). Plasma cholesterol was measured on a Technicon SMAC autoanalyzer utilizing the Liebermann-Burchard reaction. Diets were fed A) 1 wk, B) 2 wk.

	A): Dietary Mg--Casein	Plasma cholesterol mg/dl	P value*
	100 -- 20	146.4 + 8.6** (22)	- - -
	100 -- 10	165.0 ± 4.4 (5)	NS
	150 -- 40	222.2 ± 24.4 (4)	0.005
	0 -- 20	134.4 ± 10.6 (9)	NS
	0 -- 40	193.0 ± 33.1 (4)	NS
	Lab chow	101.2 ± 9.7 (4)	0.05
B):	100 -- 20	117.3 ± 4.1 (6)	- - -
	150 -- 40	162.3 ± 7.2 (12)	0.01
	100 -- 1	99.3 ± 9.9 (3)	NS
	5 -- 40	152.3 ± 5.9 (12)	0.05
	Lab chow	125.0 ± 12.6 (5)	NS

* Compared with 100-20 by t test. NS= Not Significant. **Mean±SEM

A significant elevation in cholesterol levels was related to high dietary casein, with slight reduction when lab chow was fed. Mg did not significantly affect plasma cholesterol. Supp: Mo. Heart Ass