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Abstracts for Poster Presentations

45 GLUCOSE OXIDATION IN NEONATES, INDIRECT CALORIMETRY OR STABLE ISOTOPES?

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Intravenous glucose is used frequently in newborn infants to cover their energy needs. Whether this infused glucose is directly oxidised is questionable. Indirect calorimetry (IC) may overestimate the glucose oxidation rate (GOR) due to the conversion of glucose into fat. We therefore compared GOR measured by IC and $^{13}CO_2$ production from U-^{13}C-glucose. IC was performed for 6 hr, metabolic rate (MR), and GOR was calculated from the protein-free RQ and $\dot{V}O_2$. Simultaneously a primed constant infusion of U-^{13}C-glucose was given, GOR calculated from the increase in $^{13}CO_2$ excretion above baseline. A plateau was obtained after ~2 hr. 10 AGA infants were studied. BW 2.4±0.4 kg, gestational age 37±2 wks, age 9±8 days, weight 2.3±0.4 kg. Energy intake 70±14 kcal/kg/d, glucose intake 15±2.5 g/kg/d, protein intake 2.7±1.1 g/kg/d.

Results: n=10, Mean±SE.

	MR kcal/kg/d	GOR g/kg/d	Fat Oxid. (MR-GOR) g/kg/d
IC	45.3±1.2	10.1±0.7†	0.1±0.3†
U-^{13}C-gluc		7.0±0.3	1.4±0.2

† $p < 0.001$ by paired t-test

CONCLUSIONS: 1) IC shows a significantly higher glucose oxidation than U-^{13}C methodology. 2) This difference represents glucose converted into fat with concomitant fat oxidation. 3) GOR measured by IC increased with glucose intake, but GOR calculated from U-^{13}C-gluc showed no correlation with glucose intake. 4) GOR calculated from U-^{13}C-gluc is 4.8 mg/kg/min, which approximates the endogenous glucose production found in previous studies.

46 SUBSTRATE UTILISATION OF NEWBORN INFANTS FED INTRAVENOUSLY WITH OR WITHOUT A FAT EMULSION.

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Total parenteral nutrition (TPN) is important in the management of ill newborns. The difference in metabolic rate (MR) and substrate use (SU) between infants receiving TPN with and without fat emulsion have not been fully defined. We compared MR and SU by indirect calorimetry (IC) in infants receiving a glucose/amino acid mixture only (2% Vamin/DIOW), group I, with infants (group II) receiving a fat emulsion (Nutralipid 10%) as well. Birthweight, gest. age, postnatal age and weight were similar. IC was performed for 4±1 h. MR and SU are calculated from the protein-free RQ and $\dot{V}O_2$.

Patients (Mean±SE) Group	n	Weight kg	Energy Intake kcal/kg/d	Glucose Intake g/kg/d	Fat Intake g/kg/d	Protein Intake g/kg/d
I	11	2.8±0.1	83.3±2.8	10.3±0.9	0	3.0±0.1
II	11	2.9±0.2	84.3±2.4	13.5±0.4	1.9±0.2	2.7±0.3

	MR kcal/kg/d	$\dot{V}CO_2$ ml/kg/min	Glucose Oxid. g/kg/d	Fat Oxid. g/kg/d	Protein Oxid. g/kg/d
I	49.4±1.1	6.5±0.2	12.9±0.8	-0.5±0.3	1.1±0.1
II	44.8±1.6	5.9±0.2	9.1±0.6	0.5±0.2	1.1±0.1
	p<0.05	p<0.05	p<0.001	p<0.025	ns

CONCLUSIONS: 1) MR is significantly higher in infants receiving glucose-amino acids alone. 2) $\dot{V}CO_2$ is higher in group I. 3) This might be caused by a higher conversion of glucose to fat in group I which is energy consuming. 4) We found no effect on protein balance. 5) TPN with lipids has advantages over TPN without lipids.

47 Heart-rate control in 8 to 10-year-old healthy and diabetic children

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Autonomic cardioneuropathy is a late complication in adult diabetic patients (Wheeler,T. & Watkins,P.J.,Br Med J 4:584, 1973). The problem of this project was whether disturbed cardiac chronotropic control could be detected by computerized heart-rate (HR) analysis early in juvenile diabetes mellitus. 11 children with diabetes (duration 3-5 yrs) and a similar number of sex- and age-matched healthy control subjects, age 8-10 yrs, were investigated. The HR was recorded by a hybride computer system in supine position during spontaneous breathing, deep regular breathing and tilting at a rate of 0.1 Hz. For each record of 2 min two indices of heart-rate variability (HRV) and power spectrum of HRV were computed.

Results: The diabetic patients had a higher mean HR both in spontaneous and stimulated conditions. The indices of HRV increased ($p<0.01$) in deep breathing test similarily in both test groups. The HRV did not change during tilt test. The negative slope of linear regression between the HR and HRV was significantly ($p=0.008$) steeper in healthy than in diabetic subjects in spontaneous conditions only. In the power spectrum the entrainment of HRV caused by deep breathing was identical in both groups. The results indicate evidence of limited HRV response in relation to HR already after 3 yrs' duration of diabetes, although respiratory HRV is produced in a normal way by deep breathing.

48 ENZYME PROFILES AND POTENTIAL INVASIVENESS OF PSEUDOMONAS AERUGINOSA(PA)ISOLATES IN INTENSIVE NEWBORN UNIT(INU).

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PA is one of the most important bacterial pathogens involved in INU. Because of the resistance of this microorganism to many antibiotics and the high mortality rate associated with systemic infection,the significance of a local colonizing isolate,which may act as a focus for dissemination,is critical to patient management.Recently some authors have correlated PA invasiveness with the production of extracellular enzymes.Therefore we examined the production of 8 enzymes, including protease,elastase,gelatinase,Dnase,hemolysin,lipase,chondroitinase and lecithinase,by 100 strains of PA recovered from both clinical and environmental sites in INU.25 strains were recovered from nasopharynx,31 from stools,14 from umbilicus,8 from skin,8 from systemic sources(blood,cerebro-spinal fluid),17 from environment.Enzymes were determined by substrate tube or plate assays.Protease,gelatinase,Dnase, lecithinase were mainly associated with clinical isolates of systemic source;moreover the percent of these activities decreased progressively in strains recovered,respectively,from nasopharynx,stool,umbilicus and skin.The environmental isolates were almost enzymatically inert. Therefore our data suggest that these enzymes may play an important role in the dissemination of PA from local or superficial sites and their detection could predict potential invasiveness.

49 Interactions of branched-chain amino acids in mouse brain cell cultures.

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The 3 branched-chain amino acids (BCAAs) leucine (leu), isoleucine (ile), and valine (val) are unique because they are metabolized mainly at extrahepatic sites, including the brain. Experiments were performed with dissociated neonatal mouse brain cells between 10 and 13 days in culture. At equimolar concentrations of 0.8 mM, consumption was 2.41 ± SD 0.15 µmol/mg cell protein per 72 hr for leu, 2.40 ± 0.13 for ile, and 0.80 ± 0.32 for val. Ketoacids of all three BCAAs were released at about one fourth (ketovaline) to one tenth (ketoleucine) of the above rates. If medium leu was added at 0, 0.2, 0.8, 2.0 and 5.0 mM at a constant 0.8 mM ile and val, leu consumption and release of ketoleucine and CO_2 increased progressively. At all concentrations, release rates of ketoleucine were 1.6 to 2.6 times higher than those of CO_2 from ketoleucine. Cellular uptake of ile and val and release of ketoisoleucine and ketovaline decreased with increasing extracellular leu. Modulation of val affected the other 2 BCAAs and their ketoacids similarly. These data show that in brain cell cultures the rate of transamination of the BCAAs is faster than the decarboxylation rate of the corresponding ketoacids, and that the 3 BCAA compete with each other for cellular uptake and metabolism.

50 TRANSPLANTATION AND IN VITRO ANALYSIS OF SOYBEAN-AGGLUTININ SEPARATED MOUSE SPLEEN CELLS

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In human bone marrow allotransplantation, an in vitro method using soybean agglutinin(SBA) for enrichment of stem cells and depletion of mature T cells in the graft has been described (Reisner et al.;Lancet 2:1320,1980).To define the quality of the method,mouse spleen cells (C3H, C57/B6,BALB/c)containing about 30% of mature T cells were separated by SBA.The composition and functional capacity of the cell fraction known to contain the stem cells were characterized in vitro after each of two SBA-separation steps.In addition, the ability of the cell fraction to reconstitute successfully allogeneic irradiated (900R) mice was investigated. Only the two step SBA-separation procedure yielded satisfying results: In comparison to the unseparated spleen cells,a three-fold increase in stem cells(CFU-c) and a 10-fold decrease of T cells(3% Thy1.2-pos.) was observed. Analysis by lectin and allogeneic stimulation showed significant diminuation of the cell function:The response (ratio) to PHA,Con A,and in the MLR dropped from 147,184,and 30 to 16,23,and 1.5. Transplantation of 10^7 two-step separated spleen cells in allogeneic irradiated recipients (C57/B6 in BALB/c; C3H or BALB/c in C57/B6;C57/B6 in C3H)resulted in complete reconstitution in 18% to 58% of the grafted animals. In contrast,all the animals of two control groups (with and without transplantation of 10^7 unseparated spleen cells) died either of GvHD or of wasting.- The results demonstrate that the SBA-separation procedure cannot completely eliminate the risk of GvHD in cell suspensions with an high amount of mature T lymphocytes.