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ENERGY EXPENDITURES OF TERM INFANTS DETERMINED BY THE DOUBLY-LABELED WATER ( $^2\text{H}_2^{18}\text{O}$ ) METHOD, INDIRECT CALORIMETRY, AND TEST-WEIGHING. William W. Wong, Nancy F. Butte, Cutberto Garza, Peter D. Klein. USDA/ARS Child Nutr Res Ctr, Baylor Coll Med, Dept Pediatr, and Texas Children's Hospital, Houston, TX.

Total daily energy expenditures (TDEE) of four exclusively breast-fed infants at 4 months of age were measured by the doubly-labeled water method. An oral dose of 300 mg of  $^{18}\text{O}$  and 200 mg of  $^2\text{H}_2\text{O}$ /kg body weight was administered to these infants. Two baseline urine samples and two daily postdose urine samples were collected for 10-12 days. The  $^{18}\text{O}/^{16}\text{O}$  and  $^2\text{H}/^1\text{H}$  ratios of these urine samples were measured by isotope-ratio mass spectrometry. Diet-induced thermogenesis (DIT) and basal metabolic rates (BMR) of the sleeping infants were measured postprandially, 0-2 and 2-3 hr, respectively, by indirect calorimetry. Milk intakes of the infants were measured by the test-weighing technique. TDEE of the four infants averaged  $69.0 \pm 8.4$  kcal/kg/d. DIT and BMR by indirect calorimetry averaged 0.5 and  $49.3 \pm 3.4$  kcal/kg/d, respectively. Energy remaining for activity (activity = TDEE-DIT-BMR) in these infants averaged  $19.2 \pm 6.7$  kcal/kg/d. Gross energy intake (0.67 kcal/g x milk intake, g/kg/d) was  $79.4 \pm 5.6$  kcal/kg/d. Our preliminary results indicated that TDEE of these 4-month-old breast-fed infants was 87% of their daily gross energy intake. TDEE was partitioned into DIT (1%), BMR (71%), and activity (28%). The mean ratio of TDEE/BMR in these infants was  $1.4 \pm 0.1$ .

## GENERAL PEDIATRICS & PEDIATRIC EDUCATION

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ORTHOTOPIC HEPATIC TRANSPLANTATION FOR UNIMMUNIZED CHILDREN - A PARADOX OF CONTEMPORARY MEDICAL CARE. Walter Andrews and Charles M. Ginsburg. Southwestern Medical School Depts of Surgery and Pediatrics, Dallas, Texas

We conducted a prospective evaluation of the immunization status (IS) of children with chronic liver disease (CLD) who were referred to our Center for orthotopic hepatic transplantation (OHT). One hundred-nine pts were enrolled in the study but 9 were excluded because of insufficient information. The ages of the pts ranged from 4 mos to 16 yrs (median; 34.3 mos). Fifty-seven were male. The etiologies of the CLD were: biliary atresia (BA)(67),  $\alpha$ -1 antitrypsin deficiency (14), Alagilles Syndrome (6), misc. (13). Forty-three children, 6 mos - 16 yrs 4 mos (median age, 56 mos) were completely immunized. Fifty-seven pts were inadequately immunized. Their ages ranged from 4 - 48 mos (median age, 18 mos) Twenty-three and 22 of the 57 had never received DPT or OPV, respectively, and only 5% of pts who were > 15 mos had been immunized with MMR. None of the pts who were eligible for Hib vaccine had received it. The IS correlated with chronologic age; only 22% of pts who were < 6 mos were completely immunized as compared to 100% of pts who were > than 48 mos. Children with acquired disorders of hepatic function were more often immunized than those with BA. In almost all instances, the parents stated that they had not immunized their child on the advise of their pediatrician or surgeon. Since live virus vaccines are contraindicated in immunosuppressed pts and pts with CLD are at > risk for contagion than normal child, it is essential that these pts be immunized at the routine intervals.

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MAGNETIC RESONANCE IMAGING (MRI) IN THE EVALUATION OF JUVENILE RHEUMATOID ARTHRITIS (JRA).

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Department of Radiology, and Cedars Sinai Hospital, Department of Radiology.

Radiologic evaluation of JRA is limited by the predominance of cartilage in the child's joint and by reluctance to subject children to xrays. We assessed the relative efficacy of MRI in evaluating joint disease in 16 JRA children. Mean age was 11.2 years (range 7-20.5 years), and mean duration of disease was 5.2 years (range 2-8.5 years). Although onset mode varied all had severe and active polyarthritis. MRIs on 15 knees and 12 hips demonstrated effusions in 6 hips, synovial hypertrophy in 5 knees and popliteal cysts in 6 knees, none of which were visible on corresponding xrays. Avascular necrosis, suspected in the hips of one child, was noted by MRI in two hips and one knee. Joint fragments, not seen on xray, were found in 3 knees and one hip. Cartilage loss was more severe than could be seen on xray in 9/12 hips and 5/15 knees. One child with clinically normal hips and only osteopenia on hip xray showed 50% loss of cartilage by MRI. Hypoplastic or absent menisci were found in 10/15 knees and may provide explanation for the joint instability so frequently present. In contrast, premature fusion of growth plates, seen in the xrays of hips and knees of one patient, were not well visualized by MRI. We conclude that MRI may provide a non-invasive and highly sensitive means of assessing both early and advanced joint disease in JRA.

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CHANGING PATTERNS IN NEONATAL PULMONARY HEMORRHAGE (PH) Rama Bhat, Romulo Ortega (Sponsored by D. Vidyasagar) Department of Pediatrics, University of Illinois Medical Center, Chicago, Illinois.

Pulmonary hemorrhage was the leading cause of perinatal mortality in the early 1970 (Fredrick and Butler 1971). However, the impact of improved perinatal care and the reduction in perinatal mortality during the last decade, upon PH has not been studied. We compared the incidence, distribution and the cause of PH for the two times periods (1974-1976 (I) vs 1983-1985(II)).

B.wt(kg)	I (%)	II (%)	Etiology	I (%)	II (%)
0.5-1	8/118 (6.8)	15/125 (12)	Tempr<36C	20/43 (46.5)	3/32 (9.4)
1.01-1.5	13/205 (6.3)	7/164 (4.2)	HMD	26/43 (60)	17/32 (53)
1.51-2.0	11/223 (4.9)	1/125 (.8)	FiO <sub>2</sub> > .60	37/43 (86)	17/32 (53)
<2.01	11/553 (2)	9/345 (2.6)	Apgar 65	19/43 (44)	14/32 (44)
Total	43/1133 (3.7)	32/776(4.0)	Sepsis	5/43 (12)	2/32 (6)

The incidence of PH and its distribution among b.wt (500g) groups were significantly different for both periods (Chi-square 59.10, p<0.01). 24/43 (56%) in period I and 6/32 (19% in period II had massive pulmonary hemorrhage (MPH). The remaining 44 and 81% in period I and II respectively were diagnosed only at autopsy as focal interstitial and intra parenchymal hemorrhages.

We conclude that (1) while MPH was decreased significantly in the recent years, the autopsy evidence of PH remained same. (2) Significantly more number of tiny neonates (<29 wks gestation (59%) and <1.0 kg (47%)) had PH in period II when compared to period I. (3) Hypothermia and sepsis were the major associated factor in period I than in period II (46.5 vs 9%, and 12.4 vs 6% (4)) incidence of HMD, oxygen requirement were similar in both periods. We attribute the decreased incidence of massive pulmonary hemorrhage to the improved neonatal care during the last decade.

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WITHDRAWAL OF LIFE SUPPORT: NURSE AND PHYSICIAN ATTITUDES IN THE NURSERY. E.M. Bifano and T. Slagle. SUNY, Health Science Center, Dept. of Peds. Syracuse.

Withdrawal of life support from very sick newborns is a leading issue of medical ethics. We surveyed 100 attending pediatricians, 23 pediatric houseofficers and 82 nurses caring for newborns in a regional tertiary nursery. An 83 item questionnaire measured if respondents believed that denial or withdrawal of various life support measures was justified for infants with specific serious medical conditions. Respondents' judgements varied significantly depending on the condition in question; for example, 46% said withdrawal of life support was "nearly always" justified for trisomy 13 compared with 23% for severe short gut and 2% for Down Syndrome. Most pairwise comparisons of responses to varying conditions were significant at p<0.01, indicating that life support judgements are based on medical criteria. However, significant response differences were also found among respondents of different medical training, religious backgrounds, and public policy attitudes. Among the groups more likely to believe maintenance of life support is justified are physicians, churchgoing Catholics and Protestants, and those who feel that intensive care medicine is cost effective for society (all p values<.01). Although physicians were less likely to deny support than nurses, they were more likely (p<0.01), once a withdrawal decision had been made, to deny a wider range of life support systems (eg. IV fluids, ventilation). The importance of medical role, religion, and policy preferences in life support judgements raises questions about the subjectivity of such decisions in practice, which has profound ethical implications. Furthermore, differences in physicians' and nurses' views underscore the need for better communication on life support decisions.

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PEDIATRIC RESPIRATORY ARRESTS (RA) OR CARDIORESPIRATORY ARRESTS (CRA) IN RURAL COMMUNITY HOSPITALS. B. Bonner, L. Zaim, J. E. Thompson, Dept. of Peds., Gundersen Clinic, La Crosse, WI. (Spon. by David A. Clark, M.D.)

In order to better train pediatric personnel and direct preventive care in rural areas, cases of RA or CRA, as well as serious illnesses requiring advanced life support (ALS) were examined. The data was obtained from 5 years of pediatric records at each of 4 rural hospital Emergency Rooms (>55,000 pts.). The primary etiologies leading to RA or CRA were pulmonary 27%, neuro 24%, SIDS 22%, with only 7% cardiac, 6% drowning, and 14% other. Grouping this data (Table I) shows that although trauma is very important, nontraumatic disease is equally prominent. Table II demonstrates the high survival rate of respiratory arrests in these rural hospitals.

Table I-Etiology of RA or CRA				Table II-Outcome of Arrests			
	#	%Total	%Survive		#	%Total	%Survive
Nontraumatic	24	38	46	RA	15	24	73
Trauma/Accident	22	35	9	CRA	48	76	6
SIDS	14	22	0				
Unknown	3	5	0				

Seriously ill but not arresting patients who required ALS had a similar distribution: nontraumatic disease 67% and trauma 33%. The nontraumatic disease breakdown showed a predominance of pulmonary 38%, with neuro 18%, ingestion 7%, sepsis 4%.

In conclusion, although more children will die from trauma, pediatric ALS training programs for rural areas should emphasize that the greatest proportion of salvageable patients have nontraumatic illnesses. The ongoing push for prevention and better management of trauma and accidents should be broadened to stress the appropriate preventive and management skills to treat children with nontraumatic disease.