● 1330 TESTING AN ARTIFICIAL SURFACTANT(AS) IN PREMATURE LAMBS.

Machiko Ikegami, Alan H. Jobe, Harris C. Jacobs, Sally Jones, UCLA School of Medicine, Harbor-UCLA Medical Center, Department of Pediatrics, Torrance.

We treated six 120-day gestational age lambs with 100 mg/kg of AS, a 9:1 mixture of ^{14}C-labeled saturated phosphatidylcholine (SPC) and phosphatidylglycerol, minimal surface tension (ST) 3.6 ±1.3 dynes/cm. In the 1st hr of life, pH and pCO_2 in AS lambs were similar to those of untreated lambs (UL), while pO_2=60±9 for AS lambs vs pO_2=25±2 for UL ($p<.01$). All lambs were treated with ^{3}H-labeled sheep natural surfactant (NS), ST=0. At treatment all lambs had: pH=6.92±0.03; pCO_2=109±6 mmHg. The lambs responded similarly to NS; pH, >7.25 and pCO_2, <55 mmHg. However, pO_2 remained >100 mmHg for 2.5±5 hr in lambs previously treated with AS vs 0.9±.3 hr in the other lambs ($p<.01$). The changes in the ^{3}H and ^{14}C specific activities (CPM/µmole SPC) recovered by alveolar wash at sacrifice suggest that more than 50% of the AS was no longer associated with the airways. Airway samples taken from AS lambs before treatment with NS had ST=32±2.9, while reisolated material from these samples by centrifugation had ST=0. Using an ST increase to >10, AS is 10 times more sensitive to inhibition by fetal lung fluid than NS ($p<.01$). AS restored the pressure volume curves (PV) of surfactant depleted adult rat lungs, but AS did not improve the PV of premature lamb lung while NS caused large PV changes ($p<.01$). In summary: 1) AS affects the pO_2 response of lambs. 2) AS seems to be rapidly cleared from the airways. 3) AS is more sensitive than NS to inhibitors of ST. 4) Premature lungs respond differently to AS than adult lungs.

1331 ADMINISTRATION OF DRY SURFACTANT(S) UNDER PRESSURE TO PRETERM LAMBS WITH RESPIRATORY DISTRESS SYNDROME (RDS).

Hallam H. Ivey, John Kattwinkel, Stephen A. Roth, Depts. of Pediatrics, Univ. of Virginia Medical Center, Charlottesville, and Biology, University of Pennsylvania, Phila.

Recent studies suggest that dry S promotes lung expansion in preterm rabbits. We tested 75% dipalmitoyl phosphatidyl choline/25% dipalmitoyl phosphatidyl glycerol in lambs with RDS ventilated by a pressure-limited respirator at 25 cm peak airway pressure, 5 cm PEEP, 30 breaths per minute, 1:1 inspiratory : expiratory ratio and FiO_2 0.8. Group I (n=10) received 12 mgs/kg dry S into the trachea during a constant inflation pressure of 50 cm for 60 seconds. Group II (n=6) was treated with constant pressure and no S, and a control group (n=4) received ventilator management alone. PaO_2, $PaCO_2$, pH, compliance (C) (cc/kg at 10 cm pressure on expiratory limb) and functional residual capacity (FRC) (cc/kg by He dilution) were measured pre and post treatments in groups I and II and for comparable time periods in the control group. Mean changes follow:

Group	ΔPaO_2	$\Delta PaCO_2$	ΔpH	ΔC	ΔFRC
I	+128*	-14.9*	+.052*	+7.59*	+2.7*
Control	+2	+ 1.5	-.077	-0.14	-1.9
II	+78	- 9.5	+.040*	+6.71*	+2.1

Asterisks indicate values significantly different from controls at $P<0.05$. Comparisons between groups I and II showed no significant differences. We conclude that dry S, administered under pressure, improves lung function in preterm lambs with RDS and that pressure alone may play an important role.

1332 COMPARISON OF CLINICAL PREDICTIVE VALUE OF TWELVE MEASURES OF NEONATAL HEART RATE VARIABILITY (NHRV).

John Jenkins, Garth McClure, Hasley Mitchell, Mark Reid, Stephen Ruff (Spon.by Henry Levison) Queens University of Belfast, Department of Child Health, Belfast, N. Ireland.

Many statistical parameters have been used to quantify NHRV, but little comparison has been made of their relative ability to predict the infant's clinical course. In this study seven previously described parameters of short term variability (STV) and five of long term variability (LTV) were computed from 2225 hrs of electrocardiogram from 101 infants aged 1-72 hours.

We found close correlations between all measured parameters of NHRV. No one parameter proved clinically superior at all ages studied for prediction of severity of respiratory distress or subsequent mortality. However, a combination of parameters by multiple regression or discriminant analysis led to accurate prediction of clinical course. Factor analysis revealed underlying relationships between the studied parameters of NHRV, and 3 hypothetical factors were derived which retained much of the predictive ability of the 12 original parameters. In addition we found that NHRV was lower in infants of lower gestational age (GA) and birthweight, and for STV but not LTV this could not be fully accounted for by associated differences in heart rate. NHRV of infants who were small for GA was in keeping with GA and not birthweight.

We conclude that a combination of NHRV parameters is of greater clinical predictive value than any single parameter.

1333 MONITORING GENTAMICIN DOSAGES IN PREMATURE NEONATES

S. Jenkins, D. Bolam, W. Hyde & R. Nelson, Depts of Pharmacy Practice and Pediatrics, University of Nebraska Medical Center, Omaha, Nebraska.

Dosages of I.V. gentamicin (G) seek to maintain peak serum levels of 4-12 mcq/ml. Recommendations are that pre-dose (PrD) levels remain below 2 mcq/ml to avoid nephrotoxicity. We obtained serum G levels in premature and stressed neonates with gestational ages (GA) from 24-40+ weeks following IV infusion of standard dosages (2.5 mg/kg).

G. was administered by IV or IA infusion over 20 minutes PrD levels were obtained by heel puncture one half hour before the next dose (ie after 5 calculated half lives (t 1/2). T 1/2 of G was calculated for each infant using standard pharmacokinetic formulae. Post dose levels were obtained 20 minutes following completion of the infusion.

Results are listed in the table grouped by G.A. The percentage figures reflect the incidence of PrD levels greater than 2 mcq/ml.

G.A.	24-27	28-31	32-35	36-39	40+
n	2	8	9	4	9
PRD % > 2 mcq/ml	100	75	75	25	12.5

All post dose levels were within acceptable limits. Our findings confirm that dosage intervals frequently need altering in premature and stressed neonates of all G.A., if PrD are to be kept below 2 µg/ml. Schedule alterations should be based upon each infants pharmacokinetic parameters.

1334 THE EFFECT OF ANTENATAL ADMINISTRATION OF BETAMETHASONE ON THE HOSPITAL COSTS AND SURVIVAL OF PREMATURE INFANTS.

Dana E. Johnson, David P. Munson and Theodore R. Thompson. (Spon. by William Krivit) Univ. of Minn, Dept. Pediatrics, Minneapolis, Mn.

Prenatal administration of glucocorticoids (betamethasone) has been shown to decrease the incidence and severity of respiratory distress syndrome in premature infants, but little is known regarding the immediate economic impact of this reduction in respiratory morbidity. This study examined 336 infants born during 1978 and 1979 and hospitalized in the University of Minnesota Hospitals. Comparison of survival and the hospital costs between infants whose mothers had received or not received prenatal glucocorticoid therapy showed that glucocorticoids had a significant effect in lowering mortality in infants with birth weights between 750 and 1249 grams (27-29 weeks gestation) ($P<.05$). Glucocorticoids were also effective in decreasing morbidity as reflected by hospital costs of surviving infants with birth weights between 1250 and 1749 grams (30-32 weeks gestation)($P<.05$). In both steroid treated ($r=-.994$) and non-treated ($r=-.919$) pregnancies, prolongation of gestation decreased hospital cost in a linear fashion. The noted decrease in hospital costs should not be a justification for prenatal glucocorticoid administration but a stimulus to further examine the long term positive and negative effects of the drug on surviving infants.

1335 PREDICTION OF RETROLENTAL FIBROPLASIA (RLF).

Lois H. Johnson, David B. Schaffer, Donald Goldstein, MariJo Mathis, Thomas R. Boggs. Univ.of Penn. Sch. Med; Penn. Hosp., Dept. Peds; Children's Hosp., Dept. Ophthal., Phila., Pa.

Incidence and severity of RLF was defined by a standard grading system in 269 premature infants with birth weight (BW)≤2000 gm or gestational age (GA) ≤36 weeks and needing oxygen (O_2) therapy Prediction of mean severity of RLF (acute stage, all babies) was studied by a multiple regression equation which reports proportion of total outcome variance (cumulative R Square) accounted for by the predictor variables available. It selects independent variables in order of additional contribution to RSq, the best predictor being selected first. Very weak predictors do not enter the equation. The last RSq in the summary table represents the total variance accounted for by all risk factors considered and amounts to only 35.8%.From a clinical standpoint, only BW (or GA) is a major predictor. Carefully controlled O_2 Rx seems to pose only a small risk. As yet undefined differences, probably largely genetic, (Phelp's queen effect), are of major importance.

The Dependent Variable is Mean Severity of RLF for All Infants

Predictor Variable	R-Square (RSq)	F	p
Birthweight	0.30824	93.587	<.001
Adult Blood Tx (ml/k)	0.33438	10.102	<.001
Rx-Vit. E vs Control	0.34545	4.667	<.001
Days FiO_2 over room air	0.34955	2.147	<.05
Shock	0.35344	1.239	ns
Apnea	0.35625	1.268	ns
Pregnancy Complications	0.35839	0.868	ns