

**1318** HUMAN FETUS, A POTENTIAL SURFACTANT DONOR: ISOLATION OF LUNG SURFACTANT FROM AMNIOTIC FLUID. Mikko Hallman, Howard Schneider, and Louis Gluck. University of California, San Diego, Department of Pediatrics, La Jolla, California.

Trials of surfactant substitution are complicated by suboptimal performance of artificial surfactant and possible side effects of partially purified animal surfactant. To solve these problems, human lung surfactant (HS) was isolated from amniotic fluid (AF) from seven patients with term cesarean sections (CS) by differential and sucrose density gradient centrifugation and nylon mesh filtration. Up to 600 ml of bloodless AF was obtained during CS. The recovery of HS (disaturated lecithin marker) was 53±8%, one liter of AF yielding 75±16 mg of HS phospholipid. Properties of HS were compared to rabbit surfactant (RS) from alveolar lavage on modified Wilhelmy balance at 37°C. Lowest surface tension during compression [ $\gamma_{min}$  (dynes/cm)], collapse rate at constant surface area [ $K_y$  (1/min)] at  $\gamma_{min}$ , compressibility [ $C$  (cm/dynes)] at 8-12 dynes/cm, and surface adsorption from subphase ( $\gamma_0 - \gamma_1$ ) in 1, 2, and 15 min were measured:

|          | $\gamma_{min}$ | $K_y$   | C           | $\gamma_0 - \gamma_1$ :1min | 2min  | 15min |
|----------|----------------|---------|-------------|-----------------------------|-------|-------|
| HS (n=7) | 2.2±0.4        | 2.5±0.5 | 0.039±0.006 | 30±4*                       | 34±5* | 35±5  |
| RS (n=5) | 3.0±1.0        | 2.1±0.4 | 0.035±0.011 | 16±7                        | 22±7  | 36±3  |

Both HS and RS were highly surface active. However, HS adsorbed to the surface faster than RS (\* $p < 0.02$ ). The sterile isolation yields large quantities of HS, that may be useful in surfactant therapy.

**1319** VITAMIN E DOES NOT PREVENT OXYGEN-INDUCED LUNG INJURY IN LAMBS. T. Hansen & R. Bland. Cardiovasc. Res. Inst. & Dept. Pediatrics, Univ. California, San Francisco.

Lung microvascular permeability to protein increases in lambs that breathe 100% O<sub>2</sub> for 3-5 days. We tried to prevent this injury by giving vitamin E to 6 lambs. After 4 h in air, the lambs breathed 100% O<sub>2</sub> continuously. They received vitamin E, 20 mg/kg/d IM for 2 days before and throughout the study. To assess lung fluid filtration and microvascular permeability to protein, we measured pulmonary arterial (PA) and left atrial (LA) pressures, lung lymph flow, and concentrations of protein in lymph and plasma. Before and 3 days after starting O<sub>2</sub>, we gave 125I-albumin IV to 4 lambs and determined the time at which specific activity in lymph reached 1/2 that in plasma (T<sub>1/2</sub>). Results ( $\bar{x} \pm s_x$ ):

|                      | Pressure |       | [Protein] |          | Lymph Flow | T <sub>1/2</sub> |
|----------------------|----------|-------|-----------|----------|------------|------------------|
|                      | PA       | LA    | Lymph     | Plasma   |            |                  |
|                      | torr     | torr  | g/dl      | g/dl     | ml/h*      | min              |
| Air                  | 17 ± 1   | 3 ± 1 | 2.7 ± .4  | 5.1 ± .1 | .10 ± .02  | 146 ± 21         |
| Day 3 O <sub>2</sub> | 14 ± 2   | 1 ± 1 | 3.3 ± .4  | 5.2 ± .2 | .30 ± .04  | 46 ± 7           |

\*per g dry lung underline=significant difference,  $p < .05$   
Despite a 10-fold increase in plasma tocopherol levels, lymph flow tripled, the concentration of protein in lymph increased, and T<sub>1/2</sub> decreased. These results show that pulmonary microvascular permeability to protein increased during O<sub>2</sub> breathing. All lambs died of respiratory failure within 4 days. Postmortem lung water was 25% greater than that of normal lambs, and lung histology showed extensive pulmonary edema. We conclude that vitamin E was ineffective in preventing or lessening lung injury from O<sub>2</sub>.

**1320** MATERNAL SMOKING AND BODY COMPOSITION IN THE NEWBORN. Gail G. Harrison, Yvonne E. Vaucher, and Rosemary S. Branson (Spon. by Vincent A. Fulginiti), University of Arizona College of Medicine, Department of Family and Community Medicine and Department of Pediatrics, Tucson, Arizona.

This study explores the relationship between maternal cigarette smoking and body composition of the newborn as reflected by anthropometric indices of subcutaneous fat and lean body mass.

Subjects were 285 healthy, singleton, Caucasian, term infants whose mothers were either smokers (N=109, smoked before and during pregnancy) or nonsmokers (N=176, smoked neither before or during pregnancy). Mothers who smoked were younger (mean 22 vs 24 years,  $p < .05$ ) but did not differ from nonsmokers in parity, height, prepregnant weight, weight gain in pregnancy, or length of gestation.

Infants of smokers were 235 gm lighter ( $p < .001$ ), 1 cm shorter ( $p < .001$ ), and had smaller head circumferences ( $p < .05$ ), arm circumferences ( $p < .001$ ), and arm circumference/head circumference ratios ( $p < .01$ ). Ponderal indices were similar. Calculated cross-sectional nonfat areas of the upper arm were also reduced ( $p < .001$ ). Maternal smoking did not affect *in utero* fat deposition, as estimated by the cross-sectional fat area of the upper arm and biceps, triceps, scapular, and abdominal skinfold thickness measurements.

We conclude that the reduction in birthweight associated with maternal smoking is primarily a reduction in lean body mass.

**1321** SUPEROXIDE SCAVENGERS: PRETERM NEONATES DO DEVELOP THESE PROTECTIVE AGENTS. David Hart & Michael Nardi (Spon by M. Karpatkin) NYU Med. Ctr., Dept. of Pediatrics, NYC.

Arriving in an oxygen-rich environment, the neonate encounters increased active oxygen reduction products. Superoxide scavengers such as RBC superoxide dismutase (SOD), plasma tocopherol, and plasma ceruloplasmin protect against tissue damage. Levels of these scavengers were determined during the neonatal period in a population of 58 preterm infants. Gestational age (G.A. 28-36 wk) did not correlate with levels at birth. Twenty-two infants were classified as "healthy" (IV fluids, antibiotics only) and 36 as "sick" (all other support, e.g. oxygen). RBC SOD activity in untransfused infants on day 1 was higher in sick (5.49 u/mg Hb) and healthy (5.84) infants than in adults (5.27\*). Only sick infants manifested a drop from day 1 to d2-5 (4.85\*), then a progressive increase (5.96\* on d6-8 to 6.27 on d9-14). At d15-35 sick infants (6.17) had higher levels than healthy infants (5.28\*). Sick infants exhibited a more rapid postnatal increase in ceruloplasmin protein (7.69mg/dl on d1-2 to 17.09\* on d3-8) and reached 20.6 by d9-14. (Adult mean 35) Healthy infants manifested an increase in plasma tocopherol sooner (0.34mg/dl on d1-2 to 0.74\* on d3-8) and to a greater degree than sick infants (0.37\* on d3-8). Plasma malondialdehyde (MDA) levels, which reflect the extent of lipid peroxidation, rose in all infants: (12.2 nmoles/ml on d1-2 to 17.5\* on d3-8) but fell to 9.0\* on d9-14 (Adult mean 8.1\*). This shows that oxygen-mediated damage had occurred. Regardless of G.A., infants do exhibit adaptive responses to this damage. (\* indicates a significant difference, at least  $p < .05$ )

**1322** INCUBATOR HUMIDITY WITH DIFFERENT HUMIDITY RESERVOIR BAFFLE SYSTEMS Marcus C. Hermansen, Paul H. Perlstein, Neil K. Edwards, U. Cincinnati College of Medicine, Department of Pediatrics

Although important in reducing heat and water losses from newborns, incubator humidities are difficult to predict and control. A removable metal baffle for use in an incubator humidity reservoir has been recently modified by one manufacturer and contributes to this unpredictability. Using an electric hydrometer, the relative humidities (R.H.) of 7 Air-Shields incubators were measured 1) with no baffle in the humidity reservoir, 2) with the manufacturer's older and larger iron baffle and 3) with a recently introduced smaller steel "W" shaped baffle. Incubator temps. were servo controlled to 34°C, and full humidity reservoirs were opened to maximum settings.

|                      | No Baffle | Small Steel Baffle | Large Iron Baffle |
|----------------------|-----------|--------------------|-------------------|
| % R.H. ( $\bar{x}$ ) | 83.7      | 87.4*              | 97.8**            |
| SEM                  | 2.7       | 2.7                | 1.1               |
| Range                | 72.0-93.3 | 76.0-98.7          | 92.7-100.0        |

\* $p < 0.05$  \*\* $p < 0.01$  paired t-tests n=7

Both baffles increase incubator humidity, but the variability was greater with the smaller steel baffles, and the 3.7% increase with this steel baffle is significantly less ( $p < 0.01$ ) than the 14.1% increase with the larger iron baffle. Since this observation, excess heat and water losses from newborns have been corrected by replacing the newer and smaller baffles with the larger iron baffles. This experience reinforces the opinion that incubators must not only be designed and modified carefully, but also used knowledgeably.

**1323** VITAMIN D SUPPLEMENTATION AND RICKETS IN VERY LOW BIRTH WEIGHT INFANTS. Alfredo J. Herrera, Uma T. Salcedo, Maria P. Ruiz, (Spon. by John Neff), St. Agnes Hospital, Department of Pediatrics, Baltimore, Maryland.

Infants weighing below 1500 gms admitted to our NICU between January-June 1980 were prospectively randomized in two groups. Group A was placed on 400 units of Vitamin D daily and Group B on 600 units. Calcium, phosphorus, and alkaline phosphatase were measured bi-weekly. Chest x-ray was taken, looking for evidence of poor bone mineralization every 3-4 weeks. Vitamin D (25-Hydroxycholecalciferol) was measured in those with elevated alkaline phosphatase. Diagnosis of rickets was made in those infants with alkaline phosphatase of 450 units or more, decreased Vitamin D level, and radiological or clinical signs. We had 43 infants admitted to our study. 20 died (11 were in the 500 gms range) and 9 did not complete the required length in the protocol, so we were left with 14 infants, 8 in Group A and 6 in Group B. 2 babies in Group A developed biochemical and radiological evidence of rickets (25%). Group B had 1 baby (17%) with similar findings.

This is preliminary data but it seems that the requirements of Vitamin D in VLBW are higher than 600 units daily.