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METABOLISM OF SURFACTANT PHOSPHOLIPIDS IN 3 DAY OLD AND 3 DAY POSTMATURE RABBITS Alan H. Jobe (Spon. by Delbert A. Fisher). Fetal-Maternal Research Laboratories, UCLA - Harbor General Hospital, Torrance, California.

Three day old rabbits and newborn rabbits delivered by cesarean section three days post-term following treatment of the doe with human chorionic gonadotropin were injected IV with the labeled phosphatidylcholine (PC) precursors ^{3}H-choline and ^{14}C-palmitic acid. The appearance of labeled PC in alveolar wash surfactant phospholipids (SAPL) was measured by the change in the PC specific activity (SA). PC from 3 day old and 3 day postmature rabbits labeled with either ^{3}H-choline or ^{14}C-palmitic acid was detected after a 3 hour delay, and maximal PC - SA was achieved by about 16 hours. These results are similar to earlier data for premature and term newborn rabbits, but differ from the SA characteristics of adult rabbit surfactant PC; in adults there is a ½ hour delay and 6-8 hour maximal SA pattern. Phosphatidylglycerol (PG) was not detected in the surfactant from newborn rabbits and represented 5% of SAPL of 3 day old and adult rabbits. PG was either absent or present in trace amounts in SAPL from postmature animals. Phosphatidylinositol (PI) content changed from the 10% measured in term newborn and postmature rabbit SAPL to 5% in 3 day old or adult rabbit SAPL. In conclusion: a) the appearance of PC and decrease in PI in SAPL of 3 day old rabbits was not associated with any change in kinetics of labeling of surfactant PC, and b) a delay in maturation of SAPL composition is evident in postmature animals.

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INTERMITTENT POSITIVE PRESSURE VENTILATION(IPPV) IN RABBITS: EFFECTS OF TEMPERATURE VARIATION OF THE INSPIRED GAS. Elizabeth John, Rufino Ermocilla, Rick Cash, Mike McDevitt, Susan Hale and George Cassady. Div. of Perinatal Med., University of Alabama, Birmingham, Ala. 35294.

The optimum temperature at which gas should be delivered during IPPV has not been documented. 32 New Zealand white rabbits 7-14 weeks, weighing 1.4-3.3 kg were randomly allotted to 3 groups: Group 1-controls, group 2-ventilated with air at 35-37°C, group 3 ventilated with air at 22-23°C. All were anesthetized with pentobarbitone sodium, tracheotomized & carotid artery & jugular vein cannulated. Carotid pressure(BP), central venous pressure(CVP) and arterial blood gases(ABG) were measured in all.

Results: Initial and Final Mean Values Indicated.

Group	pH	$PaCO_2$ (torr)	PaO_2 (torr)	BP (cm H_2O)	Died
1(n=10)	7.45→7.46	35→29	61→73	138→121	0
2(n=11)	7.40→7.31	41→40	55→56	121→85	3
3(n=11)	7.43→7.17*	39→51	58→45	128→70*	6

*Significantly different from initial values $p = < 0.01$

7/11 in group 3 became hypoxemic(PaO_2 <40 torr), 6 of whom had greater than 50% drop in BP. 2/11 in group 2 became hypoxemic & 1/11 had a significant drop in BP. The rabbits that survived were sacrificed after 6 hours. Group 3 had histological evidence of interstitial thickening, infiltration & vascular wall edema. Group 2 had similar changes to a moderate degree, group 1 were normal. These data suggest that IPPV in rabbits results in lung parenchymal damage, more severe & more frequently accompanied by hypotension, hypoxemia and acidemia with cold air.

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THE EFFECT OF VARYING OXYGEN TENSIONS ON SUPEROXIDE DISMUTASE, CATALASE, AND GLUTATHIONE PEROXIDASE ACTIVITIES IN ALVEOLAR MACROPHAGES (AM) FROM GUINEA PIGS G.S. Johnson, R.L. Baehner, C. Higgins, L.A. Boxer, Ind. Univ. School of Medicine, Riley Hospital for Children, Indianapolis.

Activities of superoxide dismutase (SOD), catalase (CATA), and glutathione peroxidase (GPX) of AM from guinea pigs (GP) exposed continuously to 50 or 85% oxygen have shown divergent patterns. At 50% oxygen both SOD and GPX activities increased 2-fold by 18 hours while CATA remained the same. After 18 hours of exposure to 85% oxygen, SOD, GPX, and CATA activities were similar to control. This study evaluated the effect of increasing oxygen tensions on these enzymes to explain the different patterns. GP were exposed to oxygen tensions between 30% and 85% for 18 hours and AM were harvested and purified on a Ficoll-hypaque gradient. SOD activity in room air was 3.4 ± .3 ($\bar{X}$ ± SD) units/mg protein and progressively increased to peak levels of 6.0 ± .4 at 50%, and subsequently decreased to control levels at 85% oxygen. GPX activities increased from 10.4 ± 2.7 for controls to peak at 21.7 ± 6.6 units/mg protein at 60%, and decreased to control levels at 85% oxygen. Control CATA activity was 355 ± 34 units/mg protein and exhibited no significant changes. Monocyte non-specific esterase in purified AM showed no differences between room air controls and 50% oxygen but were decreased at 85% oxygen. These studies show that SOD and GPX vary in relationship to oxygen tensions and may be the result of enzyme activation and/or induction, or heterogeneity of the AM population.

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CORTICOSTEROIDS IN STATUS ASTHMATICUS. M. Kattan, D. Gurwitz and H. Levison, University of Toronto, Department of Pediatrics and The Research Institute, The Hospital For Sick Children, Toronto, Canada.

The role of corticosteroids in status asthmaticus (SA) is controversial. To evaluate their effect thirteen children (ages 8-14 years) hospitalized in status asthmaticus were randomly assigned to one of two treatment groups. Both groups received oxygen, .01cc/kg salbutamol aerosol inhalation every 4 hours and intravenous aminophylline. Six of the 13 children were given hydrocortisone 7 mg./kg. six hourly intravenously as well. Clinical score, arterial blood gases and peak expiratory flow rates (PEFR) at the time of admission were similiar in the steroid treated and control groups. Peak and trough serum theophylline levels were also similiar in the two groups. After 24 hours of therapy, both groups showed significant improvement in clinical score and PEFR. However, the degree of improvement in the steroid treated and control groups was not statistically different. One child in each group failed to show any improvement in the first 24 hours of therapy. The mean percentage increase in PEFR in the first 24 hours with each dose of inhaled salbutamol was 19.5±15.7 in the steroid treated group and 22.8±8.2 in the control group. We conclude that in the first 24 hours corticosteroids do not hasten the recovery of children in SA. Although the results show that inhaled B-2 agonists are beneficial in SA, corticosteroids do not increase the responsiveness of the bronchial smooth muscle to these agents.

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SURFACTANT METABOLISM IN BEIGE MOUSE LUNG. Dale L. Kessler, and John L. Prueitt. Univ. of Washington School of Medicine, Dept. of Pediatrics, Seattle, WA.

The beige mouse (Be), a mutant strain of the C57 black mouse (Bl), expresses the Chediak-Higashi syndrome. Lamellar bodies in Be type II alveolar epithelial cells are markedly enlarged and associated with a 3-fold increase in lung surface active material (SAM) phospholipid (PL) compared to normal Bl (J. Histochem. Cytochem. 23:863, 1975). To determine if the accumulation of SAM is due to a defect in secretion we studied synthesis and release of PL in Be and Bl lung slices.

Incorporation of [1,2-^{14}C] choline into PL precursors and PL was measured at intervals from 0-120 min. Slices (1.0 mm) were incubated at 37°C in KRB buffer, pH 7.4, in 95% O_2/5% CO_2. Shaking rate was 120/min. Disaturated phosphatidylcholine (DPC) was 18% of the newly synthesized PL in both groups. Incorporation into PL and DPC was not different between the two strains. However, recovery of ^{14}C-PL after 30 min. in fresh media, following a 30 min. incorporation period, was 0.86±0.11(SD)% of total (tissue plus media) ^{14}C-PL in Bl and 1.48±0.17% in Be ($P< 0.01$). Specific activity of PL in media was not different in Be and Bl. There were no differences in $\dot{V}O_2$ (Be=54.0±5.2(SD)µl O_2/mg DNA/hr; Bl=60.5±12.5) and ATP depletion.

These data suggest that a simple defect in secretion does not explain the accumulation of SAM in lamellar bodies in Be type II epithelial cells. The finding of increased release of PL by Be slices under basal conditions without differences in either tissue incorporation or specific activity of released product indicates a more complex mechanism.

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SYNERGY OF COMBINED ANTIGEN INHALATION CHALLENGE IN ALLERGIC ASTHMA. Barry A. Kohn, Michael A. Wall, Francis J. Twarog, Denise J. Strieder, Harvard Medical School, Children's Hospital Medical Center, Department of Pediatrics (Allergy and Pulmonary Divisions), Boston.

To determine whether combined allergen exposure is competitive, additive or synergistic in its effect on lung function, inhalation challenges were performed in 5 asthmatic boys, 12 to 16 years old, with known sensitivity to 2 environmental antigens. Challenges were conducted according to the standards of the American Academy of Allergy on 3 occasions at least 1 week apart, first with each allergen separately then with both simultaneously. Forced Expiratory Volume in 1 sec (FEV_1) before study was at least 60% of predicted value. The response to challenge was monitored by serial measurements of FEV_1. Challenge ended either when a given provocative dose (PD) produced a 20-35% fall of FEV_1 (PD_{20} - PD_{35}) or when a concentration of 10,000 PNU/ml produced no effect. Three subjects reacted to the single antigens with a marked fall of FEV_1, allowing measurement of PD_{35} for each antigen. In the dual challenge, these subjects reacted to a mean PD of 19% (range: 7 - 32%) of the respective PD_{35} of each antigen. The other 2 subjects reacted to one antigen only and the fall of FEV_1 was small, only allowing measurement of PD_{20} for that antigen. In the dual challenge these subjects reacted with a 20% fall of FEV_1 to a PD containing 32 and 47%, respectively, of their single-antigen PD_{20}. These findings support the hypothesis that two antigens inhaled simultaneously exert synergistic effects. (Supported by NIH grant # HL-10436)