

## ABSTRACT

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### ALVEOLAR SURFACTANT COMPOSITION IN PRETERM INFANTS WITH RESPIRATORY DISTRESS SYNDROME BEFORE EXOGENOUS SURFACTANT ADMINISTRATION: EFFECT OF GESTATIONAL AGE AND INFLAMMATION

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**INTRODUCTION** It is well known that pulmonary surfactant deficiency is the main cause of Infant Respiratory Distress Syndrome (RDS). However, knowledge about the surfactant components is still scarce. Studies report that little mature protein is detected in lung tissue of preterm infants. The aim of this study was to examine the composition of the alveolar surfactant in preterm infants with RDS at different gestational ages (GA).

**METHODS** Eighty-five newborns with GA  $\leq$  32 weeks with RDS and 11 term infants without lung disease were enrolled. Preterm infants were divided in two groups, the first one with  $23 \leq$  GA  $\leq$  28 weeks (Group A) and the second one with  $28 <$  GA  $\leq$  32 weeks (Group B). Tracheal aspirate (TA) samples and 60-100  $\mu$ l of blood sample were collected at birth, before the administration of exogenous surfactant. TA Desaturated Phosphatidylcholine (DSPC) was measured by gas-chromatography; TA albumin and myeloperoxidase activity (MPO) by a colorimetric assay; SP-A and SP-B by ELISA. Urea concentration in the TA and in plasma was also measured and the values were used to estimate TA dilution.

**RESULTS** Clinical characteristics and laboratory markers are reported in Tab. 1. Group A had higher incidence of histological chorioamnionitis (Chorio) than Group B (38% vs 9%;  $p = 0.01$ ) and higher TAs MPO activity ( $p < 0.01$ ). Preterm newborns had significantly less Epithelial Lining Fluid (ELF) DSPC than term infants ( $p < 0.01$ ) and Group B had significantly lower SPA concentration than term infants ( $p < 0.01$ ) whereas Group A had similar SP-A and SP-B as to in term infants. We found that infants in Group A with Chorio had more DSPC (3.00 [0.59-6.29] vs 0.55 [0.16-1.04] mg/ml;  $p = 0.003$ ), more SP-B (12.7 [6.6-35.0] vs 5.8 [3.7- 10.3]  $\mu$ g/ml;  $p = 0.021$ ) and SP-A (24.1 [10.5-63.0] vs 12.5 [3.0-27.9]  $\mu$ g/ml;  $p = 0.043$ ) than infants without Chorio. MPO was higher in Group A with Chorio (1,513 [560-2,210] vs 14 [0-294] mU/ml;  $p < 0.00001$ ) compared to Group A without Chorio.

**CONCLUSIONS** Preterm infants at birth and before surfactant administration had consistent amount of DSPC, SP-A and SP-B especially those with Chorio. However, inflammation induced by chorioamnionitis could significantly affect surfactant synthesis and inactivation and lung maturation. Further studies with a larger number of infants will help us to determine the role of inflammation in the development of chronic lung disease.

Table 1 (ABS 78). Clinical characteristics and laboratory markers.

	Group A 23 ≤ GA ≤ 28 weeks n = 42	Group B 28 < GA ≤ 32 weeks n = 43	p	Term n = 11
<b>Clinical variable</b>				
Birth weight (g)	734 ± 174	1,213 ± 322	0.000	3,284 ± 385
GA (weeks)	25.7 ± 1.4	29.8 ± 1.3	0.000	39.2 ± 1.2
Age ss (h)	1.0 (0.4-3.6)	3.5 (1.1-12.8)	0.000	141.0 (17.3-1,688.0)
IUGR (%)	25%	26%	0.362	
OI	8.1 (5.5-9.9)	6.3 (3.4-7.8)	0.002	
MAP	8.5 (7.8-9.4)	8.3 (6.2-8.9)	0.029	
FiO <sub>2</sub>	0.40 (0.30-0.60)	0.35 (0.30-0.46)	0.073	
AaDO <sub>2</sub>	198.5 (116.6-315.4)	158.1 (106.6-238.5)	0.042	
PaO <sub>2</sub> /FIO <sub>2</sub>	106.4 (88.5-157.7)	132.8 (91.1-186.3)	0.072	
Total MV (days)	8.9 (5.7-40.2)	1.9 (0.8-4.1)	0.000	
Total amount of surfactant (mg/kg)	245 (200-300)	200 (200-270)	0.016	0
BPD at 28 gg (%)	79%	36%	0.000	0%
BPD at 36 GA (%)	47%	26%	0.013	0%
Histological chorioamnionitis %	38%	9%	0.001	
<b>Laboratory data</b>				
DSPC (mg/mL of ELF)	0.87 [0.31-3.74]	0.60 [0.25-1.15]	0.216	3.34 [2.0-6.5]
SP-A (ug/mL of ELF)	19.2 [5.7-68.6]	13.8 [3.2-28.2]	0.058	32.3 [27.0-42.6]
SP-B (ug/mL of ELF)	10.5 [5.1-19.5]	5.9 [3.7-16.3]	0.143	7.2 [3.3-9.0]
MPO (mU/mL of ELF)	630 [57-1,828]	52 [0-699]	0.009	2 [0-102]

GA: gestational ages; DSPC: Desaturated Phosphatidylcholine; ELF: Epithelial Lining Fluid.