

### NEONATES WITH SEVERE RESPIRATORY INSUFFICIENCY REQUIRING ECMO HAVE DECREASED SURFACTANT SYNTHESIS

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**Background:** Respiratory insufficiency in neonates with congenital diaphragmatic hernia (CDH), meconium aspiration syndrome (MAS) or other forms of persistent pulmonary hypertension of the newborn (PPHN) is frequently so severe that extracorporeal membrane oxygenation (ECMO) is needed. Although disturbances in surfactant function have been described, the metabolism of surfactant has not been studied on ECMO.

**Aim:** To study endogenous surfactant metabolism with the use of stable isotopes in neonates with severe respiratory insufficiency with CDH, MAS or PPHN requiring ECMO in comparison to ventilated term controls without significant lung disease.

**Methods:** All patients received a 24 h infusion with [U-<sup>13</sup>C]glucose to study label incorporation into palmitate groups of surfactant phosphatidylcholine isolated from sequential tracheal aspirates. Kinetic parameters were calculated from the <sup>13</sup>C-enrichment (measured by gaschromatography-isotope ratio mass spectrometry) over time curves.

#### Results:

	Control	CDH- ECMO	MAS- ECMO	PPHN-ECMO	p-value
number	10	11	11	6	
gestational age(w)	39±0.4	38.2±0.8	40.2±0.7	38.1±0.9	
birth weight (g)	3189±237	3077±150	3345±175	3412±202	
Age start study (h)	137.6±45.5	42.9±4.5	58.3±8.7	47.8±6.3	
FSR (%/day)	8.0±2.4	2.4±0.3	3.3±0.7	2.6±0.3	p<0.05
E <sub>max</sub> (APE)	0.18±0.03	0.09±0.02	0.09±0.01	0.11±0.01	p<0.05
Half life (h)	63.4±10.7	69±10.3	68.5±11.8	98.1±27.2	NS

The fractional synthesis rate (FSR) (the percentage of the surfactant phosphatidylcholine pool size synthesized per day) and maximal enrichment of surfactant phosphatidylcholine (E<sub>max</sub> in atom percent excess, APE) are significantly decreased in all ECMO groups compared to controls. The first appearance of label in tracheal aspirates (12 to 18 hours), time of maximal enrichment (50 to 70 hours) and half-life of label disappearance (Table) were not different between groups.

**Conclusion:** In neonates with CDH, MAS and PPHN who require ECMO surfactant phosphatidylcholine synthesis is decreased and may play a role in the pathogenesis of the severe respiratory insufficiency.