European Respiratory Society
Annual Congress 2012

Abstract Number: 1617

Publication Number: 3293

Abstract Group: 7.1. Paediatric Respiratory Physiology

Keyword 1: Neonates **Keyword 2:** Smoking **Keyword 3:** No keyword

Title: Ventilatory response to hypercarbia in newborns of smoking and substance abusing mothers

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Body: Infants of smoking and substance abusing mothers have an increased risk of sudden infant death. A possible explanation for the association is that such infants have neurodevelopmental abnormalities which adversely affect the control of ventilation. Aims: To test the hypothesis that infants of substance abusing mothers (SA) and of smoking mothers (SM) compared to infants of non substance abusing, non-smoking mothers (controls) would have a poorer ventilatory response to hypercarbia. Methods: Infants were assessed before maternity/neonatal unit discharge. Respiratory flow (and tidal volume) was measured using a pneumotachograph inserted into a face mask placed over the infant's mouth and nose. The ventilatory responses to three levels of inspired carbon dioxide (baseline = 0%, 2% and 4% CO_2) were assessed. Results: 8 SA, 15 SM and 15 control infants were assessed. The birth weight of the controls was higher than the SA and SM infants (p=0.01). At baseline SA infants had a higher respiratory rate (p=0.03) and minute volume (p=0.049) compared to controls and SM infants (Table). Both the SA and SM infants had a lower respiratory response to 2% (p=0.02) and 4% (p=0.004) CO_2

	Control	SM	SA	p
Baseline minute volume (ml/kg/min)	295 (150-390)	301 (228-398)	373 (145-526)	0.049
% change in minute volume at 2% CO_2	38 (7-87)	20 (-5-53)	27 (6-48)	0.02
% change in minute volume at 4% CO_2	96 (32-153)	61 (4-103)	61 (14-134)	0.004

Conclusion: These results are consistent with infants of smoking and substance abusing mothers having a dampened ventilatory response to hypercarbia.