

### FLOW TRIGGERED VENTILATION (FTV) IN VLBW BABIES. Corrado Moretti, Luigi Giannini, Flavia Butturni, Tiziana Sbaraglia, Anna M. Delfino, Elisa Messina, Giovanni Bucci, Inst. of Pediatrics, "La Sapienza" Univ. of Rome

In our system the inspiratory airflow next to the tracheal tube is sensed by a "hot wire" anemometer. The flow signal, signals from the pressure limited ventilator (MOG 2000, Ginevri, Rome) (PAW; Ti; Te) and the patient (thor. impedance), and a variable, triggering electrical threshold are also displayed. The response time was less than 10 ms. Synchronous interaction was documented in 98% of about 2000 recorded breaths from 8 VLBW infants. So far 16 neonates weighing 500-1500g (in 9 = b. wt  $\bar{m}$  764g, range 500-1000; GA  $\bar{m}$  26.7 wks, range 24-29 wks) received FTV (in 75% from the 1st day of life). 2 babies died at 4-19 days with sepsis and severe brain damage. Out of the 14 (87.5%) survivors, 11 (79%) were extubated within day 8, and the remaining 3 within the first month of life. 9 patients were given surfactant, and 5 indomethacin. PNF, PIF were never observed. In the first 5 days of life, the average PIP was 17.20 cmH<sub>2</sub>O, the average MAP ranged from 5.8 to 6.5 cmH<sub>2</sub>O; the mean PCO<sub>2</sub> ranged between 45 and 49 mmHg in the first 60 hours after birth and increased slightly thereafter. In most infants effective respiratory support in the days following extubation was apparently achieved by FTV through specially designed nasal prongs. At 28 days of age the required FIO<sub>2</sub> was  $\bar{m}$  0.3 in 4 (31%) of the cases.

**Conclusions:** In the present small series of VLBW infants, FTV was feasible even in the youngest and tiniest neonates; the survival rate was satisfactory, lung barotrauma was not apparent, and in most cases the age at extubation was quite low. In spite of this a disturbing incidence of chronic lung disease was observed. *Italian CNR, Targ. Project FATMA, contr n 92.00032 PF 41.*

### Sucrose reduces pain reaction to heel prick in preterm infants. A placebo controlled, randomized, and masked study

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In term infants duration of crying after heel prick seems to be reduced by sucrose given orally (Blass et al. Pediatrics 1991; 87:215-218).

**Major objective:** Does sucrose reduce nociceptive activity in preterm infants as assessed by change in heart rate and duration of crying?

**Minor objective:** Changes in cerebral blood volume (CBV) during the study?

**Methods:** 16 preterm infants (27 - 34 gestational weeks, postnatal age 10-67 days, birth weight 900-1900 g) were studied. Each infant was its own control and got 2 ml sucrose 50% or 2 ml aqua dest. in random order unknown to the investigator before heel prick. Reaction to pain was documented by video, continuous monitoring of heart rate and CBV (Near infrared spectroscopy).

**Results:** [Mean (SD)] p: paired t-test.

	$\Delta$ Heart rate	% Cry	Decrease in CBV
Sucrose	+34.4 (13.5)	67.0 (28.1)	5/14
Placebo	+49.4 (14.1)	87.6 (14.1)	6/14
p	0.004	0.019	ns

#### Conclusion:

Sucrose administered orally before a heel prick reduces nociceptive reaction in preterm infants, but does not seem to alter response of CBV to pain.

**CARDIOVASCULAR EFFECTS OF NEUROMUSCULAR BLOCKAGE WITH PANCURONIUM, VECURONIUM, AND ATRACURIUM IN NEONATES.** Shari A. Gray, Jeffrey G. Betcher, D. Norman Buckley, W. Scott Beattie, Haresh Kirpalani, spn by Andreas Schulze. Dept of Anaesth and Ped, McMaster Univ., Hamilton, Cdn.

**Introduction:** The purpose of this pilot study was to investigate the cardiovascular effects of pancuronium (PAN), vecuronium (VEC) and atracurium (ATR).

**Hypothesis:** ATR and VEC are not as potent in cardiovascular side effects, especially blood pressure (BP).

**Methods:** The study was approved by the hospital's research advisory group. Infants (n=23) were randomized to receive either PAN 0.1 mg/kg, VEC 0.1 mg/kg or ATR 0.3 mg/kg prior to anaesthesia. The induction and maintenance procedures were standardized for all infants. The study drug was administered three minutes after induction in a double-blind fashion. A blinded observer recorded heart rate (HR) and blood pressure (BP) prior to induction, prior to study drug, and every 1 min for 5 min; then every 5 min for a total of 30 min. Statistics were by paired t-test and ANOVA. A p<0.05 was considered significant.

**Results:** The groups were comparable in age, post conceptual age, weight and electrolytes. PAN caused an increase over baseline in AR at 5 min (p<0.05) and a decrease in BP at 2 min (p<0.01) which persisted till 10 min (p=0.01). For ATR, there were no significant changes.

**Conclusions:** This pilot study confirms that PAN causes an increase in HR and a decrease in BP in neonates. VEC may also cause a decrease in BP but ATR does not seem to affect either of these parameters. This suggests that for hemodynamic stability, ATR may be a better choice as a paralytic agent in newborns.

**PRECISION AND ACCURACY OF CLINICAL SIGNS IN INFANTS AT RISK OF PATENT DUCTUS ARTERIOSUS (PDA)** Peter Davis, Sophronia Turner-Gomes, Kathryn Cunningham, Clifton Way, Robin Roberts, Barbara Schmidt (Sponsored by John C. Sinclair). Departments of Pediatrics, Nursing, Clinical Epidemiology & Biostatistics, McMaster University, Hamilton, Canada.

Although screening of premature infants for PDA with L-R shunt is a daily nursery routine, little is known about the precision (observer agreement) and accuracy (agreement with gold standard) of the clinical exam. Both were studied prospectively on days 3-7 in 100 infants with BW<1750 g. Five independent observers (2 nurse specialists, 1 neonatal fellow, 1 neonatologist, 1 cardiologist) noted  $\uparrow$  pulse volume, active precordium, heart murmur, cardio-thoracic ratio (CTR)>60% and  $\uparrow$  pulmonary vascular markings (PVM) on concurrent CXR. Colour flow doppler echocardiography was performed within 4 hours. All 100 tapes were reviewed by a 2nd cardiologist who was masked to the clinical signs. Twenty-four infants had a PDA on this gold standard test. A third of the entire cohort was intubated at the time of study. Precision of clinical signs was modest, with average kappas of 0.15 for pulse volume, 0.36 for precordium and 0.47 for murmur. Mean sensitivities and specificities are shown in the table, together with the ranges between observers.

	Pulse	Precordium	Murmur	$\uparrow$ CTR	$\uparrow$ PVM
Sens. (Z)	43; 33-62	25; 5-42	41; 33-50	14; 5-25	27; 17-35
Spec. (Z)	74; 60-83	86; 80-91	87; 71-95	95; 88-98	88; 77-95

Clinical signs of a PDA are specific but insensitive. Abnormal signs strongly suggest a L-R shunt, while a normal exam does not exclude a PDA. (Supported by Resident Research Grant from the PSI Foundation)

### EARLY GROWTH AND SUBSEQUENT STATURE

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To evaluate the effect of disturbance in early growth on subsequent stature we have made detailed measurements of weight, length and lower leg length in the early postnatal period and at 8 months corrected age in 33 babies who received intensive care.

Mean leg length SD score decreased by 1.22 (p = 0.0001, paired t test) between birth and 36 weeks postconceptional age. Both length and weight at 8 months most closely correlated with length or mean leg length at 36 weeks (r = 0.762 & 0.703, p = 0.0001 for length; r = 0.556 & 0.511, p = 0.0017 & 0.003 for weight). Correlation with any measure of early weight was less strong.

Using stepwise linear regression leg length velocity in the first eight weeks of life was most strongly associated with length at eight months (adjusted r squared = 0.3, F = 10.4, p = <0.001). Duration of ventilation was found to have the strongest correlation with early leg length velocity (adjusted r squared = 0.299, F = 20.9, p = <0.005). Calorie intake was found to be significantly lower during ventilation (85.5 v 142 kcal/kg/day) but inclusion of it in the stepwise regression model did not alter the importance of duration of ventilation.

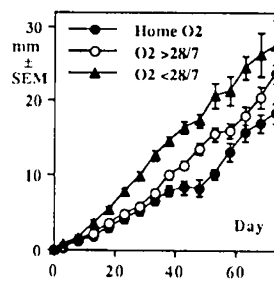
Length and weight at 8 months are largely determined by early postnatal length changes. There is a strong association with the duration of ventilation which requires further evaluation.

### GROWTH IMPAIRMENT IN BRONCHOPULMONARY DYSPLASIA (BPD)

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Impairment of growth in BPD is well described but the amount by which growth is disturbed and the stage at which impairment occurs is unclear. We have compared lower leg growth, measured by knemometry, and weight gain, in 16 babies who needed home oxygen, 22 babies who needed oxygen for more than 28 days but were discharged in air and 24 babies who needed supplementary oxygen for less than 28 days

#### Mean increase in lower leg length



All groups exhibited an initial weight loss followed by steady weight gain, with no apparent difference in weight gain for the two oxygen dependent groups. Changes in leg length are shown in the figure. Comparison of leg length velocities demonstrated differences in the three groups between 0-13 days (p=0.12); 14-27 days (p=0.0001) and 28-41 days (p=0.006).

A significant impairment of growth in the early postnatal period is seen in those babies who will develop moderate and severe BPD. This may occur despite apparently similar weight gains