131 PEAK INSPIRATORY PRESSURE (PIP) OVERSHOOTS ON SOME INFANT VENTILATORS DURING ACTIVE EXPIRATION.

H Kirpalani, R Santos, D Kohelet, Divisions of Neonatology and Research Institute, The Hospital for Sick Children, Toronto, Canada.

We examined the performance of 4 infant ventilators (Bourns BP 200, Healthdyne 105, Sechrist IV-100B, Infrasonic Infant Star) during a simulated expiration. A test lung was connected via a conventional circuit to the ventilator which was set to deliver a PIP of 20 cm H_2O. A Statham pressure transducer was placed proximal to the test lung. During the inspiratory phase of the ventilator, an expiratory flow was introduced. This varied from +4 to +12 L/min. We had previously recorded such peak crying expiratory flow rates on intubated infants (birthweight 0.5 to 2.5 kg). Three ventilators of each type were tested at all 5 expiratory flow rates and each ventilator was examined twice. Increments of PIP above the set value of 20 cm H_2O are tabulated below. Values represent $\bar{x} \pm$ S.D. of 6 records.

EXPIRATORY FLOW	+4 L/m	+6 L/m	+8 L/m	+10 L/m	+12 L/m
Bourns BP 200	7.7±1.6	10.3±1.5	13.0±2.4	14.4±2.2	17.5±0.9
Healthdyne 105	1.6±0.5	2.3±0.2	3.2±0.3	3.7±0.9	3.4±1.1
Sechrist IV-100B	4.0±0.4	6.2±0.3	9.1±1.7	9.4±1.1	10.3±1.6
Infrasonic	7.4±0.9	8.9±0.5	9.7±1.0	12.1±1.4	13.0±0.8

Because these findings were consistent over a range of tidal volumes of 10 to 30 ml, we conclude that expiration during the inspiratory cycle of some ventilators considerably increases PIP in a flow dependent manner. This PIP overshoot is remarkably different in currently used infant ventilators. It is speculated that this PIP overshoot contributes to the development of air leaks in actively expiring ventilated infants.

132 THE INFLUENCE OF PANCURONIUM BROMIDE AND VAGAL COOLING ON THE INHIBITION OF INSPIRATORY ACTIVITY DURING POSITIVE PRESSURE VENTILATION.

Norsted T, Nelin L, Jonzon A & Sedin G. Department of Paediatrics, University Hospital, Uppsala, and Department of Physiology and Medical Biophysics, Uppsala University, Sweden.

Inhibition of inspiratory activity during intermittent positive pressure ventilation (IPPV) requires primarily an adequate alveolar ventilation but variables in the ventilatory pattern such as frequency and positive end-expiratory pressure (PEEP) also influence the inspiratory activity measured as integrated phrenic nerve activity.

We studied whether pancuronium bromide would change the arterial blood gases, pH and the ventilatory pressures at which inhibition of inspiratory activity occurred in young chloralose-anaesthetized cats. In addition we studied how elimination of the stretch receptor activity by cooling the vagal nerves would influence the arterial pH and blood gases and the airway pressures at which inhibition of inspiratory activity occured.

Injection of pancuronium bromide in a central vein under inhibition of phrenic nerve activity caused a reappearance of this activity for a period of a few to several minutes. Inhibition of phrenic nerve activity under IPPV was achieved at slightly lower intratracheal pressures with than without muscle relaxation. If the influence from irritant and stretch receptors in the lung were eliminated by cooling the vagal nerves the cats had to be ventilated to a lower arterial P_{CO_2} to achieve inhibition of inspiratory activity. The intratracheal pressures and tidal volumes at inhibition of phrenic nerve activity were the same irrespective of if the vagal nerves were at body temperature or cooled to +5 to +7°C or -2 to ±0°C.

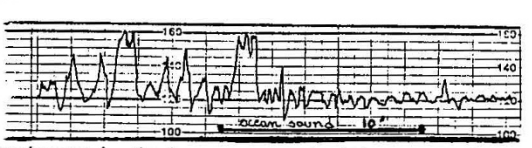
133 PRELIMINARY RESULTS ON THE EFFECT OF ACOUSTIC STIMULATIONS ON PREMATURE INFANTS

M.C. BUSNEL, Ch. MOSSER, J.P. RELIER

The effects of different acoustic stimuli (e.g. heart beats, recurrent "Pink noise" (waves) and several kinds of music, on the behavoir of premature babies were studied at the Port-Royal neonatology center in Paris. Infant heart rate variations, latency and length of quite states and of crying were measured ;

Tested musics were composed so as to sound either softly modulated evokative of placental sounds, or very rythmical, suggestive of maternal heart beat.

As an example, when stimulated with ocean wave sounds (at 80 dB), out of the 9 crying babies, all stopped (2 who did not cry before, started after the end of the stimulus). In addition 38/40 (95%) showed heart rate modifications : stabilisation (30/40, 75%), lowering (24/60, 60%), increased calmness (quiet sleep?) 19/40, 47,5%).



Example: changes in the heart rate variability: a few min. after start of stimulus.

134 CHANGES IN VISUAL EVOKED POTENTIALS WITH AROUSAL STATES IN PRETERM NEONATES.

H. Whyte, J. Pearce, and M. Taylor, The Hospital for Sick Children, Toronto, Canada.

The effect of sleep state on the visual evoked potentials (VEPs) in neonates was investigated in seven preterm infants. Polygraphic monitoring including EEG, EOG, ECG, respirogram and submental EMG for the purpose of sleep staging was carried out on all infants simultaneously with VEP testing. Awake-sleep states were divided into four: awake, transitional or atypical, quiet sleep, and active sleep. VEPs were recorded from Oz, referenced to Fz, in response to binocular stimulation with light emitting diode goggles.

Polygraphic and EEG data were analysed separately. Reproducible VEPs were seen in all infants in the awake state that were appropriate for their ages. The N300 was the most reliable component across sleep states but there was a significant decrease in amplitude with quiet sleep [$f(3.69) = 8.1$, $p < 0.0001$]. There were no signficant differences among awake, atypical, or active sleep states. The other two VEP components followed the same trends as the N300. The P200, present in the older infants, disappeared in both active and quiet sleep states; the P400 was typically variable but reliably present in the awake or atypical states.

When a distinction is made between quiet sleep and other arousal states, consistent and significant differences emerge. Our results emphasize the need to test infants in the same arousal states in studies of VEPs in order to make valid comparisons of latency or amplitude changes, particularly with longitudinal or follow-up studies.

135 THE VARIABLE COURSE OF HbF to HbA SWITCHING IN PRETERM INFANTS: A BASIS DERIVED FROM MATHEMATICAL ANALYSIS FOR ASSESSMENT OF POSSIBLE CLINICAL INFLUENCES.

Holland B, Phillips H, Jones G, Moiz A, Wardrop C. Departments of Paediatrics, Queen Mother's Hospital Glasgow; Haematology, University of Wales; College of Medicine and Biochemistry, University College, Cardiff, United Kingdom.

The onset of the switchover from fetal to adult erythropoiesis is generally agreed to occur at about 32-36 weeks' post conceptual age. The time course of switching is subject to individual variation, as implied by the scatter in published data. However, the essentially cross-sectional nature of these studies fails to predict patterns of Hb switching in individuals. Such variations and their association with clinical correlates may therefore be missed. We present findings from 15 untransfused babies of 27-34 weeks gestation, studied prospectively till c. 52 weeks' post conceptual age; we monitored total haemoglobin (Hb) concentration and % HbF and derived from these a mathematical analysis allowing deduction of the timing of onset and subsequent rate of Hb switching. We found onset at 32-34 weeks' post conceptual age, with a mean half-time ($t_{\frac{1}{2}}$) of 5 weeks. There was wide individual variation in the rate, with $t_{\frac{1}{2}}$ of 1-8 weeks. Evaluation of the % HbF in concentrated reticulocytes (prepared using the Flourescence-Activated Cell Sorter) has allowed direct assessment of the validity of the predictions. Quantitation of individual variation in onset and rate of Hb switching allows correlation with specific clinical features. These might include placentofetal transfusion, drugs, stress erythropoiesis and red cell transfusions.

136 VARIABILITY OF BLOOD COUNT WITH SITE OF SAMPLING IN VERY IMMATURE INFANTS

Thurlbeck S M and McIntosh N
Neonatal Unit, St. George's Hospital, London, U.K.

Blood counts were compared using simultaneous paired arterial catheter and capillary samples (n=13) or arterial catheter and peripheral venous samples (n=21) in infants of 25-31 weeks gestation (mean birthweight ± 1SD = 1211± 311 grams) during the first seven days of life.

Mean capillary haemoglobin was 2.3g/dL higher ($p<0.001$) than mean arterial haemoglobin and the difference was extremely variable (0.6-4.9g/dL). Although the mean venous haemoglobin was also significantly higher ($p<0.001$) than the arterial haemoglobin the difference was small (0.5g/dL) and much more consistent.

Mean absolute neutrophil count in capillary samples was 50% higher than in arterial samples ($p<0.01$) and was again very variable with differences of 0.4 to 5.6 x 10^9/L. The same pattern of capillary-arterial differences was noted for the total white blood cell count ($p<0.001$). Comparing venous and arterial samples: the venous total white blood cell count was higher ($p<0.05$) but the venous absolute neutrophil count was not higher ($p>0.05$) than the corresponding arterial samples with the difference being small - 5%.

Absolute lymphocyte, eosinophil and platelet counts did not vary significantly according to the site of sampling.

The discrepancy in haemoglobin and neutrophil counts between capillary samples and those from venous or arterial sites may lead to inappropriate action in this group of infants if sampling is from the capillary site.