973 IS CAFFEINE SAFE FOR THE TREATMENT OF APNEA IN PREMATURE INFANTS?

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The long term effects of drugs given in the neonatal period must be evaluated before their use can be recommended. Infants have been followed for from 6 to 24 months, to determine the outcome of treatment with caffeine for recurrent apnea (cessation of breathing >20 sec and requiring assisted ventilation by bag and mask). 18 infants treated with caffeine citrate, available for follow-up, were compared to a group of infants with apneic spells of similar severity, individually matched as to birth weight, gestational age, birth date and sex.

	CONTROL (N=18)	CAFFEINE (N=18)
Birth weight (grams)	1165 ± 274	1155 ± 302
Gestational age (wks)	28.7 ± 1.9	28.4 ± 2.7
Cont.Dist.Airway Press. (infants)	9	10
Mechanical ventilation IPPB "	10	1 p = 0.01
Neurologic defects "	1	1
Cicatricial R.L.F. "	5	5
Weight index (wgt age)	0.81 ± .22	0.93 ± .29
6 months (corr.gest.age)	(25%)	(25-50%)
Height index (hgt age)	0.88 ± .21	0.96 ± .19
6 months (corr.gest.age)	(25-50%)	(25-50%)

In both groups a high incidence of R.L.F. (gr 1 to 5) 27% occurred. A significant reduction in the need for mechanical ventilation was noted for the infants treated with caffeine. Thus, the use of caffeine may reduce the need for mechanical ventilation for apnea, without apparent later complications.

974 EFFECTS OF SLEEP STATE ON THE VENTILATORY RESPONSE TO INHALED CO_2 IN THE NEONATAL PRIMATE.

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Sleep state and an altered CO_2 response have been implicated in the pathophysiology of idiopathic apnea of prematurity and the Sudden Infant Death Syndrome. In order to examine the effect of sleep on CO_2 sensitivity, the steady state ventilatory response to inhaled CO_2 was determined in gestationally timed Macaca nemestrina at 7 and 21 days of age. Tidal volume (V_T) and respiratory frequency (f) were measured in premature (gestational age = 143-150 days) and term (gestational age = 165-169 days) animals in the awake (Aw), REM and NREM states following CO_2 inhalation. Sleep state was determined from simultaneous recordings of sleep electroencephalograms. Data presented is the slope of the ventilatory response, ±SE, cc/Kg.min mmHg P_ICO_2 on day 7.

	Aw	NREM	REM	
Term (n=3)	34.5 ± 5.1	26.4 ± 2.6	28.9 ± 3.0	NS
Premature (n=3)	23.9 ± 3.3	24.6 ± 1.3	25.2 ± 1.3	NS

There were no differences among the slopes of the CO_2 response curves plotted against P_ICO_2 or P_aCO_2 in the Aw, REM or NREM states in premature or term animals at postnatal ages 1 or 7 days. During CO_2 breathing a large increase in V_T and a small increase in f was observed in each state in both premature and term animals at each postnatal age. There were no differences in the $\%\Delta V_T$/Kg. mmHg P_ICO_2 or $\%\Delta f$/Kg.mmHg P_ICO_2 in REM compared to NREM sleep. Sleep state does not influence the CO_2 sensitivity of the premature or term monkey between 1 and 3 weeks of age.

975 EFFECT OF SLEEP STAGE ON THE QT INTERVAL IN NORMAL INFANTS.

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Prolongation of the QT interval has been associated with increased vulnerability to ventricular arrhythmias and implicated as a mechanism for the Sudden Infant Death Syndrome (SIDS). Since QT prolongation may result from imbalance of the cardiac sympathetic tone and since autonomic activity varies with stage of sleep, this study was performed to determine the effect of sleep stage on the QT interval.

Twenty QT intervals selected at random from the middle periods of REM and Quiet sleep were measured in 8 normal babies studied at monthly intervals for the first four months of life. An accuracy of 2.0 msec. or better was achieved by using a time-base expansion of the ECG and computer averaging of the digitized signal. Sleep staging was done visually using a C4-A1 EEG lead, a single bipolar EOG lead and submental EMG. The QT index ($QTc=QT/\sqrt{RR}$) was significantly greater during Quiet sleep (mean=0.445; SD=0.016) than during REM sleep (Mean=0.437; SD=0.014)($p<0.001$). These results suggest that, contrary to recent speculations, 1) imbalance of the cardiac sympathetic tone is greater in Quiet than in REM sleep in normal infants, and 2) the ventricles may be more susceptible to potentially lethal arrhythmias in Quiet sleep than in REM sleep.

976 COMPARISON OF RDS NEONATAL MORTALITY IN SEVERAL URBAN NICUs FROM A TRANSPORTED POPULATION.

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Standardized care is presumed at 3° NICUs. To test this hypothesis, newborns with RDS who were transported to these NICUs in NYC were analyzed during 1975. Diagnosis was based on discharge chart and/or autopsy report review (meeting accepted clinical, radiological & laboratory RDS criteria). Eliminated were respiratory distress due to cardiac problems, congenital anomalies & other disorders. 172 RDS NB's were sent to 3 NICUs & were matched by weight & pick-up temp. Results: 1-The regression curve of RDS mortality on weight is $y_c=396.3-48.96 \ln X$ ($r=.9508, p<.05$) & can be used for prediction. 2-Weight specific RDS mortality rates were created. 3-The F statistic (analysis of variance) showed no statistical difference in neonatal RDS mortality in three NICUs-$F^2_9=.018$ NS.

	% MORTALITY & RDS BY NICU & BY WEIGHT						
	NICU "A" N=41		NICU "B" N=66		NICU "C" N=65		TOTAL(172)
<1 K	75	(N=8)	70	(N=10)	73.3	(N=15)	72.7
1-1.5 K	53.8	(N=13)	42.3	(N=26)	61.1	(N=18)	50.9
1.5-2 K	33.3	(N=9)	15	(N=20)	19	(N=21)	20
2-2.5 K	9.1	(N=11)	40	(N=10)	27.3	(N=11)	25
MEAN	42.8		41.8		45.2		
S.D.	24.4		19.5		22.6		

977 EARLY PREDICTION OF CONJUGATED HYPERBILIRUBINEMIA IN INFANTS WITH ERYTHROBLASTOSIS FETALIS.

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In an attempt to identify those infants at risk of developing conjugated hyperbilirubinemia (CH), the ratio of hematocrit to total bilirubin concentration in cord blood at birth (H/B ratio) has been examined in 67 infants with erythroblastosis fetalis. 22 developed CH and 45 made an uneventful recovery. Between these groups, there were no differences in birthweight, gestational age, peak total bilirubin level, and the number of extrauterine exchange transfusions. Statistically significant differences ($P<.05$) were demonstrated in cord total bilirubin concentration, delivery by cesarian section, time of peak bilirubin, intrauterine exchange transfusions and respiratory problems.

Of the 22 who developed CH, 73% had an H/B ratio of 5 or less. Although the mean H/B ratio of each group was not significantly different, 67% of those with an H/B ratio of 5 or less developed CH while only 22% with a ratio of 6 or more developed this complication ($P<.01$). Of those with an H/B ratio of 20 or less, 92% required extrauterine exchange transfusion while of those with a ratio of 21 or more only 18% required subsequent exchange.

The H/B ratio identifies those infants at highest risk of developing CH and requiring exchange transfusion. It permits the physician to introduce preventive measures early in the course of treatment or to study different modes of therapy in a high risk group.

978 CONTINUOUS MONITORING OF PO_2 IN NEONATES WITH APNEA,

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Recurrent apnea of prematurity was studied in 8 infants (weight 950-1800 gm) with the Huch transcutaneous PO_2 electrode during the first month of life (mean age = 10 d). Thirteen uncomplicated apneic episodes (duration 10-50 sec, mean = 22 sec) were analyzed. In all the infants studied apnea occurred following a stable period of at least 60 seconds at a mean PO_2 of 75 mmHg (range 48-92 mmHg). After the onset of apnea PO_2 fell (lag time = 8 sec) and continued to fall after the reestablishment of respiration (delay time = 33 sec). The PO_2 recovery to a stable value was much slower (mean time = 164 sec). The mean PO_2 decreased from the initial value of 75 mmHg to 62 mmHg at the end of apnea and continued to fall to a mean minimum of 45 mmHg. The mean initial rate of fall was 2.3 mmHg/sec. The recovery was characterized by an initial rate of increase of 1.6 mmHg/sec followed by a period of slower increase at 1 mmHg/sec. The rate of fall of PO_2 did not correlate significantly with initial PO_2, lag time, birthweight or mode of respiratory support. There was a significant negative correlation of rate of fall with speed of recovery and with recovery time ($p<.05$). Thus apnea of prematurity does not seem to be preceded by hypoxemia; PO_2 continues to fall for a prolonged interval after the onset of respiration; and the initial rate of fall of PO_2 is more rapid than the rate of increase after the end of apnea.